A Honeywell Company

UOPR SF-009

PROJECT SPECIFICATION

Job # J-488

Equipment #: SK2

P.O. #4500842732

FABRICATORS PIPING & STRUCTURE INSPECTION PLAN
HONEYWELL UOP RUSSELL PROCESS PLANTS
FOR CRYO, REFRIGERATION, AMINE,

REV DATE BY CHK APV REV DATE BY CHK APV
03/8/2016 JB

REVISION	DESCRIPTION
0	Fabricators Skid ITP

As a minimum, Fabricator shall review and inspect the Control Activities indicated below.

FABRICATORS PIPING & STRUCTURE INSPECTION PLAN
HONEYWELL UOP RUSSELL PROCESS PLANTS
FOR CRYO, REFRIGERATION, AMINE,

Fabricator shall provide inspectors (UOPR and Client) with Two (2) working days advance notice for inspection points (A1 and A2).

Fabricator shall provide UPOR QC with Two (2) working days written notification for hold points (H). E-mail is the preferred method of written notification.

Inspection Code:

A1 – 100% Actual Inspection
A2 – Random Inspection

R1 – 100% Review of Documentation
R2 – Random Review of Documentation

H – Hold Point – do not proceed until inspection by party requesting the hold is complete.
W—Witness Point -- do not proceed until inspection by party requesting the witness point is Complete or (waived.)

AP – Approval Required
NA – Not Applicable

Control Activity	Governing Code or Specification	Required Inspections Initials and Date			
		Fabricator/ vendor	UOPR	Client	A.I/3rd party
Fabrication Inspection and Testing plan					
Review fabrication isometric drawings and PO Clarification SOP.	UOPR SOP-001 P&IDs ENG-14cf ENG-14ca ENG-14cas	R1	R1		

REV DATE BY CHK APV REV DATE BY CHK APV
03/8/2016 JB

FABRICATORS PIPING & STRUCTURE INSPECTION PLAN
HONEYWELL UOP RUSSELL PROCESS PLANTS FOR CRYO, REFRIGERATION, AMINE,

Control Activity	Governing Code or Specification	Required Inspections Initials and Date			
		Fabricator/ vendor	UOPR	Client	A.I/3rd party
Review WPS's and PQR's	ENG-14cam ENG-13ap UOPR Quality Control Manual ASME D1.1 Weld Maps ASME Sec. IX		R1		
100%VT/Dimensional check of skid top (Done on Ground).	AWS D1.1 ENG-14de	A1	H		H
Visually examine weld quality and dimensional check of ALL structural components.	AWS D1.1	A1	A1,H, A2		A1,H A2
Verify trial fit of upper and lower stacked skid structures, ladders, platforms, stairs, handrails and any additional bolt on attachments.		H, A1	H, A1		H,A1
Visually examine piping weld quality.	ENG-13aae ASME B-31.3	A1	A1,AP		A1,AP MS 10/16/15
Conduct dimensional piping and fitting orientation check.	Structural Steel Plan, Elevation and Isometric drawings	H, A1	H, A1		H,A1 MS 10/15/15
Review radiographs and NDE test reports	ASME B-31.3	R1	R1	Reader sheets only	R1 MS 10/16/15

REV DATE BY CHK APV REV DATE BY CHK APV
03/8/2016 JB

A Honeywell Company

UOPR SF-009

FABRICATORS PIPING & STRUCTURE INSPECTION PLAN
HONEYWELL UOP RUSSELL PROCESS PLANTS
FOR CRYO, REFRIGERATION, AMINE,

Control Activity	Governing Code or Specification	Required Inspections Initials and Date			
		Fabricator/ vendor	UOPR	Client	A.I/3rd party
Witness pressure testing of piping. Verify pressure test results. **Chart Required.**	Line List ENG-13aae ASME B-31.3 HUR-1000		A1, R1		A1,R1
Review skid documentation / data book.	ENG-13aae	R1	R1, AP		R1,AP MS 10/16/18

REV DATE BY CHK APV REV DATE BY CHK APV
03/8/2016 JB

J-488 SK2
SPOOLS
NDE REPORTS

American Piping Inspection

TECHNIQUE/INSPECTION REPORT

DATE 10-1-18 DAY MONDAY

CUSTOMER DATA

NAME: CISPER WELDING INC.

ADDRESS: INOLA,OK.

PHONE: ATTN:

W.O.#: J488 18-066 SK 2 P.O.#: Z-3197305

JOB LOCATION: API

DESCRIPTION: SPOOL PIPE MATERIAL TYPE: CS

DEFECT CODE

AB - ARC BURN
AI - ALIGHNED INDICATION
BT - BURN THROUGH
CON - CONCAVITY
CRACK - CRACK
HB - HOLLOW BEAD
IF - INADECUATE FUSION
IP - INCOMPLETE PENETRATION
MA - MISALIGNMENT
POR - POROSITY
SLI - SLAG INCLUSION
SLL - SLAG LINE
SURF - SURFACE INDICATION
UCE - UNDERCUT EXTERNAL
UCI - UNDERCUT INTERNAL
SOD - SOURCE TO OBJECT DISTANCE
OFD - SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD - OUTER DIAMETER
WT - WELD THICKNESS
WR - WELD REINFORCEMENT
REP - REPAIR
RES - RESHOOT
RET - RETAKE
BM - BASE MATERIAL

	WELD/FILM NUMBER	Sta. NO / Stencil	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE/MFG/TYPE	SOD	OFD	IQI S.F.	#EXP	DEFECT LOCATION
1	SK2-035	W-181	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
2	SK2-035	W-182	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
3	SK2-035	W-183	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
4	SK2-035	W-184	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
5	SK2-035	W-185	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
6	SK2-035	W-186	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
7	SK2-129	W-9	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
8	SK2-129	W-10	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
9	SK2-129	W-11	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
10	SK2-129	W-12	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
11	SK2-101	W-8	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
12	SK2-101	W-9	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
13	SK2-101	W-10	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
14	SK2-101	W-11	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
15	SK2-101	W-12	8"	.322"	.125"	.447"	X		3	3.5X17 F-80	8.553"	.447"	BF	3	
16	SK2-133	W-1	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
17	SK2-133	W-2	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
18	SK2-133	W-3	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
19	SK2-133	W-4	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
20	SK2-133	W-5	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
21	SK-010	W-65	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
22	SK-010	W-66	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
23	SK-010	W-67	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
24	SK-010	W-68	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
25	SK-010	W-69	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
26															
27															
28															
29															
30															

METHOD	SOURCE SIZE DIAG.	ISOTOPE	NO. CURIES	DEV. TIME	DEV. TEMP	DENSITY
RT	.124	IR 192	114	AUTO	AUTO	2.0-4.0

NO. OF WELDS	FT. LONG SEAMS	STANDARDS	PER DIEM Y / N	NO. OF FILM	EXPOSURE: DBL WALL / S. WALL	VIEWING: DBL WALL / S. WALL	MR/R	SCREEN
25		B31.3 N		75		S. WALL X	2.8	PB

TRUCK NO.	REPORT NUMBER	PAGE NUMBER	TECH HOURS	ASST. HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE
T-159	1	1	8	8			

FILM INTERPRETER		ASSISTANT NAME	NATHANIEL DUCLOS	ASNT LEVEL	I
COMPANY REPRESENTATIVE		NDT TECHNICIAN	DREW DUCLOS	ASNT LEVEL	II

American Piping Inspection

TECHNIQUE/INSPECTION REPORT

DATE 10-2-18 DAY TUESDAY

CUSTOMER DATA

NAME CISPER WELDING

ADDRESS

PHONE ATTN.

W O # J-488 SK2 P O # 18-066

JOB LOCATION. INOLA,OK.

DESCRIPTION: SPOOL PIPE MATERIAL TYPE: CS

DEFECT CODE

AB - ARC BURN	HB - HOLLOW BEAD	SLI - SLAG INCLUSION	SOD - SOURCE TO OBJECT DISTANCE
AI - ALIGHNED INDICATION	IF - INADECUATE FUSION	SLL - SLAG LINE	OFD - SOURCE SIDE OF OBJECT TO FILM DISTANCE
BT - BURN THROUGH	IP - INCOMPLETE PENETRATION	SURF - SURFACE INDICATION	OD - OUTER DIAMETER REP - REPAIR
CON - CONCAVITY	MA - MISALIGNMENT	UCE - UNDERCUT EXTERNAL	WT - WELD THICKNESS RES - RESHOOT RET - RETAKE
CRACK - CRACK	POR - POROSITY	UCI - UNDERCUT INTERNAL	WR - WELD REINFORCEMENT BM - BASE MATERIAL

	WELD/FILM NUMBER	Sta. NO / Stencil	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE/MFG/TYPE	SOD	OFD	IQI S-F	#EXP	DEFECT LOCATION
1	112 W-1	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.5"	.500"	BF	3	
2	108 W-1	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.5"	.500"	BF	3	
3	112 W-7	100%	12"	.375"	.125"	.500"		X	3	3.5X17 F-80	12.5"	.500"	BF	3	100% SLAG
4	112 W-5A	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.5"	.500"	BF	3	
5	108 W-6	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.5"	.500"	BF	3	
6															
7															
8															
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30															

METHOD RT	SOURCE SIZE DIAG. .124	ISOTOPE IR 192	NO. CURIES 113	DEV. TIME AUTO	DEV. TEMP AUTO	DENSITY 2.0-4.0	
NO. OF WELDS 5	FT. LONG SEAMS	STANDARDS B31.3 N	PER DIEM Y N	NO. OF FILM 15	EXPOSURE: DBL WALL X S. WALL VIEWING: DBL WALL S. WALL X	MR/R 2.8	SCREEN PB
TRUCK NO. T-159	REPORT NUMBER 1	PAGE NUMBER 1	TECH HOURS	ASST HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE
FILM INTERPRETER DREW DUCLOS			ASSISTANT NAME NATHANIEL DUCLOS			ASNT LEVEL I	
COMPANY REPRESENTATIVE			NDT TECHNICIAN DREW DUCLOS			ASNT LEVEL II	

American Piping Inspection

TECHNIQUE/INSPECTION REPORT

DATE 10-5-18 DAY FRIDAY

CUSTOMER DATA

NAME CISPER WELDING INC.

ADDRESS INOLA,OK.

PHONE ATTN:

W.O.# J488 18-066 SK2 P.O.#

JOB LOCATION: INOLA

DESCRIPTION: SPOOL PIPE MATERIAL TYPE: CS

DEFECT CODE

AB - ARC BURN	**HB** - HOLLOW BEAD	**SLI** - SLAG INCLUSION	**SOD** - SOURCE TO OBJECT DISTANCE
AI - ALIGHNED INDICATION	**IF** - INADECUATE FUSION	**SLL** - SLAG LINE	**OFD** - SOURCE SIDE OF OBJECT TO FILM DISTANCE
BT - BURN THROUGH	**IP** - INCOMPLETE PENETRATION	**SURF** - SURFACE INDICATION	**OD** - OUTER DIAMETER **REP** - REPAIR
CON - CONCAVITY	**MA** - MISALIGNMENT	**UCE** - UNDERCUT EXTERNAL	**WT** - WELD THICKNESS **RES** - RESHOOT **RET** - RETAKE
CRACK - CRACK	**POR** - POROSITY	**UCI** - UNDERCUT INTERNAL	**WR** - WELD REINFORCEMENT **BM** - BASE MATERIAL

	WELD/FILM NUMBER	Sta. NO / Stencil	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE/MFG/TYPE	SOD	OFD	IQI S-F	#EXP	DEFECT LOCATION
1	114 W-1	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.625'	500"	BF	3	
2	114- W-2	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.625'	500"	BF	3	
3	114 W-3	100%	10"	.365"	.125"	490"	X		3	3.5X17 F-80	10.635'	.490"	BF	3	
4	114 W-4	100%	10"	.365"	.125"	490"	X		3	3.5X17 F-80	10.635'	.490"	BF	3	
5	114 W-5	100%	10"	.365"	.125"	490"	X		3	3.5X17 F-80	10.635'	.490"	BF	3	
6	114 W-6	100%	10"	.365"	.125"	490"	X		3	3.5X17 F-80	10.635'	.490"	BF	3	
7	009 W-56	100%	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
8	009 W-57	100%	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
9	009 W-58	100%	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
10	009 W-59	100%	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
11	009 W-60	100%	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
12	002 W-14	100%	8"	.500"	.125"	.625"	X		3	3.5X17 F-80	8.5"	.625"	BF	3	
13	002W-15	100%	8"	.500"	.125"	.625"	X		3	3.5X17 F-80	8.5"	.625"	BF	3	
14	002 W-16	100%	8"	.500"	.125"	.625"	X		3	3.5X17 F-80	8.5"	.625"	BF	3	
15	116 W-5	100%	8"	.500"	.125"	.625"	X		3	3.5X17 F-80	8.5"	.625"	BF	3	
16	116 W-7	100%	8"	.500"	.125"	.625"	X		3	3.5X17 F-80	8.5"	.625"	BF	3	
17	116 W-13	100%	8"	.500"	.125"	.625"	X		3	3.5X17 F-80	8.5"	.625"	BF	3	
18	116 W-14	100%	8"	.500"	.125"	.625"	X		3	3.5X17 F-80	8.5"	.625"	BF	3	
19	037 W-207	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
20	037 W-208	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
21	037 W-209	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
22	037 W-210	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
23	037 W-211	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
24	037 W-212	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
25	032 W-147	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
26	032 W-148	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
27	032 W-149	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
28	032 W-150	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
29	032 W-151	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
30	032W-152	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	

METHOD	SOURCE SIZE DIAG.	ISOTOPE	NO. CURIES	DEV. TIME	DEV. TEMP	DENSITY
RT	.124	IR 192	97	AUTO	AUTO	2.0-4.0

NO. OF WELDS	FT. LONG SEAMS	STANDARDS	PER DIEM Y	PER DIEM N	NO. OF FILM	EXPOSURE: DBL WALL	EXPOSURE: S. WALL	VIEWING: DBL WALL	VIEWING: S. WALL	MR/R	SCREEN
30		B31.3 N			90	X			X	2.8	PB

TRUCK NO.	REPORT NUMBER	PAGE NUMBER	TECH HOURS	ASST. HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE
T-159	1	2	8	8			

FILM INTERPRETER		ASSISTANT NAME	NATHANIEL DUCLOS	ASNT LEVEL	I
COMPANY REPRESENTATIVE		NDT TECHNICIAN	DREW DUCLOS	ASNT LEVEL	II

American Piping Inspection

TECHNIQUE/INSPECTION REPORT

DATE 10-5-18 DAY FRIDAY

CUSTOMER DATA

NAME: CISPER WELDING INC.

ADDRESS: INOLA,OK.

PHONE: ATTN:

W.O.#: J488 18-066 SK2 P.O.#:

JOB LOCATION: INOLA

DESCRIPTION: SPOOL PIPE MATERIAL TYPE: CS

DEFECT CODE

AB - ARC BURN	**HB** - HOLLOW BEAD	**SLI** - SLAG INCLUSION	**SOD** - SOURCE TO OBJECT DISTANCE
AI - ALIGHNED INDICATION	**IF** - INADECUATE FUSION	**SLL** - SLAG LINE	**OFD** - SOURCE SIDE OF OBJECT TO FILM DISTANCE
BT - BURN THROUGH	**IP** - INCOMPLETE PENETRATION	**SURF** - SURFACE INDICATION	**OD** - OUTER DIAMETER **REP** - REPAIR
CON - CONCAVITY	**MA** - MISALIGNMENT	**UCE** - UNDERCUT EXTERNAL	**WT** - WELD THICKNESS **RES** - RESHOOT **RET** - RETAKE
CRACK - CRACK	**POR** - POROSITY	**UCI** - UNDERCUT INTERNAL	**WR** - WELD REINFORCEMENT **BM** - BASE MATERIAL

	WELD/FILM NUMBER	Sta. NO / Stencil	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE/MFG/TYPE	SOD	OFD	IQI S-F	#EXP	DEFECT LOCATION
1	036 W-187	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
2															
3	036 W-189	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
4	036 W-190	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
5	036 W-191	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
6	036 W-192	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
7	010 W-78	100%	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
8	010 W-79	100%	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
9	010 W-80	100%	6"	.432"	.125"	.557"	X		3	3.5X10 F-80	6.443"	.557"	BF	3	
10	034 W169	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
11	034 W-170	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
12	034 W-171	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
13	034 W-172	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
14	034 W-173	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
15	034 W-174	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
16	034 W-175	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
17	034 W-176	100%	6"	.280"	.125"	.405"	X		3	3.5X10 F-80	6.595"	.405"	BF	3	
18															
19															
20															
21															
22															
23															
24															
25															
26															
27															
28															
29															
30															

METHOD RT	SOURCE SIZE DIAG. .124	ISOTOPE IR 192	NO. CURIES 97	DEV. TIME AUTO	DEV. TEMP AUTO	DENSITY 2.0-4.0	
NO. OF WELDS 16	FT. LONG SEAMS	STANDARDS B31.3 N	PER DIEM Y N	NO. OF FILM 48	EXPOSURE: DBL WALL X S. WALL VIEWING: DBL WALL S. WALL X	MR/R 2.8	SCREEN PB
TRUCK NO. T-159	REPORT NUMBER 2	PAGE NUMBER 2	TECH HOURS 8	ASST. HOURS 8	TRAVEL HOURS	TOTAL HOURS	MILEAGE
FILM INTERPRETER DREW DUCLOS			ASSISTANT NAME NATHANIEL DUCLOS			ASNT LEVEL I	
COMPANY REPRESENTATIVE			NDT TECHNICIAN DREW DUCLOS			ASNT LEVEL II	

American Piping Inspection

TECHNIQUE/INSPECTION REPORT

DATE 10-2-18 DAY TUESDAY

CUSTOMER DATA

NAME: CISPER WELDING

ADDRESS:

PHONE: ATTN:

W.O.# J-488 SK2 P.O.# 18-066

JOB LOCATION: INOLA,OK.

DESCRIPTION: SPOOL PIPE MATERIAL TYPE: CS

DEFECT CODE

AB - ARC BURN
AI - ALIGHNED INDICATION
BT - BURN THROUGH
CON - CONCAVITY
CRACK - CRACK
HB - HOLLOW BEAD
IF - INADECUATE FUSION
IP - INCOMPLETE PENETRATION
MA - MISALIGNMENT
POR - POROSITY
SLI - SLAG INCLUSION
SLL - SLAG LINE
SURF - SURFACE INDICATION
UCE - UNDERCUT EXTERNAL
UCI - UNDERCUT INTERNAL
SOD - SOURCE TO OBJECT DISTANCE
OFD - SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD - OUTER DIAMETER
WT - WELD THICKNESS
WR - WELD REINFORCEMENT
REP - REPAIR
RES - RESHOOT
RET - RETAKE
BM - BASE MATERIAL

	WELD/FILM NUMBER	Sta. NO / Stencil	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE/MFG/TYPE	SOD	OFD	IQI S-F	#EXP	DEFECT LOCATION
1	112 W-1	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.5"	.500"	BF	3	
2	108 W-1	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.5"	.500"	BF	3	
3	112 W-7	100%	12"	.375"	.125"	.500"		X	3	3.5X17 F-80	12.5"	.500"	BF	3	100% SLAG
4	112 W-5A	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.5"	.500"	BF	3	
5	108 W-6	100%	12"	.375"	.125"	.500"	X		3	3.5X17 F-80	12.5"	.500"	BF	3	
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
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21															
22															
23															
24															
25															
26															
27															
28															
29															
30															

METHOD	SOURCE SIZE DIAG.	ISOTOPE	NO. CURIES	DEV. TIME	DEV. TEMP	DENSITY
RT	.124	IR 192	113	AUTO	AUTO	2.0-4.0

NO. OF WELDS	FT. LONG SEAMS	STANDARDS	PER DIEM Y / N	NO. OF FILM	EXPOSURE: DBL WALL / S. WALL	VIEWING: DBL WALL / S. WALL	MR/R	SCREEN
5		B31.3 N		15	X	X	2.8	PB

TRUCK NO.	REPORT NUMBER	PAGE NUMBER	TECH HOURS	ASST. HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE
T-159	1	1					

FILM INTERPRETER	DREW DUCLOS	ASSISTANT NAME	NATHANIEL DUCLOS
			ASNT LEVEL I
COMPANY REPRESENTATIVE		NDT TECHNICIAN	DREW DUCLOS
			ASNT LEVEL II

SIGNATURE CERTIFIES TIME MATERIALS CORRECT

API INC. ASSUMES NO RESPONSIBILITY FOR LOSSES OF ANY KIND DUE TO INTERPRETATION

REV. 2/13

American Piping Inspection

TECHNIQUE/INSPECTION REPORT

DATE 10-9-18 DAY TUESDAY

CUSTOMER DATA

NAME CISPER WELDING

ADDRESS

PHONE ATTN:

W.O # 18-066 UOP J-488 SK2 P.O.#

JOB LOCATION: INOLA

DESCRIPTION: MATERIAL TYPE: CS

DEFECT CODE

AB - ARC BURN
AI - ALIGHNED INDIC
BT - BURN THROUG
CON - CONCAVITY
CRACK - CRACK
HB - HOLLOW BEAD
IF - INADECUATE FUSION
IP - INCOMPLETE PENETRA
MA - MISALIGNMENT
POR - POROSITY
SLI - SLAG INCLUSION
SLL - SLAG LINE
SURF - SURFACE INDICAT
UCE - UNDERCUT EXTER
UCI - UNDERCUT INTERI
SOD - SOURCE TO OBJECT DISTANCE
OFD - SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD - OUTER DIAMETER
WT - WELD THICKNESS
WR - WELD REINFORCEMEN
REP - REPAIR
RES - RESHOOT
RET - RETAKE
BM - BASE MATERIAL

	WELD/FILM NUMBER	Sta. NO / Stencil	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE/MFG/TYPE	SOD	OFD	IQI S-F	#EXP	DEFECT LOCATION
1	W7	SK2-128	3"	.120	.100	.220	X		3	3.5X8 F50	3"	.220	12	3	
2	W13T1	SK2-124	3"	.216	.100	.316	X		3	3.5X8 F50	3"	.316	12	3	
3	W94	SK2-011	3"	.216	.100	.316	X		3	3.5X8 F50	3"	.316	12	3	
4															
5	W1	SK2-128	6"	.280	.100	.380	X		3	3.5X10 F50	6"	.380	B	3	
6	W9	SK2-128	6"	.280	.100	.380	X		3	3.5X10 F50	6"	.380	B	3	
7	W15T2	SK2-124	6"	.280	.100	.380	X		3	3.5X10 F50	6"	.380	B	3	
8	W14	SK2-124	6"	.280	.100	.380	X		3	3.5X10 F50	6"	.380	B	3	
9	W8	SK2-128	6"	.280	.100	.380	X		3	3.5X10 F50	6"	.380	B	3	
10	W5	SK2-128	6"	.280	.100	.380	X		3	3.5X10 F50	6"	.380	B	3	
11															
12	W103	SK2-015	8"	.322	.100	.422	X		3	3.5X17 F80	8"	.422	B	3	
13	W104	SK2-015	8"	.322	.100	.422	X		3	3.5X17 F80	8"	.422	B	3	
14															
15	W114	SK2-015	10"	.365	.100	.465	X		3	3.5X17 F80	10"	.465	B	3	
16															
17	W-7R	SK2-112	12"	.375	.100	.475	X		3	3.5X17 F80	12"	.475	B	3	
18															
19															
20															
21															
22															
23															
24															
25															
26															
27															
28															
29															
30															

METHOD RT	SOURCE SIZE DIAG. .152	ISOTOPE IR 192	NO. CURIES 52	DEV. TIME 5	DEV. TEMP 68	DENSITY 2-4

NO. OF WELDS 13	FT. LONG SEAMS	STANDARDS B31.3	PER DIEM Y N	NO. OF FILM 39	EXPOSURE: DBL WALL X S. WALL VIEWING: DBL WALL S. WALL X	MR/R	SCREEN PB

TRUCK NO. 219	REPORT NUMBER	PAGE NUMBER	TECH HOURS 7	ASST. HOURS 7	TRAVEL HOURS	TOTAL HOURS 7	MILEAGE

FILM INTERPRETER C. STEWART	ASSISTANT NAME E. SHAFFER	ASNT LEVEL I
COMPANY REPRESENTATIVE	NDT TECHNICIAN C.STEWART	ASNT LEVEL II

SIGNATURE CERTIFIES TIME MATERIALS CORRECT

API INC. ASSUMES NO RESPONSIBILITY FOR LOSSES OF ANY KIND DUE TO INTERPRETATION

REV. 2/13

American Piping Inspection
17110 E Pine Tulsa, OK 74116
918.234.6300

OPERATOR QUALIFICATION & EMPLOYEE CERTIFICATION

Employee: Colby Stewart
Emp ID: 2844
Method: RT Level: II
API Task No: RT II
Certification Date: 12/5/2017
Restrictions: None
This certification expires in 3 years
Vision Acuity: Pass
Latest Eye Examination Date: 12/5/2017
Color Contrast: Pass
Eye Examination Expires: 12/5/2018 Natural: Corrected: x
This individual is a participant in a DOT approved Drug and Alcohol Misuse Program
Education Record:
Grade School: X High School: X Vocational: College: Other:

Experience Record:

Company	Level	Months
American Piping Inspection	I	>12
American Piping Inspection	II	<6

Training Record:

Course	By	Hours
RT Level I	American Piping Inspection	40
RT Level II	American Piping Inspection	40

Recertification based on documented previous certification and American Piping Inspection Examination

Examination Scores:	General	Specific	Practical	Average
	94%	92%	96%	94%

AOC Test: Pass

The information provided in this certification record is in accordance with the latest edition of: The American Society of Nondestructive Testing's Recommended Practice SNT-TC-1A 49 CFR Part 192, Subpart N, and 49 CFR Part 149, Subpart G. All information provided is true and correct to the best of this company's knowledge. Copies of tests and testing procedures and requirements are on file at API.

This certification was administered by: Orville McBride

J. Orville McBride - President/Owner

American Piping Inspection
17110 E Pine Tulsa, OK 74116
918.234.6300

OPERATOR QUALIFICATION & EMPLOYEE CERTIFICATION

Employee: Andrew Duclos — Emp ID: 3152
Method: RT — Level: II — API Task No: RT II
Certification Date: 12/5/2017 — Restrictions: None
This certification expires in 3 years — Vision Acuity: Pass
Latest Eye Examination Date: 12/5/2017 — Color Contrast: Pass
Eye Examination Expires: 12/5/2018 — Natural: X — Corrected:
This individual is a participant in a DOT approved Drug and Alcohol Misuse Program
Education Record:
Grade School: X — High School: X — Vocational: — College: — Other:

Experience Record:

Company	Level	Months
American Piping Inspection	I	<12
American Piping Inspection	II	>12

Training Record:

Course	By	Hours
RT Level I	American Piping Inspction	40
RT Level II	American Piping Inspction	40

Recertification based on documented previous certification and American Piping Inspection Examination

Examination Scores:	General	Specific	Practical	Average
	90%	88%	90%	89%

AOC Test: Pass

The information provided in this certification record is in accordance with the latest edition of: The American Society of Nondestructive Testing's Recommended Practice SNT-TC-1A 49 CFR Part 192, Subpart N, and 49 CFR Part 149, Subpart G. All information provided is true and correct to the best of this company's knowledge. Copies of tests and testing procedures and requirements are on file at API.

This certification was administered by: Orville McBride

J. Orville McBride - President/Owner

J-488 SK2

SPOOLS

WPQs

CISPER WELDING, INC.
15681 East 590
Inola, Oklahoma 74036
Phone (918) 543-2321

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Tim Ward | Stamp: T | Date: 10/20/2016

Test WPS No.: CWI-320-1

Welding process(es) type(s) used: GTAW/ Manual

Type of joint welded: Pipe Groove Weld | Joint Type(s) qualified: Groove and fillet welds

Base material(s) welded: SA 106-B to SA 106-B

Welder Variables (QW-350)		Actual Values Used	Range Qualified
P-No. to P-No.		P-No.1 to P-No. 1	P-1 thru P-11, P-34 & P-4X
Base metal thickness	(in)	0.218	Max. to be welded
Pipe diameter	(in)	2.375	1.0" minimum/unlimited
		GTAW/Manual	**GTAW/Manual**
Backing **		No backing used	With or without backing
A W S Classification		ER-70S-6	
Filler metal specification (SFA)		5.18	5.xx
Filler metal F-No.		6	F-No. 6
Filler metal product form		Bare (Solid)	Bare / metal cored
Consumable insert		No insert used	Without insert only
Weld deposit thickness (in)		0.218	0.4360" maximum
Welding position		6G - 45 degree pipe	All Positions
Weld progression		Vertical up	Vertical up (n4)
Backing gas		No backing gas used	With or Without backing gas
GTAW welding current/ polarity		DCEN (straight)	DCEN (straight)
Machine Welding Variables (QW-360)		**Actual Values Used**	**Range Qualified**
Direct / remote visual control		N/A	N/A
Automatic voltage control		N/A	N/A
Automatic joint tracking		N/A	N/A
Welding position		N/A	N/A
Consumable insert		N/A	N/A
Backing **		N/A	N/A
Single / multiple pass per side		N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194

Radiographic test results: None

Welding test conducted by: Cisper Welding, Inc.

Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. | Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro | 10/20/2016

Cameron Munro - Cisper Welding - QA/QC Manager | Date

CISPER WELDING, INC.
15681 East 590 Rd.
Inola, Oklahoma 74036
Phone (918) 543-7755
E-Mail: CisperWelding.com

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Tim Ward Stamp: A Date: 7/23/2015

Test WPS No.: CWI-161-1

Welding process(es) type(s) used: GMAW/Semiautomatic FCAW/Semiautomatic

Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds

Base material(s) welded: SA106B to SA-106B

Welder Variables (QW-350)		Actual Values Used		Range Qualified	
P-No. to P-No.		P-No.1 to P-No. 1		P-1 thru P-11, P-34 & P-4X	
Base metal thickness	(in)	0.906		Max to be Welded	
Pipe diameter	(in)	8" Nom		2.875" minimum/Unlimited	
		GMAW/Semi.	FCAW/Semi.	GMAW/Semi.	FCAW/Semi.
Backing **		No backing used	Backing used	With or without backing	With backing only
AWS Classification		ER70S-6	E71T-1		
Filler metal specification (SFA)		5.18	5.2	5.xx	5.xx
Filler metal F-No.		6	6	F-No. 6	F-No. 6
Filler metal product form		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Weld deposit thickness (in)		0.125	0.781	0.1375" maximum	8.0" maximum
Welding position		6G	6G	All	All
Weld progresion		N/A	N/A	N/A	N/A
Backing gas		No backing used	N/A	With/Without backing gas	N/A
Machine Welding Variables (QW-360)		Actual Values Used		Range Qualified	
Direct / remote visual control		N/A	N/A	N/A	N/A
Automatic voltage control		N/A	N/A	N/A	N/A
Automatic joint tracking		N/A	N/A	N/A	N/A
Welding position		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Backing **		N/A	N/A	N/A	N/A
Single / multiple pass per side		N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194

Radiographic test results: None

Welding test conducted by: Cisper Welding, Inc.

Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By:  7/23/15

Cameron Munro QA/QC Cisper Welding Inc. Date

CISPER WELDING, INC.
15681 East 590
Inola, Oklahoma 74036
Phone (918) 543-2321

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Casey Bryant Stamp: D Date: 12/3/2016

Test WPS No.: CWI 320-1

Welding process(es) type(s) used: GTAW/ Manual

Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds

Base material(s) welded: SA 106-B to SA 106-B

Welder Variables (QW-350)		Actual Values Used	Range Qualified
P-No. to P-No.		P-No.1 to P-No. 1	P-1 thru P-11, P-34 & P-4X
Base metal thickness	(in)	0.218	Max. to be welded
Pipe diameter	(in)	2.375	1.0" minimum/unlimited
		GTAW/Manual	GTAW/Manual
Backing **		No backing used	With or without backing
A W S Classification		ER-70S-6	
Filler metal specification (SFA)		5.18	5.xx
Filler metal F-No.		6	F-No. 6
Filler metal product form		Bare (Solid)	Bare / metal cored
Consumable insert		No insert used	Without insert only
Weld deposit thickness (in)		0.218	0.4360" maximum
Welding position		6G - 45 degree pipe	All Positions
Weld progression		Vertical up	Vertical up (n4)
Backing gas		No backing gas used	With or Without backing gas
GTAW welding current/ polarity		DCEN (straight)	DCEN (straight)
Machine Welding Variables (QW-360)		**Actual Values Used**	**Range Qualified**
Direct / remote visual control		N/A	N/A
Automatic voltage control		N/A	N/A
Automatic joint tracking		N/A	N/A
Welding position		N/A	N/A
Consumable insert		N/A	N/A
Backing **		N/A	N/A
Single / multiple pass per side		N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194

Radiographic test results: None

Welding test conducted by: Cisper Welding, Inc.

Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro

Cameron Munro - Cisper Welding - QA/QC Manager

12/3/2016
Date

CISPER WELDING, INC.
15681 East 590 Rd.
Inola, Oklahoma 74036
Phone (918) 543-7755
E-Mail: CisperWelding.com

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Casey Bryant Stamp: D Date: 5/1/2015
Test WPS No.: CWI-161-1

Welding process(es) type(s) used: GMAW/Semiautomatic FCAW/Semiautomatic
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA106B to SA-106B

Welder Variables (QW-350)		Actual Values Used		Range Qualified	
P-No. to P-No.		P-No.1 to P-No. 1		P-1 thru P-11, P-34 & P-4X	
Base metal thickness	(in)	0.906		Max to be Welded	
Pipe diameter	(in)	8" Nom		2.875" minimum/Unlimited	
		GMAW/Seml.	FCAW/Seml.	GMAW/Seml.	FCAW/Seml.
Backing **		No backing used	Backing used	With or without backing	With backing only
A W S Classification		ER70S-6	E71T-1		
Filler metal specification (SFA)		5.18	5.2	5.xx	5.xx
Filler metal F-No.		6	6	F-No. 6	F-No. 6
Filler metal product form		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Weld deposit thickness (in)		0.125	0.781	0.1375" maximum	8.0" maximum
Welding position		6G	6G	All	All
Weld progression		N/A	N/A	N/A	N/A
Backing gas		No backing used	N/A	With/Without backing gas	N/A
Machine Welding Variables (QW-360)		Actual Values Used		Range Qualified	
Direct / remote visual control		N/A	N/A	N/A	N/A
Automatic voltage control		N/A	N/A	N/A	N/A
Automatic joint tracking		N/A	N/A	N/A	N/A
Welding position		N/A	N/A	N/A	N/A
Consumable Insert		N/A	N/A	N/A	N/A
Backing **		N/A	N/A	N/A	N/A
Single / multiple pass per side		N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

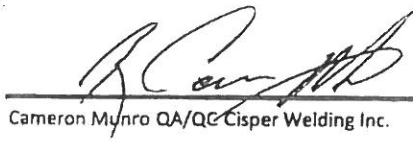
Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: 
Cameron Munro QA/QC Cisper Welding Inc.

5/1/15
Date

CISPER WELDING, INC.
15681 East 590 Rd.
Inola, Oklahoma 74036
Phone (918) 543-7755
E-Mail: CisperWelding.com

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Jeff Pickle Stamp: Q Date: 6/19/2017

Test WPS No.: CWI-325-1

Welding process(es) type(s) used: GMAW/Semiautomatic FCAW/Semiautomatic

Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds

Base material(s) welded: SA106B to SA-106B

Welder Variables (QW-350)		Actual Values Used		Range Qualified	
P-No. to P-No.		P-No.1 to P-No. 1		P-1 thru P-11, P-34 & P-4X	
Base metal thickness	(in)	0.906		Max to be Welded	
Pipe diameter	(in)	8" Nom		2.875" minimum/Unlimited	
		GMAW/Semi.	FCAW/Semi.	GMAW/Semi.	FCAW/Semi.
Backing **		No backing used	Backing used	With or without backing	With backing only
A W S Classification		ER70S-6	E71T-1		
Filler metal specification (SFA)		5.18	5.2	5.xx	5.xx
Filler metal F-No.		6	6	F-No. 6	F-No. 6
Filler metal product form		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Weld deposit thickness (in)		0.125	0.781	0.1375" maximum	8.0" maximum
Welding position		6G	6G	All	All
Weld progression		N/A	N/A	N/A	N/A
Backing gas		No backing used	N/A	With/Without backing gas	N/A

Machine Welding Variables (QW-360)	Actual Values Used		Range Qualified	
Direct / remote visual control	N/A	N/A	N/A	N/A
Automatic voltage control	N/A	N/A	N/A	N/A
Automatic joint tracking	N/A	N/A	N/A	N/A
Welding position	N/A	N/A	N/A	N/A
Consumable insert	N/A	N/A	N/A	N/A
Backing **	N/A	N/A	N/A	N/A
Single / multiple pass per side	N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194

Radiographic test results: None

Welding test conducted by: Cisper Welding, Inc.

Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 6/19/2017

Cameron Munro QA/QC Cisper Welding Inc. Date

Approved for Shell Project T.16051
Geoff Rogers obo SPLC
1 August 2017

CISPER WELDING, INC.
15681 East 590 Rd.
Inola, Oklahoma 74036
Phone (918) 543-7755
E-Mail: CisperWelding.com

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Justin McDaniel Stamp: S Date: 1/8/2018
Test WPS No.: CWI-325-1

Welding process(es) type(s) used: GMAW/Semiautomatic FCAW/Semiautomatic
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA106B to SA-106B

Welder Variables (QW-350)		**Actual Values Used**		**Range Qualified**	
P-No. to P-No.		P-No.1 to P-No. 1		P-1 thru P-11, P-34 & P-4X	
Base metal thickness	(in)	0.906		Max to be Welded	
Pipe diameter	(in)	8" Nom		2.875" minimum/Unlimited	
		GMAW/Semi.	**FCAW/Semi.**	**GMAW/Semi.**	**FCAW/Semi.**
Backing **		No backing used	Backing used	With or without backing	With backing only
A W S Classification		ER70S-6	E71T-1		
Filler metal specification (SFA)		5.18	5.2	5.xx	5.xx
Filler metal F-No.		6	6	F-No. 6	F-No. 6
Filler metal product form		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Weld deposit thickness (in)		0.125	0.781	0.1375" maximum	8.0" maximum
Welding position		6G	6G	All	All
Weld progression		N/A	N/A	N/A	N/A
Backing gas		No backing used	N/A	With/Without backing gas	N/A

Machine Welding Variables (QW-360)	**Actual Values Used**		Range Qualified	
Direct / remote visual control	N/A	N/A	N/A	N/A
Automatic voltage control	N/A	N/A	N/A	N/A
Automatic joint tracking	N/A	N/A	N/A	N/A
Welding position	N/A	N/A	N/A	N/A
Consumable insert	N/A	N/A	N/A	N/A
Backing **	N/A	N/A	N/A	N/A
Single / multiple pass per side	N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 1/8/2018
Cameron Munro QA/QC Cisper Welding Inc. Date

CISPER WELDING, INC.
15681 East 590
Inola, Oklahoma 74036
Phone (918) 543-2321

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Justin McDaniel Stamp: S Date: 1/8/2018
Test WPS No.: CWI-241-1

Welding process(es) type(s) used: GTAW/ Manual
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA 106-B to SA 106-B

Welder Variables (QW-350)		**Actual Values Used**	**Range Qualified**
P-No. to P-No.		P-No.1 to P-No. 1	P-1 thru P-11, P-34 & P-4X
Base metal thickness	(in)	0.218	Max. to be welded
Pipe diameter	(in)	2.375	1.0" minimum/unlimited
		GTAW/Manual	**GTAW/Manual**
Backing **		No backing used	With or without backing
A W S Classification		ER-70S-6	
Filler metal specification (SFA)		5.18	5.xx
Filler metal F-No.		6	F-No. 6
Filler metal product form		Bare (Solid)	Bare / metal cored
Consumable insert		No insert used	Without insert only
Weld deposit thickness (in)		0.218	0.4360" maximum
Welding position		6G - 45 degree pipe	All Positions
Weld progression		Vertical up	Vertical up (n4)
Backing gas		No backing gas used	With or Without backing gas
GTAW welding current/ polarity		DCEN (straight)	DCEN (straight)
Machine Welding Variables (QW-360)		**Actual Values Used**	**Range Qualified**
Direct / remote visual control		N/A	N/A
Automatic voltage control		N/A	N/A
Automatic joint tracking		N/A	N/A
Welding position		N/A	N/A
Consumable insert		N/A	N/A
Backing **		N/A	N/A
Single / multiple pass per side		N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 1/8/2018
Cameron Munro - Cisper Welding - QA/QC Manager Date

CISPER WELDING, INC.
15681 East 590 Rd.
Inola, Oklahoma 74036
Phone (918) 543-7755
E-Mail: CisperWelding.com

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Jimmie Nibarger Stamp: O Date: 5/14/2018
Test WPS No.: CWI-325-1

Welding process(es) type(s) used: GMAW/Semiautomatic FCAW/Semiautomatic
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA106B to SA-106B

Welder Variables (QW-350)		**Actual Values Used**		**Range Qualified**	
P-No. to P-No.		P-No.1 to P-No. 1		P-1 thru P-11, P-34 & P-4X	
Base metal thickness	(in)	0.906		Max to be Welded	
Pipe diameter	(in)	8" Nom		2.875" minimum/Unlimited	
		GMAW/Semi.	**FCAW/Semi.**	**GMAW/Semi.**	**FCAW/Semi.**
Backing **		No backing used	Backing used	With or without backing	With backing only
A W S Classification		ER70S-6	E71T-1		
Filler metal specification (SFA)		5.18	5.2	5.xx	5.xx
Filler metal F-No.		6	6	F-No. 6	F-No. 6
Filler metal product form		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Weld deposit thickness (in)		0.125	0.781	0.1375" maximum	8.0" maximum
Welding position		6G	6G	All	All
Weld progression		N/A	N/A	N/A	N/A
Backing gas		No backing used	N/A	With/Without backing gas	N/A
Machine Welding Variables (QW-360)		**Actual Values Used**		Range Qualified	
Direct / remote visual control		N/A	N/A	N/A	N/A
Automatic voltage control		N/A	N/A	N/A	N/A
Automatic joint tracking		N/A	N/A	N/A	N/A
Welding position		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Backing **		N/A	N/A	N/A	N/A
Single / multiple pass per side		N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 5/14/2018
Cameron Munro QA/QC Cisper Welding Inc. Date

CISPER WELDING, INC.
15681 East 590
Inola, Oklahoma 74036
Phone (918) 543-2321

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Felipe Romero Stamp: CC Date: 3/6/2017
Test WPS No.: CWI-320-1

Welding process(es) type(s) used: GTAW/ Manual
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA 106-B to SA 106-B

Welder Variables (QW-350)		**Actual Values Used**	**Range Qualified**
P-No. to P-No.		P-No.1 to P-No. 1	P-1 thru P-11, P-34 & P-4X
Base metal thickness	(in)	0.218	Max. to be welded
Pipe diameter	(in)	2.375	1.0" minimum/unlimited
		GTAW/Manual	**GTAW/Manual**
Backing **		No backing used	With or without backing
A W S Classification		ER-70S-6	
Filler metal specification (SFA)		5.18	5.xx
Filler metal F-No.		6	F-No. 6
Filler metal product form		Bare (Solid)	Bare / metal cored
Consumable insert		No insert used	Without insert only
Weld deposit thickness (in)		0.218	0.4360" maximum
Welding position		6G - 45 degree pipe	All Positions
Weld progression		Vertical up	Vertical up (n4)
Backing gas		No backing gas used	With or Without backing gas
GTAW welding current/ polarity		DCEN (straight)	DCEN (straight)
Machine Welding Variables (QW-360)		**Actual Values Used**	**Range Qualified**
Direct / remote visual control		N/A	N/A
Automatic voltage control		N/A	N/A
Automatic joint tracking		N/A	N/A
Welding position		N/A	N/A
Consumable insert		N/A	N/A
Backing **		N/A	N/A
Single / multiple pass per side		N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no: N/A

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 3/6/2017
Cameron Munro - Cisper Welding - QA/QC Manager Date

CISPER WELDING, INC.
15681 East 590 Rd.
Inola, Oklahoma 74036
Phone (918) 543-7755
E-Mail: CisperWelding.com

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Clay Mindemann Stamp: CM Date: 1/25/2017
Test WPS No.: CWI-325-1

Welding process(es) type(s) used: GMAW/Semiautomatic FCAW/Semiautomatic
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA106B to SA-106B

Welder Variables (QW-350)		**Actual Values Used**		**Range Qualified**	
P-No. to P-No.		P-No.1 to P-No. 1		P-1 thru P-11, P-34 & P-4X	
Base metal thickness	(in)	0.906		Max to be Welded	
Pipe diameter	(in)	8" Nom		2.875" minimum/Unlimited	
		GMAW/Semi.	**FCAW/Semi.**	**GMAW/Semi.**	**FCAW/Semi.**
Backing **		No backing used	Backing used	With or without backing	With backing only
A W S Classification		ER70S-6	E71T-1		
Filler metal specification (SFA)		5.18	5.2	5.xx	5.xx
Filler metal F-No.		6	6	F-No. 6	F-No. 6
Filler metal product form		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Weld deposit thickness (in)		0.125	0.781	0.1375" maximum	8.0" maximum
Welding position		6G	6G	All	All
Weld progression		N/A	N/A	N/A	N/A
Backing gas		No backing used	N/A	With/Without backing gas	N/A
Machine Welding Variables (QW-360)		**Actual Values Used**		Range Qualified	
Direct / remote visual control		N/A	N/A	N/A	N/A
Automatic voltage control		N/A	N/A	N/A	N/A
Automatic joint tracking		N/A	N/A	N/A	N/A
Welding position		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Backing **		N/A	N/A	N/A	N/A
Single / multiple pass per side		N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 1/25/2017
Cameron Munro QA/QC Cisper Welding Inc. Date

CISPER WELDING, INC.
15681 East 590
Inola, Oklahoma 74036
Phone (918) 543-2321

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Clay Mindemann Stamp: CM Date: 3/25/2017
Test WPS No.: CWI-320-1

Welding process(es) type(s) used: GTAW/ Manual
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA 106-B to SA 106-B

Welder Variables (QW-350)		**Actual Values Used**	**Range Qualified**
P-No. to P-No.		P-No.1 to P-No. 1	P-1 thru P-11, P-34 & P-4X
Base metal thickness	(in)	0.218	Max. to be welded
Pipe diameter	(in)	2.375	1.0" minimum/unlimited
		GTAW/Manual	**GTAW/Manual**
Backing **		No backing used	With or without backing
A W S Classification		ER-70S-6	
Filler metal specification (SFA)		5.18	5.xx
Filler metal F-No.		6	F-No. 6
Filler metal product form		Bare (Solid)	Bare / metal cored
Consumable insert		No insert used	Without insert only
Weld deposit thickness (in)		0.218	0.4360" maximum
Welding position		6G - 45 degree pipe	All Positions
Weld progression		Vertical up	Vertical up (n4)
Backing gas		No backing gas used	With or Without backing gas
GTAW welding current/ polarity		DCEN (straight)	DCEN (straight)
Machine Welding Variables (QW-360)		**Actual Values Used**	**Range Qualified**
Direct / remote visual control		N/A	N/A
Automatic voltage control		N/A	N/A
Automatic joint tracking		N/A	N/A
Welding position		N/A	N/A
Consumable insert		N/A	N/A
Backing **		N/A	N/A
Single / multiple pass per side		N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 3/25/2017
Cameron Munro - Cisper Welding - QA/QC Manager Date

CISPER WELDING, INC.
15681 East 590 Rd.
Inola, Oklahoma 74036
Phone (918) 543-7755
E-Mail: CisperWelding.com

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Jeremy Ross Stamp: JR Date: 1/3/2017
Test WPS No.: CWI-325-1

Welding process(es) type(s) used: GMAW/Semiautomatic FCAW/Semiautomatic
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA106B to SA-106B

Welder Variables (QW-350)		Actual Values Used		Range Qualified	
P-No. to P-No.		P-No.1 to P-No. 1		P-1 thru P-11, P-34 & P-4X	
Base metal thickness	(in)	0.906		Max to be Welded	
Pipe diameter	(in)	8" Nom		2.875" minimum/Unlimited	
		GMAW/Semi.	**FCAW/Semi.**	**GMAW/Semi.**	**FCAW/Semi.**
Backing **		No backing used	Backing used	With or without backing	With backing only
A W S Classification		ER70S-6	E71T-1		
Filler metal specification (SFA)		5.18	5.2	5.xx	5.xx
Filler metal F-No.		6	6	F-No. 6	F-No. 6
Filler metal product form		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Weld deposit thickness (in)		0.125	0.781	0.1375" maximum	8.0" maximum
Welding position		6G	6G	All	All
Weld progression		N/A	N/A	N/A	N/A
Backing gas		No backing used	N/A	With/Without backing gas	N/A
Machine Welding Variables (QW-360)		**Actual Values Used**		Range Qualified	
Direct / remote visual control		N/A	N/A	N/A	N/A
Automatic voltage control		N/A	N/A	N/A	N/A
Automatic joint tracking		N/A	N/A	N/A	N/A
Welding position		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Backing **		N/A	N/A	N/A	N/A
Single / multiple pass per side		N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no:

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 1/3/2017
Cameron Munro QA/QC Cisper Welding Inc. Date

CISPER WELDING, INC.

P.O. Box 946
Locust Grove, Oklahoma 74352
Phone (918) 543-2321

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Jeremy Ross Stamp: JR Date: 3/4/2017
Test WPS No.: CWI-321-1

Welding process(es) type(s) used: GTAW/Manual FCAW/Semiautomatic
Type of joint welded: Plate Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA516-70 to 516-70

Welder Variables (QW-350)		Actual Values Used		Range Qualified	
P-No. to P-No.		P-No.1 to P-No. 1		P-1 thru P-11, P-34 & P-4X	
Base metal thickness	(in)	1.5		Max to be welded	
Pipe diameter	(in)	N/A		2.875" minimum/Unlimited	
		GTAW/Manual	FCAW/Semiautomatic	GTAW/Manual	FCAW/Semiautomatic
Backing **		No backing used	Backing used	With or without backing	With backing only
A W S Classification		ER70S-2	E71T-1		
Filler metal specification (SFA)		5.18	5.2	5.xx	5.xx
Filler metal F-No.		6	6	F-No. 6	F-No. 6
Filler metal product form		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Weld deposit thickness (in)		0.125	1.375	0.2500" maximum	2.75" maximum
Welding position		1G Flat	1G Flat	Flat Only	Flat Only
Weld progression		N/A	N/A	N/A	N/A
Backing gas		No backing used	N/A	With/Without backing gas	N/A
Transfer Mode		N/A	Spray Arc	N/A	Spray Arc
Machine Welding Variables (QW-360)		**Actual Values Used**		Range Qualified	
Direct / remote visual control		N/A	N/A	N/A	N/A
Automatic voltage control		N/A	N/A	N/A	N/A
Automatic joint tracking		N/A	N/A	N/A	N/A
Welding position		N/A	N/A	N/A	N/A
Consumable insert		N/A	N/A	N/A	N/A
Backing **		N/A	N/A	N/A	N/A
Single / multiple pass per side		N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
QW-462.2 Side Bend	Satisfactory	QW-462.2 Side Bend	Satisfactory
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no: CWI-321-1

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 3/4/2017
Cameron Munro - Cisper Welding - QA/QC Manager Date

CISPER WELDING, INC.
15681 East 590
Inola, Oklahoma 74036
Phone (918) 543-2321

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Jeremy Ross Stamp: JR Date: 3/3/2017
Test WPS No.: CWI-320-1

Welding process(es) type(s) used: GTAW/ Manual
Type of joint welded: Pipe Groove Weld Joint Type(s) qualified: Groove and fillet welds
Base material(s) welded: SA 106-B to SA 106-B

Welder Variables (QW-350)		**Actual Values Used**	**Range Qualified**
P-No. to P-No.		P-No.1 to P-No. 1	P-1 thru P-11, P-34 & P-4X
Base metal thickness	(in)	0.218	Max. to be welded
Pipe diameter	(in)	2.375	1.0" minimum/unlimited
		GTAW/Manual	**GTAW/Manual**
Backing **		No backing used	With or without backing
A W S Classification		ER-70S-6	
Filler metal specification (SFA)		5.18	5.xx
Filler metal F-No.		6	F-No. 6
Filler metal product form		Bare (Solid)	Bare / metal cored
Consumable insert		No insert used	Without insert only
Weld deposit thickness (in)		0.218	0.4360" maximum
Welding position		6G - 45 degree pipe	All Positions
Weld progression		Vertical up	Vertical up (n4)
Backing gas		No backing gas used	With or Without backing gas
GTAW welding current/ polarity		DCEN (straight)	DCEN (straight)
Machine Welding Variables (QW-360)		**Actual Values Used**	**Range Qualified**
Direct / remote visual control		N/A	N/A
Automatic voltage control		N/A	N/A
Automatic joint tracking		N/A	N/A
Welding position		N/A	N/A
Consumable insert		N/A	N/A
Backing **		N/A	N/A
Single / multiple pass per side		N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base materials thickness and pipe diameters of any size.

** Welds with backing include fillets and doubles-welded groove welds.

Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number And Type	Result
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
QW-462.3 Face Bend	Satisfactory	QW-462.3 Root Bend	Satisfactory
None		None	

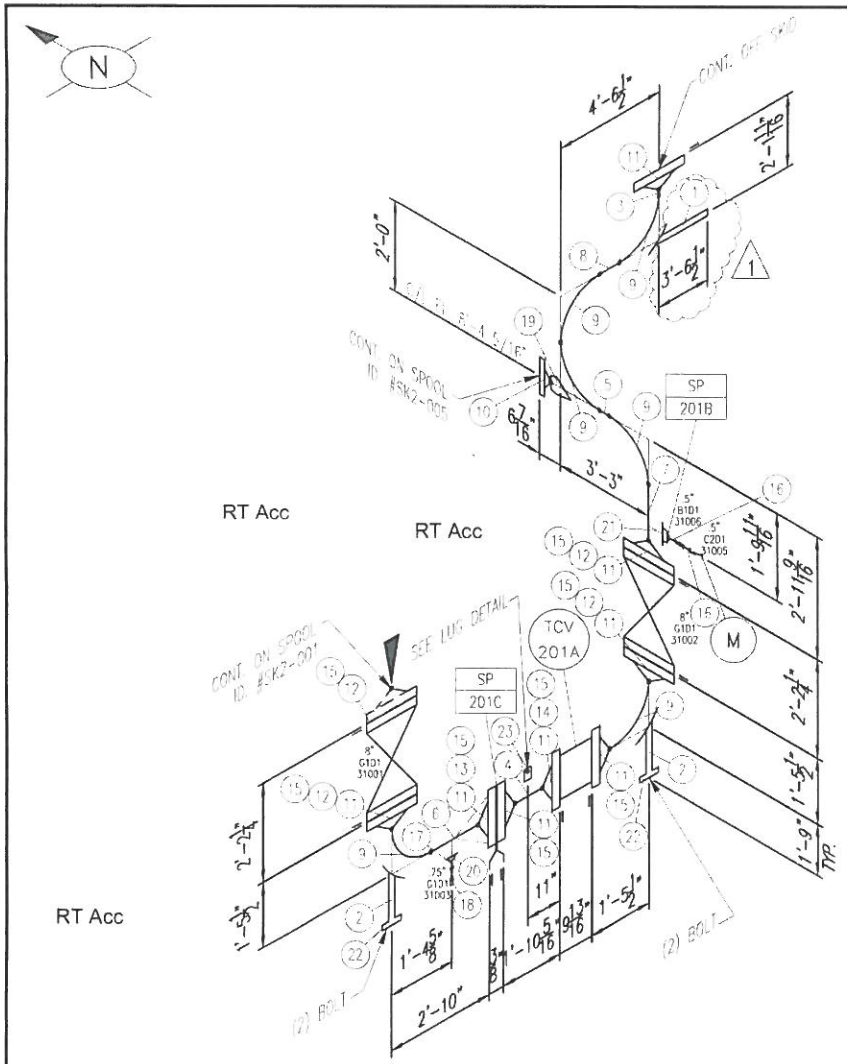
Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Radiographic test results: None
Welding test conducted by: Cisper Welding, Inc.
Mechanical/Radiographic tests conducted by: Cisper Welding, Inc. Lab test no:

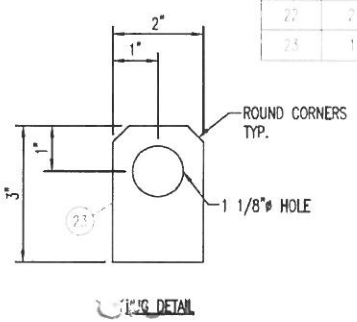
We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Certified By: Cameron Munro 3/3/2017
Cameron Munro - Cisper Welding - QA/QC Manager Date

J-488 SK2

SPOOLS
WELD MAPS
HEAT MAPS





1" LG DETAIL

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	4"	PIPE, STD SMLS, A-106-B	3'-6 1/2"
2	2	4"	PIPE, STD SMLS, A-106-B	2'-8 1/2"
3	1	8"	PIPE, XH SMLS, A-106-B 101966	8 3/16"
4	1	8"	PIPE, XH SMLS, A-106-B	11 5/16"
5	1	8"	PIPE, XH SMLS, A-106-B	1'-3"
6	1	8"	PIPE, XH SMLS, A-106-B	1'-4 1/2"
7	1	8"	PIPE, XH SMLS, A-106-B	1'-6 1/16"
8	1	8"	PIPE, XH SMLS, A-106-B	2'-6 1/2"
9	6	8"	ELL, 90 LR XH, A-234-WPB	
10	1	3"	FLG, RFWN 600LB XH, A-105	
11	8	8"	FLG, RFWN 600LB XH, A-105	
12	4	1 1/8"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	7 3/4"
13	1	1 1/8"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	8 1/4"
14	1	1 1/8"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	1'-5 1/2"
15	8	8"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
16	2	1/2"	NIPPLE, S/160 SMLS, A-106-B TBE	3"
17	1	3/4"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	3"
18	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
19	1	8"x3"	EOL, BW, XH, A-105	
20	1	3"x3/4"	SOL, 3000LB FS, A-105	
21	1	8"x1 1/2"	TOL, 3000LB FS, A-105	
22	2		BASE PLATE, 1/2" THK x 6" x 6" (SA-36 MATERIAL)	
23	1		LIFTING LUG, 1/2" THK x 2" x 3" w/ 1 1/8" HOLE (SA-36 MATERIAL)	

J-488
08/22/18
REV

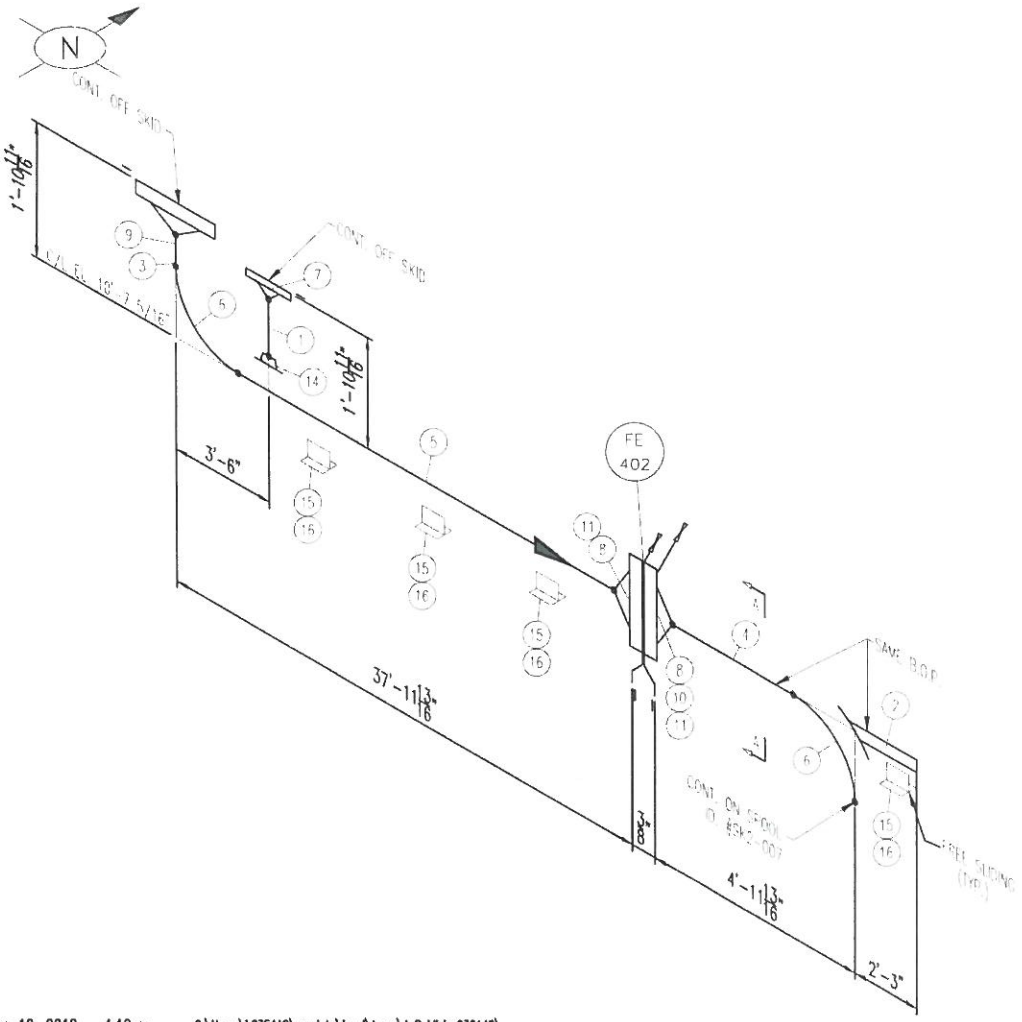
Aug 22, 2018 - 7:51am Z:\400 - Drafting\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-Piping\SPOOLS\IFC\SK2\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	885 Psia						
OPER. TEMP.	76 °F	CORR. ALLOW.	.0625"	1	REVISED ITEM 1 TO REACH STRUCTURAL SUPPORT	8/21/18	COB	WD
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SWAGED ON.

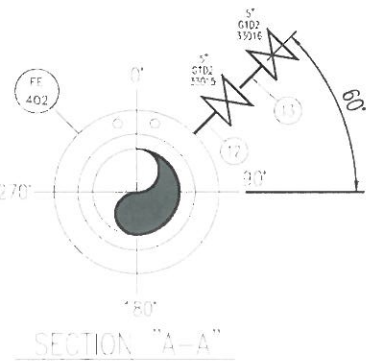
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	150-D1-CS-8"
ASSEMBLY DRAWING	488-402
P&ID DRAWING	488-231
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	488
SPOOL I.D. No.	SK2-002
REV.	1



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION		LENGTH
1	1	2"	PIPE, XH SMLS, A-333-6	1144852	1'-1 3/4"
2	1	4"	PIPE, STD SMLS, A-333-6		3'-3"
3	1	8"	PIPE, XH SMLS, A-333-6	X02753	5'-3/16"
4	1	8"	PIPE, XH SMLS, A-333-6	X02753	3'-6 5/16"
5	1	8"	PIPE, XH SMLS, A-333-6	01531	36"-6 5/16"
6	2	8"	ELL, 90 LR XH, A-420-WPL6		
7	1	2"	FLG, RFWN 600LB XH, A-350-LF2		
8	2	8"	FLG, RFWN 600LB ORIFICE XH, A-350-LF2, w/ 1/2" NPT TAPS		
9	1	8"	FLG, RFWN 600LB XH, A-350-LF2		
10	1	1 1/8"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H		8 1/4"
11	2	8"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING		
12	1	1/2"	NIPPLE, S/160 SMLS, A-333-6 TBE		1"
13	1	1/2"	NIPPLE, S/160 SMLS, A-333-6 TBE		6"
14	1	8"x2"	WOL, XH, A-350-LF2		
15	4		PLATE, 1/4" THK, x 2 3/4" x 6" (SA-516-70 MATERIAL)		
16	4		PLATE, 1/4" THK, x 6" x 6" (SA-516-70 MATERIAL)		



SECTION "A-A"

J-488
04/11/18
IFC

*** = JOB #

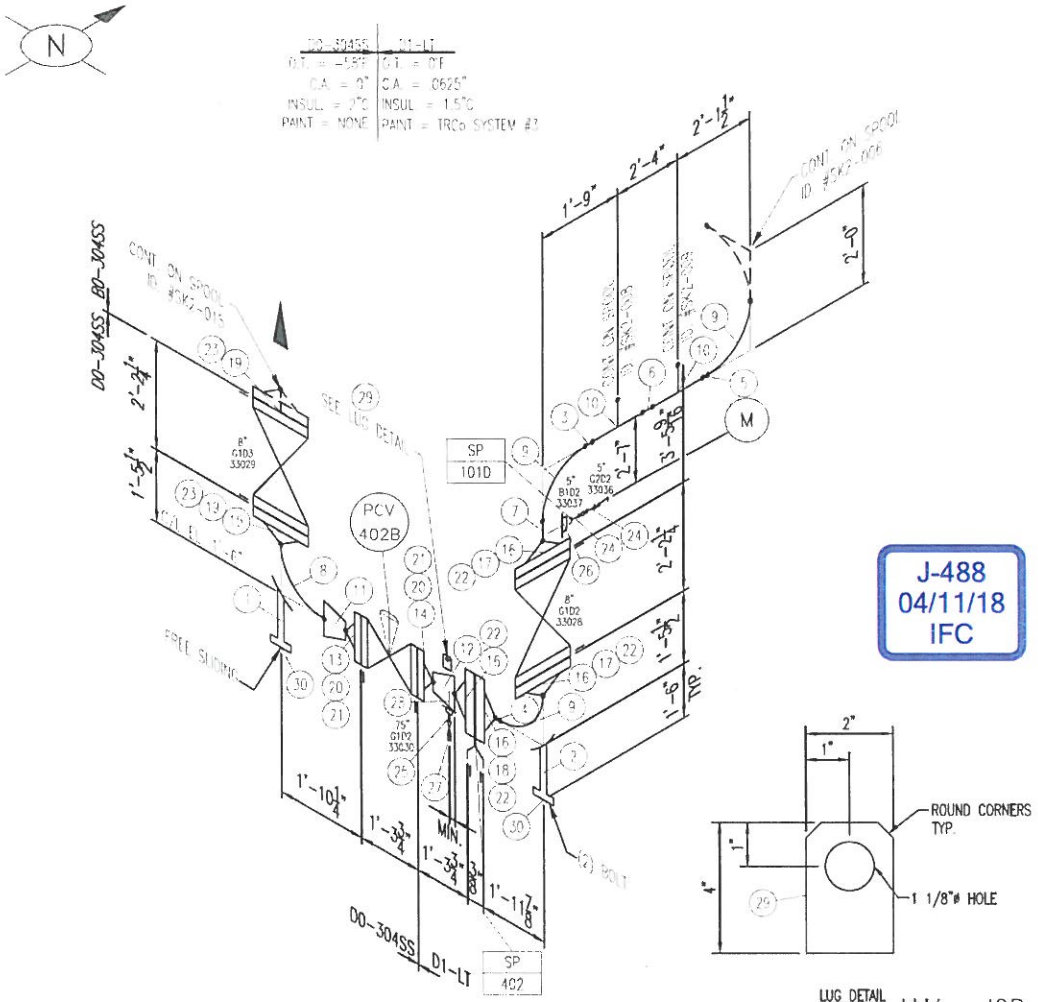
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	865 Psia						
OPER. TEMP.	0°F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	158-D1-LT-8" 1.5"C
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-233 & 234
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	SC6
SPOOL I.D. No.	SK2-006
REV.	0



LUG DETAIL

J-488
04/11/18
IFC

*** = JOB #

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	4"	PIPE, S/10S EFW, A-312-TP304/304L	2'-5 1/2"
2	1	4"	PIPE, STD SMLS, A-333-6	2'-5 1/2"
3	1	8"	PIPE, XH SMLS, A-333-6 01531	2"
4	1	8"	PIPE, XH SMLS, A-333-6	6 3/8"
5	1	8"	PIPE, XH SMLS, A-333-6	6 1/2"
6	1	8"	PIPE, XH SMLS, A-333-6	1'-2"
7	1	8"	PIPE, XH SMLS, A-333-6	2'-2 1/16"
8	1	4"	ELL, 90 LR S/80S, A-403-WP304/304L	
9	3	8"	ELL, 90 LR XH, A-420-WPL6	
10	2	8"x8"	TEE, REDUCING XH, A-420-WPL6	
11	1	8"x4"	REDUCER, CONC S/80S x S/40S, A-403-WP304/304L	
12	1	8"x4"	REDUCER, CONC XH, A-420-WPL6	
13	1	4"	FLG, RFWN 600LB S/40S, A-182-F304/304L	
14	1	4"	FLG, RFWN 600LB XH, A-350-LF2	
15	1	8"	FLG, RFWN 600LB S/80S, A-182-F304/304L	
16	4	8"	FLG, RFWN 600LB XH, A-350-LF2	
17	2	1 1/8"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	7 3/4"
18	1	1 1/8"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	8 1/4"
19	2	1 1/8"	(12) STUD BOLTS, A-320-L7 w/ TWO HEAVY HEX NUTS, A-194-7	7 3/4"
20	2	7/8"	(8) STUD BOLTS, A-320-L7 w/ TWO HEAVY HEX NUTS, A-194-7	6"
21	2	4"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, GRAPHITE FILLER, 304 SS GUIDE RING	
22	4	8"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
23	2	8"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, GRAPHITE FILLER, 304 SS GUIDE RING	
24	2	1/2"	NIPPLE, S/160 SMLS, A-333-6 TOE	3"
25	1	3/4"	NIPPLE, S/160 SMLS, A-333-6 POE-TOE	3"
26	1	8"x1 1/2"	TOL, 3000LB FS, A-350-LF2	
27	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-350-LF2	
28	1	8"x3/4"	SOL, 3000LB FS, A-350-LF2	
29	1		LIFTING LUG, 1/2" THK, x 2" x 4" w/ 1 1/8" HOLE (A-516-70 MATL.)	
30	2		BASE PLATE, 1/2" THK, x 6" x 6" (SA-36 MATERIAL)	

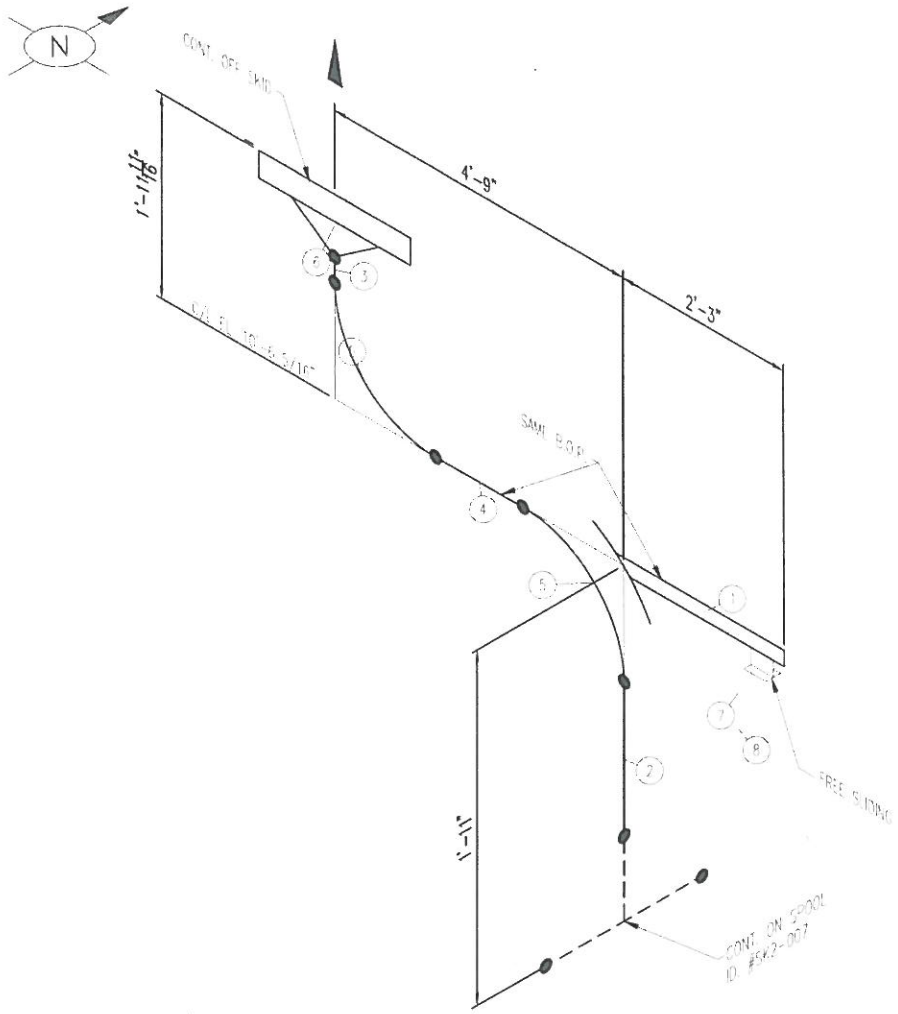
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	865 Psia							
OPER. TEMP.	NOTED °F	CORR. ALLOW.	NOTED					
STRESS RELIEVE	NO	INSULATION	NOTED	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	NOTED	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SWAGED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No. 164-D1-LT-8" 1.5"C
ASSEMBLY DRAWING SC6-402
PIPED DRAWING ***-233
DRAWN BY DV | DATE DRAWN 03/21/11
JOB No. SC6 | SPOOL I.D. No. SK2-007 | REV. 0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION		LENGTH
1	1	6"	PIPE, STD SMLS, A-333-6		3'-0"
2	1	6"	PIPE, XH SMLS, A-333-6	1162655	7 3/8"
3	1	6"	PIPE, XH SMLS, A-333-6	1162655	9 13/16"
4	1	6"	PIPE, XH SMLS, A-333-6	1162655	3'-3"
5	2	6"	ELL, 90 LR, XH, A-420-WPL6		
6	1	6"	FLG, RFWN 600LB XH, A-350-LF2		
7	1		PLATE, 1/4" THK. x 2 1/4" x 6" (SA-516-70 MATERIAL)		
8	1		PLATE, 1/4" THK. x 6" x 6" (SA-516-70 MATERIAL)		

J-488
04/11/18
IFC

*** = JOB #

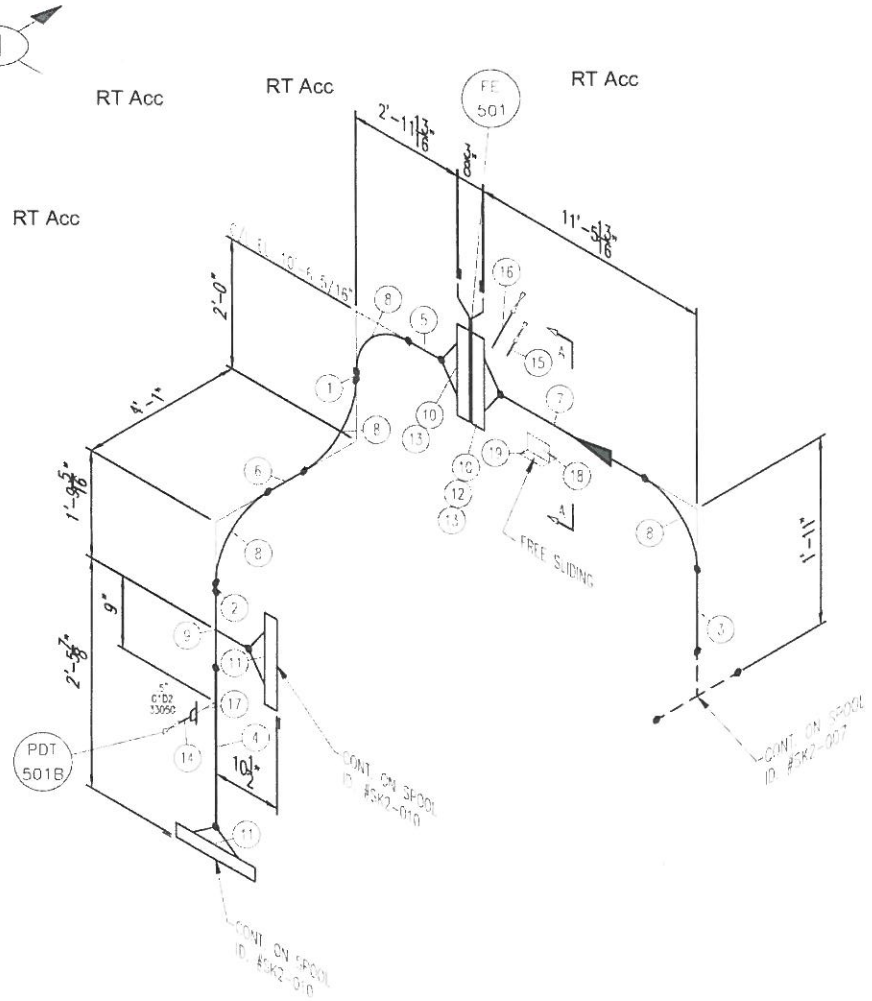
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	865 Psig							
OPER. TEMP.	0°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS. SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

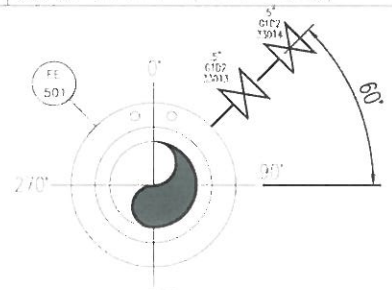
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	162-D1-LT-6" 1.5"C		
ASSEMBLY DRAWING	SC6-402		
PIPED DRAWING	***-233		
DRAWN BY	DV	DATE DRAWN	03/21/11
JOB No.	SC6	SPOOL I.D. No.	SK2-008
REV.	0		



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	6"	PIPE, XH SMLS, A-333-6 1162655	6"
2	1	6"	PIPE, XH SMLS, A-333-6	6 11/16"
3	1	6"	PIPE, XH SMLS, A-333-6	2 3/8"
4	1	6"	PIPE, XH SMLS, A-333-6	1'-7 3/8"
5	1	6"	PIPE, XH SMLS, A-333-6	1'-9 15/16"
6	1	6"	PIPE, XH SMLS, A-333-6	2'-2"
7	1	6"	PIPE, XH SMLS, A-333-6	10'-3 15/16"
8	4	6"	ELL, 90 LR XH, A-420-WPL6	
9	1	6"	TEE, STR, XH, A-420-WPL6	
10	2	6"	FLG, RFWN 600LB ORIFICE XH, A-350-LF2, w/ 1/2" NPT TAPS	
11	2	6"	FLG, RFWN 600LB XH, A-350-LF2	
12	1	1"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	7 1/4"
13	2	6"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
14	1	1/2"	NIPPLE, S/160 SMLS, A-333-6, POE-TOE	3"
15	1	1/2"	NIPPLE, S/160 SMLS, A-333-6 THE	3"
16	1	1/2"	NIPPLE, S/160 SMLS, A-333-6 THE	6"
17	1	6"x1/2"	SOL, 3000LB FS, A-350-LF2	
18	1		PLATE, 1/4" THK x 2 3/4" x 6" (SA-516-70 MATERIAL)	
19	1		PLATE, 1/4" THK x 6" x 6" (SA-516-70 MATERIAL)	



SECTION "A-A"

J-488
04/11/18
IFC

*** = JOB #

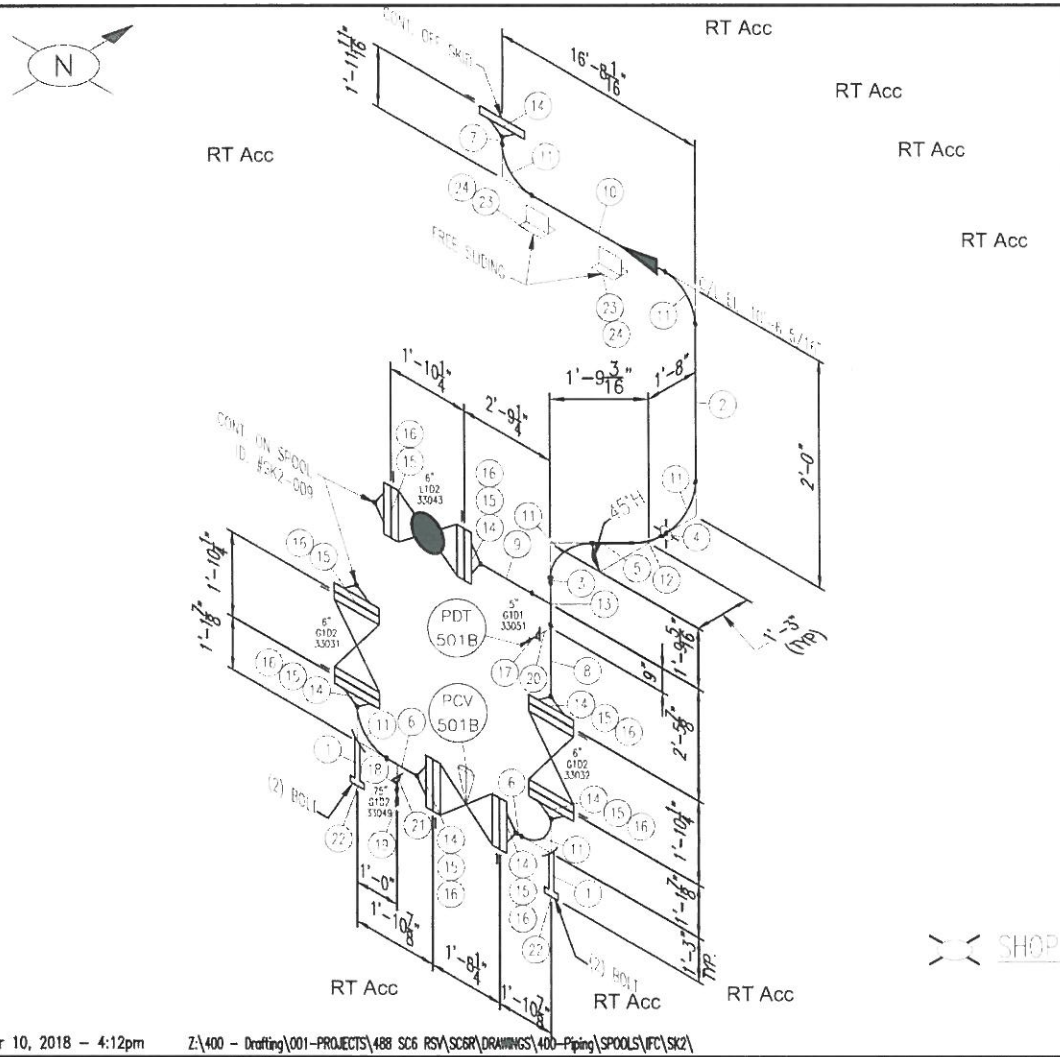
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS. 1100 Psig	FAB. LOCATION SHOP						
DESIGN TEMP. 150°F	SPOOL LOCATION SKID #2						
OPER. PRESS. 865 Psia							
OPER. TEMP. 0°F	CORR. ALLOW. .0625"						
STRESS RELIEVE NO	INSULATION 1.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY 15% NORMAL	PAINT TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SKOLLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	159-D1-LT-6" 1.5"C
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	SC6
SPOOL I.D. No.	SK2-009
REV.	0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	2	6"	PIPE, STD SMLS, A-333-6	1'-11 1/2"
2	1	6"	PIPE, XH SMLS, A-333-6 1162655	6"
3	1	6"	PIPE, XH SMLS, A-333-6	6 11/16"
4	1	6"	PIPE, XH SMLS, A-333-6	7 1/4"
5	1	6"	PIPE, XH SMLS, A-333-6	8 7/16"
6	2	6"	PIPE, XH SMLS, A-333-6	9"
7	1	6"	PIPE, XH SMLS, A-333-6	9 13/16"
8	1	6"	PIPE, XH SMLS, A-333-6	1'-7 3/8"
9	1	6"	PIPE, XH SMLS, A-333-6	1'-10 3/4"
10	1	6"	PIPE, XH SMLS, A-333-6	15'-2 1/16"
11	6	6"	ELL, 90 LR XH, A-420-WPL6	
12	1	6"	ELL, 45 LR XH, A-420-WPL6	
13	1	6"	TEE, STR XH, A-420-WPL6	
14	7	6"	FLG, RFWN 600LB XH, A-350-LF2	
15	8	1"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	7"
16	8	6"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
17	1	1/2"	NIPPLE, S/160 SMLS, A-333-6, POE-TOE	3"
18	1	3/4"	NIPPLE, S/160 SMLS, A-333-6, POE-TOE	3"
19	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-350-LF2	
20	1	6"x1/2"	SOL, 3000LB FS, A-350-LF2	
21	1	6"x3/4"	SOL, 3000LB FS, A-350-LF2	
22	2		BASE PLATE, 1/2" THK x 6" x 6" (SA-36 MATERIAL)	
23	2		PLATE, 1/4" THK x 2 3/4" x 6" (SA-516-70 MATERIAL)	
24	2		PLATE, 1/4" THK x 5" x 6" (SA-516-70 MATERIAL)	

J-488
04/11/18
IFC

*** = JOB #

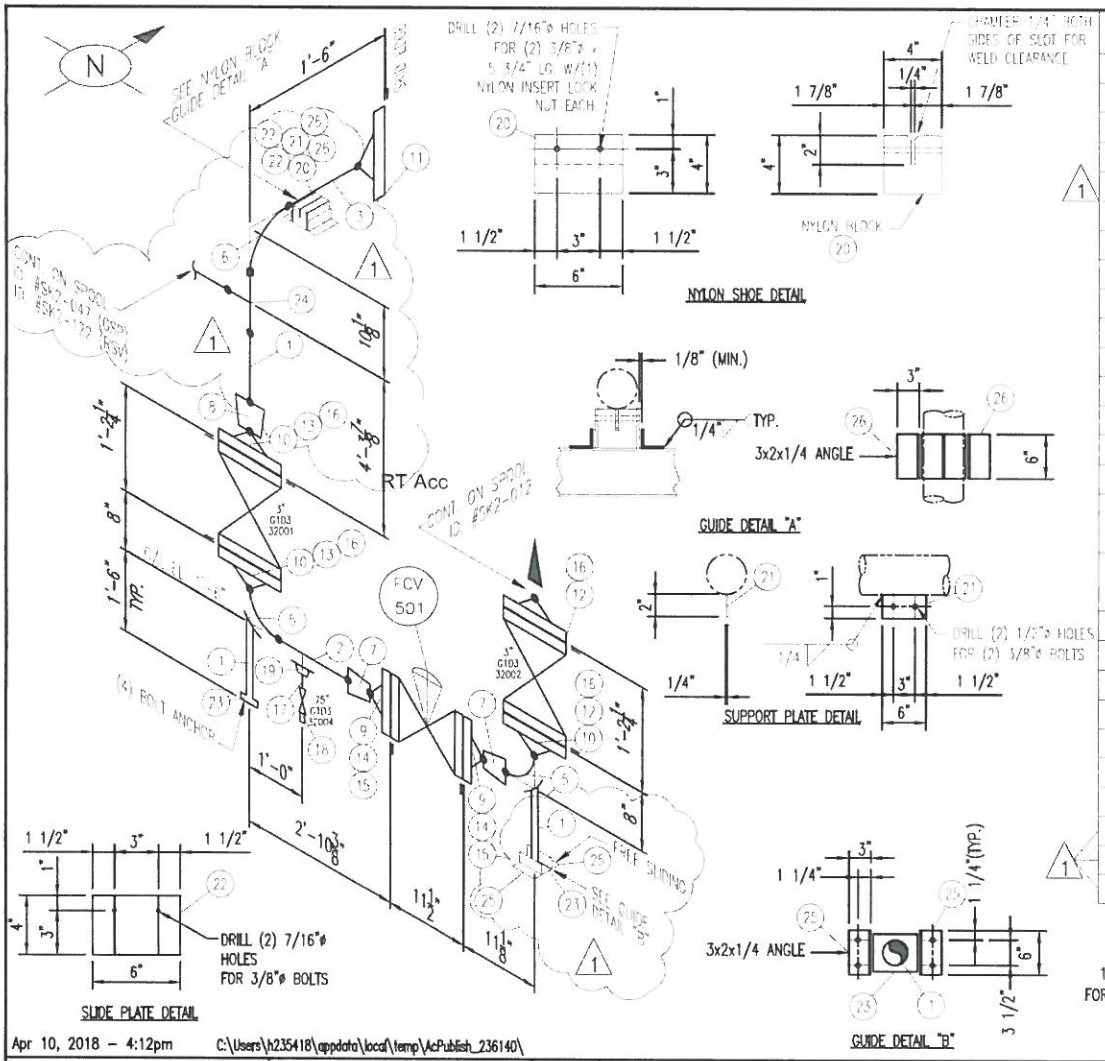
Apr 10, 2018 – 4:12pm Z:\400 – Drafting\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-Piping\SPOOLS\IFC\SK2\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	865 Psia							
OPER. TEMP.	0 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SWOLLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	159-D1-LT-6" 1.5"C
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	SC6
SPOOL I.D. No.	SK2-010
REV.	0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	2	2"	PIPE, S/40S EFW, A-312-TP304/304L	1'-10"
2	1	3"	PIPE, S/40S EFW, A-312-TP304/304L 475B-2483451	1'-11 1/4"
3	1	4"	PIPE, S/40S EFW, A-312-TP304/304L 049N	2'-3/4"
4	1	4"	PIPE, S/40S EFW, A-312-TP304/304L 049N	3'-4 1/4"
5	2	3"	ELL, 90 LR S/40S, A-403-WP304/304L	
6	1	4"	ELL, 90 LR S/40S, A-403-WP304/304L	
7	2	3"x2"	REDUCER, CONC S/40S, A-403-WP304/304L	
8	1	4"x3"	REDUCER, CONC S/40S, A-403-WP304/304L	
9	2	2"	FLG, RFWN 600LB S/40S, A-182-F304/304L	
10	3	1"	FLG, RFWN 600LB S/40S, A-182-F304/304L	
11	1	4"	FLG, RFWN 600LB S/40S, A-182-F304/304L	
12	2	3/4"	(8) STUD BOLTS, A-193-B8 w/ TWO HEAVY HEX NUTS, A-194-8B	5 1/4"
13	2	3/4"	(8) STUD BOLTS, A-193-B8 w/ TWO HEAVY HEX NUTS, A-194-8B	5 1/4"
14	2	5/8"	(8) STUD BOLTS, A-193-B8 w/ TWO HEAVY HEX NUTS, A-194-8B	4 1/2"
15	2	2"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, GRAPHITE FILLER, 304 SS GUIDE RING	
16	4	3"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, GRAPHITE FILLER, 304 SS GUIDE RING	
17	1	3/4"	NIPPLE, S/80S EFW, A-312-TP304/304L PSE-3CE	3"
18	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-182-F304/304L	
19	1	3"x3/4"	SOL, 3000LB FS, A-182-F304/304L	
20	1		NYLON BLOCK, 4" x 4" x 6" LG	
21	1		PLATE, 1/4" THK x 2" x 6" LG A-240-304SS (PER DETAIL)	
22	2		PLATE, 1/4" THK x 4" x 6" LG A-240-304SS (PER DETAIL)	
23	2		BASE PLATE, 1/2" THK x 5" x 5" (SA-36 MATERIAL)	
24	1	4"x2"	TEE, RED S/40S, A-403-WP304/304L	
25	2		ANGLE 3" x 2" x 1/4" x 6"LG A-36 (DRILL PER DETAIL)	
26	2		ANGLE 3" x 2" x 1/4" x 6"LG A-36	

J-488
04/11/18
IFC

*** = JOB #

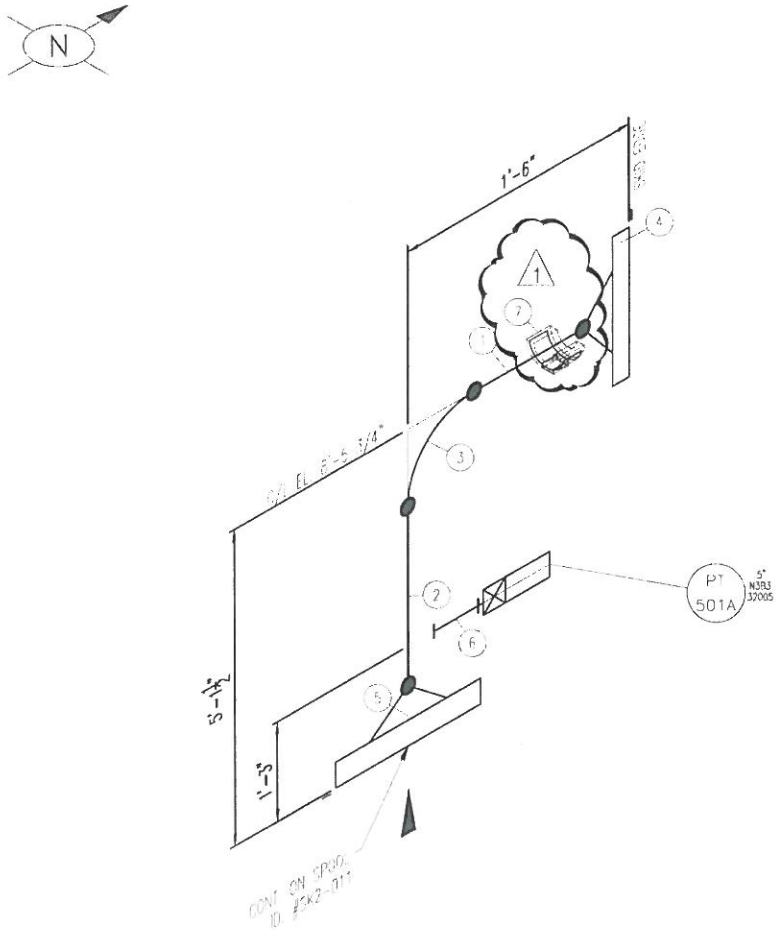
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	860 Psia							
OPER. TEMP.	−102 °F	CORR. ALLOW.	0"	1	REVISED AS NOTED	10/03/13	MSD	KK
STRESS RELIEVE	NO	INSULATION	2.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	NONE	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SWDOLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	160-DO-304SS-4" 2.5"C
ASSEMBLY DRAWING	SC6-402
PAID DRAWING	***-232
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	SC6
SPOOL I.D. No.	SK2-011
REV.	1



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION		LENGTH
1	1	3"	PIPE, S/10S ERW, A-312-TP304/304L	232R	10 3/8"
2	1	3"	PIPE, S/10S ERW, A-312-TP304/304L	232R	4'-5 1/2"
3	1	3"	ELL, 90 LR S/10S, A-403-WP304/304L		
4	1	3"	FLG, RFWN 300LB S/10S, A-182-F304/304L		
5	1	3"	FLG, RFWN 600LB S/10S, A-182-F304/304L		
6	1	1/2"	CPLG, TOE x 3" LG., 3000LB FS, A-182-F304/304L		
7	1	3"	TYPE 3 SUPPORT PER ENG-14aar, 2.5"C INSUL		

J-488
04/11/18
IFC

Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

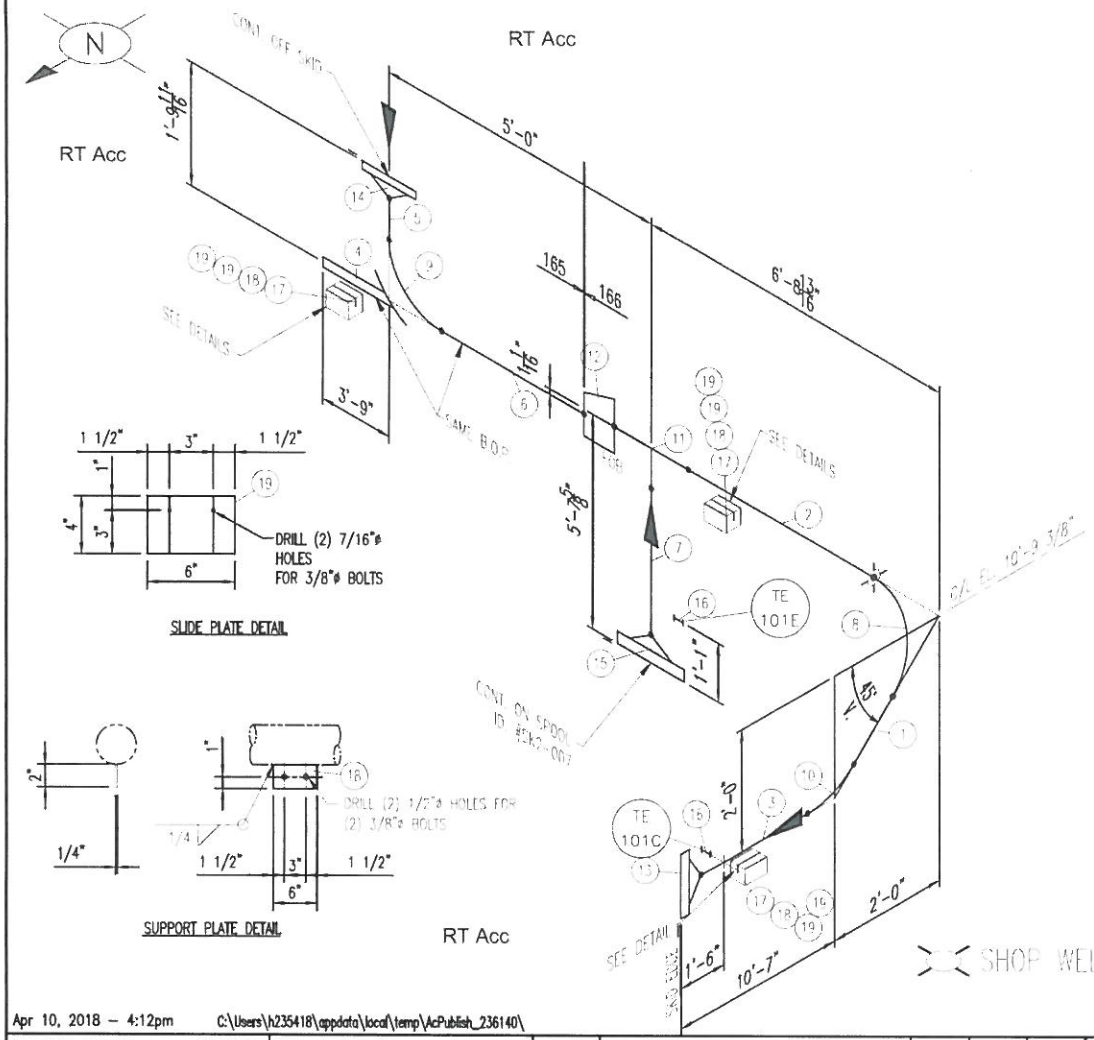
*** = JOB #

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP						
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2						
OPER. PRESS.	220 Psia								
OPER. TEMP.	−160°F	CORR. ALLOW.	0"	1	ADDED ITEM #7	05/26/11	PLO	LH	
STRESS RELIEVE	NO	INSULATION	2.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH	
RADIOGRAPHY	15% NORMAL	PAINT	NONE	NO.	REVISION	DATE	BY	APR	

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SHOULED ON.

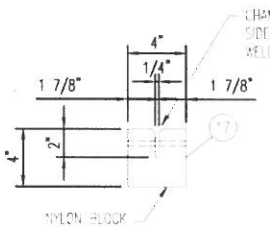
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

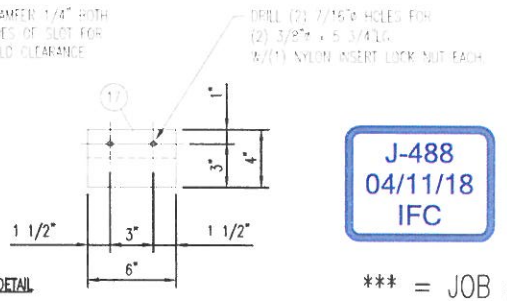
LINE No.	161-B0-304SS-3" 2.5"C
ASSEMBLY DRAWING	SC6-402
PIPED DRAWING	***-232
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	SC6
SPOOL I.D. No.	SK2-012
REV.	1



SLIDE PLATE DETAIL

SUPPORT PLATE DETAIL





NYLON SHOE DETAIL

J-488
04/11/18
IFC

*** = JOB #

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION		LENGTH
1	1	10"	PIPE, S/40S ERW, A-312-TP304/304L	119E	1'-0 13/16"
2	1	10"	PIPE, S/40S ERW, A-312-TP304/304L	119E	4'-9 5/16"
3	1	10"	PIPE, S/40S ERW, A-312-TP304/304L	119E	6'-8 7/8"
4	1	4"	PIPE, S/10S ERW, A-312-TP304/304L		4'-9"
5	1	8"	PIPE, S/40S ERW, A-312-TP304/304L	516113-2404716	5'-5 7/8"
6	1	8"	PIPE, S/40S ERW, A-312-TP304/304L		2'-8 1/2"
7	1	8"	PIPE, S/40S ERW, A-312-TP304/304L		4'-6 1/8"
8	1	10"	ELL, 90 LR S/40S, A-403-WP304/304L		
9	1	8"	ELL, 90 LR S/40S, A-403-WP304/304L		
10	1	10"	ELL, 45 LR S/40S, A-403-WP304/304L		
11	1	10"X8"	TEE, RED S/40S, A-403-WP304/304L		
12	1	10"X8"	REDUCER, ECC S/40S, A-403-WP304/304L		
13	1	10"	FLG, RFWN 300LB S/40S, A-182-F304/304L		
14	1	8"	FLG, RFWN 300LB S/40S, A-182-F304/304L		
15	1	8"	FLG, RFWN 600LB S/40S, A-182-F304/304L		
16	2	3/4"	CPLG, TOE x 3" LG, 3000LB FS, A-182-F304/304L		
17	3		NYLON BLOCK, 4" x 4" x 6" LG		
18	3		PLATE, 1/4" THK x 2" x 6" LG A-240-304SS (PER DETAIL)		
19	6		PLATE, 1/4" THK x 4" x 6" LG A-240-304SS (PER DETAIL)		

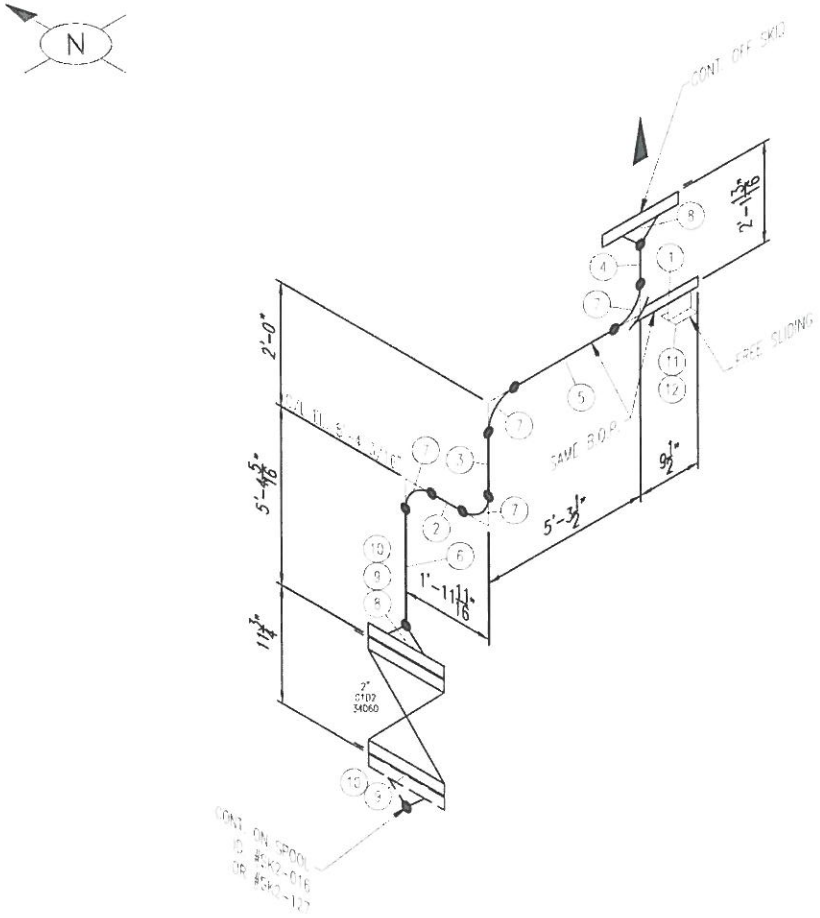
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	220 Psia							
OPER. TEMP.	-83 °F	CORR. ALLOW.	0"					
STRESS RELIEVE	NO	INSULATION	2.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	NONE	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR DW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SWAGED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	166-B0-304SS-10" 2.5"C
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	SC6
SPOOL I.D. No.	SK2-015
REV.	0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	1 1/2"	PIPE, XH, SMLS, A-333-6	1'-0 1/2"
2	1	2"	PIPE, XH SMLS, A-333-6 BBE 1144852	1'-5 11/16"
3	1	2"	PIPE, XH SMLS, A-333-6 BBE	1'-6"
4	1	2"	PIPE, XH SMLS, A-333-6 BBE	1'-7 11/16"
5	1	2"	PIPE, XH SMLS, A-333-6 BBE	4'-9 1/2"
6	1	2"	PIPE, XH SMLS, A-333-6 BBE	4'-10 3/16"
7	4	2"	ELL, 90 LR XH, A-420-WPL6	
8	2	2"	FLG, RFWN BOSS XH, A-350-LF2	
9	7	5/8"	(8) STUD BOLTS, A-193-B7 x/ TWO HEAVY HEX NUTS, A-194-2H ZINC PLATED	4 1/2"
10	2	2"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING (YELLOW W/PINK STRIPE)	
11	1		PLATE, 1/4" THK x 2 3/4" x 6" LG A-516-70	
12	1		PLATE, 1/4" THK x 6" x 6" LG A-516-70	

J-488
04/11/18
IFC

*** = JOB #

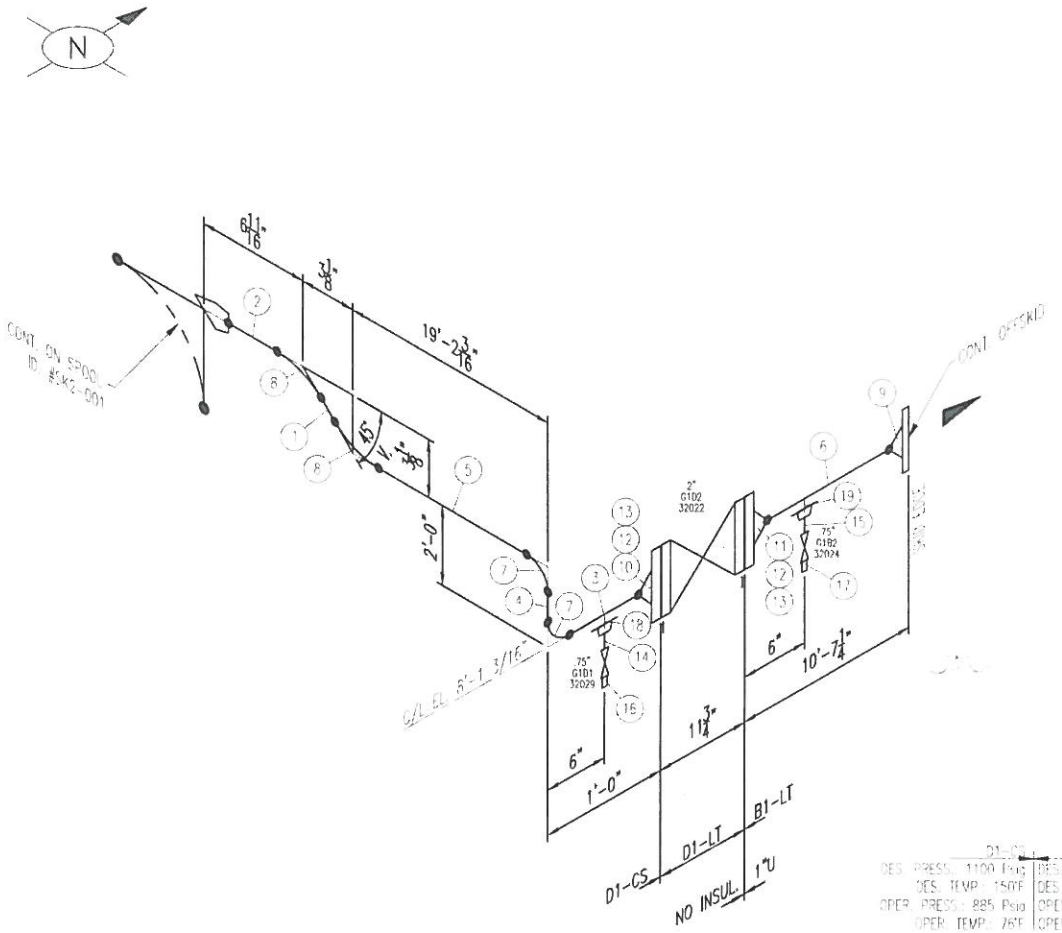
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	863 Psia							
OPER. TEMP.	−28 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	173-D1-LT-2" 1.5"C
ASSEMBLY DRAWING	SC6R-402
PIPED DRAWING	***-234
DRAWN BY	COB
DATE DRAWN	1/12/18
JOB No.	488
SPOOL I.D. No.	SK2-017
REV.	1



	D1-CS	D1-LT	B1-LT
DES. PRESS.	1100 Psig	1100 Psig	400 Psig
DES. TEMP.	150°F	150°F	200°F
OPER. PRESS.	885 Psig	885 Psig	220 Psig
OPER. TEMP.	76°F	60°F	60°F

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	*	2"	PIPE, XH SMLS, A-106-B D04408	1'-11/16"
2	*	2"	PIPE, XH SMLS, A-106-B	3"
3	*	2"	PIPE, XH SMLS, A-106-B	5'-7/8"
4	*	2"	PIPE, XH SMLS, A-106-B	1'-6"
5	*	2"	PIPE, XH SMLS, A-106-B	18'-9 13/16"
6	*	2"	PIPE, XH SMLS, A-333-6 1144852	10'-1 3/8"
7	2	2"	ELL, 90 LR XH, A-234-WPB	
8	2	2"	ELL, 45 LR XH, A-234-WPB	
9	*	2"	FLG, RFWN 300LB XH, A-350-LF2	
10	*	2"	FLG, RFWN 600LB XH, A-105	
11	*	2"	FLG, RFWN 600LB XH, A-350-LF2	
12	2	5/8"	(R) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	4 1/2"
13	2	2"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
14	*	3/4"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	3"
15	*	3/4"	NIPPLE, XH SMLS, A-333-6 POE-TOE	3"
16	*	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
17	*	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-350-LF2	
18	*	2"x3/4"	SOL, 3000LB FS, A-105	
19	*	2"x3/4"	SOL, 3000LB FS, A-350-LF2	

J-488
04/11/18
IFC

*** = JOB #

Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	NOTED Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	NOTED °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	NOTED Psig							
OPER. TEMP.	NOTED °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NOTED	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

CONFIDENTIAL STATEMENT

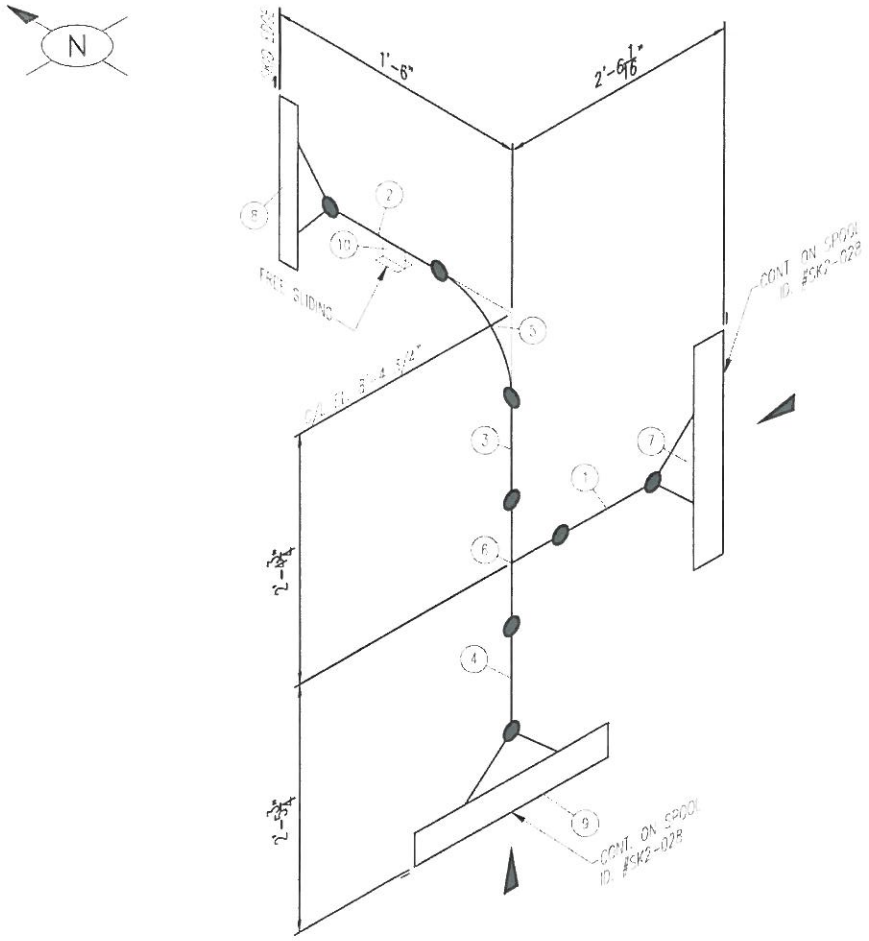
THIS DRAWING IS THE PROPERTY OF THE THOMAS RUSSELL Co. AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	110-D1-CS-2"
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-221/232
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-021
REV.	0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION		LENGTH
1	1	2"	PIPE, XH SMLS, A-106-B	D04408	1'-10 3/4"
2	1	3"	PIPE, STD SMLS, A-106-B	1700766	10 3/8"
3	1	3"	PIPE, STD SMLS, A-106-B		1'-6 7/8"
4	1	3"	PIPE, STD SMLS, A-106-B		1'-10 1/16"
5	1	3"	ELL, 90 LR STD, A-234-WPB		
6	1	3"x2"	TEE, REDUCING STD-XH, A-234-WPB		
7	1	2"	FLG, RTJWN 900LB XH, A-105		
8	1	3"	FLG, RTJWN 900LB STD, A-105		
9	1	3"	FLG, RTJWN 900LB XH, A-105		
10	1		PIPE SHOE, 6" LG x 3" HI (TRCo W6x15)		

J-488
04/11/18
IFC

*** = JOB #

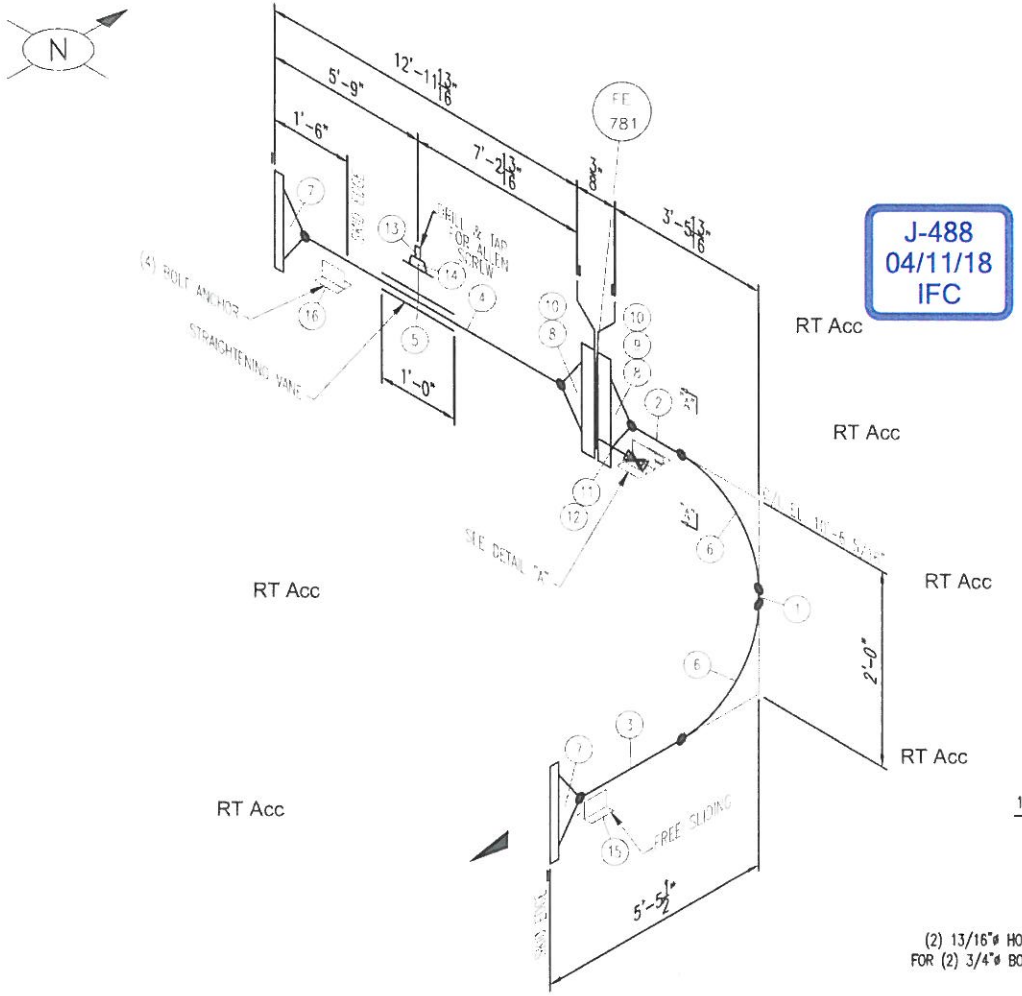
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	195 Psia							
OPER. TEMP.	23°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SWDOLED OH.

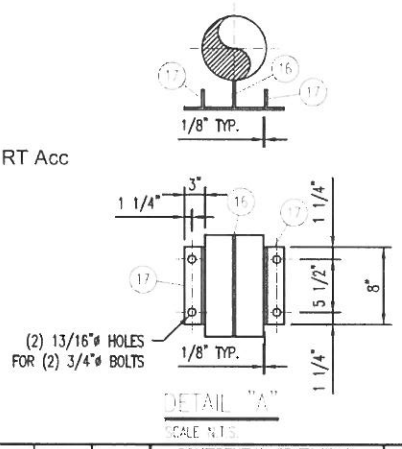
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5662

LINE No.	237-B1-CS-3" 1"C
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-235
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-029
REV.	0

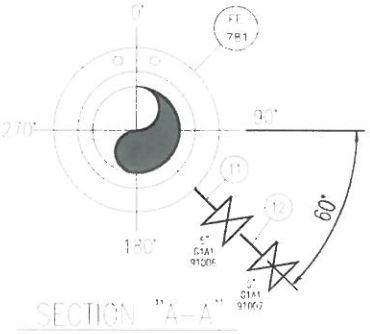


BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	6"	PIPE, STD SMLS, A-106-B 17607172	6"
2	1	6"	PIPE, STD SMLS, A-106-B	2'-4 7/8"
3	1	6"	PIPE, STD SMLS, A-106-B	1'-5"
4	1	6"	PIPE, STD SMLS, A-106-B	12'-4 3/8"
5	1	6"	STRAIGHTENING VANE, #11COL LINE TYPE, 6.065" LINE I.D.	1'-0"
6	2	6"	ELL, 90 LR STD, A-234-WPB	
7	2	6"	FLG, RFWN 150LB STD, A-105	
8	2	6"	FLG, RFWN 300LB ORIFICE STD, A-105, w/ 1/2" NPT TAPS	
9	1	3/4"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	5 1/4"
10	2	6"	GASKET, 1/8" THK, 300LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
11	1	1/2"	NIPPLE, S/160 SMLS, A-106-B TBE	3"
12	1	1/2"	NIPPLE, S/160 SMLS, A-106-B TBE	6"
13	1	1/2"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
14	1	1/2"	CPLG, THRD, 3000LB FS, A-105	
15	1		PIPE SHOE, 6" LG x 3" HI FROM W6x15	
16	2		PIPE SHOE, 8" LG x 3" HI FROM W6x15	
17	2		ANGLE, 3" x 3" x 1/4" x 8" LG. (DRILL PER DETAIL)	



DETAIL "A"
SCALE N.T.S.



SECTION "A-A"

*** = JOB #

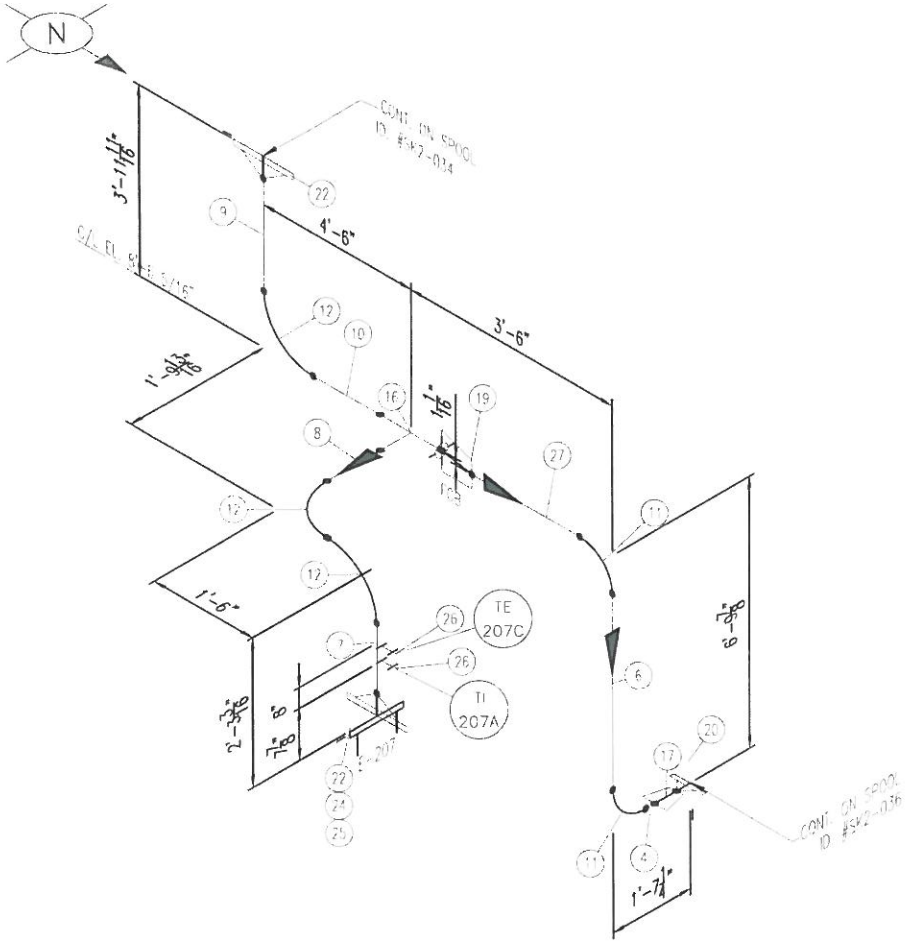
Apr 10, 2018 – 4:12pm Z:\400 – Drafting\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-Piping\SPOOLS\IFC\SK2\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	50 Psia						
OPER. TEMP.	300 °F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	611-A1-CS-6" 2"H
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-291
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-032
REV.	0



SHOP WELD

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION		LENGTH
1					
2					
3					
4	1	4"	PIPE, STD SMLS, A-106-B	58130K	6 3/4"
5					
6	1	4"	PIPE, STD SMLS, A-106-B	58130K	3'-9 7/8"
7	1	6"	PIPE, STD SMLS, A-106-B	17607172	1'-2 11/16"
8	1	6"	PIPE, STD SMLS, A-106-B		7 3/16"
9	1	6"	PIPE, STD SMLS, A-106-B		2'-11 3/16"
10	1	6"	PIPE, STD SMLS, A-106-B		3'-3 3/8"
11	2	4"	ELL, 90 LR STD, A-234-WPB		
12	3	6"	ELL, 90 LR STD, A-234-WPB		
13					
14					
15					
16	1	6"	TEE, STR STD, A-234-WPB		
17	1	4"x6"	REDUCER, CONC STD - XH , A-234-WPB		
18					
19	1	6"x4"	REDUCER, ECC STD, A-234-WPB		
20	1	2"	FLG, RFWN 150LB XH, A-105		
21					
22	2	6"	FLG, RFWN 150LB STD, A-105		
23					
24	1	3/4"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H		5 3/4"
25	1	6"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING		
26	2	3/4"	CPLG, TOE x 2 1/2" LG, 3000LB FS, A-105		
27	1	4"	PIPE, STD SMLS, A-106-B	58130K	2'-3 7/8"

4

J-488
04/11/18
IFC

*** = JOB #

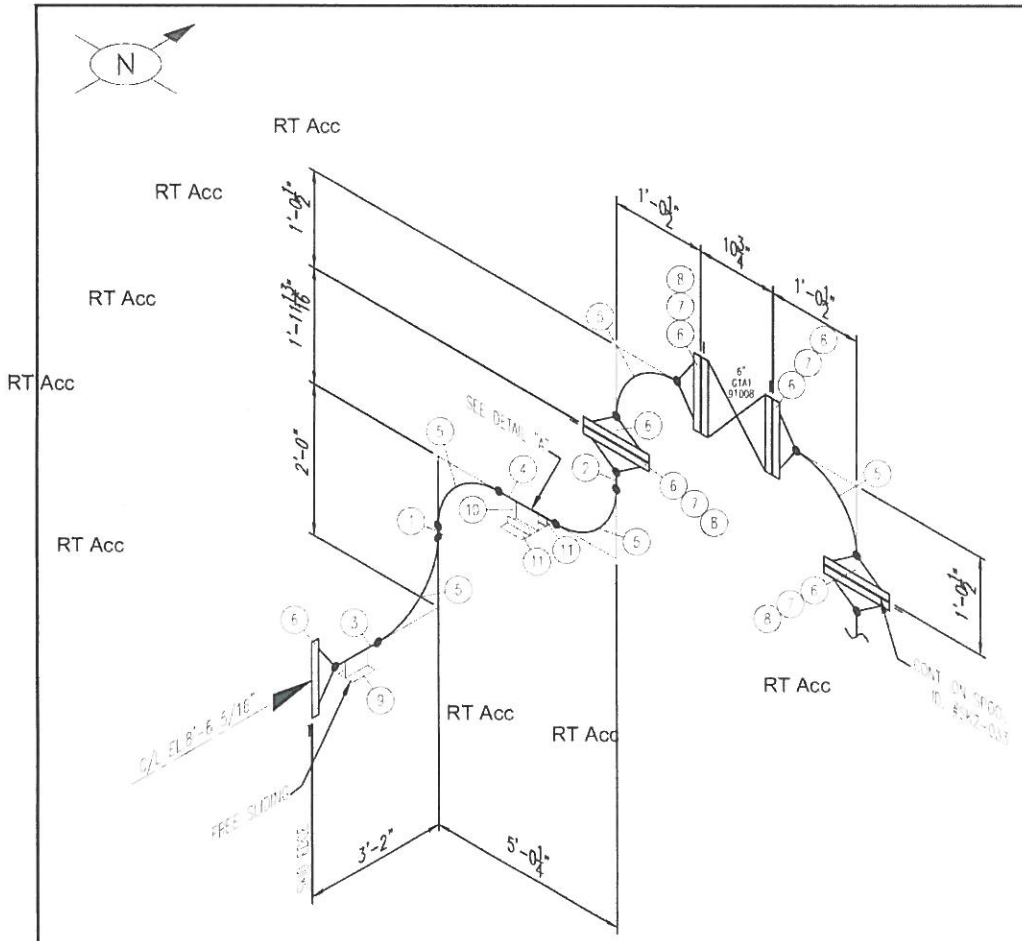
Apr 10, 2018 – 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP	4	REVISED & REMOVED ITEM #4	04/01/16	CC	LH
DESIGN TEMP.	400°F	SPOOL LOCATION	SKID #2	3	REVISED & REMOVED PIPING	10/03/13	MSD	KK
OPER. PRESS.	50 Psia			2	REVISED AS NOTED	2/9/12	DV	LH
OPER. TEMP.	300°F	CORR. ALLOW.	.0625"	1	REVISED AS NOTED	12/27/11	DV	LH
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

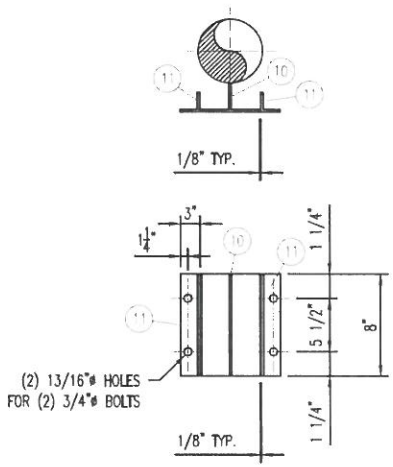
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	611-A1-CS-6" 2"H
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-291
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-033
REV.	4



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	6"	PIPE, STD SMLS, A-106-B 17702125	6"
2	1	6"	PIPE, STD SMLS, A-106-B	11 3/16"
3	1	6"	PIPE, STD SMLS, A-106-B	2'-1 1/2"
4	1	6"	PIPE, STD SMLS, A-106-B	2'-6 1/4"
5	5	6"	ELL, 90 LR STD, A-234-WPB	
6	6	6"	FLG, RFWN 150LB STD, A-105	
7	4	3/4"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	4 1/4"
8	4	6"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
9	1		PIPE SHOE, 6" LG x 3" HI FROM W6x15	
10	1		PIPE SHOE, 8" LG x 3" HI FROM W6x15	
11	2		ANGLE, 3" x 2" x 1/4" x 8" LG, (DRILL PER DETAIL "A")	



DETAIL "A"
SCALE: NTS

J-488
04/11/18
IFC

*** = JOB #

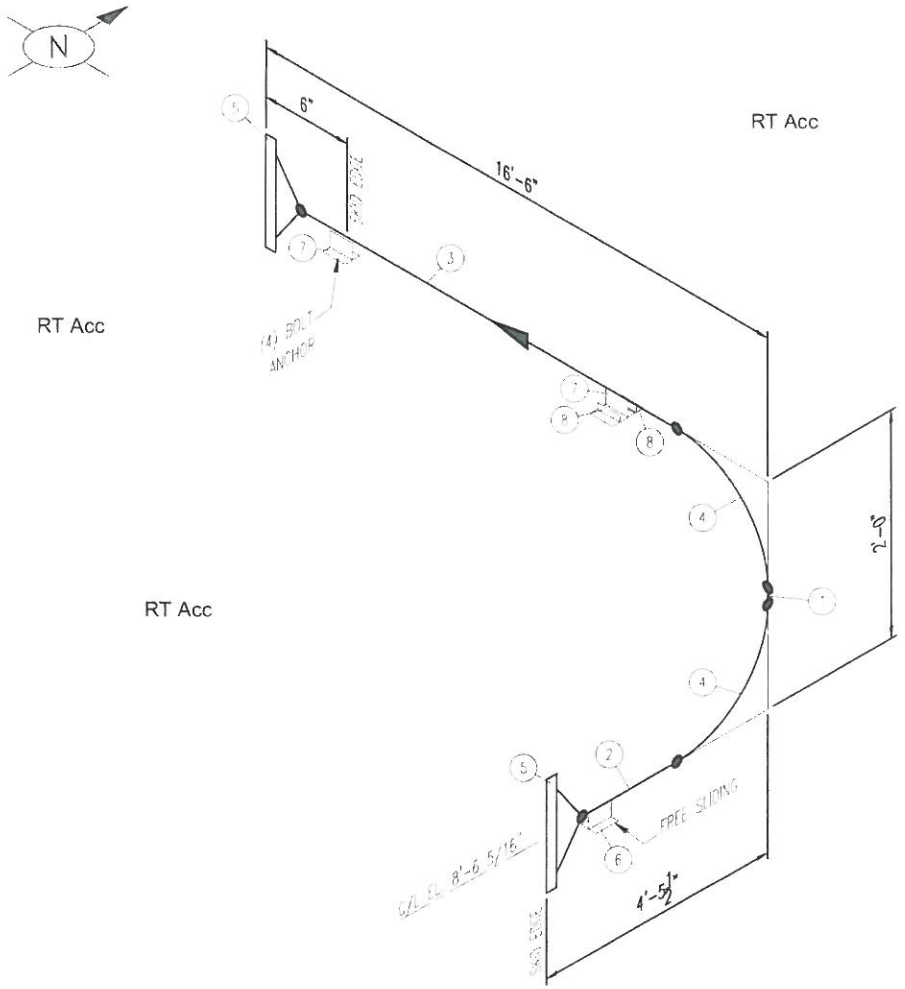
Apr 10, 2018 – 4:12pm Z:\400 – Drafting\001–PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400–Piping\SPOOLS\IFC\SK2\

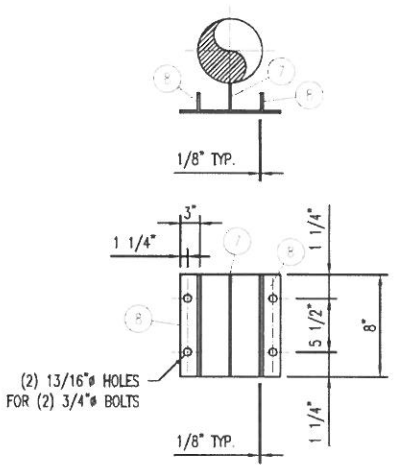
DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	50 Psia							
OPER. TEMP.	300 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE–UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS. SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SHOULDER ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918–481–5682

LINE No.	611–A1–CS–6" 2"H
ASSEMBLY DRAWING	SC6–402
PAID DRAWING	***–291
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2–034
REV.	0





DETAIL "A"
SCALE: 3/16"

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	6"	PIPE, STD SMLS, A-106-B 17702125	6"
2	1	6"	PIPE, STD SMLS, A-106-B	2'-6"
3	1	6"	PIPE, STD SMLS, A-106-B	16'-5 1/2"
4	2	6"	ELL, 90 LR STD, A-234-WPB	
5	2	6"	FLG, RFWN 150LB STD, A-105	
6	1		PIPE SHOE, 6" LG x 3" HI FROM MSAS	
7	2		PIPE SHOE, 6" LG x 3" HI FROM MSAS	
8	2		ANGLE, 3" x 2" x 1/4" x 2" LG. (DRILL PER DETAIL)	

J-488
04/11/18
IFC

*** = JOB #

Apr 10, 2018 – 4:12pm Z:\400 – Drafting\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-Piping\SPOOLS\IFC\SK2\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	40 Psia							
OPER. TEMP.	200 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY	APR

CONFIDENTIAL STATEMENT

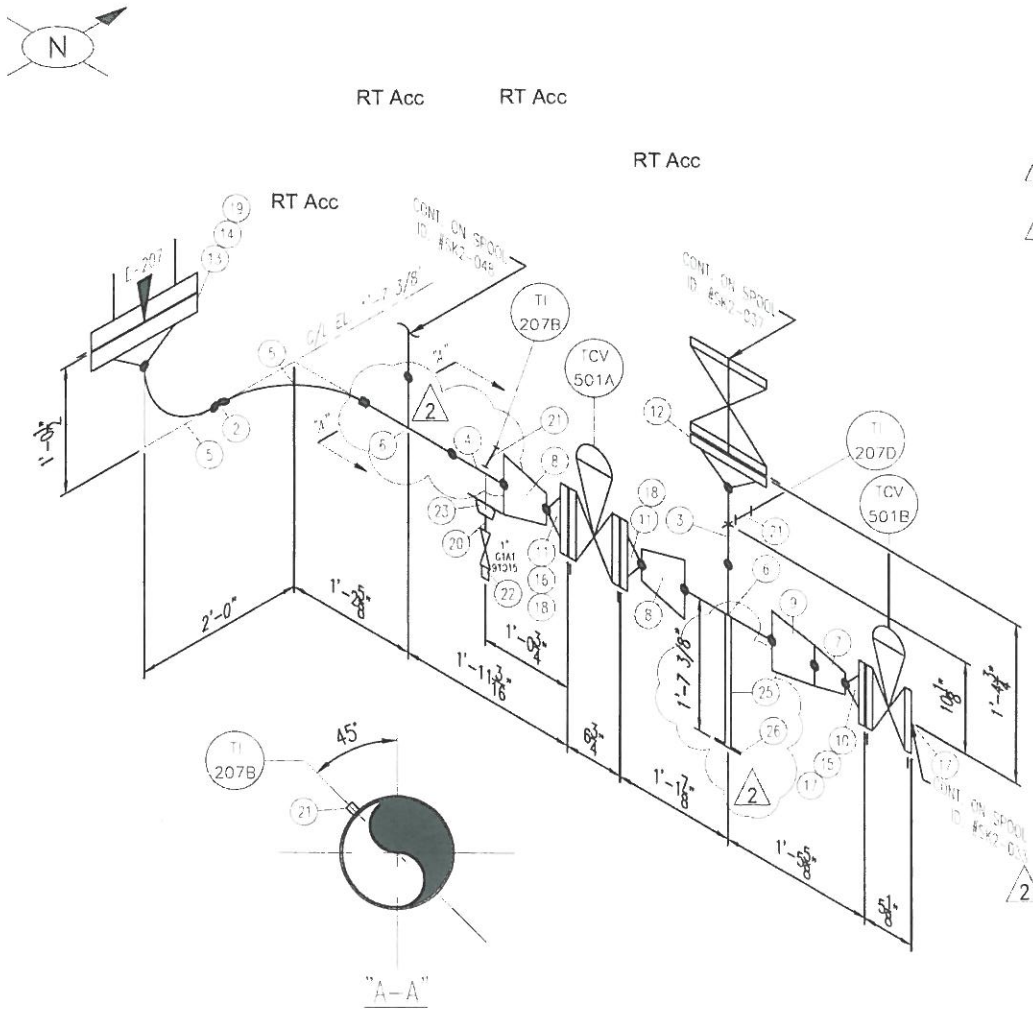
THIS DRAWING IS THE PROPERTY OF THE THOMAS RUSSELL Co. AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SKOOLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	614-A1-CS-6" 2"H
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-291
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-035
REV.	0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1				
2	1	6"	PIPE, STD SMLS, A-106-B 17607172	6"
3	1	6"	PIPE, STD SMLS, A-106-B	7 5/8"
4	1	6"	PIPE, STD SMLS, A-106-B	9 5/16"
5	2	6"	ELL, 90 LR STD, A-234-WPB	
6	2	6"	TEE, STR STD, A-234-WPB	
7	1	4"x6"	REDUCER, CONC STD - XH, A-234-WPB	
8	2	6"x1"	REDUCER, CONC STD, A-234-WPB	
9	1	6"x4"	REDUCER, CONC STD, A-234-WPB	
10	1	2"	FLG, RFWN 150LB XH, A-105	
11	2	1"	FLG, RFWN 150LB STD, A-105	
12	1	6"	FLG, RFWN 150LB STD, A-105	
13	1	6"	FLG, RFWN 150LB STD, A-105	
14	1	3/4"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	4 3/4"
15	1	5/8"	(4) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	8 1/2"
16	1	5/8"	(4) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	10 1/2"
17	2	2"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
18	2	1"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
19	1	6"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
20	1	1"	NEEDLE, XH SMLS, A-106-B POE-TOE	3"
21	2	3/4"	CPLG, TOE x 2 1/2" LG., 3000LB FS, A-105	
22	1	1"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
23	1	6"x1"	SOL, 3000LB FS, A-105	
24				
25	1	3"	PIPE, STD SMLS, A-106-B	1'-6 7/8"
26			BASE PLATE, 1/2" THK x 6" x 6" (SA-36 MATERIAL)	

J-488
04/11/18
IFC

*** = JOB #

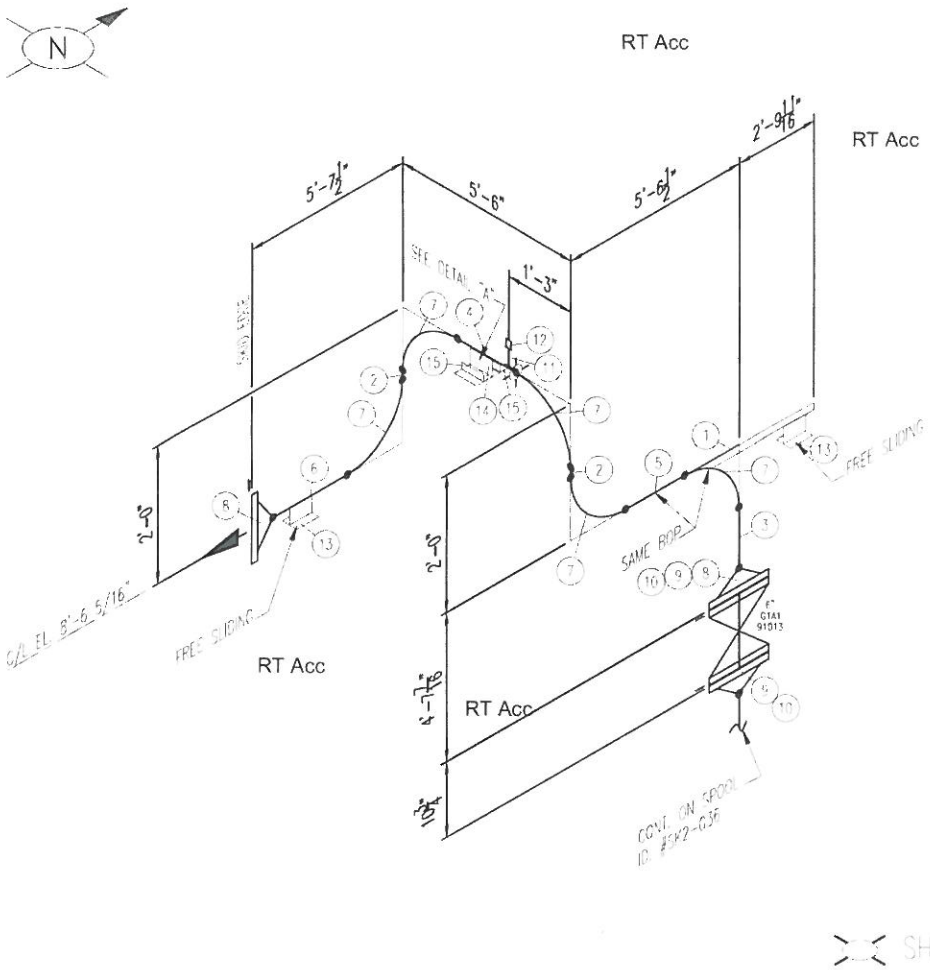
Apr 10, 2018 – 4:13pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	40 Psia			2	REVISED TO ADD 6" TEE & PIPE SUPPORT	10/03/13	MSD	KK
OPER. TEMP.	200 °F	CORR. ALLOW.	.0625"	1	REVISED AS NOTED	12/27/11	DV	LH
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SHOULDED ON.

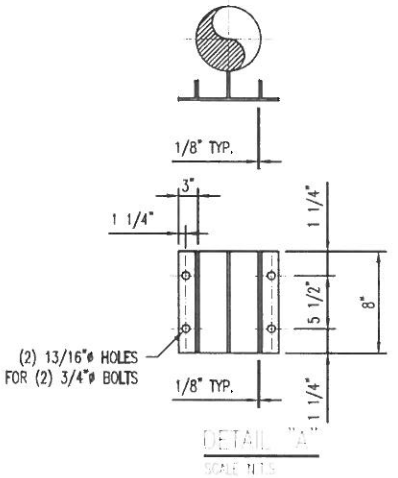
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	614-A1-CS-6" 2"H
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-291
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-036
REV.	2



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION		LENGTH
1	1	6"	PIPE, STD SMLS, A-106-B		2'-6 11/16"
2	2	6"	PIPE, STD SMLS, A-106-B	17702125	6"
3	1	6"	PIPE, STD SMLS, A-106-B	17607172	2'-6 15/16"
4	1	6"	PIPE, STD SMLS, A-106-B	17702125	4'-0"
5	1	6"	PIPE, STD SMLS, A-106-B	17702125	4'-6 1/2"
6	1	6"	PIPE, STD SMLS, A-106-B	17702125	4'-7"
7	5	6"	ELL, 90 LR STD, A-234-WPB		
8	2	6"	FLG, RFWN 150LB STD, A-105		
9	2	3/4"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H		4 1/4"
10	2	6"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING		
11	1	1/2"	CPLG, TOE x 2 1/2" LG, 3000LB FS, A-105		
12	1	1/2"	PLUG, SOLID STEEL, ROUND HEAD, A-105		
13	2		PIPE SHOE, 5" LG x 3" HI FROM W6x15		
14	1		PIPE SHOE, 8" LG x 3" HI FROM W5x19		
15	2		ANGLE, 3" x 2" x 1/4" x 8" LG (DRILL PER DETAIL)		



DETAIL "A"
SCALE: NTS

J-488
04/11/18
IFC

*** = JOB #

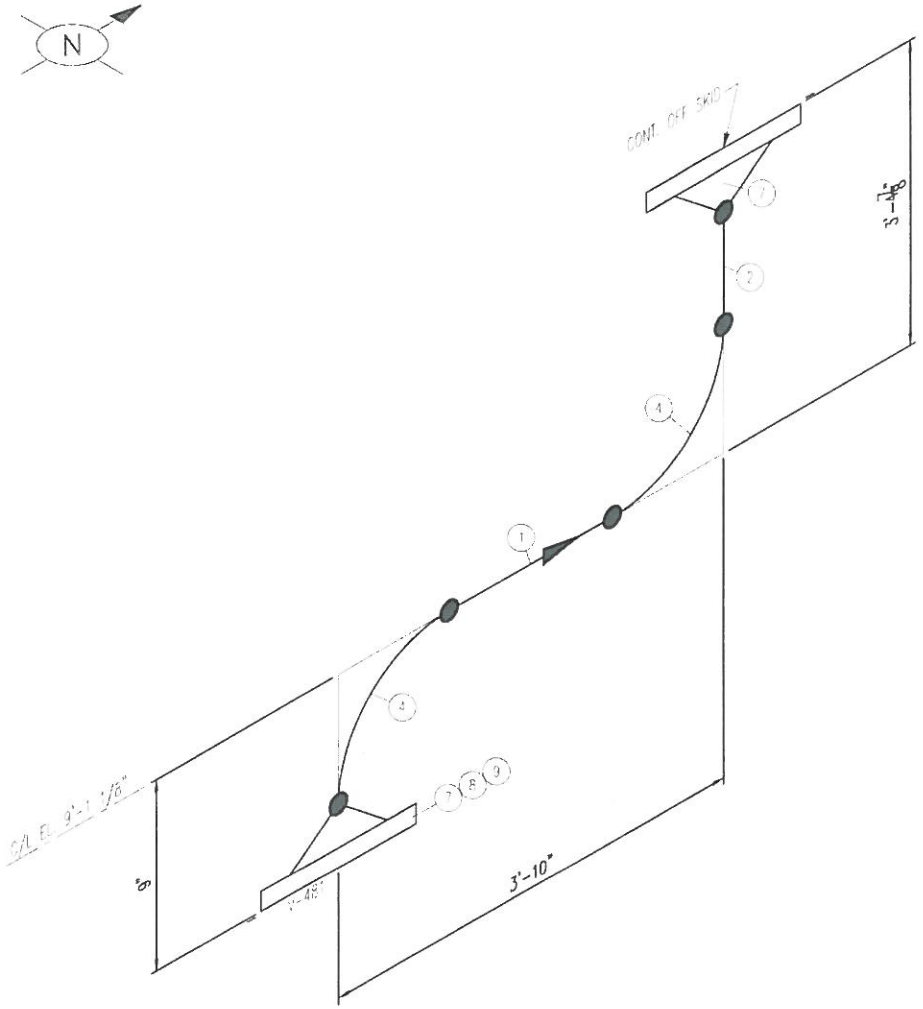
Apr 10, 2018 – 4:13pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	40 Psia							
OPER. TEMP.	200 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SHOULDED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	614-A1-CS-6" 2"H
ASSEMBLY DRAWING	SC6-402
PIPING DRAWING	***-291
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-037
REV.	0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION		LENGTH
1	1	4"	PIPE, STD SMLS, A-106-B	58130K	2'-10"
2	1	4"	PIPE, STD SMLS, A-106-B	58130K	2'-7 7/8"
3	1	3"	ELL, 90 LR STD, A-234-WPB		
4	2	4"	ELL, 90 LR STD, A-234-WPB		
5	1	4"x4"	REDUCER, CONC STD, A-234-WPB		
6	1	3"	FLG, RFWN 150LB STD, A-105		
7	2	4"	FLG, RFWN 150LB STD, A-105		
8	*	5/8"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H		3 3/4"
9	*	4"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING		

1

J-488
04/11/18
IFC

*** = JOB #

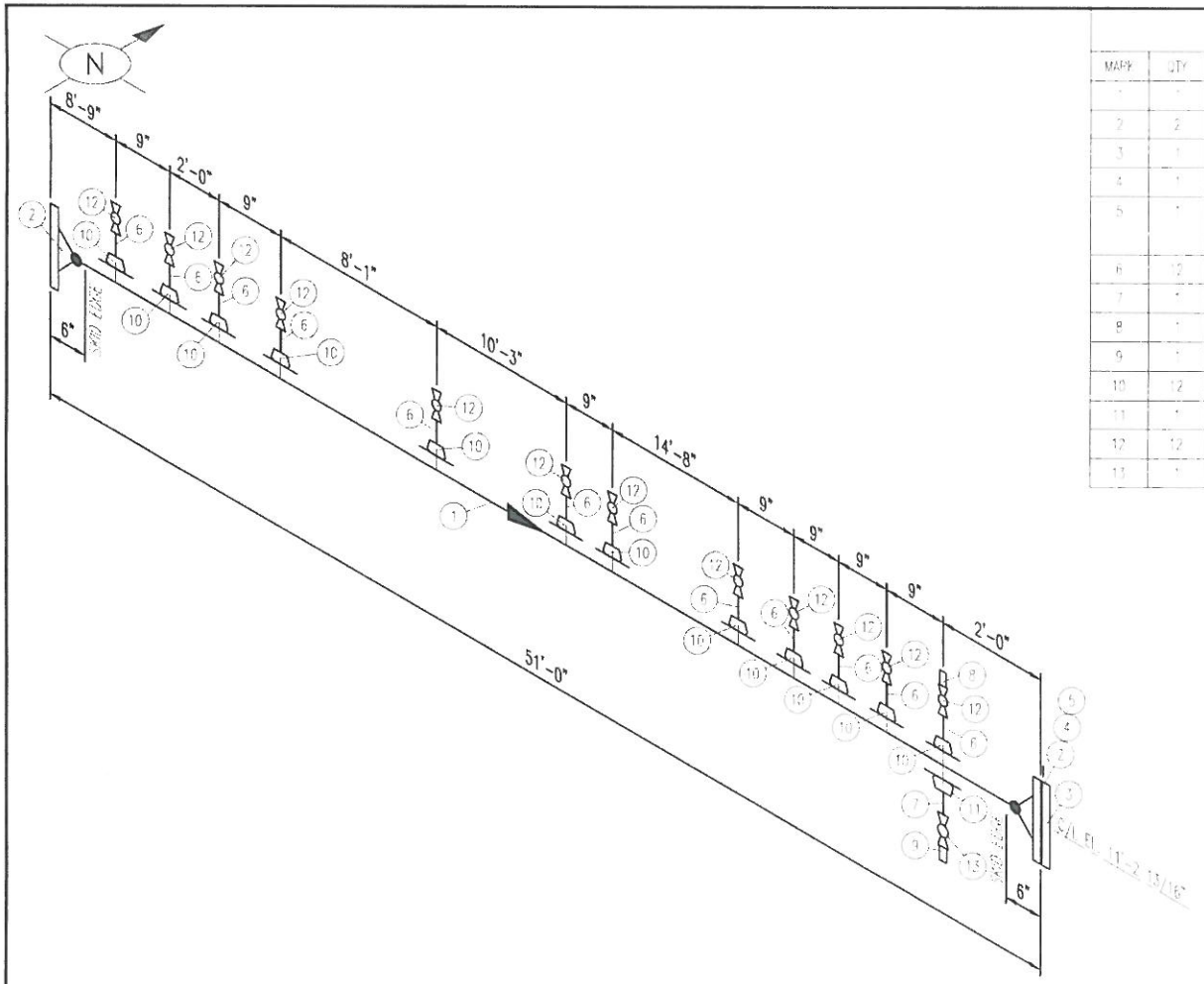
Apr 10, 2018 – 4:13pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	100 Psia							
OPER. TEMP.	69 °F	CORR. ALLOW.	.0625"	1	CHANGED FROM 3" TO 4"	07/29/11	ROC	LH
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	703-A1-CS-4"
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-296
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-038
REV.	1



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	2"	PIPE, XH SMLS, A-106-B D04408	50'-3"
2	2	2"	FLG, BFWN 150LB XH, A-105	
3	1	2"	FLG, RF BLIND 150LB, A-105	
4	1	5/8"	(4) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	5 1/2"
5	1	2"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
6	12	1/2"	NIPPLE, S/160 SMLS, A-106-B TBE	3"
7	1	3/4"	NIPPLE, XH SMLS, A-106-B TBE	3"
8	1	1/2"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
9	1	1/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
10	12	2"x1/2"	TOL, 3000LB FS, A-105	
11	1	2"x3/4"	TOL, 3000LB FS, A-105	
12	12	1/2"	BALL VALVE, THRD, 2000 LB (APOLLO MODEL 76-103-01)	1 7/16"
13	1	3/4"	BALL VALVE, THRD, 2000 LB (APOLLO MODEL 76-104-01)	1 5/8"

J-488
04/11/18
IFC

Apr 10, 2018 – 4:13pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

*** = JOB #

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	90 Psia							
OPER. TEMP.	AMBIENT °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS. SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SHOULDED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
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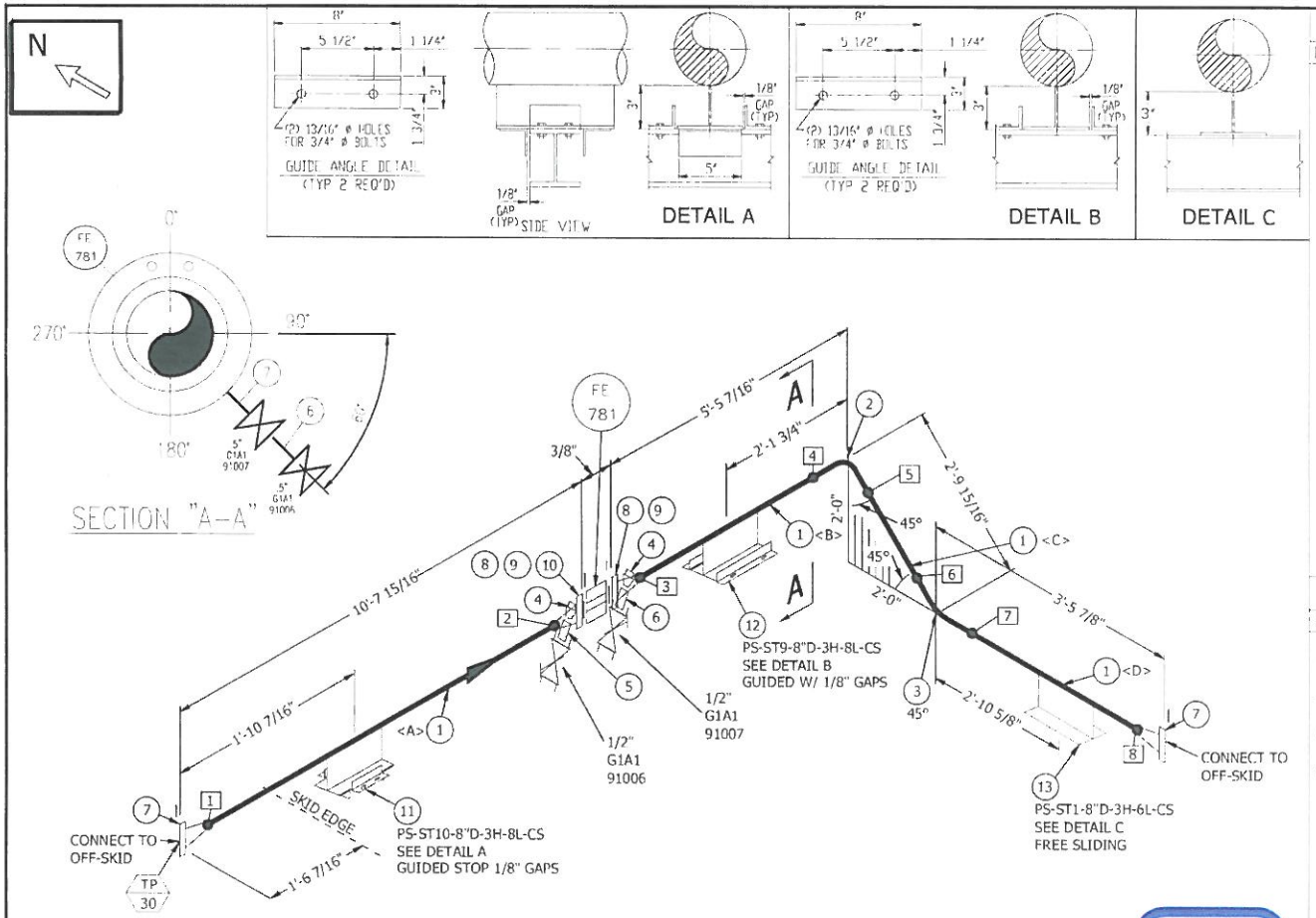
PH.: 918-481-5682

LINE No.	2" INSTRUMENT AIR
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-231-235/291/296
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-041
REV.	0



BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE 1170069	18'-2 7/16"
2	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	1
3	8	ELL 45, BW, STD, A-234 Gr. WPB	1
4	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	2
5	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, TBE (6" LG)	1
6	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, TBE (3" LG)	1
7	8	FLG, RFWN, 150#, STD, A-105	2
8	8	FLG, ORIFICE, RFWN, 300#, STD, A-105 w/ 1/2" NPT TAPS	2
9	8	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
10	7/8	(12) STUD BOLTS, 300# x 6" LG, A 193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
		PIPE SHOE (TYPE 10) 3" HI. x 12" LG. FROM W6x15 A-992 (2)	1
11		STOP ANG, 2" x 2" x 1/4" x 5" LG. A-36 (2) GUIDE ANG, 2" x 3" x 1/4" x 8" LG. A-36	
12		PIPE SHOE (TYPE 9) 3" HI. x 12" LG. FROM W6x15 A-992 (2)	1
		GUIDE ANGLE, 2" x 3" x 1/4" x 8" LG. A-36	
13		PIPE SHOE (TYPE 1) 3" HI. x 6" LG. FROM W6x15 A-992	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	JR
2	8"	BW	
3	8"	BW	
4	8"	BW	
5	8"	BW	
6	8"	BW	
7	8"	BW	
8	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	9'-11 9/16"	BEVEL	BEVEL
B	8"	4'-1 1/16"	BEVEL	BEVEL
C	8"	1'-4 15/16"	BEVEL	BEVEL
D	8"	2'-8 7/8"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2				
OPER. PRESS.	50 Psig						
OPER. TEMP.	300 °F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/07/17	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES.
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SAGGED ON

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DWG No	611-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	CW
DATE DRAWN	11/07/17
JOB No	488
SPOOL ID No	SK2-100
REV	0

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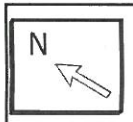
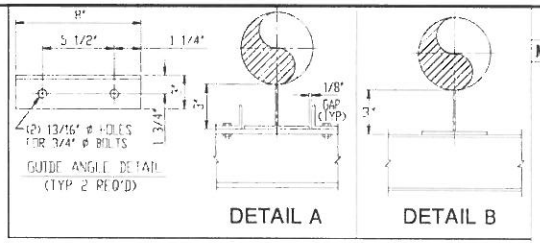
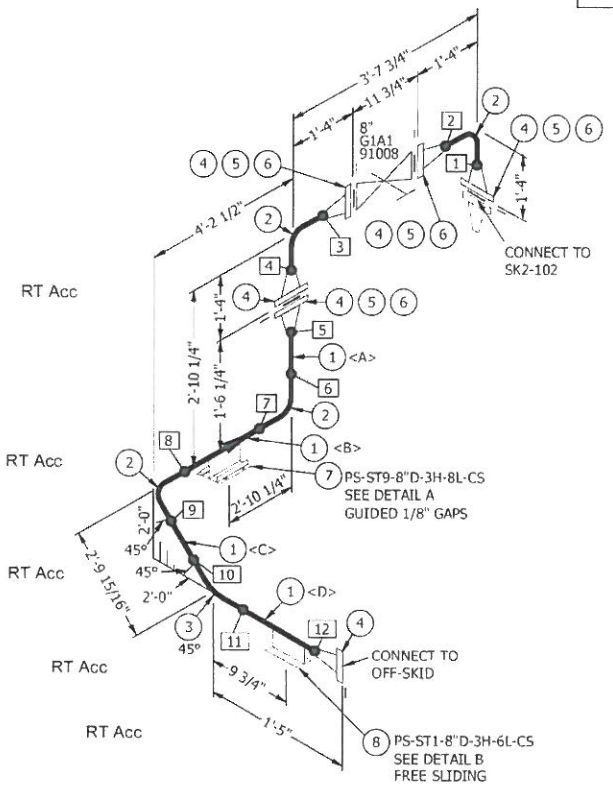




BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE 1170278	4'-5 9/16"
2	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	4
3	8	ELL 45, BW, STD, A-234 Gr. WPB	1
4	8	FLG, RFWN, 150#, STD, A-105	6
5	8	GSKT, 1/8" THK, 150#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	4
6	3/4	(8) STUD BOLTS, 150# x 4 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	4
7	8	PIPE SHOE (TYPE 9) 3" HI. x 8" LG. FROM W6x15 A-992 (2) GUIDE ANGLE, 2" x 3" x 1/4" x 8" LG. A-36	1
8	8	PIPE SHOE (TYPE 1) 3" HI. x 6" LG. FROM W6x15 A-992	1



WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	O
2	8"	BW	O
3	8"	BW	O
4	8"	BW	O
5	8"	BW	CC
6	8"	BW	
7	8"	BW	
8	8"	BW	
9	8"	BW	
10	8"	BW	
11	8"	BW	
12	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	2 1/8"	BEVEL	BEVEL
B	8"	2'-2 1/2"	BEVEL	BEVEL
C	8"	1'-4 15/16"	BEVEL	BEVEL
D	8"	8"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2					
OPER. PRESS.	50 Psig							
OPER. TEMP.	300 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/07/17	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
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DWG No	611-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	CW
DATE DRAWN	11/07/17
JOB No	488
SPOOL ID No	SK2-101
REV	0

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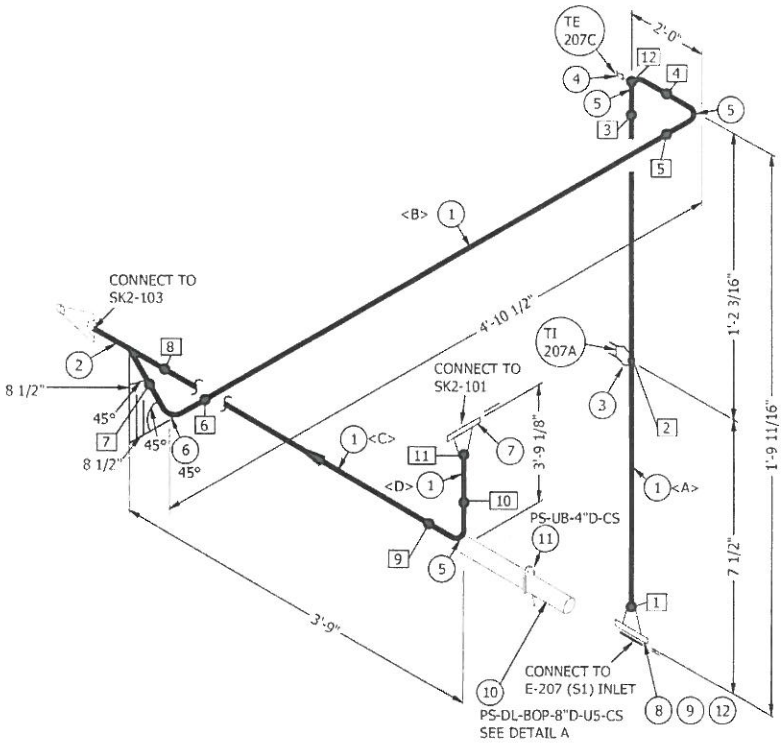

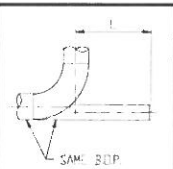

DETAIL A

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE 1170069	6'-5 15/16"
2	8X8	TEE, BW, STD, A-234 Gr. WPB	1
3	8X3/4	CPLG, TOE, x 2 1/2" LG, 3000#, A-105	1
4	8X3/4	E-O-L, THRD, 3000#, A-105	1
5	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	3
6	8	ELL 45, BW, STD, A-234 Gr. WPB	1
7	8	FLG, RFWN, 150#, STD, A-105	1
8	8	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
9	7/8	(12) STUD BOLTS, 300#, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (5 3/4" LG)	1
10		(1) PIPE, 4" STD, SMLS, x 4'-5 1/4" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 4 3/8" O.D. A-36 (L=3'-5 1/4")	1
11		U-BOLT FOR 4" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	1
12	8	FLG, RFWN, 300#, STD, A-105	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	JR
2	3/4"	LET	
3	8"	BW	
4	8"	BW	
5	8"	BW	
6	8"	BW	
7	8"	BW	
8	8"	BW	
9	8"	BW	
10	8"	BW	
11	8"	BW	
12	3/4"	LET	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	5 5/16"	BEVEL	BEVEL
B	8"	3'-5 1/2"	BEVEL	BEVEL
C	8"	2'-2"	BEVEL	BEVEL
D	8"	2'-5 1/8"	BEVEL	BEVEL

DESIGN PRESS.	150 Psig	TAB. LOCATION	SHOP				
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2				
OPER. PRESS.	50 Psig						
OPER. TEMP.	300 °F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/17/17	CW
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY

CONFIDENTIAL STATEMENT

THIS DRAWING IS THE PROPERTY OF THE THOMAS RUSSELL Co. AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.

FABRICATION NOTES:

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ALL COUPLING TO BE SADDLED ON

UOP Russell Honeywell UOP

2350 S. Yale, Suite 210
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Phone: 918-481-5682
Fax: 918-481-7427

UNIT No.	611-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	888-291
DRAWN BY	CW
DATE DRAWN	11/13/17
JOB No.	488
SPOOL ID No.	SK2-102
REV.	0

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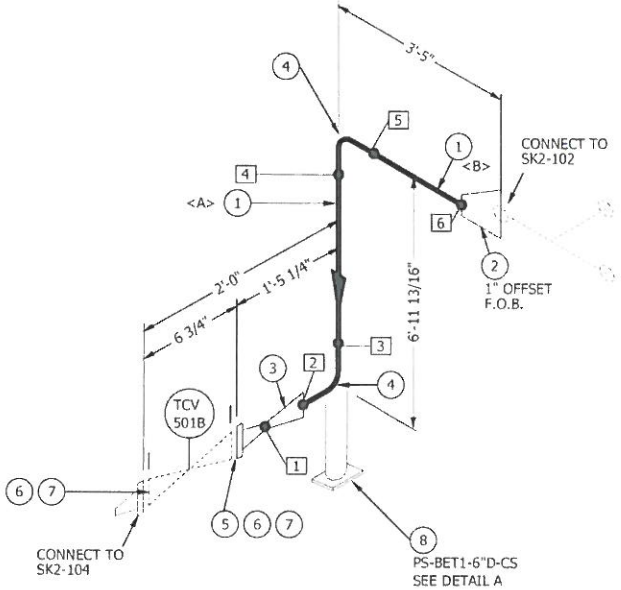

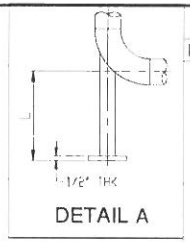

DETAIL A

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, STD, SMLS, A-106 Gr. B, 17607172	7'-7 13/16"
2	8X6	RED ECC, BW, STD - STD, A-234 Gr. WPB	1
3	6X3	RED CONC, BW, STD - STD, A-234 Gr. WPB	1
4	6	ELL 90 LR, BW, STD, A-234 Gr. WPB	2
5	3	FLG, RFWN, 150#, STD, A-105	1
6	3	GSKT, 1/8" THK, 150#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
7	5/8	(4) STUD BOLTS, 150# x 10 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (10 1/2" LG)	2
8		(1) PIPE, 3" STD, SMLS, x 2'-0" LG. A-106 Gr. B (1) BASE PL, 1/2" THK. x 6" x 6" A-36 (L= 1'-3 1/2")	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	3"	BW	JR
2	6"	BW	
3	6"	BW	
4	6"	BW	
5	6"	BW	
6	6"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	5'-5 13/16"	BEVEL	BEVEL
B	6"	2'-2"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	400°F	SPOOL LOCATION	SKID#2				
OPER. PRESS.	50 Psig						
OPER. TEMP.	300°F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/17/17	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY	APR

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LINE No.	612-A1-CS-6" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	CW
DATE DRAWN	11/13/17
JOB No.	489
SPOOL IDENT No.	SK2-103
REV.	0

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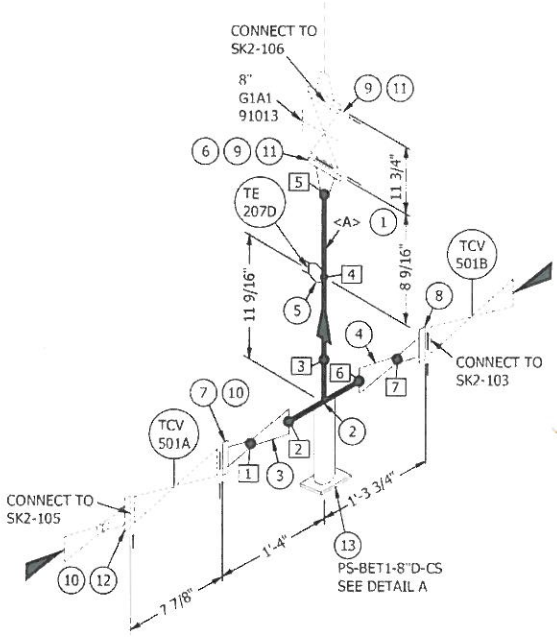

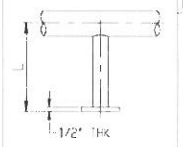

DETAIL A

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE 1170278	0'-9 1/8"
2	8X8	TEE, BW, STD, A-234 Gr. WPB	1
3	8X4	RED CONC, BW, STD - STD, A-234 Gr. WPB	1
4	8X3	RED CONC, BW, STD - STD, A-234 Gr. WPB	1
5	8X3/4	CPLG, TOE, x 2 1/2" LG, 3000#, A-105	1
6	8	FLG, RFWN, 150#, STD, A-105	1
7	4	FLG, RFWN, 150#, STD, A-105	1
8	3	FLG, RFWN, 150#, STD, A-105	1
9	8	GSKT, 1/8" THK, 150#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
10	4	GSKT, 1/8" THK, 150#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
11	3/4	(8) STUD BOLTS, 150# x 4 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	2
12	5/8	(8) STUD BOLTS, 150# x 11 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
13		(1) PIPE, 4" STD, SMLS, x 1'-3" LG. A-106 Gr. B (1) BASE PL, 1/2" THK. x 6" x 6" A-36 (L=1'-3 1/2")	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	4"	BW	S
2	8"	BW	
3	8"	BW	
4	3/4"	LET	
5	8"	BW	
6	8"	BW	
7	3"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	9 1/8"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2				
OPER. PRESS.	40 Psig						
OPER. TEMP.	200 °F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	4/2/18	COB
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SOCKET-ON

UOP Russell
Honeywell
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2990 S. Yale, Suite 210
Tulsa, Oklahoma 74135
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Fax: 918-481-7427

LINE No.	614-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	COB
DATE DRAWN	4/2/18
JOB No.	488
SPOOL ID No.	SK2-104
REV	0

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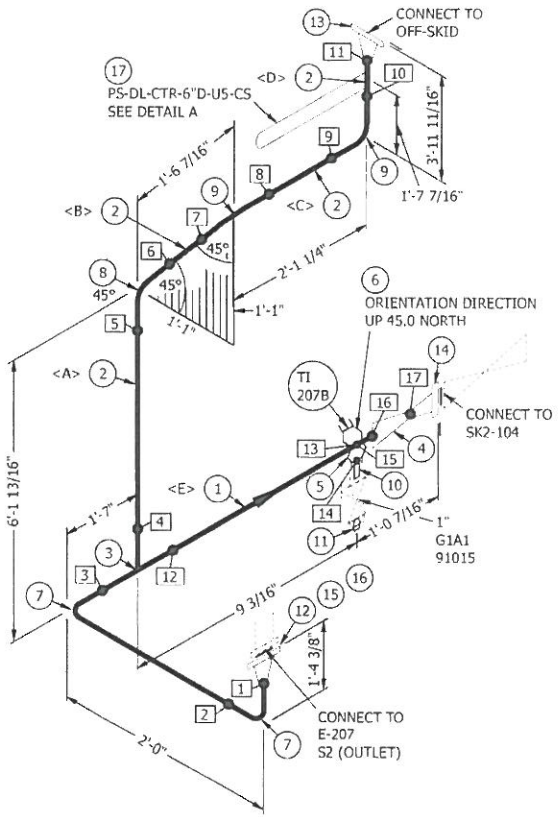

DETAIL B

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE 1170069	0'-5 5/8"
2	6	PIPE, STD, SMLS, A-106 Gr. B, BBE 17607172	9'-3 1/2"
3	8X6	TEE RED, BW, STD - STD, A-234 Gr. WPB	1
4	8X4	RED CONC, BW, STD - STD, A-234 Gr. WPB	1
5	8X1	S-O-L, SW, 3000#, A-105	1
6	8X3/4	CPLG, TOE, x 2 1/2" LG, 3000#, A-105	1
7	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	2
8	6	ELL 45, BW, STD, A-234 Gr. WPB	1
9	6	ELL 90 LR, BW, STD, A-234 Gr. WPB	2
10	1	NIPPLE, XH, SMLS, A-106 Gr. B, x 3" LG, POE-TOE	1
11	1	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
12	8	FLG, RFWN, 300#, STD, A-105	1
13	6	FLG, RFWN, 150#, STD, A-105	1
14	4	FLG, RFWN, 150#, STD, A-105	1
15	8	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
16	7/8	(12) STUD BOLTS, 300# x 5 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
17	6	(1) PIPE, 3" STD, SMLS, x 2'-0" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 3 3/8" O.D. A-36 (L=2'-0")	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	JR
2	8"	BW	
3	8"	BW	
4	6"	BW	
5	6"	BW	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	6"	BW	
11	6"	BW	
12	8"	BW	A
13	1"	LET	A
14	1"	SW	
15	3/4"	LET	A
16	8"	BW	A
17	4"	BW	A

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	5'-3 7/16"	BEVEL	BEVEL
B	6"	5 5/8"	BEVEL	BEVEL
C	6"	7 1/4"	BEVEL	BEVEL
D	6"	2'-11 3/16"	BEVEL	BEVEL
E	8"	5 5/8"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	400°F	SPOOL LOCATION	SKID#2				
OPER. PRESS.	40 Psig						
OPER. TEMP.	200°F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/17/17	CW
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY

CONFIDENTIAL STATEMENT

THIS DRAWING IS THE PROPERTY OF THE THOMAS RUSSELL Co. AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

UOP Russell Honeywell uop

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LINE No.	614-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	CW
DATE DRAWN	11/14/17
JOB No.	488
SPOOL ID No.	SK2-105
REV.	0

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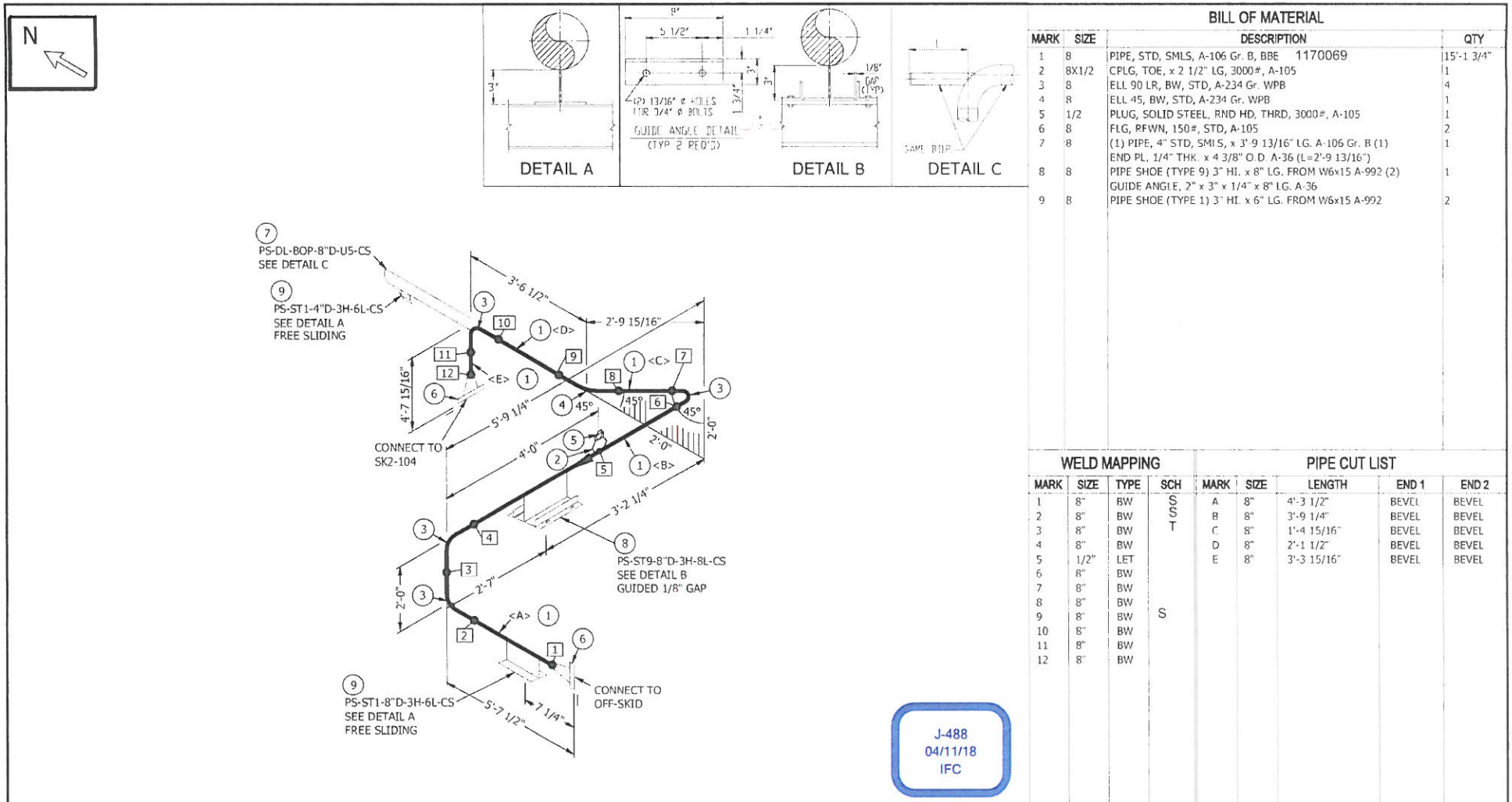

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE 1170069	15'-1 3/4"
2	8X1/2	CPLG, TOE, x 2 1/2" LG, 3000#, A-105	1
3	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	4
4	8	ELL 45, BW, STD, A-234 Gr. WPB	1
5	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
6	8	FLG, RFWN, 150#, STD, A-105	2
7	8	(1) PIPE, 4" STD, SMLS, x 3'-9 13/16" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 4 3/8" O.D. A-36 (L=2'-9 13/16")	1
8	8	PIPE SHOE (TYPE 9) 3" HI. x 8" LG. FROM W6x15 A-992 (2) GUIDE ANGLE, 2" x 3" x 1/4" x 8" LG. A-36	1
9	8	PIPE SHOE (TYPE 1) 3" HI. x 6" LG. FROM W6x15 A-992	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	S
2	8"	BW	S
3	8"	BW	T
4	8"	BW	
5	1/2"	LET	
6	8"	BW	
7	8"	BW	
8	8"	BW	
9	8"	BW	S
10	8"	BW	
11	8"	BW	
12	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	4'-3 1/2"	BEVEL	BEVEL
B	8"	3'-9 1/4"	BEVEL	BEVEL
C	8"	1'-4 15/16"	BEVEL	BEVEL
D	8"	2'-1 1/2"	BEVEL	BEVEL
E	8"	3'-3 15/16"	BEVEL	BEVEL

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2					
OPER. PRESS.	40 Psig							
OPER. TEMP.	200 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/17/17	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES.
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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LINE No.	614-A1-CS-8"-2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	CW
DATE DRAWN	11/14/17
JOB No.	488
SPOOL ID No.	SK2-106
REV.	0

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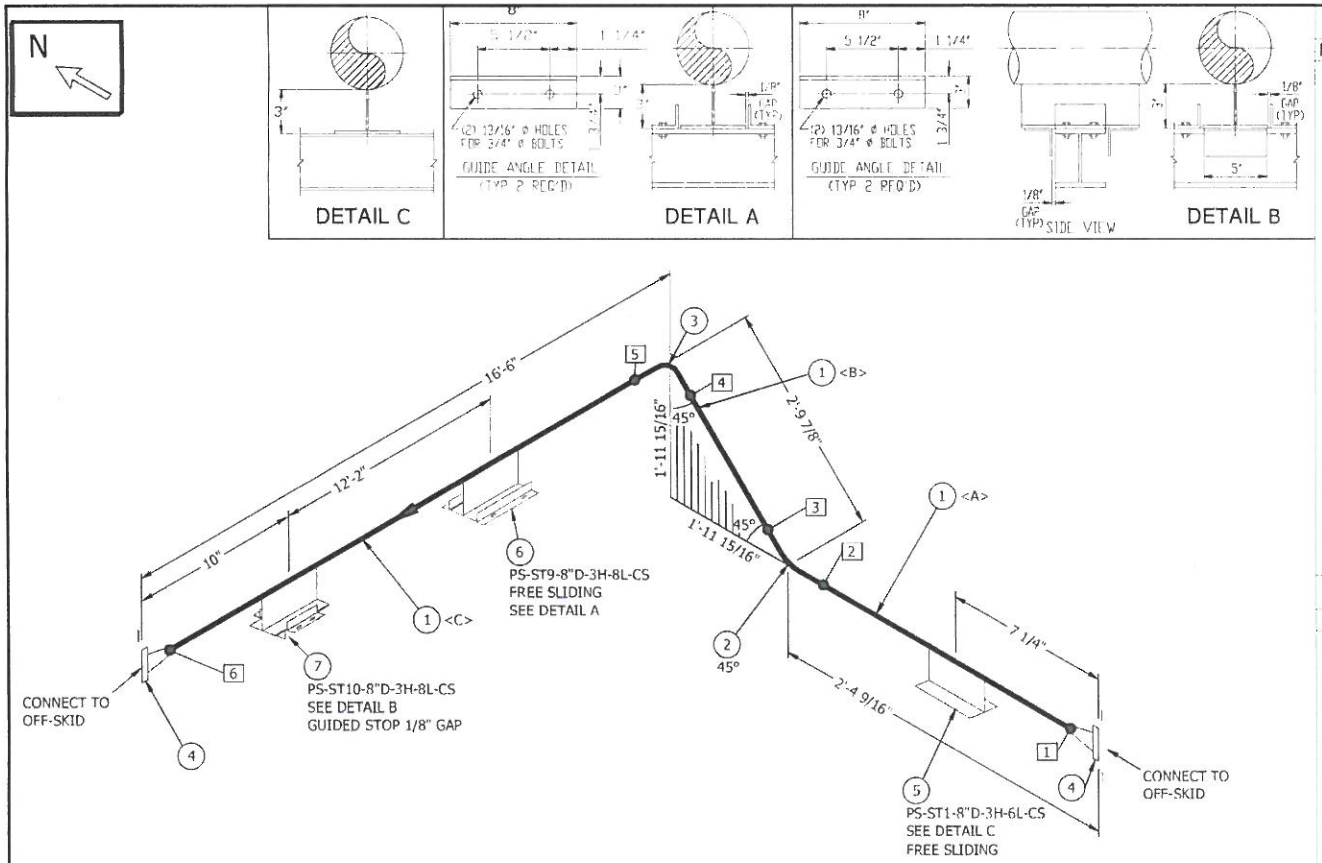

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE 1170069	18'-2 7/16"
2	8	ELL 45, BW, STD, A-234 Gr. WPB	1
3	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	1
4	8	FLG, RFWN, 150#, STD, A-105	2
5	8	PIPE SHOE (TYPE 1) 3" HI. x 6" LG. FROM W6x15 A-992	1
6	8	PIPE SHOE (TYPE 9) 3" HI. x 8" LG. FROM W6x15 A-992 (2) GUIDE ANGLE, 2" x 3" x 1/4" x 8" LG. A-36	1
7	8	PIPE SHOE (TYPE 10) 3" HI. x 12" LG. FROM W6x15 A-992 (2) STOP ANG, 2" x 2" x 1/4" x 5" LG. A-36 (2) GUIDE ANG, 2" x 3" x 1/4" x 8" LG. A-36	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	JR
2	8"	BW	
3	8"	BW	
4	8"	BW	
5	8"	BW	
6	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	1'-7 9/16"	BEVEL	BEVEL
B	8"	1'-4 7/8"	BEVEL	BEVEL
C	8"	15'-2"	BEVEL	BEVEL

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2					
OPER. PRESS.	40 Psig							
OPER. TEMP.	200 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/17/17	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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UNIT No.	614-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	CW
DATE DRAWN	11/14/17
JOB No.	488
SPOOL ID No.	SK2-107
REV.	0

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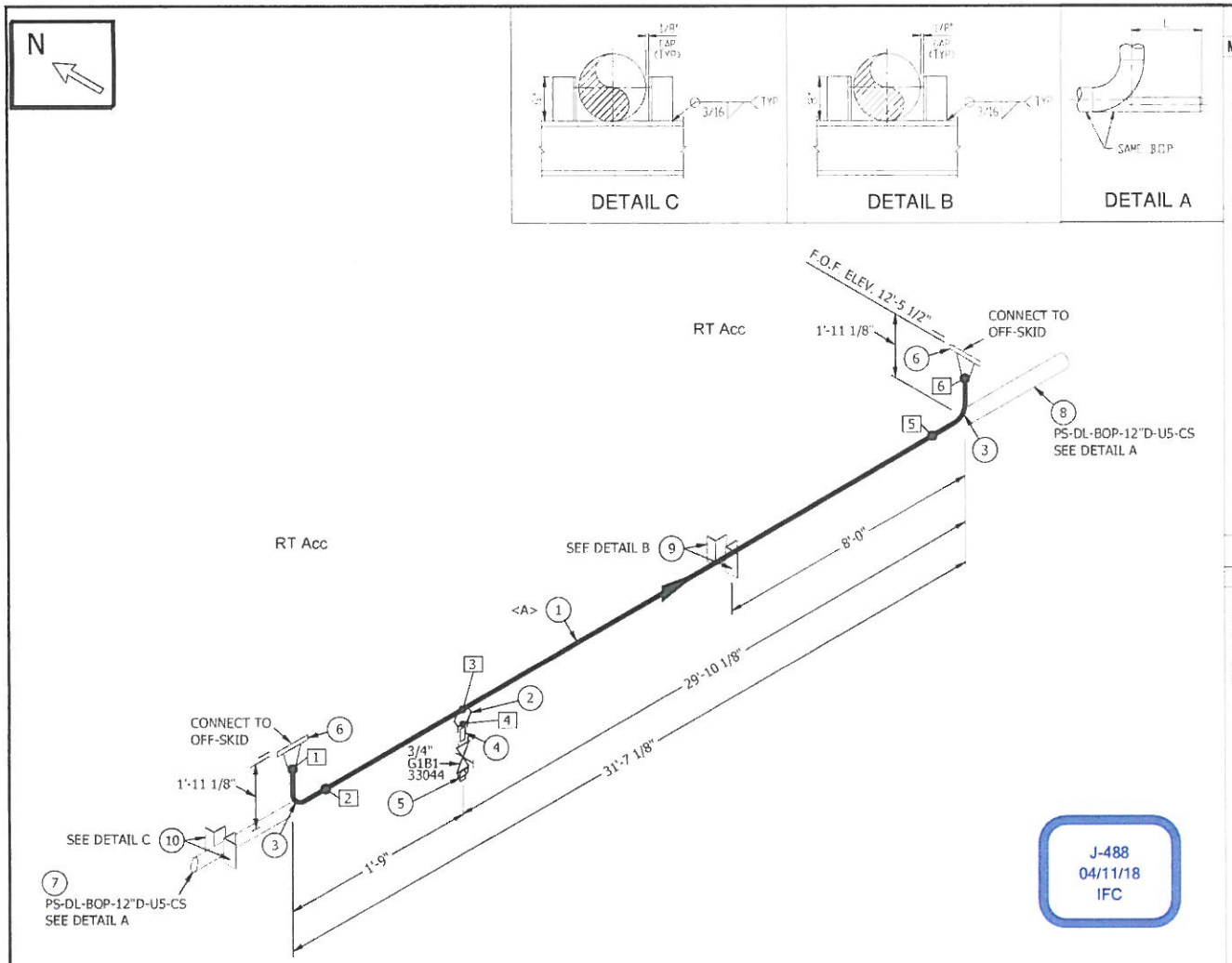

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	12	PIPE, STD, SMLS, A-106 Gr. B, BBE 173201	28'-7 1/8"
2	12X3/4	S-O-L, SW, 3000#, A-105	1
3	12	ELL 90 LR, BW, STD, A-234 Gr. WPB	2
4	3/4	NIPPLE, XH, SMLS, A-106 Gr. B, x 3" LG, POE-TOE	1
5	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
6	12	FLG, RFWN, 300#, STD, A-105	2
7	12	(1) PIPE, 8" STD, SMLS. x 3'-6" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 8 1/2" O.D. A-36 (L=2'-0")	1
8	12	(1) PIPE, 8" STD, SMLS, x 6'-3" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 8 1/2" O.D. A-36 (L=4'-9")	1
9		ANGLE, 3"x3"x1/4", A-36, 8" LG	2
10		ANGLE, 2"x2"x1/4", A-36, 6" LG	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	12"	BW	O
2	12"	BW	O
3	3/4"	LET	O
4	3/4"	SW	
5	12"	BW	Q
6	12"	BW	Q

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	12"	28'-7 1/8"	BEVEL	BEVEL

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID#2				
OPER. PRESS.	210 Psig						
OPER. TEMP.	88 °F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUED FOR CONSTRUCTION	11/17/17	CW
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY

CONFIDENTIAL STATEMENT

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FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

UOP Russell Honeywell UOP

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DWG. No.	1/8-B1-CS-12"
ASSEMBLY DRAWING	SC6R-402
FIELD DRAWING	*** 233
DRAWN BY	CW
DATE DRAWN	11/15/17
JOB No.	488
SPOOL I.D. No.	SK2-108
REV.	0

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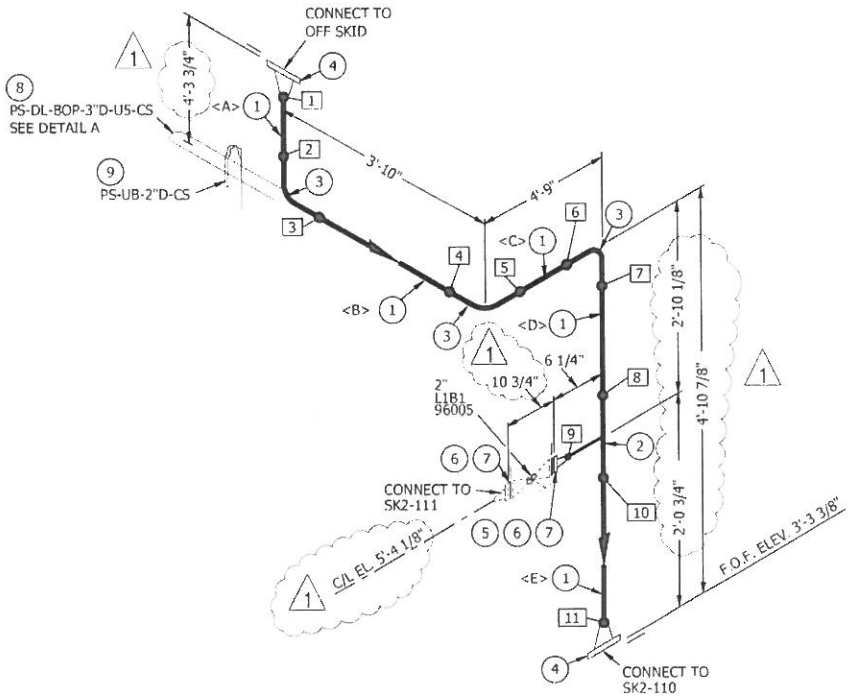

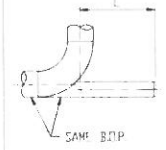

DETAIL A

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	4	PIPE, STD, SMLS, A-106 Gr. B, BBE 58130K	13'-6 5/8"
2	4X2	TEE RED, BW, STD - XH, A-234 Gr. WPB	1
3	4	ELL 90 LR, BW, STD, A-234 Gr. WPB	3
4	4	FLG, RFWN, 300#, STD, A-105	2
5	2	FLG, RFWN, 300#, XH, A-105	1
6	2	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
7	5/8	(8) STUD BOLTS, 300#, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H, (ZINC PLATED) (3 3/4" LG)	2
8		(1) PIPE, 3" STD, SMLS, x 2'-1 7/8" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 3 3/8" O.D. A-36 (L= 1'-7 7/8")	1
9		U-BOLT FOR 3" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	4"	BW	CM
2	4"	BW	
3	4"	BW	
4	4"	BW	
5	4"	BW	
6	4"	BW	
7	4"	BW	
8	4"	BW	
9	2"	BW	
10	4"	BW	
11	4"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	4"	3'-6 3/8"	BEVEL	BEVEL
B	4"	2'-10"	BEVEL	BEVEL
C	4"	3'-9"	BEVEL	BEVEL
D	4"	2'-0"	BEVEL	BEVEL
E	4"	1'-5 1/4"	BEVEL	BEVEL

J-488
05/15/18
REV

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID#2				
OPER. PRESS.	210 Psia						
OPER. TEMP.	88°F	CORR. ALLOW.	.0625"	1	REVISED FOR VALVE SIZE CHANGE	5/9/18	COB	WD
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	5/9/18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDOLET ON

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UNIT No	700-B1-CS-4"
ASSEMBLY DRAWING	SC6R-402
PIPING DRAWING	488-296
DRAWN BY	CW
DATE DRAWN	5/9/18
JOB No	488
SPOOL ID No	SK2-109
REV	1

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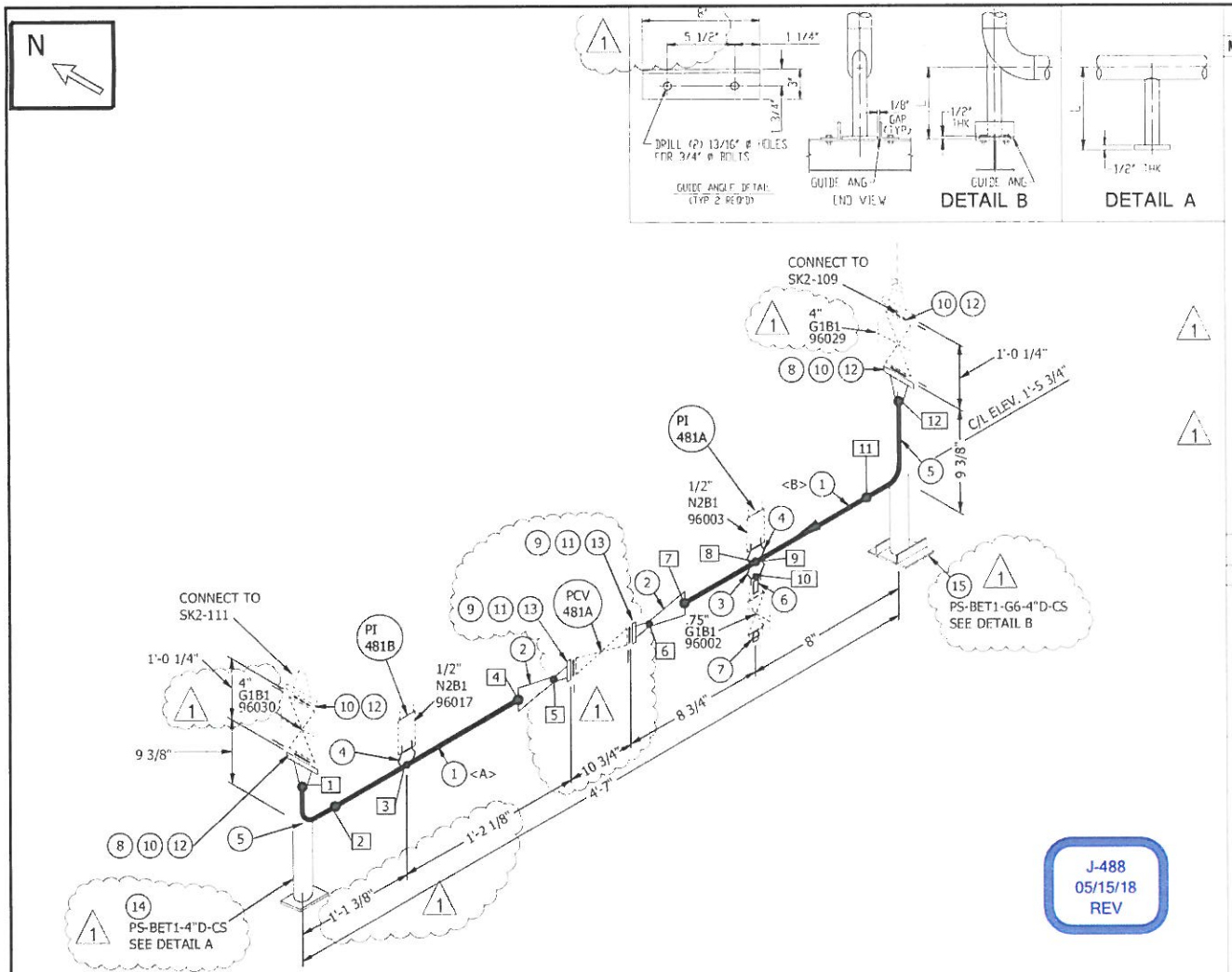

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	4	PIPE, STD, SMLS, A-106 Gr. B, BBE 58130K	1'-6 3/4"
2	4X2	RED CONC, BW, STD - XH, A-234 Gr. WPB	2
3	4X3/4	S-O-L, SW, 3000#, A-105	1
4	4X1/2	T-O-L, THRD, 3000#, A-105	2
5	4	ELL 90 LR, BW, STD, A-234 Gr. WPB	2
6	3/4	NIPPLE, XH, SMLS, A-106 Gr. B, x 3" LG, POE-TOE	1
7	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
8	4	FLG, RFWN, 300#, STD, A-105	2
9	2	FLG, RFWN, 300#, XH, A-105	2
10	4	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	4
11	2	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
12	3/4	(8) STUD BOLTS, 300# x 4 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	4
13	5/8	(8) STUD BOLTS, 300# x 3 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	2
14	4	(1) PIPE, 2" XH, SMLS, x 1'-11 3/16" LG. A-106 Gr. B (1) BASE PL, 1/2" THK. x 5" x 5" A-36 (L=1'-5 11/16")	1
15	4	(1) PIPE, 2" XH, SMLS, x 1'-11 3/16" LG. A-106 Gr. B (1) BASE PL, 1/2" THK. x 5" x 5" A-36 (2) GUIDE ANG, 2" x 3" x 1/4" x 8" LG. A-36 (L=1'-5 11/16")	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	4"	BW	CC
2	4"	BW	
3	1/2"	LET	
4	4"	BW	
5	2"	BW	
6	2"	BW	
7	4"	BW	
8	1/2"	LET	
9	3/4"	LET	
10	3/4"	SW	
11	4"	BW	CC
12	4"	BW	CC

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	4"	1'-2 3/4"	BEVEL	BEVEL
B	4"	4"	BEVEL	BEVEL

J-488
05/15/18
REV

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2
OPER. PRESS.	210 Psig		
OPER. TEMP.	88 °F	CORR. ALLOW.	0625"
STRESS RELIEVE	NO	INSULATION	NONE
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3

NO.	REVISION	DATE	BY	APR
1	REVISED FOR CONTROL VALVE SIZE CHANGE	5/15/18	COB	WD
0	ISSUE FOR CONSTRUCTION	5/9/18	COB	WD

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SWAGED ON

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LINE No.	700-B1-CS-4"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	488-236
DRAWN BY	COB
DATE DRAWN	5/9/18
JOB No.	488
SPOOL I.D. No.	SK2-110
REV	1

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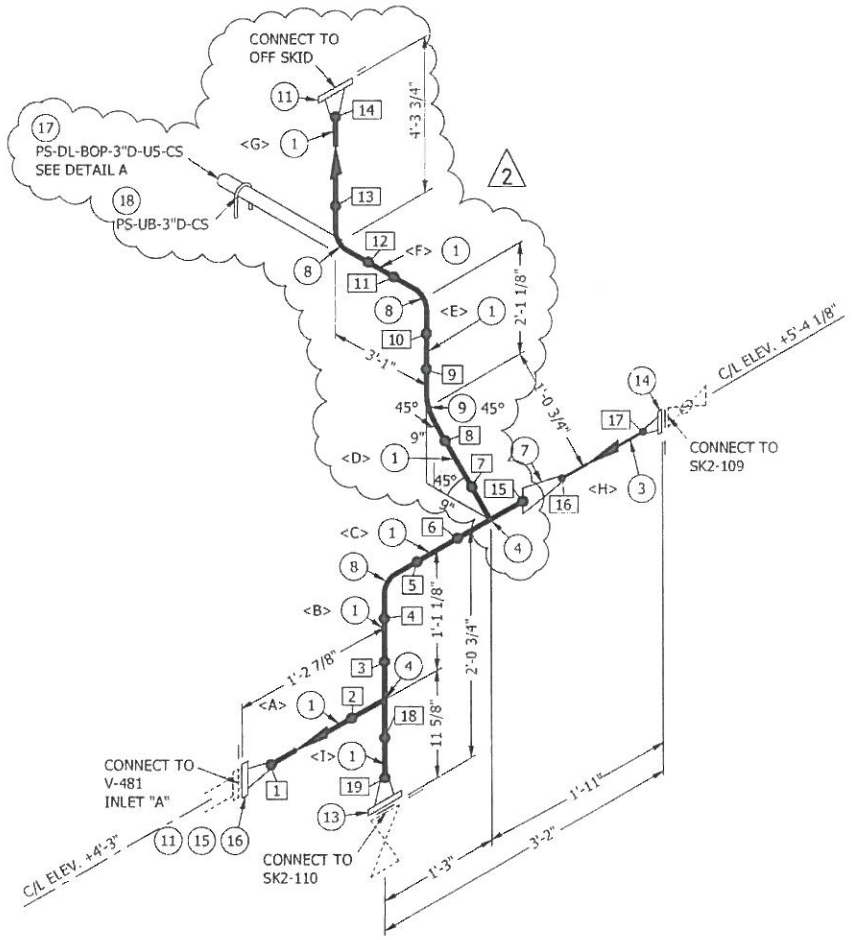

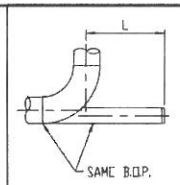

DETAIL A

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	4 (2)	PIPE, STD, SMLS, A-106 Gr. B, BBE 58130K	(2) 9'-2 1/4"
3	2	PIPE, XH, SMLS, A-106 Gr. B, BBE D04408	(2) 1'-0 1/8"
4	4X4 (2)	TEE, BW, STD, A-234 Gr. WPB	2
7	4X2	RED CONC, BW, STD - XH, A-234 Gr. WPB	(2) 1
8	4 (2)	ELL 90 LR, BW, STD, A-234 Gr. WPB	(2) 3
9	4 (2) (2)	ELL 45, BW, STD, A-234 Gr. WPB	1
11	4 (2)	FLG, RFWN, 150#, STD, A-105	2
13	4	FLG, RFWN, 300#, STD, A-105	1
14	2	FLG, RFWN, 300#, XH, A-105	1
15	4	GSKT, 1/8" THK, 150#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
16	5/8	(8) STUD BOLTS, 150# x 3 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
17	(2)	(1) PIPE, 3" STD, SMLS, x 2'-1 7/8" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 3 3/8" O.D. A-36 (L=1'-7 7/8")	1
18	3 (2)	U-BOLT FOR 3" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	4"	BW	CC
2	4"	BW	
3	4"	BW	
4	4"	BW	
5	4"	BW	
6	4"	BW	
7	4"	BW	
8	4"	BW	
9	4"	BW	
10	4"	BW	
11	4"	BW	
12	4"	BW	
13	4"	BW	
14	4"	BW	
15	4"	BW	
16	2"	BW	CM
17	2"	BW	
18	4"	BW	
19	4"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	4"	7 3/4"	BEVEL	BEVEL
B	4"	3"	BEVEL	BEVEL
C	4"	4 7/8"	BEVEL	BEVEL
D	4"	6 1/8"	BEVEL	BEVEL
E	4"	1'-4 5/8"	BEVEL	BEVEL
F	4"	2'-1"	BEVEL	BEVEL
G	4"	3'-6 3/4"	BEVEL	BEVEL
H	2"	1'-0 1/8"	BEVEL	BEVEL
I	4"	4 1/8"	BEVEL	BEVEL

J-488
06/10/18
REV

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	100 Psia			2	REVISED FOR SIZE CHANGE IN PSV-481	6/5/18	COB	WD
OPER. TEMP.	69 °F	CORR. ALLOW.	.0625"	1	REVISED FOR CONTROL VALVE SIZE CHANGE	5/9/18	COB	WD
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUED FOR CONSTRUCTION	5/9/18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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LINE No.	702-A1-CS-4"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	488-296
DRAWN BY	CW
DATE DRAWN	11/20/17
JOB No.	488
SPOOL I.D. No.	SK2-111
REV	2

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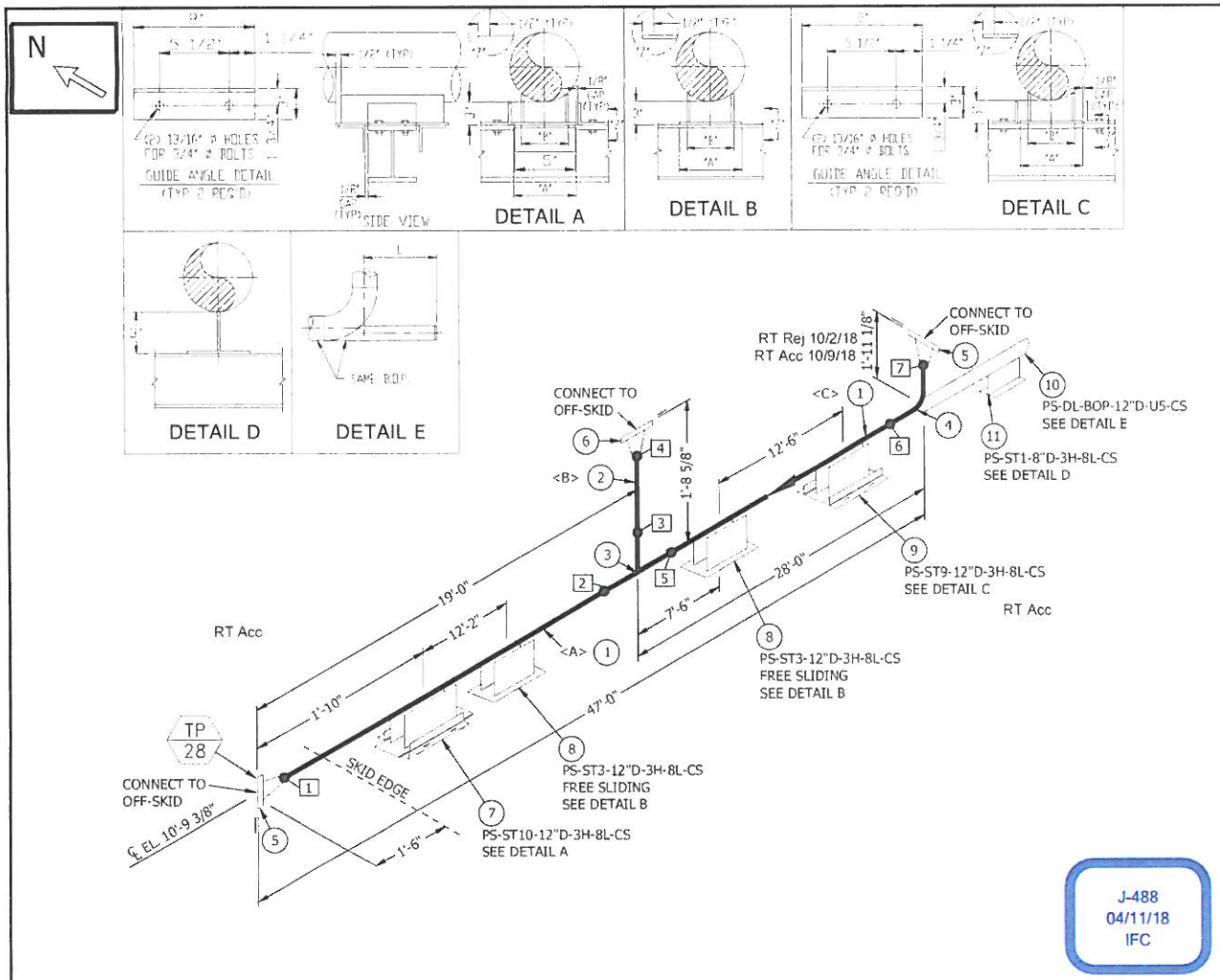

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	12	PIPE, STD, SMLS, A-106 Gr. B, BBE 173201	43'-4 7/8"
2	8	PIPE, STD, SMLS, A-106 Gr. B, BBF 1170069	0'-7 1/4"
3	12X8	TEE RED, BW, STD - STD, A-234 Gr. WPB	1
4	12	ELL 90 LR, BW, STD, A-234 Gr. WPB	1
5	12	FLG, RFWN, 300#, STD, A-105	2
6	8	FLG, RFWN, 300#, STD, A-105	1
7		(2) PL, 1/4" THK. x 2 7/8" x 11" LG. A-36 (1) PL, 3/8" THK. x 6" x 12" LG. A-36 (2) STOP ANG, 2" x 2" x 1/4" x 5" LG. A-36 (2) GUIDE ANG, 2" x 3" x 1/4" x 8" LG. A-36 (A=6") (B=4")	1
8		(2) PL, 1/4" THK. x 2 7/8" x 7" LG. A-36 (1) PL, 3/8" THK. x 6" x 8" LG. A-36 (A=6") (B=4")	2
9		(2) PL, 1/4" THK. x 2 7/8" x 7" LG. A-36 (1) PL, 3/8" THK. x 6" x 8" LG. A-36 (2) GUIDE ANG, 2" x 3" x 1/4" x 8" LG. A-36 (A=6") (B=4")	1
10		(1) PIPE, 8" STD, SMLS, x 6' 3 1/8" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 8 1/2" O.D. A-36 (L=4'-9 1/8")	1
11		PIPE SHOE (TYPE 1) 3" HT. x 8" LG. FROM W6x15 A-992	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	12"	BW	T
2	12"	BW	T
3	8"	BW	T
4	8"	BW	T
5	12"	BW	Q
6	12"	BW	S
7	12"	BW	S
5A	12"	BW	Q

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	12"	17'-8 7/8"	BEVEL	BEVEL
B	8"	7 1/4"	BEVEL	BEVEL
C	12"	25'-8"	BEVEL	BEVEL

DESIGN PRESS.	500 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	250°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	246 Psig							
OPER. TEMP.	117°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1"B	0	ISSUED FROM CONSTRUCTION		CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SWAGED ON

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LINE No. 180-B1-CS-12" 1"B
ASSEMBLY DRAWING: SC6R-402
FAB'D DRAWING: ***-2331
DRAWN BY: CW
DATE DRAWN: 11/30/17
JOB No. 488
SPOOL I.D. No. SK2-112
REV. 0

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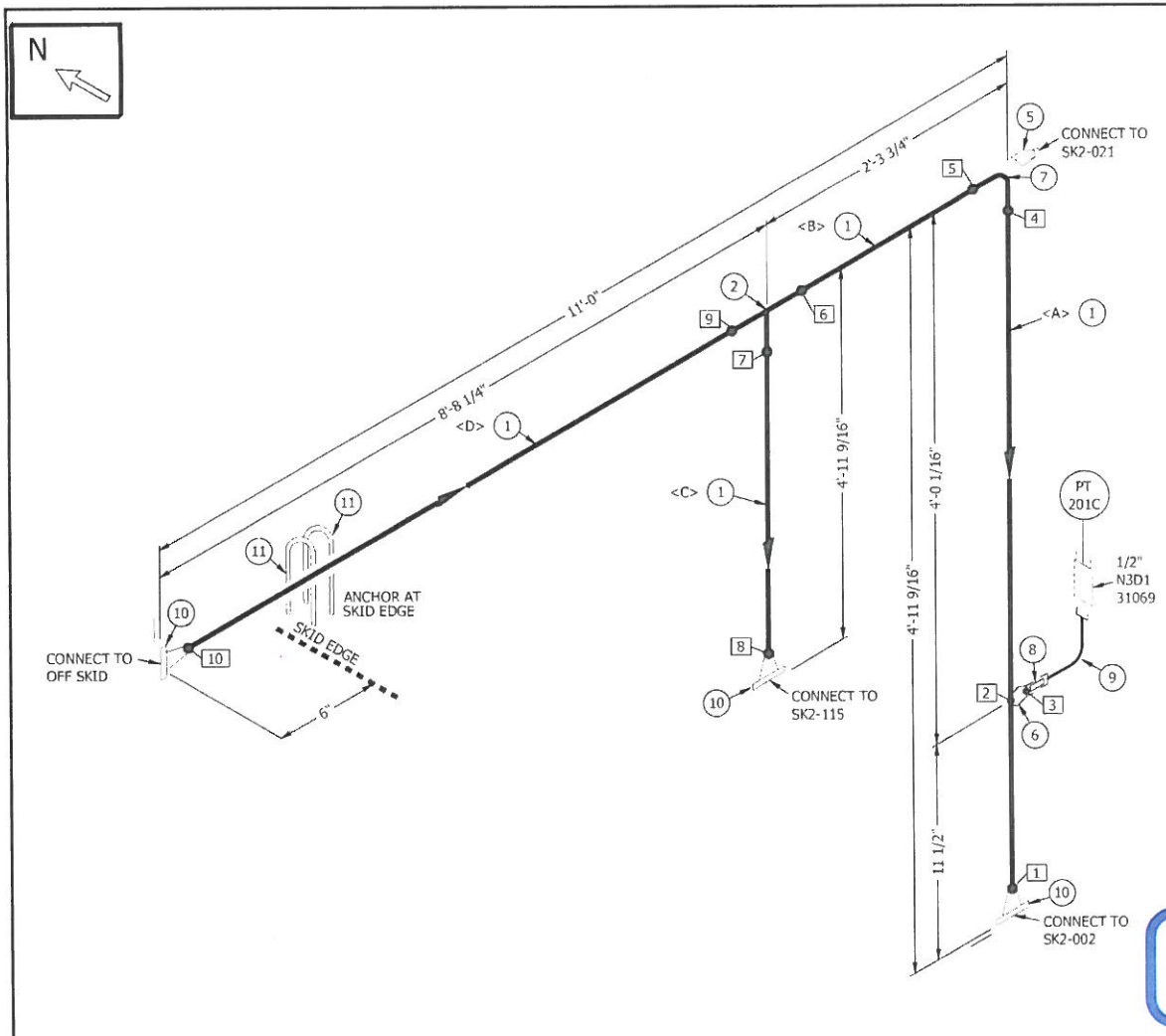

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, XH, SMLS, A-106 Gr. B, BBE 101966	15'-9 5/8"
2	8X8	TEE, BW, XH, A-234 Gr. WPB	1
5	8X2	E-O-L, BW, XH, A-105	1
6	8X1/2	S-O-L, SW, 6000#, A-105	1
7	8	ELL 90 LR, BW, XH, A-234 Gr. WPB	1
8	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, x 6" LG, POE-TOE (6" LG)	1
9	1/2	ELL 90, THRD, 3000#, A-105	1
10	8	FLG, RFWN, 600#, XH, A-105	3
11	8	U-BOLT FOR 8" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	CM
2	1/2"	LET	CM
3	1/2"	SW	
4	8"	BW	CM
5	8"	BW	
6	8"	BW	
7	8"	BW	
8	8"	BW	
9	8"	BW	
10	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	3'-6 1/16"	BEVEL	BEVEL
B	8"	8 3/4"	BEVEL	BEVEL
C	8"	3'-11 1/16"	BEVEL	BEVEL
D	8"	7'-7 3/4"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2
OPER. PRESS.	820 Psig		
OPER. TEMP.	85 °F	CORR. ALLOW.	0.0625"
STRESS RELIEVE	NO	INSULATION	NONE
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3

NO.	REVISION	DATE	BY	APR
0	ISSUE FOR CONSTRUCTION	12/13/17	COB	WD

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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LINE No.	109-D1-CS-8"
ASSEMBLY DRAWING	SC6R-402
PAID DRAWING	***-221/231
DRAWN BY	COB
DATE DRAWN	12/13/17
JOB No.	488
SPOOL I.D. No.	SK2-113
REV.	0

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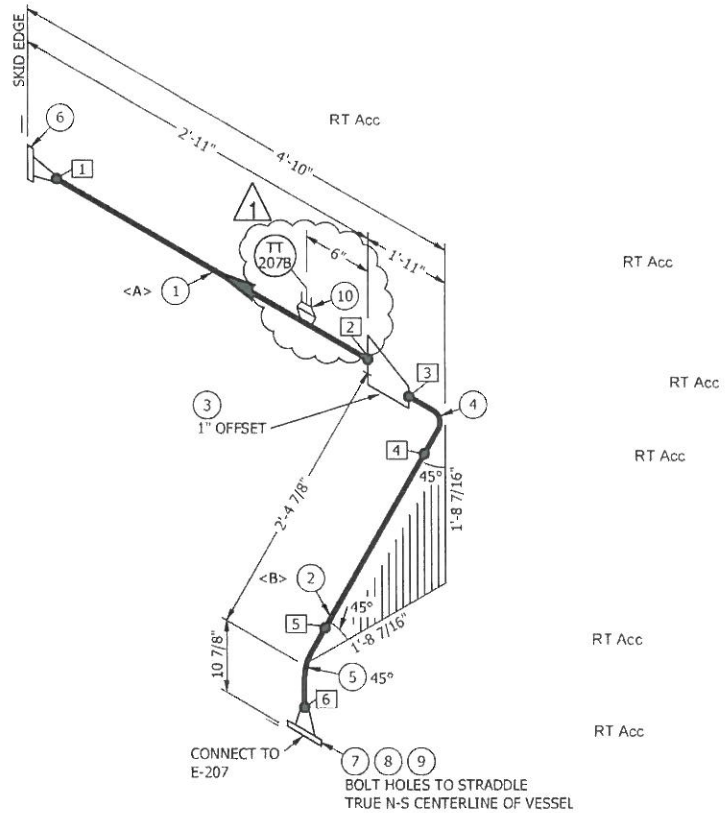

J-488
05/01/18
REV

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	12	PIPE, STD, SMLS, A-333 Gr. 6, BBE 1133589	2'-5 7/8"
2	10	PIPE, STD, SMLS, A-333 Gr. 6, BBE T45432	0'-7 5/8"
3	12X10	RED ECC, BW, STD - STD, A-420 Gr. WPL6	1
4	10	ELL 90 LR, BW, STD, A-420 Gr. WPL6	1
5	10	ELL 45, BW, STD, A-420 Gr. WPL6	1
6	12	FLG, RFWN, 300#, STD, A-350 Gr. LF2-1	1
7	10	FLG, RFWN, 300#, STD, A-350 Gr. LF2-1	1
8	10	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
9	1	(16) STUD BOLTS, 300# x 6 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
10	3/4	T.O.L., THRD, 3000#, A-350 Gr. LF2-1	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	12"	BW	CM
2	12"	BW	
3	10"	BW	
4	10"	BW	
5	10"	BW	
6	10"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	12"	2'-5 7/8"	BEVEL	BEVEL
B	10"	7 5/8"	BEVEL	BEVEL

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	253 Psia							
OPER. TEMP.	135 °F	CORR. ALLOW.	.0625"	1	ADDED TT-207B	4/30/18	COB	WD
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	2-20-17	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
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ALL COUPLING TO BE SADDLED ON.

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LINE No.	207-B1-LT-12"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-232
DRAWN BY	COB
DATE DRAWN	12/12/17
JOB No.	488
SPOOL I.D. No.	SK2-114
REV.	1

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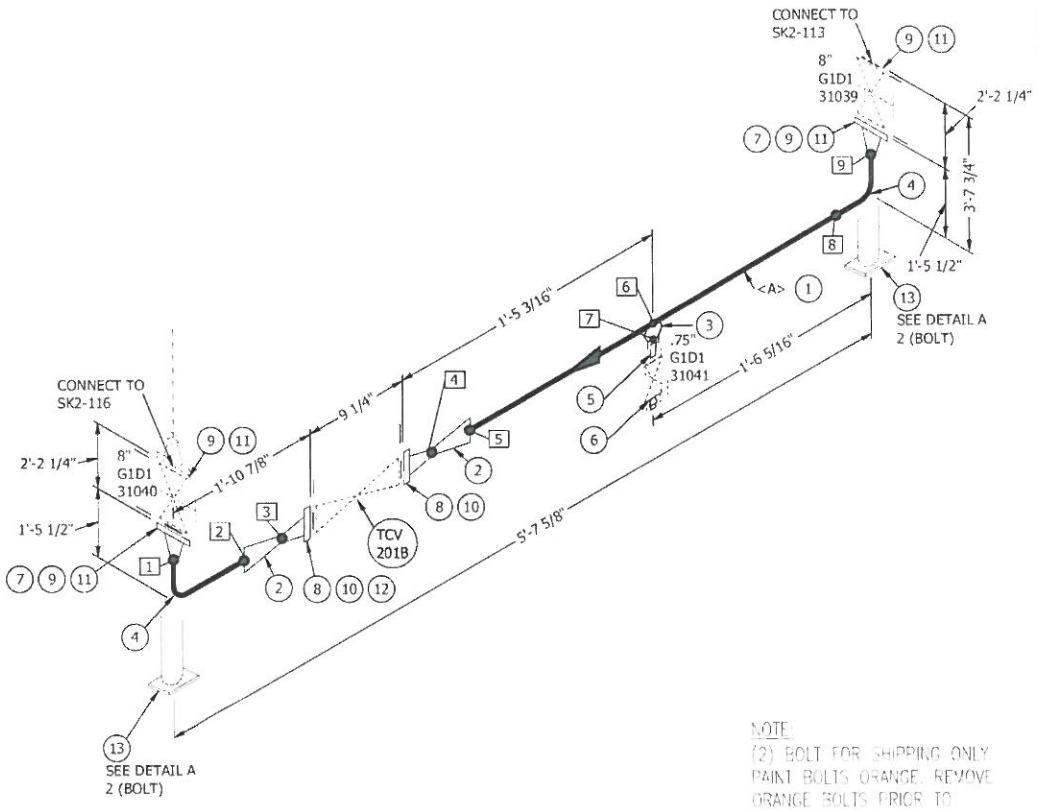

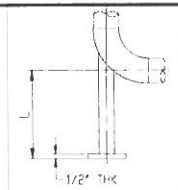

DETAIL A

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, XH, SMLS, A-106 Gr. B, BBE 1170306	1'-0 5/8"
2	8X6	RED CONC, BW, XH - XH, A-234 Gr. WPB	2
3	8X3/4	S-O-L, SW, 6000#, A-105	1
4	8	ELL 90 LR, BW, XH, A-234 Gr. WPB	2
5	3/4	NIPPLE, S/160, SMLS, A-106 Gr. B, x 3" LG, POE-TOE	1
6	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
7	8	FLG, RFWN, 600#, XH, A-105	2
8	6	FLG, RFWN, 600#, XH, A-105	2
9	8	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	4
10	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
11	1 1/8	(12) STUD BOLTS, 600# x 7 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	4
12	1	(12) STUD BOLTS, 600# x 16 1/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
13	8	(1) PIPE, 4" STD, SMLS, x 2'-8 1/2" LG. A-106 Gr. B (1) BASE PL, 1/2" THK. x 6" x 6" A-36 (L=1'-9")	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	CM
2	8"	BW	
3	6"	BW	
4	6"	BW	
5	8"	BW	
6	3/4"	LET	
7	3/4"	SW	
8	8"	BW	
9	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	1'-0 5/8"	BEVEL	BEVEL

NOTE:
(2) BOLT FOR SHIPPING ONLY. PAINT BOLTS ORANGE. REMOVE ORANGE BOLTS PRIOR TO SERVICE.

J-488
04/11/18
IFC

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2
OPER. PRESS.	820 Psig		
OPER. TEMP.	85°F	CORR. ALLOW.	0.0625"
STRESS RELIEVE	NO	INSULATION	NONE
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3

NO.	REVISION	DATE	BY	APR
0	ISSUE FOR CONSTRUCTION	12/20/17	COB	WD

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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UNIT No.	151-D1-CS-8"
ASSEMBLY DRAWING	SC6R-402
PIPING DRAWING	*** 231
DRAWN BY	COB
DATE DRAWN	12/13/17
JOB No.	488
SPOOL ID No.	SK2-115
REV.	0

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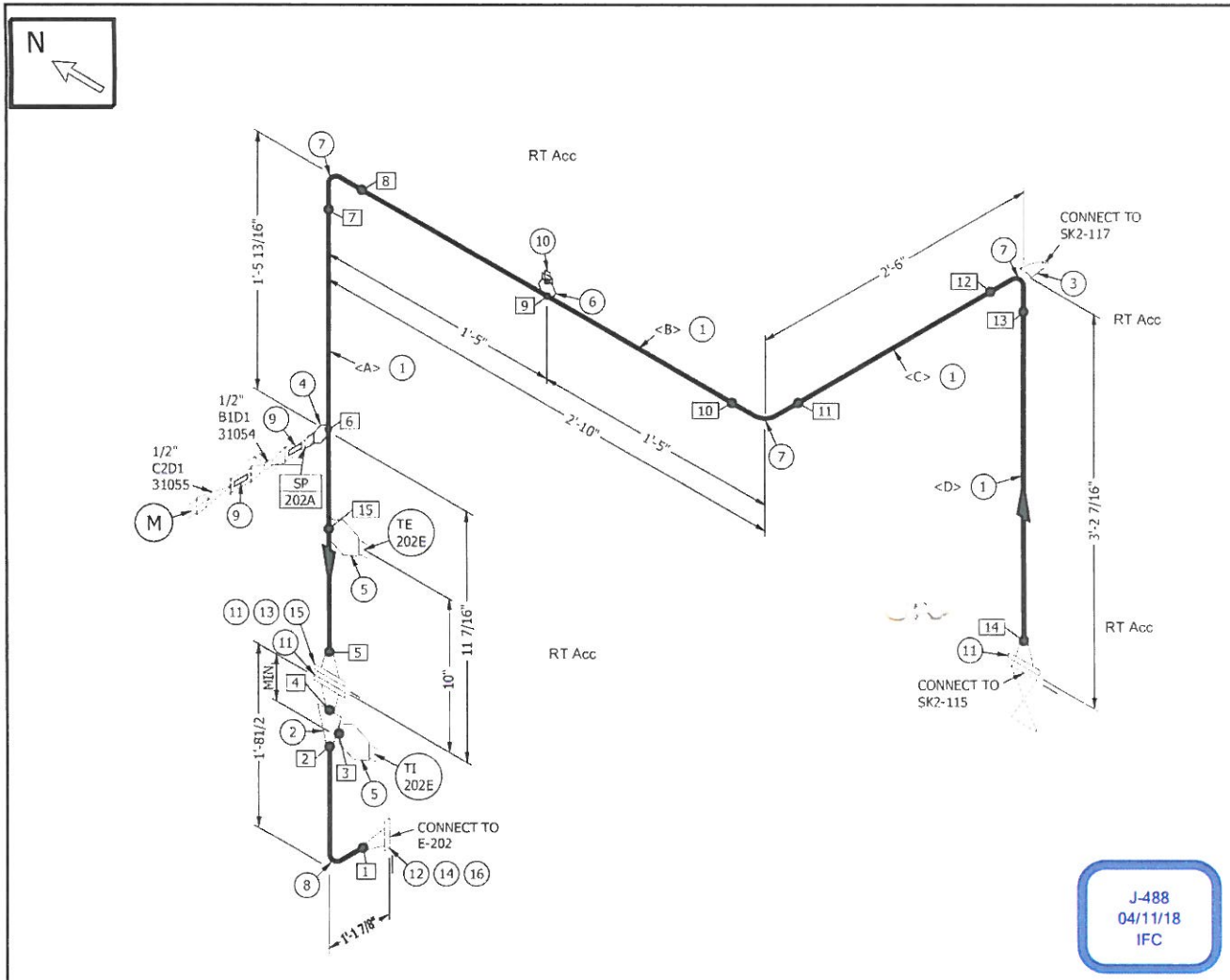

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, XH, SMLS, A-106 Gr. B, BBE 1170306	4'-0 1/2"
2	8X6	RED CONC, BW, XH - XH, A-234 Gr. WPB	1
3	8X2	E-O-L, BW, XH, A-105	1
4	8X1 1/2	T-O-L, THRD, 3000#, A-105	1
5	8X3/4	T-O-L, THRD, 3000#, A-105	2
6	8X1/2	T-O-L, SW, 3000#, A-105	1
7	8	ELL 90 LR, BW, XH, A-234 Gr. WPB	3
8	6	ELL 90 LR, BW, XH, A-234 Gr. WPB	1
9	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, x 3" LG, TBE	2
10	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
11	8	FLG, RFWN, 600#, XH, A-105	3
12	6	FLG, RFWN, 600#, XH, A-105	1
13	8	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
14	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
15	1 1/8	(12) STUD BOLTS, 600# x 7 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
16	1	(12) STUD BOLTS, 600# x 7", A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	JR
2	6"	BW	JR
3	3/4"	LET	JR
4	8"	BW	JR
5	8"	BW	CC
6	1 1/2"	LET	CC
7	8"	BW	CM
8	8"	BW	
9	1/2"	LET	
10	8"	BW	
11	8"	BW	
12	8"	BW	
13	8"	BW	
14	8"	BW	
15	3/4"	LET	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	11 9/16"	BEVEL	BEVEL
B	8"	10"	BEVEL	BEVEL
C	8"	6"	BEVEL	BEVEL
D	8"	1'-8 15/16"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	820 Psig							
OPER. TEMP.	85 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	12/20/17	COB	WC
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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UNIT No.	151-D1-CS-8"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-231
DRAWN BY	COB
DATE DRAWN	12/13/17
JOB No.	488
SPOOL I.D. No.	SK2-116
REV.	0

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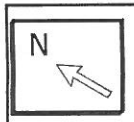
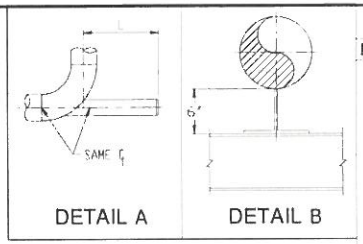
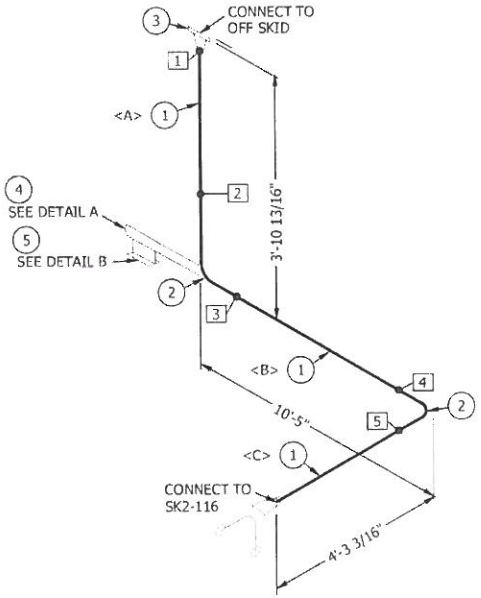




BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	2	PIPE, XH, SMLS, A-106 Gr. B, BBE D04408	17'-3 7/8"
2	2	ELL 90 LR, BW, XH, A-234 Gr. WPB	2
3	2	FLG, RFWN, 600#, XH, A-105	1
4		(1) PIPE, 1 1/2" XH SMLS, x 2'-5" LG. A-106-B (1) END PL. 1/4" THK. x 1 3/4" O.D. A-36 (L=2'-2")	1
5		PIPE SHOE (TYPE 1) 6" HI. x 6" LG. FROM W8x24 A-992	1



WELD MAPPING

MARK	SIZE	TYPE	SCH
1	2"	BW	CC
2	2"	BW	
3	2"	BW	
4	2"	BW	
5	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	2"	3'-4 11/16"	BEVEL	BEVEL
B	2"	9'-11"	BEVEL	BEVEL
C	2"	4'-0 3/16"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	820 Psig						
OPER. TEMP.	85 °F	CORR. ALLOW.	0.0625"				
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	12/20/17	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE STAINLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SAGGED ON

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Fax 918-481-7627

LINE No.	151-D1-CS-8"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-231
DRAWN BY	COB
DATE DRAWN	12/13/17
JOB No.	488
SPOOL I.D. No.	SK2-117
REV.	0

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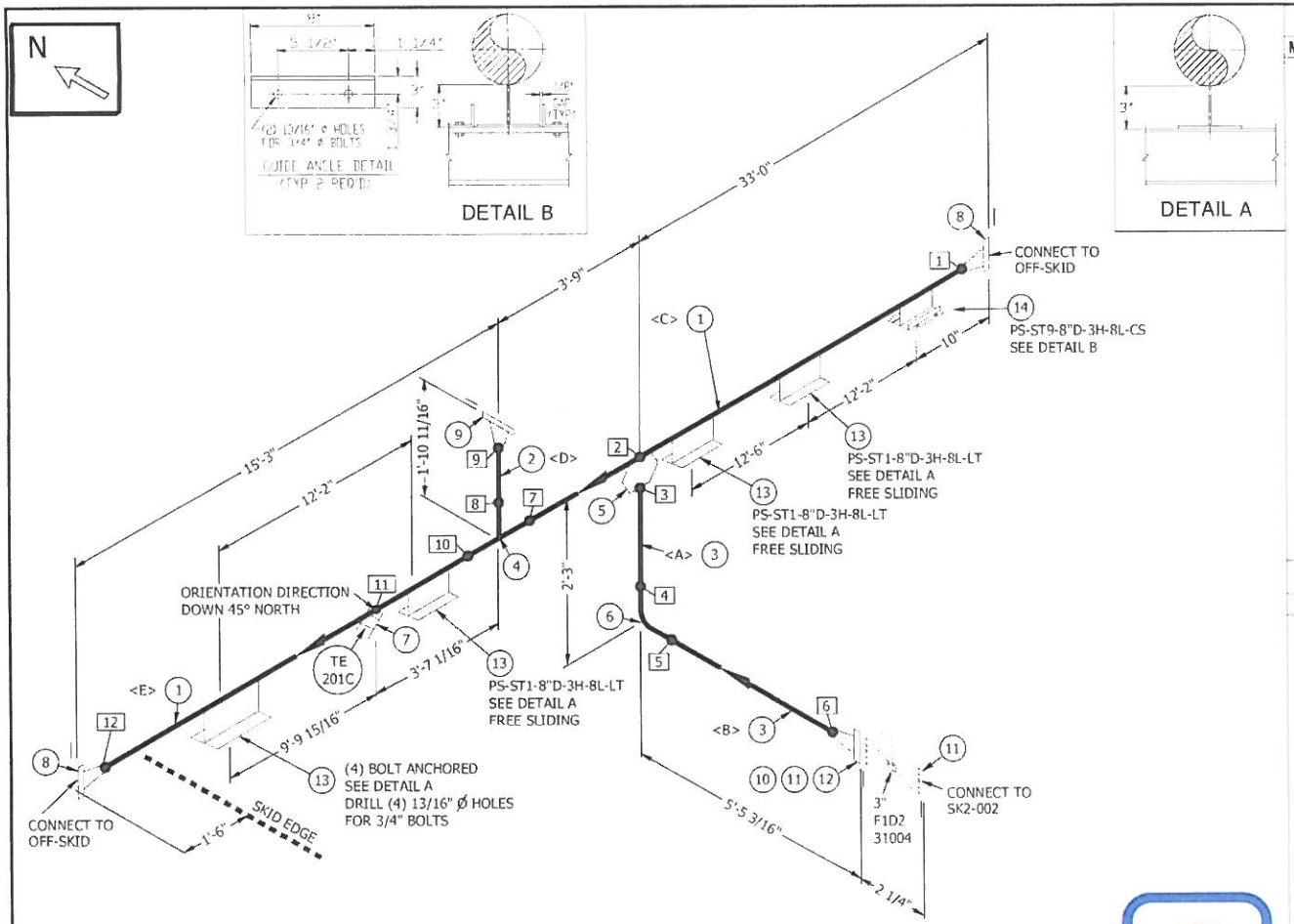

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, XH, SMLS, A-333 Gr. 6, BBE 1174593	49'-11"
2	6	PIPE, XH, SMLS, A-333 Gr. 6, BBE 1162655	0'-11 3/16"
3	3	PIPE, XH, SMLS, A-333 Gr. 6, BBE 79271	6'-1 5/8"
4	8X6	TEE RED, BW, XH - XH, A-420 Gr. WPL6	1
5	8X3	W-O-L, BW, XH, A-350 Gr. LF2-1	1
6	3	ELL 90 LR, BW, XH, A-420 Gr. WPL6	1
7	3/4	CPLG, THRD X 2" LG., 3000#, A-350 Gr. LF2-1	1
8	8	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	2
9	6	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	1
10	3	FLG, RFWN, 600#, STD, A-350 Gr. LF2-1	1
11	3	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
12	3/4	(8) STUD BOLTS, 600# x 7 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
13		PIPE SHOE (TYPE 1) 3" HI. x 8" LG. FROM W6x15 A-992	4
14		PIPE SHOE (TYPE 9) 3" HI. x 8" LG. FROM W6x15 A-992 (2) GUIDE ANGLE, 2" x 3" x 1/4" x 8" LG. A-36	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	CM
2	3"	LET	
3	3"	BW	
4	3"	BW	
5	3"	BW	
6	3"	BW	
7	8"	BW	
8	6"	BW	
9	6"	BW	
10	8"	BW	
11	3/4"	LET	
12	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	3"	1'-4 7/16"	BEVEL	BEVEL
B	3"	4'-9 3/16"	BEVEL	BEVEL
C	8"	35'-8 1/2"	BEVEL	BEVEL
D	6"	11 3/16"	BEVEL	BEVEL
E	8"	14'-2 1/2"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	820 Psig							
OPER. TEMP.	71°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	12-21-17	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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UNIT No.	155-D1-LT-8" 1.5"C
ASSEMBLY DRAWING	SC6R-402
FIELD DRAWING	*** 231
DRAWN BY	COB
DATE DRAWN	3-17-17
JOB No.	488
SPOOL I.D. No.	SK2-118
REV.	0

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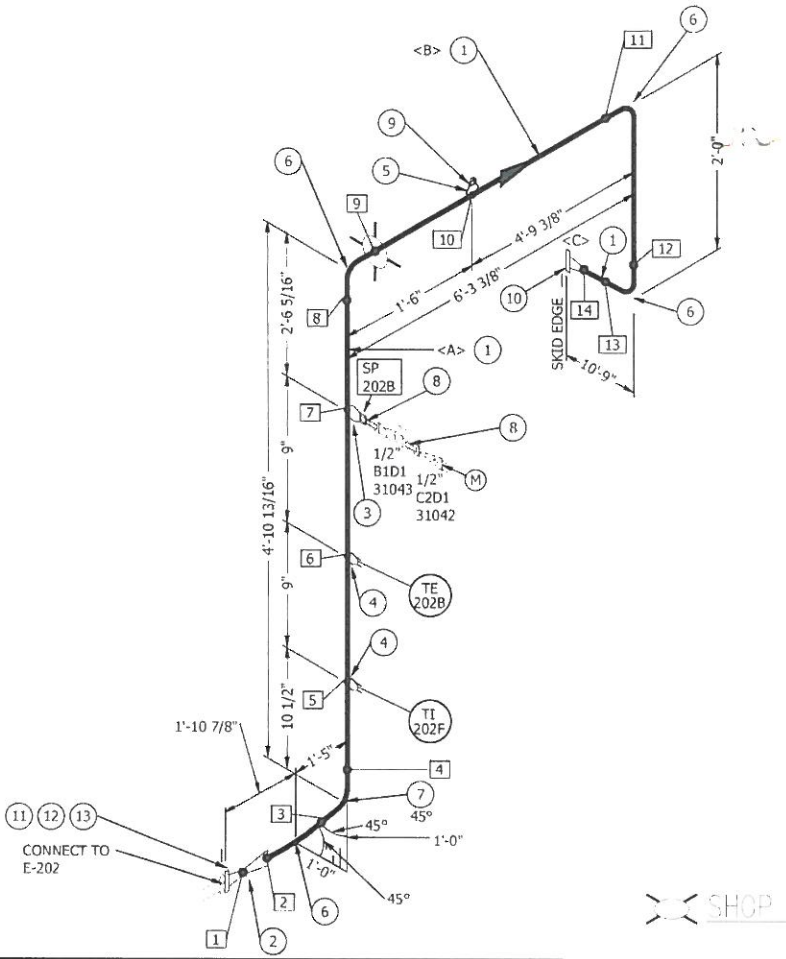

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, XH, SMLS, A-106 Gr. B, BBE 101966	17'-0 3/4"
2	8X6	RED CONC, BW, XH - XH, A-234 Gr. WPB	1
3	8X1 1/2	T-O-L, THRD, 3000#, A-105	1
4	8X3/4	T-O-L, THRD, 3000#, A-105	2
5	8X1/2	T-O-L, THRD, 3000#, A-105	1
6	8	ELL 90 LR, BW, XH, A-234 Gr. WPB	4
7	8	ELL 45, BW, XH, A-234 Gr. WPB	1
8	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, x 3" LG, TBE (3" LG)	2
9	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
10	8	FLG, RFWN, 600#, XH, A-105	1
11	6	FLG, RFWN, 600#, XH, A-105	1
12	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
13	1	(12) STUD BOLTS, 600# x 7" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (7" LG)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	JR
2	8"	BW	
3	8"	BW	
4	8"	BW	
5	3/4"	LET	
6	3/4"	LET	
7	1 1/2"	LET	
8	8"	BW	
9	8"	BW	
10	1/2"	LET	
11	8"	BW	
12	8"	BW	
13	8"	BW	
14	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	3'-5 13/16"	BEVEL	BEVEL
B	8"	4'-3 3/8"	BEVEL	BEVEL
C	8"	9'-3 9/16"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	830 Psig							
OPER. TEMP.	109 °F	CORR. ALLOW.	0.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	1/12/18	COB	WC
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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Fax: 918-481-7477

P/F No.	153-D1-CS-8"
ASSEMBLY DRAWING	SC6R-402
PAID DRAWING	***-251
DRAWN BY	COB
DATE DRAWN	1/8/18
JOB NO.	488
SPOOL ID No.	SK2-121
REV	0

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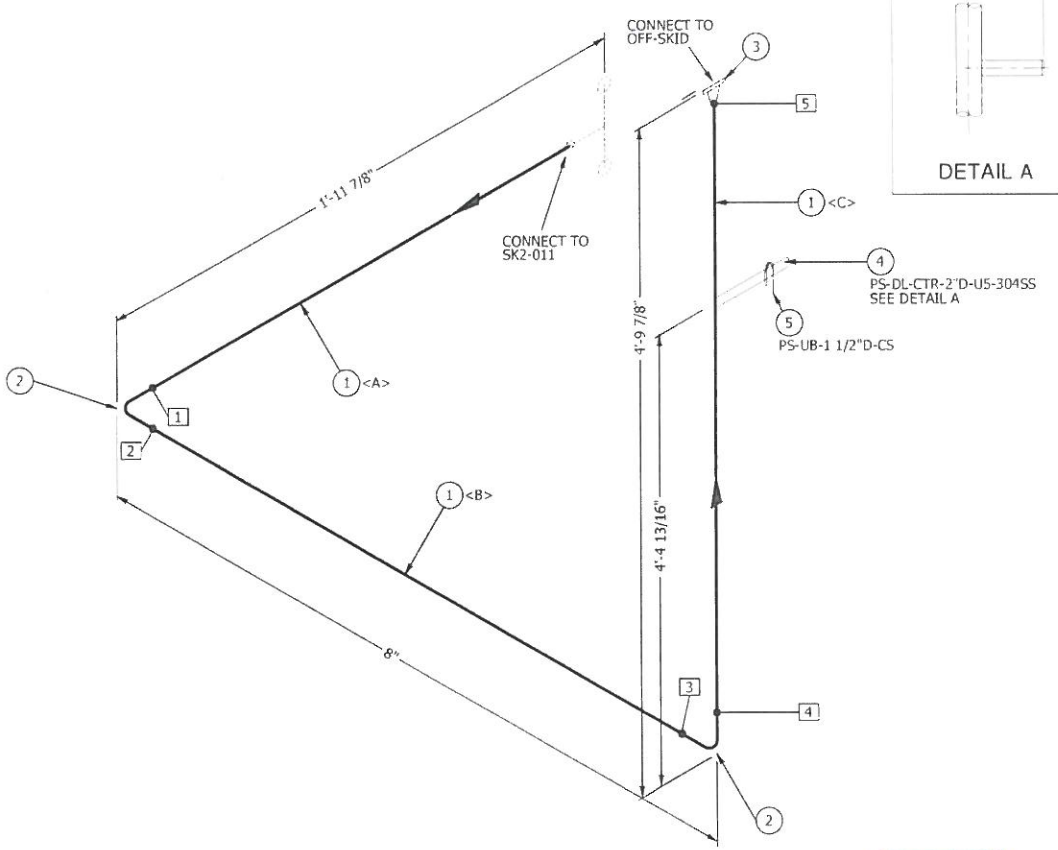

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	2	PIPE, S/40S, SMLS, A-312 Gr. TP-304/304L, BBE OC513085	5'-11 1/8"
2	2	ELL 90 LR, BW, S/40S, A-403 Gr. WP-304/304L	2
3	2	FLG, RFWN, 600#, S/40S, A-182 Gr. F304/304L	1
4	2	(1) PIPE, 1 1/2" S/80S, SMLS OR WLD, x 1'-7 1/8" LG. A-312 Gr. TP-304/304L (1) END PL, 1/4" THK. x 1 3/4" O.D. A-36 (L=2'-1")	1
5	1 1/2	U-BOLT FOR 1 1/2" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	2"	BW	D
2	2"	BW	
3	2"	BW	
4	2"	BW	
5	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	2"	1'-5 3/8"	BEVEL	BEVEL
B	2"	2"	BEVEL	BEVEL
C	2"	4'-3 3/4"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	810 Psia						
OPER. TEMP.	-71°F	CORR. ALLOW.	NONE				
STRESS RELIEVE	NO	INSULATION	2.5"C	0	ISSUE FOR CONSTRUCTION	01/09/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	NONE	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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UNIT No.	160-DO-304SS-4" 2.5"C
ASSEMBLY DRAWING	SC6R-402
PAID DRAWING	***-231
DRAWN BY	CW
DATE DRAWN	01/09/18
JOB No.	488
SPOOL I.D. No.	SK2-122
REV.	0

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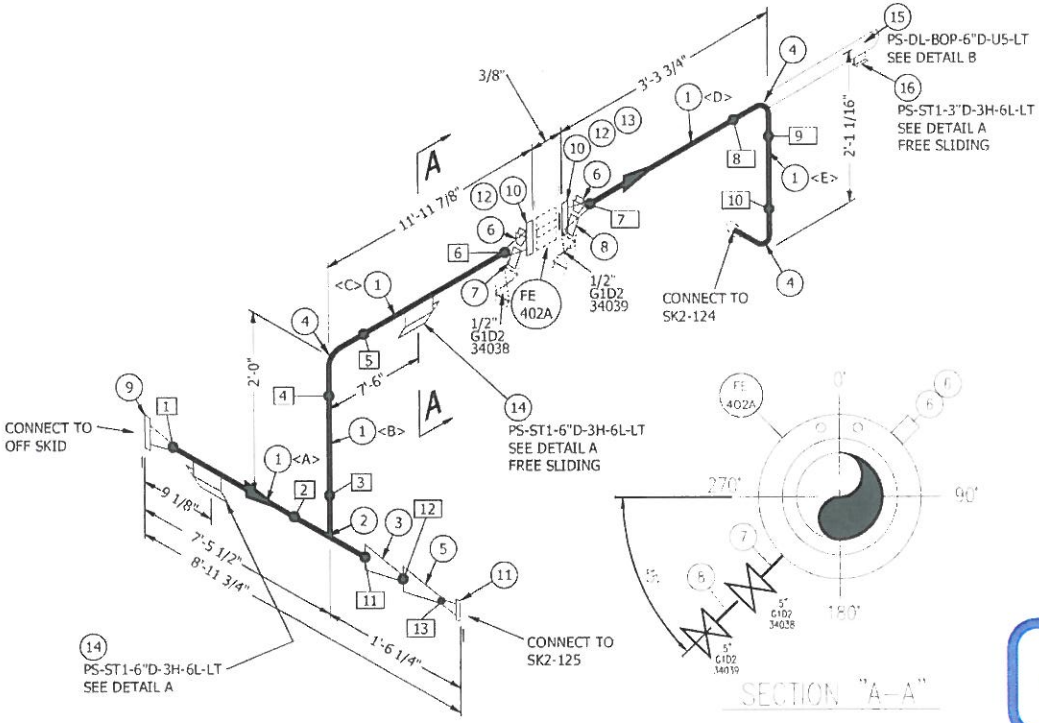

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-333 Gr. 6, BBE 1162655	20'-11 5/16"
2	6X6	TEE, BW, XH, A-420 Gr. WPL6	1
3	6X4	RED CONC, BW, XH - XH, A-420 Gr. WPL6	1
4	6	ELL 90 LR, BW, XH, A-420 Gr. WPL6	3
5	4X2	RED CONC, BW, XH - XH, A-420 Gr. WPL6	1
6	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-350 Gr. LF2-1	2
7	1/2	NIPPLE, S/160, SMLS, A-333 Gr. 6, x 3" LG, TBE (3.00000000 LG)	1
8	1/2	NIPPLE, S/160, SMLS, A-333 Gr. 6, x 6" LG, TBE (6.00000000 LG)	1
9	6	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	1
10	6	FLG, ORIFICE, RFWN, 600#, XH, A-350 Gr. LF2-1 w/ 1/2" NPT TAPS	2
11	2	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	1
12	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
13	1	(12) STUD BOLTS, 600# x 7 1/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (7.25000000 LG)	1
14	6	(1) PL, 1/4" THK. x 6" x 6" LG. A-516-70 (1) PL, 1/4" THK. x 2 3/4" x 6" LG. A-516-70	2
15	6	(1) PIPE, 4" STD, SMLS, x 5'-11" LG. A-333 Gr. 6 (1) END PL, 1/4" THK. x 4 3/8" O.D. A-36 (L=5'-1")	1
16	3	(1) PL, 1/4" THK. x 6" x 8" LG. A-516 70 (1) PL, 1/4" THK. x 2 3/4" x 8" LG. A-516-70	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	CM
2	6"	BW	
3	6"	BW	
4	6"	BW	
5	6"	BW	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	6"	BW	
11	6"	BW	
12	4"	BW	
13	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	6'-7"	BEVEL	BEVEL
B	6"	9 3/8"	BEVEL	BEVEL
C	6"	10'-10"	BEVEL	BEVEL
D	6"	2'-1 7/8"	BEVEL	BEVEL
E	6"	7 1/16"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	800 Psig						
OPER. TEMP.	-30 °F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

CONFIDENTIAL STATEMENT

THIS DRAWING IS THE PROPERTY OF THE THOMAS RUSSELL Co. AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.

FABRICATION NOTES

ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SWAGED ON

UOP Russell Honeywell uop

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LINE No.	170-D1-LT-6" 1.5"C
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-234
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
ISOM. ID No.	SK2-123
REV.	0

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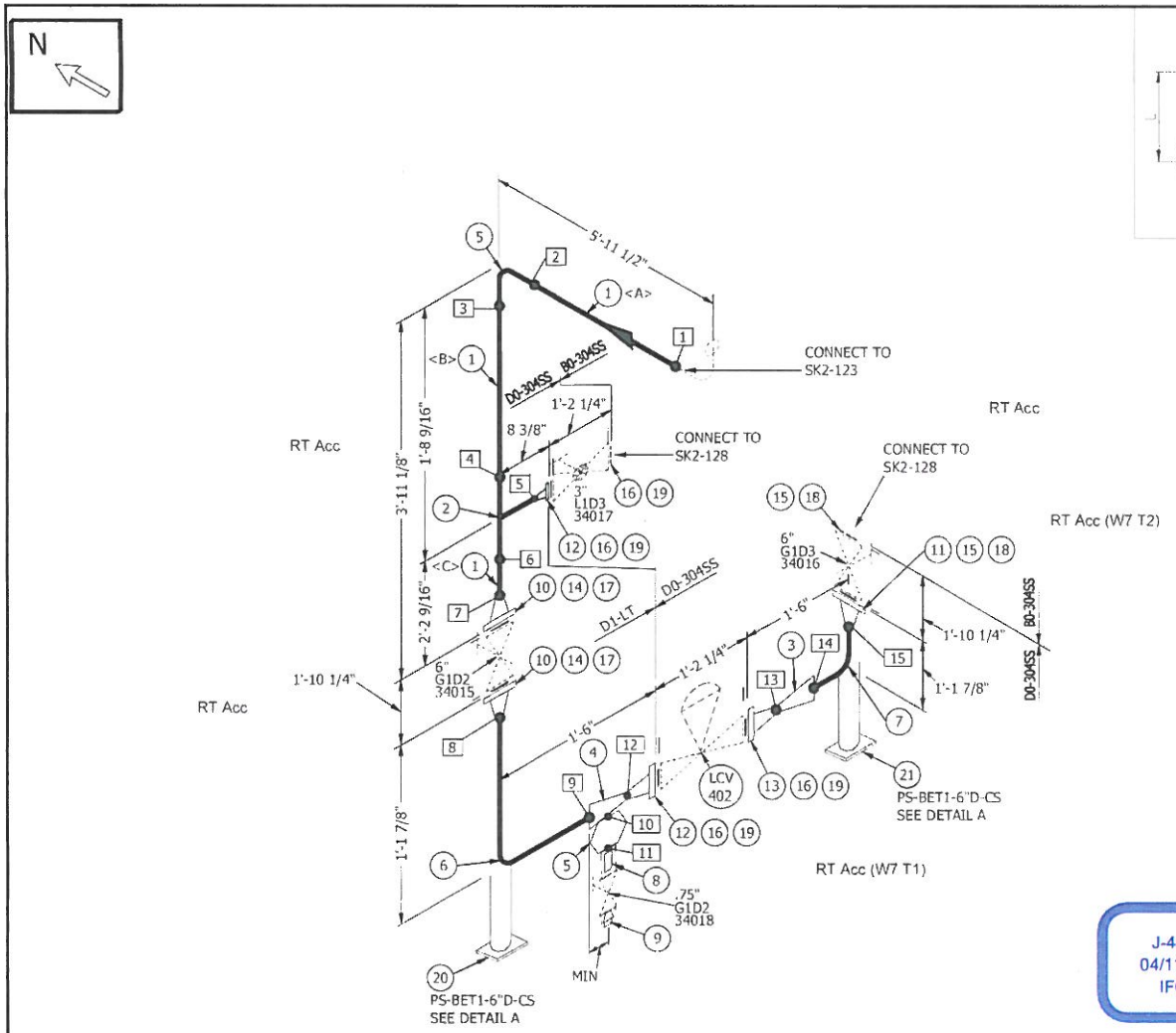

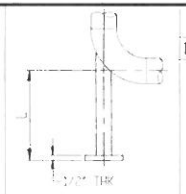

DETAIL A

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-333 Gr. 6, BBE 1162655	6'-3 1/2"
2	6X3	TEE RED, BW, XH - XH, A-420 Gr. WPL6	1
3	6X3	RED CONC, BW, XH - XH, A-420 Gr. WPL6	1
4	6X3	RED CONC, BW, S/40S - S/40S, A-403 Gr. WP-304/304L	1
5	6X3/4	S-O-L, SW, 3000#, A-350 Gr. LF2-1	1
6	6	ELL 90 LR, BW, XH, A-420 Gr. WPL6	2
7	6	ELL 90 LR, BW, S/40S, A-403 Gr. WP-304/304L	1
8	3/4	NIPPLE, S/160, SMLS, A-333 Gr. 6, x 3" LG, (3" LG)	1
9	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-350 Gr. LF2-1	1
10	6	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	2
11	6	FLG, RFWN, 600#, S/40S, A-182 Gr. F304/304L	1
12	3	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	2
13	3	FLG, RFWN, 600#, S/40S, A-182 Gr. F304/304L	1
14	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16 20 (YELLOW W/ PINK STRIPE)	2
15	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXIBLE GRAPHITE FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ GREY STRIPE)	2
16	3	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXIBLE GRAPHITE FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ GREY STRIPE)	4
17	1	(12) STUD BOLTS, 600# x 7" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	2
18	1	(12) STUD BOLTS, 600# x 7" LG, A-193 Gr. B8 Cl. 2, w/ 2 HVY HEX NUTS, A-194 Gr. 8 (ZINC PLATED)	2
19	3/4	(8) STUD BOLTS, 600# x 5 1/4" LG, A-193 Gr. B8 Cl. 2, w/ 2 HVY HEX NUTS, A-194 Gr. 8 (ZINC PLATED)	4
20	6	(1) PIPE, 3" STD, SMLS, x 2'-2 1/2" LG. A-333 Gr. 6 (1) BASE PL, 1/2" THK. x 6" x 6" A-36 (L=1'-6")	1
21	6	(1) PIPE, 3" S/10S, SMLS OR WLD. x 2'-2 1/2" LG. A-312 Gr. TP 304/304L (1) BASE PL, 1/2" THK. x 6" x 6" A-36 (L=1'-6")	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	CC
2	6"	BW	
3	6"	BW	
4	6"	BW	
5	3"	BW	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	3/4"	LET	
11	3/4"	SW	
12	3"	BW	S
13	3"	BW	
14	6"	BW	
15	6"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	4'-5 1/2"	BEVEL	BEVEL
B	6"	5 15/16"	BEVEL	BEVEL
C	6"	1'-4 1/16"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	800 Psig							
OPER. TEMP.	-30°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C					
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR
				0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR PW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON

UOP Russell
Honeywell
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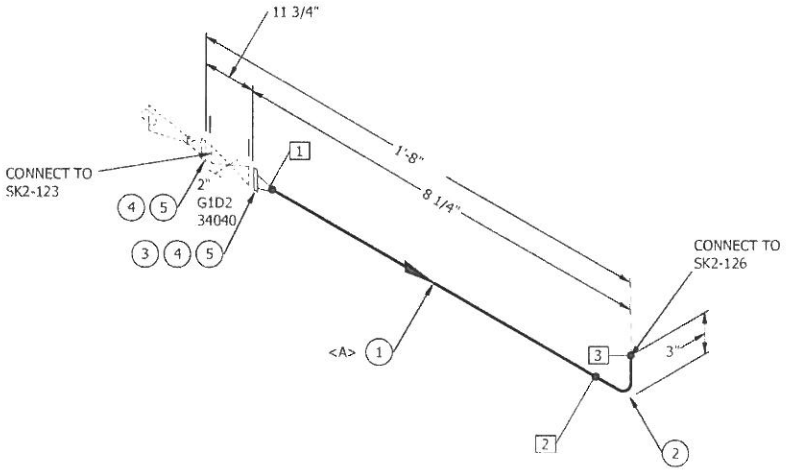
Tulsa, Oklahoma 74136
Phone: 918-481-5682
Fax: 918-481-7427

UOP No.	170-D1-L1-6" 1.5"C
ASSEMBLY DRAWING	SC6R-402
MFG DRAWING	***-234
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
SPOOL ID No.	SK2-124
REV	0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-124



BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	2	PIPE, XH, SMLS, A-333 Gr. 6, BBE 1144852	0'-2 1/8"
2	2	ELL 90 LR, BW, XH, A-420 Gr. WPL6	1
3	2	FLG, RFWN, 600#, STD, A-350 Gr. LF2-1	1
4	2	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
5	5/8	(8) STUD BOLTS, 600# x 4 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (4 1/2" LG)	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	2"	BW	CC
2	2"	BW	
3	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	2"	2 1/8"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2
OPER. PRESS.	863 Psig		
OPER. TEMP.	-28 °F	CORR. ALLOW.	0.0625"
STRESS RELIEVE	NO	INSULATION	1.5"C
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3

NO.	REVISION	DATE	BY	APR
0	ISSUE FOR CONSTRUCTION	1-11-18	COB	WD

CONFIDENTIAL STATEMENT

THIS DRAWING IS THE PROPERTY OF THE THOMAS RUSSELL Co. AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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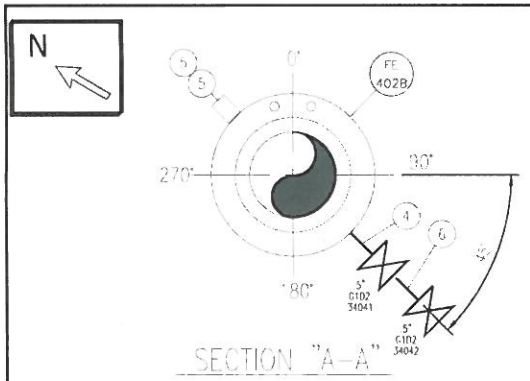
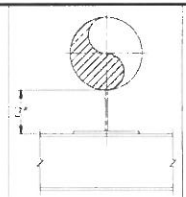
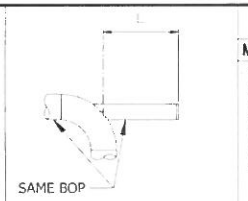
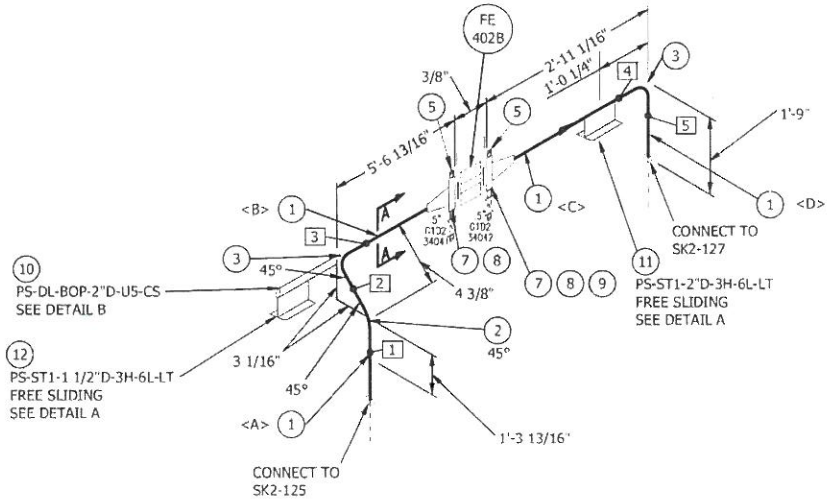
LINE NO.	1/2-D1-LT-2" 1.5"C
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-214
DRAWN BY	COB
DATE DRAWN	1/10/18
JOB No.	488
SPOOL ID No.	SK2-125
REV.	0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-125









J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	2	PIPE, XH, SMLS, A-333 Gr. 6, BBE 1144852	10'-1 1/16"
2	2	ELL 45, BW, XH, A-420 Gr. WPL6	1
3	2	ELL 90 LR, BW, XH, A-420 Gr. WPL6	2
4	1/2	NIPPLE, S/160, SMLS, A-333 Gr. 6, x 3" LG, POE-TOE (3"LG)	1
5	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-350 LF2-1	2
6	1/2	NIPPLE, S/160, SMLS, A-333 Gr. 6, x 6" LG, POE-TOE (6" LG)	1
7	2	FLG, ORIFICE, RFWN, 600#, XH, A-350 Gr. LF2-1 w/ 1/2" NPT TAPS	2
8	2	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
9	5/8	(8) STUD BOLTS, 600# x 5.00" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (5.00" LG)	1
10	2	(1) PIPE, 1 1/2" XH, SMLS, x 5'-1" LG. A333 Gr. 6, (1) END PL, 1/4" THK. x 1 3/4" O.D. A-36 (L=5'-1")	1
11	2	(1) PLATE, 1/4" THK. x 6" x 8" LG. A-516-70 (1) PLATE, 1/4" THK. x 2 3/4" x 8" LG. A-516-70	1
12	1 1/2	(1) PLATE, 1/4" THK. x 6" x 8" LG. A-516-70 (1) PLATE, 1/4" THK. x 2 3/4" x 8" LG. A-516-70	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	2"	BW	CC
2	2"	BW	
3	2"	BW	
4	2"	BW	
5	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	2"	1'-2 7/16"	BEVEL	BEVEL
B	2"	5'-0 3/16"	BEVEL	BEVEL
C	2"	2'-4 7/16"	BEVEL	BEVEL
D	2"	1'-6"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	TAB LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	865 Psig							
OPER. TEMP.	-28 °F	CORR. ALLOW.	0.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	1-11-18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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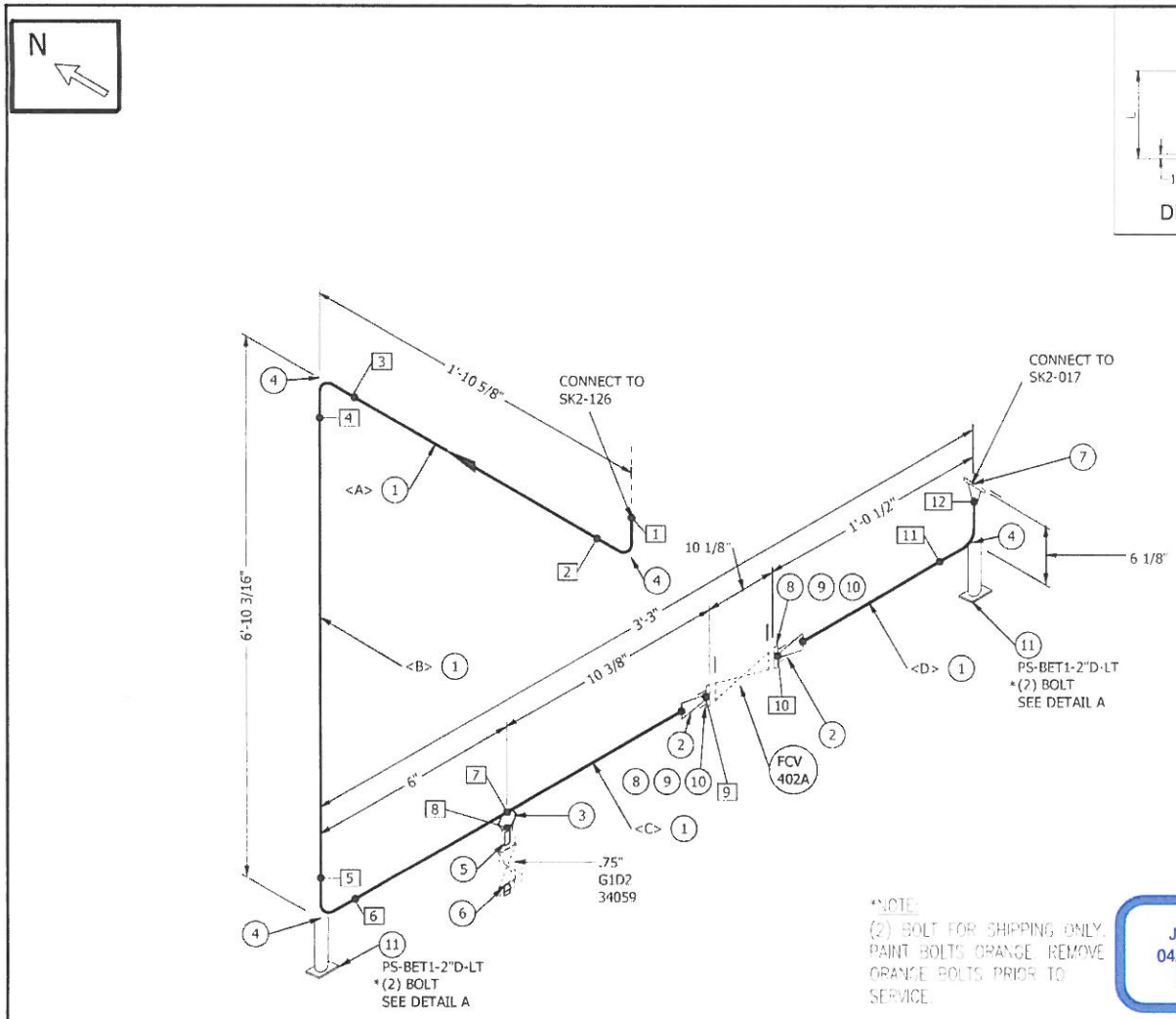
UNIT No.	172-D1-LT-2" 1.5"C
ASSEMBLY DRAWING	SC6R-402
PAID DRAWING	***-234
DRAWN BY	COB
DATE DRAWN	1/10/18
JOB No.	488
SPOOL ID No.	S42-125
REV.	0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-126



BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	2	PIPE, XH, SMLS, A-333 Gr. 6, BBE 1144852	8'-4 15/16"
2	2X1 1/2	SWAGE CONC, XH - S/160, A-420 Gr. WPL6 BLE-PSE	2
3	2X3/4	S-O-L, SW, 3000#, A-350 Gr. LF2-1	1
4	2	ELL 90 LR, BW, XH, A-420 Gr. WPL6	4
5	3/4	NIPPLE, S/160, SMLS, A-333 Gr. 6, x 3" LG, POE-TOE (3" LG)	1
6	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-350 Gr. LF2-1	1
7	2	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	1
8	1 1/2	FLG, RFSW, 600#, S/160, A-350 Gr. LF2-1	2
9	1 1/2	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
10	3/4	(4) STUD BOLTS, 600# x 4 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (4 1/2" LG)	2
11	2	(1) PIPE, 1 1/2" XH SMLS x 1'-8 1/2" LG. A-333 Gr. 6 (1) BASE PLATE, 1/2" THK. x 5" x 5" A-36 (L=1'-6")	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	2"	BW	CM
2	2"	BW	
3	2"	BW	
4	2"	BW	
5	2"	BW	
6	2"	BW	
7	3/4"	LET	
8	3/4"	SW	
9	1 1/2"	SW	
10	1 1/2"	SW	
11	2"	BW	
12	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	2"	1'-4 5/8"	BEVEL	BEVEL
B	2"	6'-4 3/16"	BEVEL	BEVEL
C	2"	6"	BEVEL	BEVEL
D	2"	2 1/8"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	863 Psig							
OPER. TEMP.	-28°F	CORR. ALLOW.	0.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	1-11-18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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LINE No.	1/2-D1-LT-2" 1.5"C
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-234
DRAWN BY	COB
DATE DRAWN	1/10/18
JOB No.	488
SPOOL ID No.	SK2-127
REV.	0

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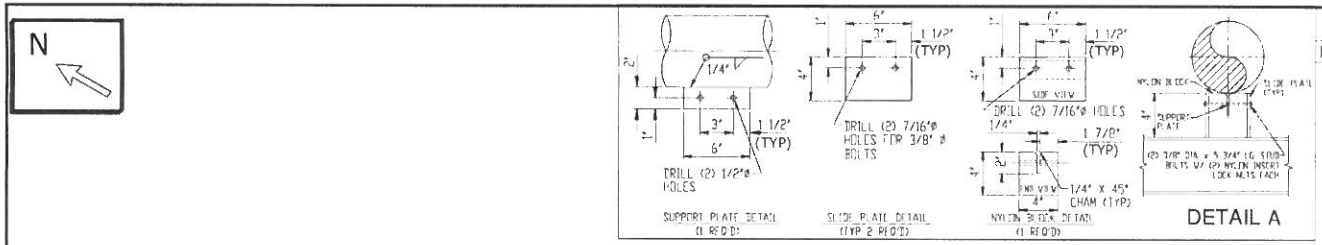

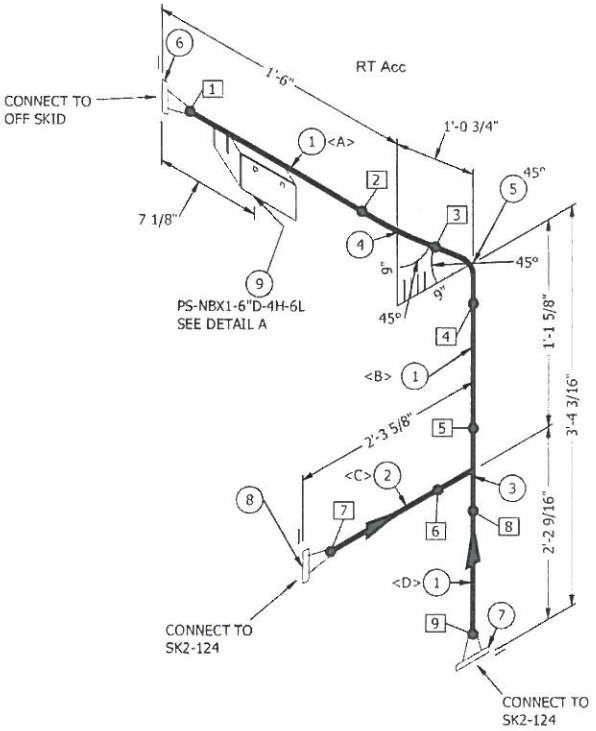

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, S/40S, SMLS OR WLD, A-312 Gr. TP-304/304L, BBE	2'-1 7/16"
2	3	PIPE, S/10S, SMLS, A-312 Gr. TP-304/304L, BBE	1'-7 1/4"
3	6X3	TEE RED, BW, S/40S - S/10S, A-403 Gr. WP-304/304L	1
4	6	ELL 90 LR, BW, S/40S, A-403 Gr. WP-304/304L	1
5	6	ELL 45, BW, S/40S, A-403 Gr. WP-304/304L	1
6	6	FLG, RFWN, 300#, S/40S, A-182 Gr. F304/304L	1
7	6	FLG, RFWN, 600#, S/40S, A-182 Gr. F304/304L	1
8	3	FLG, RFWN, 600#, S/10S, A-182 Gr. F304/304L	1
9	6	(1) SUPT PL, 1/4" THK. x 2" x 6" LG. A-240-304SS (2) SLIDE PL, 1/4" THK. x 4" x 6" LG. A-240-304SS (1) NYLON BLK, 4" x 4" x 6" LG.	1

6" HT. No. 516135-2167994

3" HT. No. 232R

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	A
2	6"	BW	
3	6"	BW	
4	6"	BW	
5	6"	BW	
6	3"	BW	
7	3"	BW	
8	6"	BW	
9	6"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	5 1/8"	BEVEL	BEVEL
B	6"	4 1/4"	BEVEL	BEVEL
C	3"	1'-7 1/4"	BEVEL	BEVEL
D	6"	1'-4 1/16"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	225 Psig							
OPER. TEMP.	-81°F	CORR. ALLOW.	NONE					
STRESS RELIEVE	NO	INSULATION	2"C	0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	NONE	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES.
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ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE BEVELED ON

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Fax: 918-481-7427

LINE No.	1/1-BO-304SS-6" 2"C
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-232/234
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	439
SPOOL ID No.	SK2-128
REV	0

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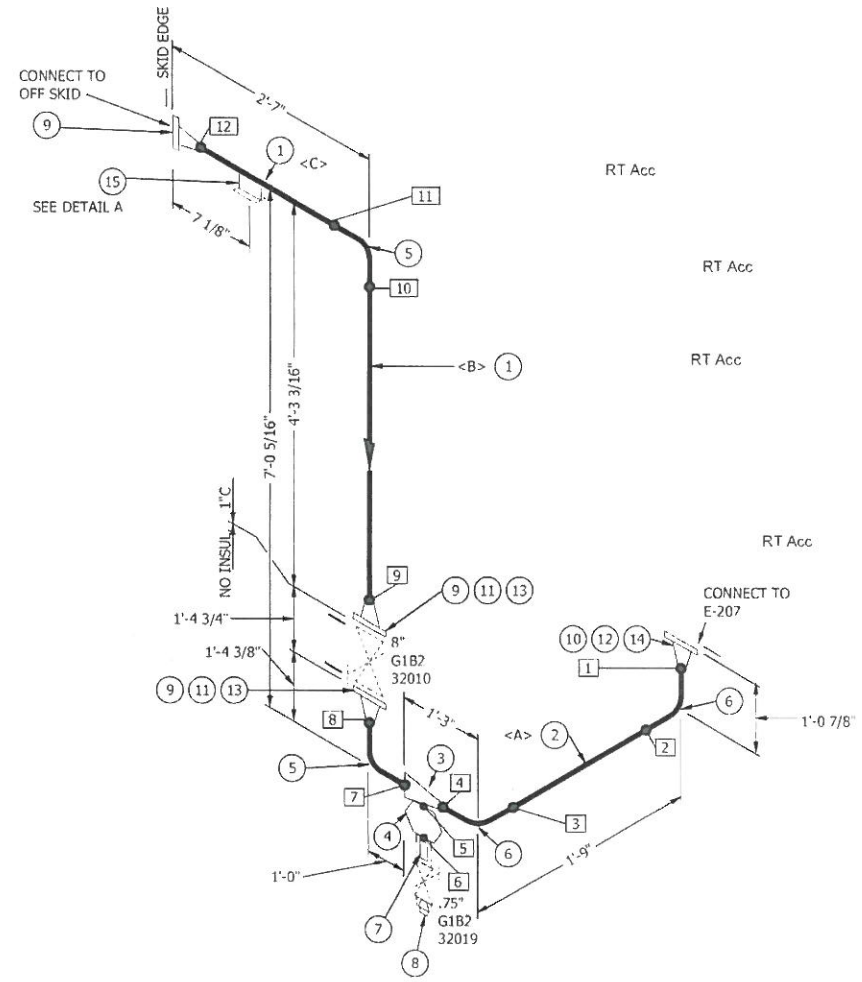

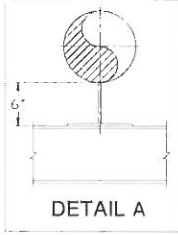

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-333 Gr. 6, BBE X02753	4'-1 7/16"
2	6	PIPE, STD, SMLS, A-333 Gr. 6, BBE 1170114	0'-3"
3	8X6	RED CONC, BW, STD - STD, A-420 Gr. WPL6	1
4	8X3/4	S-O-L, SW, 3000#, A-350 Gr. LF2-1	1
5	8	ELL 90 LR, BW, STD, A-420 Gr. WPL6	2
6	6	ELL 90 LR, BW, STD, A-420 Gr. WPL6	2
7	3/4	NIPPLE, S/160, SMLS, A-333 Gr. 6, x 3" LG, POE-TOE (3" LG)	1
8	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-350 Gr. LF2-1	1
9	8	FLG, RFWN, 300#, STD, A-350 Gr. LF2-1	3
10	6	FLG, RFWN, 300#, STD, A-350 Gr. LF2-1	1
11	8	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
12	6	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
13	7/8	(12) STUD BOLTS, 300# x 5 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (5 3/4" LG)	2
14	3/4	(12) STUD BOLTS, 300# x 5" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (5" LG)	1
15		(1) PL, 1/4" THK. x 6" x 6" LG. A-516-70 (1) PL, 1/4" THK. x 2 3/4" x 6" LG. A-516-70	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	CM
2	6"	BW	
3	6"	BW	
4	6"	BW	
5	2"	LET	
6	3/4"	SW	
7	8"	SW	
8	8"	BW	CM
9	8"	BW	
10	8"	BW	
11	8"	BW	
12	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	3"	BEVEL	BEVEL
B	8"	2'-10 13/16"	BEVEL	BEVEL
C	8"	1'-2 5/8"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	253 Psig							
OPER. TEMP.	120°F	CORR. ALLOW.	0.0625"					
STRESS RELIEVE	NO	INSULATION	NOTED	0	ISSUE FOR CONSTRUCTION	1/10/18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

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SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
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ALL COUPLING TO BE SADDLED ON

UOP Russell Honeywell UOP

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UNIT No.	205-B1-LT-8"
ASSEMBLY DRAWING	SCRR-402
P&ID DRAWING	***-232
DRAWN BY	COB
DATE DRAWN	1/10/18
JOB No.	488
SPOOL ID No.	SK2-129
REV.	0

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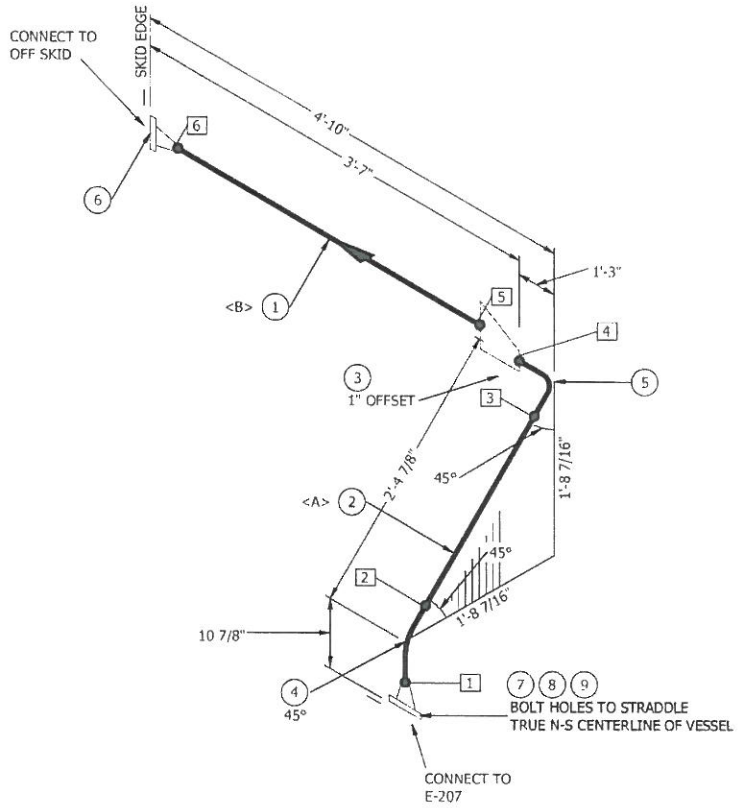

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	12	PIPE, STD, SMLS, A-333 Gr. 6, BBE 1133589	2'-5 7/8"
2	10	PIPE, STD, SMLS, A-333 Gr. 6, BBE 78376K	0'-7 5/8"
3	12X10	RED ECC, BW, STD - STD, A-420 Gr. WPL6	1
4	10	ELL 45, BW, STD, A-420 Gr. WPL6	1
5	10	ELL 90 LR, BW, STD, A-420 Gr. WPL6	1
6	12	FLG, RFWN, 300#, STD, A-350 Gr. LF2-1	1
7	10	FLG, RFWN, 300#, STD, A-350 Gr. LF2-1	1
8	10	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
9	1	(16) STUD BOLTS, 300# x 6 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (6.50000000 LG)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	10"	BW	CM
2	10"	BW	
3	10"	BW	
4	10"	BW	
5	12"	BW	
6	12"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	10"	7 5/8"	BEVEL	BEVEL
B	12"	2'-5 7/8"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	253 Psig						
OPER. TEMP.	135 °F	CORR. ALLOW.	0.0625"				
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	1/12/18	COB
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE GROOVED ON

UOP Russell Honeywell UOP

LINE No.	207-B1-LT-12"
ASSEMBLY DRAWING	SC6R-402
PAID DRAWING	***-239
DRAWN BY	COB
DATE DRAWN	1/10/18
JOB No.	488
SPOOL ID No.	SK2-130
REV.	0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-130

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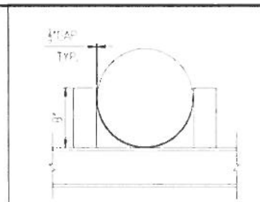
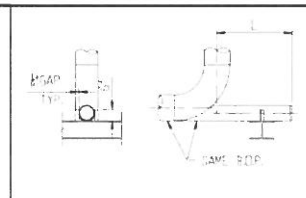


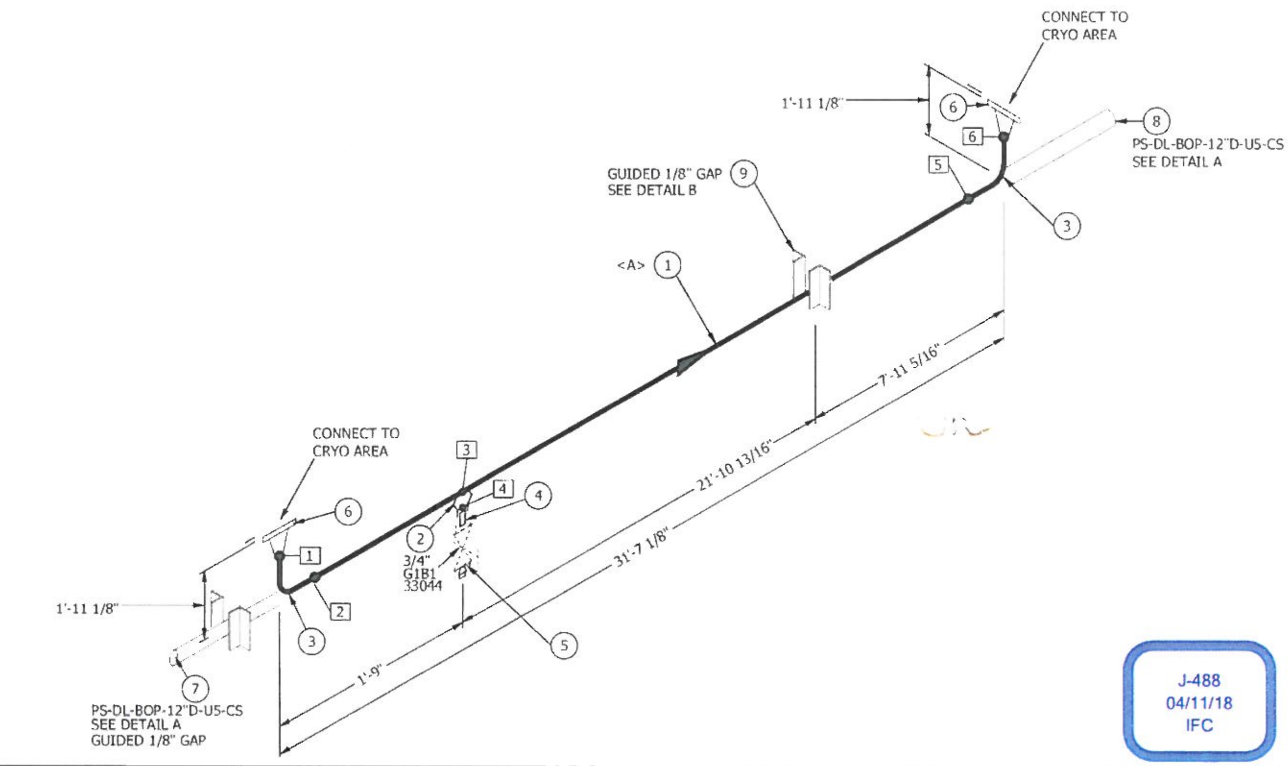
DETAIL B



DETAIL A

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	12	PIPE, STD, SMLS, A-106 Gr. B, BBE 173201	28'-7 1/8"
2	12X3/4	S-O-L, SW, 3000#, A-105	1
3	12	ELL 90 LR, BW, STD, A-234 Gr. WPB	2
4	3/4	NIPPLE, XH, SMLS, A-106 Gr. B, x 3" LG, POE-TOE (3.00000000 LG)	1
5	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
6	12	FLG, RFWN, 300#, STD, A-105	2
7	12	(1) PIPE, 8" STD, SMLS, x 3'-6" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 8 1/2" O.D. A-36 (L=2'-0"), (2) L 2"x2"x1/4"X6" LG.	1
8	12	(1) PIPE, 8" STD, SMLS, x 6'-3" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 8 1/2" O.D. A-36 (L=4'-9")	1
9		(2) L 3"x3"x1/4"x8" LG	1



WELD MAPPING

MARK	SIZE	TYPE	SCH
1	12"	BW	Q
2	12"	BW	
3	3/4"	LET	
4	3/4"	SW	
5	12"	BW	Q
6	12"	BW	Q

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	12"	28'-7 1/8"	BEVEL	BEVEL

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IFC

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2
OPER. PRESS.	210 Psig		
OPER. TEMP.	88 °F	CORR. ALLOW.	.0625"
STRESS RELIEVE	NO	INSULATION	NONE
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3

NO.	REVISION	DATE	BY	APR
0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD

CONFIDENTIAL STATEMENT

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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LINE No.	1/8-B1-CS-12"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-2331
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
SPOOL ID No.	SK2-131
REV	0

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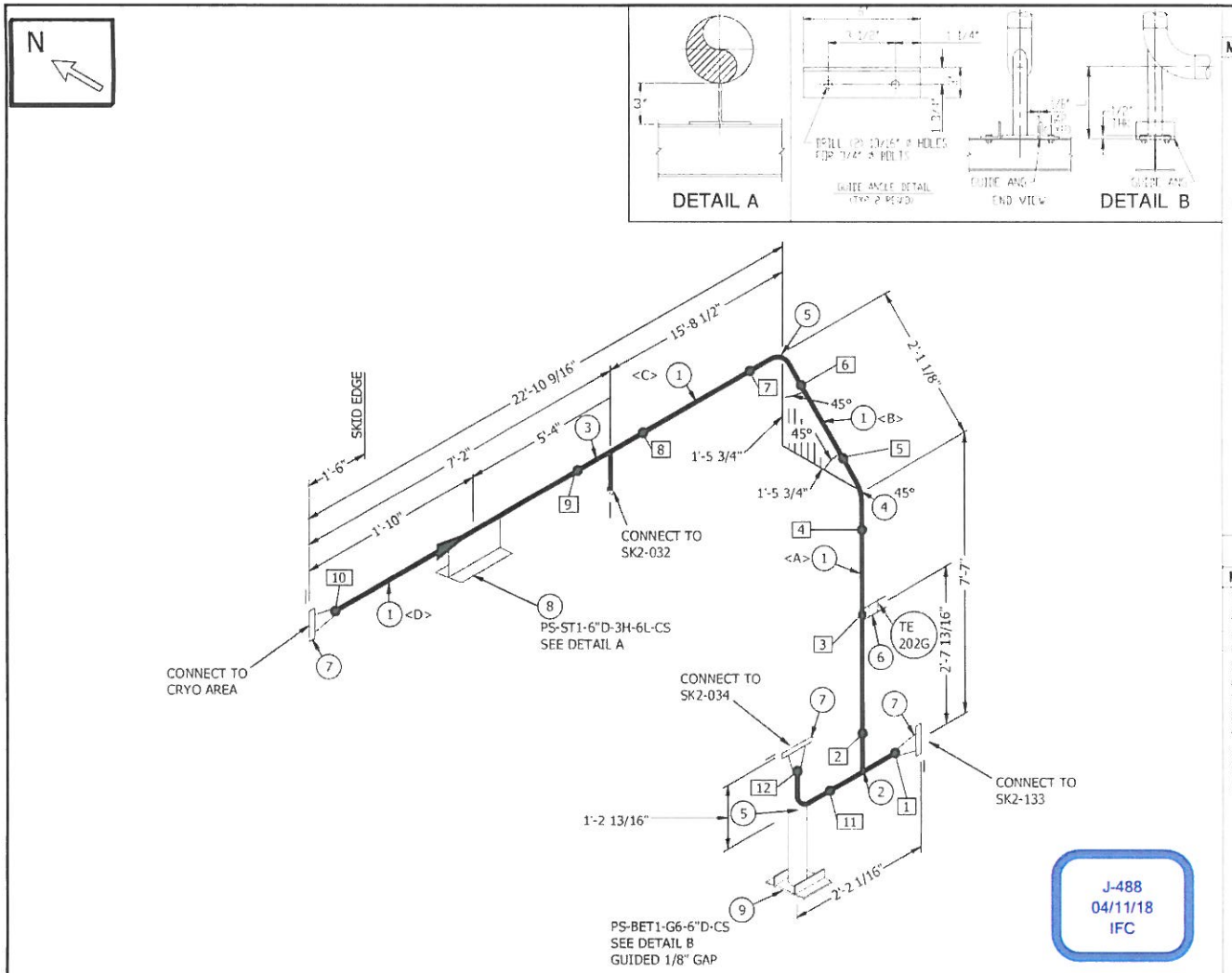

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-106 Gr. B, BBE 4204171	28'-6 9/16"
2	6X6	TEE, BW, XH, A-234 Gr. WPB	1
3	6X3	TEE RED, BW, XH - XH, A-234 Gr. WPB	1
4	6	ELL 45, BW, XH, A-234 Gr. WPB	1
5	6	ELL 90 LR, BW, XH, A-234 Gr. WPB	2
6	3/4	CPLG, THRD X 1 1/2" LG., 3000#, A-105	1
7	6	FLG, RTJWN, 900#, XH, A-105	3
8		PIPE SHOE (TYPE 1) 3" HI. x 6" LG. FROM W6x15 A-992	1
9		(1) PIPE, 3" STD, SMLS, x 2'-2 1/16" LG. A-106 Gr. B (1) BASE PL, 1/2" THK x 6" x 6" A-36 (2) GUIDE ANG, 2" x 3" x 1/4" x 6" LG. A-36 (L=1'-5 9/16")	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	JR
2	6"	BW	
3	3/4"	LET	
4	6"	BW	
5	6"	BW	CC
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	6"	BW	
11	6"	BW	JR
12	6"	BW	JR

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	6'-9 11/16"	BEVEL	BEVEL
B	6"	1'-0 3/8"	BEVEL	BEVEL
C	6"	14'-5 7/8"	BEVEL	BEVEL
D	6"	6'-2 5/8"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2
OPER. PRESS.	1270 Psig		
OPER. TEMP.	58 °F	CORR. ALLOW.	.0625"
STRESS RELIEVE	NO	INSULATION	1"C
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3

NO.	REVISION	DATE	BY	APR
0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR PIPING DO NOT INCLUDE WELD GAPS
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL COUPLING TO BE SADDLED ON

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UNIT No.	215-E1-CS-6" 1"C
ASSEMBLY DRAWING	SC6R-402
PIPING DRAWING	***-231/236
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
SPOOL ID No.	SK2-132
REV.	0

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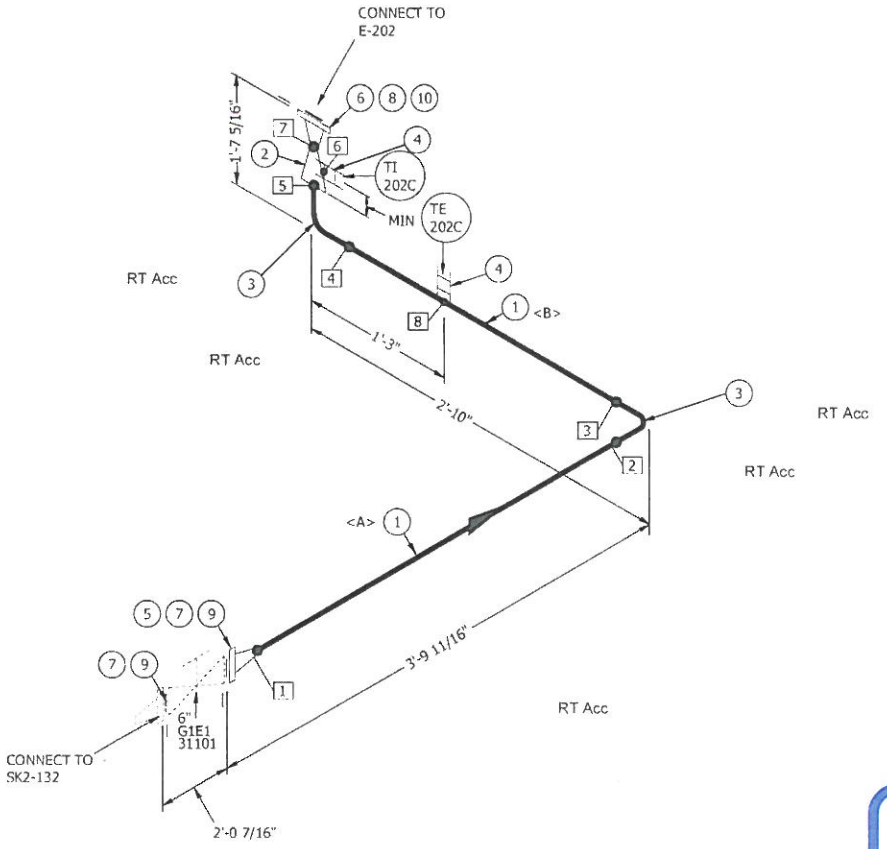

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-106 Gr. B, BBE 4204171	3'-10 7/8"
2	6X4	RED CONC, BW, XH - XH, A-234 Gr. WPB	1
3	6	ELL 90 LR, BW, XH, A-234 Gr. WPB	2
4	3/4	CPLG, THRD X 1 1/2" LG., 3000#, A-105	2
5	6	FLG, RTJWN, 900#, XH, A-105	1
6	4	FLG, RTJWN, 900#, XH, A-105	1
7	6	GSKT, 900# RTJ, SOFT IRON, OVAL RING R37, BRINELL HARDNESS 90 R45	2
8	4	GSKT, 900# RTJ, SOFT IRON, OVAL RING R37, BRINELL HARDNESS 90 R37	1
9	1 1/8	(12) STUD BOLTS, 900# x 8" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	2
10	1 1/8	(8) STUD BOLTS, 900# x 7" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	CM
2	6"	BW	
3	6"	BW	
4	6"	BW	
5	6"	BW	
6	3/4"	LET	
7	4"	BW	
8	3/4"	LET	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	2'-6 7/8"	BEVEL	BEVEL
B	6"	1'-4"	BEVEL	BEVEL

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	1270 Psig						
OPER. TEMP.	58 °F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	1"C	0	ISSUE FOR CONSTRUCTION	04/2/18	COB	WC
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

CONFIDENTIAL STATEMENT

THIS DRAWING IS THE PROPERTY OF THE THOMAS RUSSELL Co. AND IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE
ALL ROUTING TO BE SADDLE ON

UOP Russell Honeywell uop

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LINE No.	215-E1-CS-6" 1"C
ASSEMBLY DRAWING	SC6R-402
PAID DRAWING	***-231/236
DRAWN BY	COB
DATE DRAWN	4/2/18
JOB No.	488
SPOOL I.D. No.	SK2-133
REV.	0

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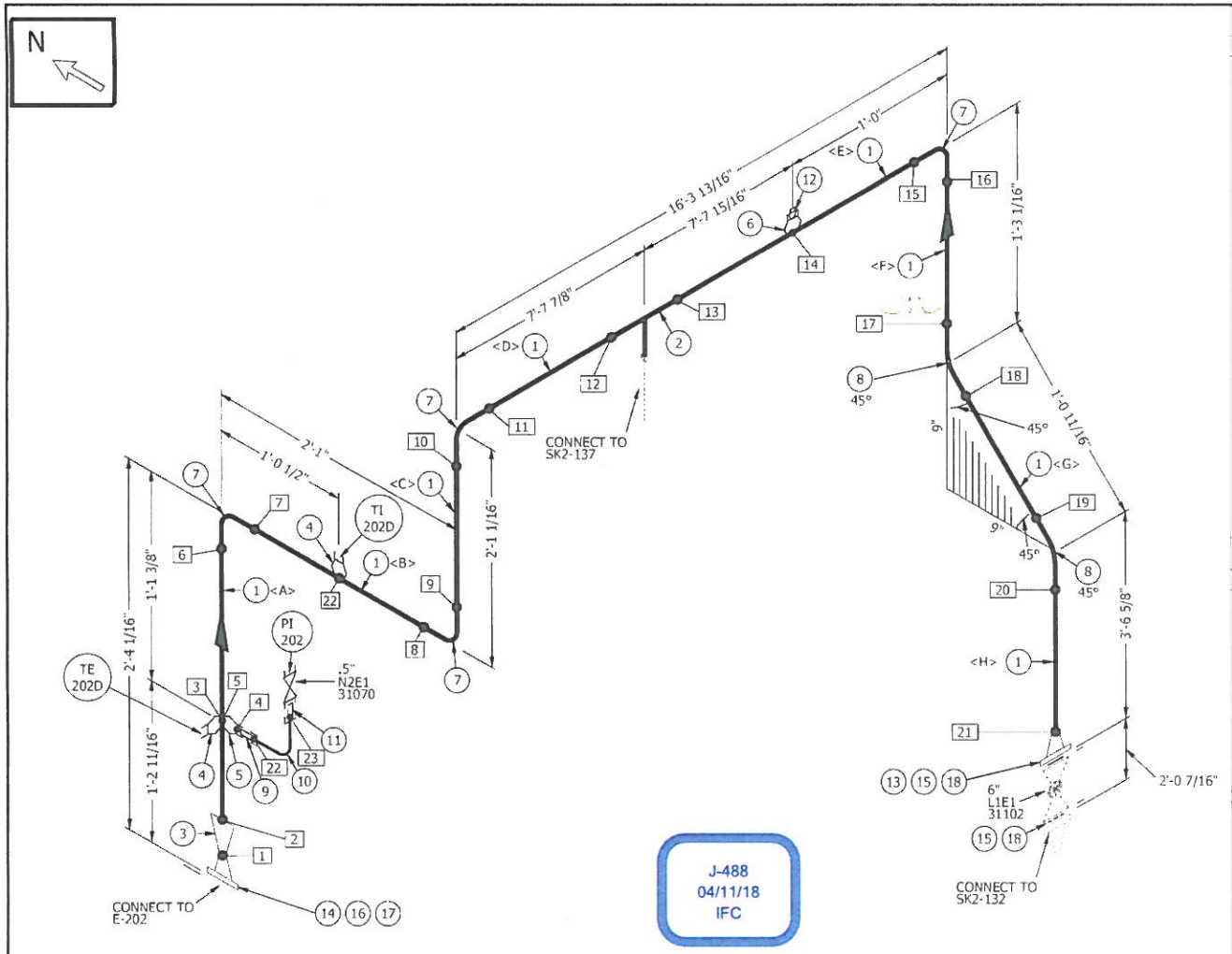

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-106 Gr. B, BBE 4204171	19'-1 15/16"
2	6X6	TEE, BW, XH, A-234 Gr. WPB	1
3	6X4	RED CONC, BW, XH - XH, A-234 Gr. WPB	1
4	6X3/4	T-O-L, THRD, 3000#, A-105	2
5	6X1/2	S-O-L, SW, 3000#, A-105	1
6	6X1/2	T-O-L, THRD, 3000#, A-105	1
7	6	ELL 90 LR, BW, XH, A-234 Gr. WPB	4
8	6	ELL 45, BW, XH, A-234 Gr. WPB	2
9	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, x 6" LG, PBE (6" LG.)	1
10	1/2	ELL 90, SW, 3000#, A-105	1
11	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, x 3" LG, POE-TOE (3" LG.)	1
12	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
13	6	FLG, RTJWN, 900#, XH, A-105	1
14	4	FLG, RTJWN, 900#, XH, A-105	1
15	6	GSKT, 900# RTJ, SOFT IRON, OVAL RING R37, BRINELL HARDNESS 90 R45	2
16	4	GSKT, 900# RTJ, SOFT IRON, OVAL RING R37, BRINELL HARDNESS 90 R37	1
17	1 1/8	(8) STUD BOLTS, 900# x 7" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
18	1 1/8	(12) STUD BOLTS, 900# x 8" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	4"	BW	CM
2	6"	BW	
3	1/2"	LET	
4	1/2"	SW	
5	3/4"	LET	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	6"	BW	
11	6"	BW	
12	6"	BW	
13	6"	BW	
14	1/2"	LET	
15	6"	BW	
16	6"	BW	
17	6"	BW	
18	6"	BW	
19	6"	BW	
20	6"	BW	
21	6"	BW	
22	1/2"	SW	
23	1/2"	SW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	8 3/4"	BEVEL	BEVEL
B	6"	7"	BEVEL	BEVEL
C	6"	7 1/16"	BEVEL	BEVEL
D	6"	6'-5 1/4"	BEVEL	BEVEL
E	6"	7'-5 5/16"	BEVEL	BEVEL
F	6"	2 5/16"	BEVEL	BEVEL
G	6"	5 3/16"	BEVEL	BEVEL
H	6"	2'-9 1/16"	BEVEL	BEVEL

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	1265 Psig							
OPER. TEMP.	72°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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LINE No.	216-E1-CS-6"
ASSEMBLY DRAWING	SC6R-402
PAID DRAWING	***-231
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
SPOOL ID No.	SK2-134
REV.	0

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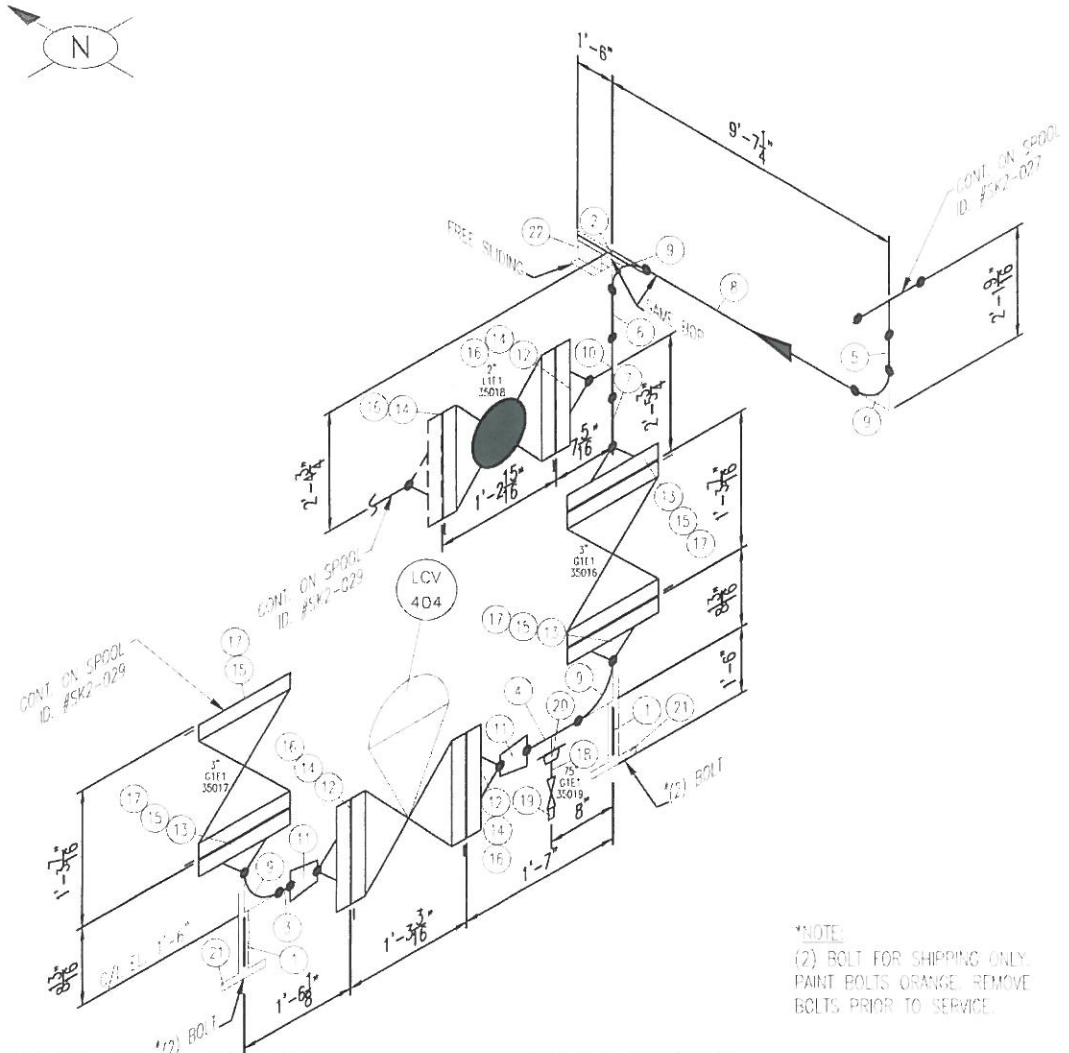

*NOTE:
(2) BOLT FOR SHIPPING ONLY. PAINT BOLTS ORANGE. REMOVE BOLTS PRIOR TO SERVICE.

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	2	2"	PIPE, XH SMLS, A-106-B, BBE	1'-10"
2	1	2"	PIPE, XH SMLS, A-106-B, BBE	1'-2 1/2"
3	1	3"	PIPE, XH SMLS, A-106-B, BBE 1707384	5 11/16"
4	1	3"	PIPE, XH SMLS, A-106-B, BBE	6 11/16"
5	1	3"	PIPE, XH SMLS, A-106-B, BBE	1'-4 3/16"
6	1	3"	PIPE, XH SMLS, A-106-B, BBE	1'-8 7/8"
7	1	3"	PIPE, XH SMLS, A-106-B, BBE	1'-10 1/16"
8	1	3"	PIPE, XH SMLS, A-106-B, BBE	8'-10 1/4"
9	4	3"	ELL, 90 LR XH, A-234-WPB	
10	1	3"x2"	TEE, RED XH, A-234-WPB	
11	2	3"x2"	REDUCER, CONC XH, A-234-WPB	
12	3	2"	FLG, RTJW 900LB XH, A-105	
13	3	3"	FLG, RTJW 900LB XH, A-105	
14	4	7/8"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H (ZINC PLATED)	6"
15	4	7/8"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H (ZINC PLATED)	6"
16	4	2"	GASKET, RTJ, 900LB R24	
17	4	3"	GASKET, RTJ, 900LB R31	
18	1	3/4"	NIPPLE, S/160 SMLS, A-106-B PBE-TBE	3"
19	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
20	1	3"x3/4"	SOL, 3000LB FS, A-105	
21	2		BASE PLATE, 1/2" THK. x 5" x 5" (SA-36 MATERIAL)	
22	1		PIPE SHOE, 6" LG x 3" HI FROM Ø6x15	

J-488
04/11/18
IFC

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DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	1270 Psia							
OPER. TEMP.	154 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1"C	0	ISSUE FOR CONSTRUCTION	01/11/18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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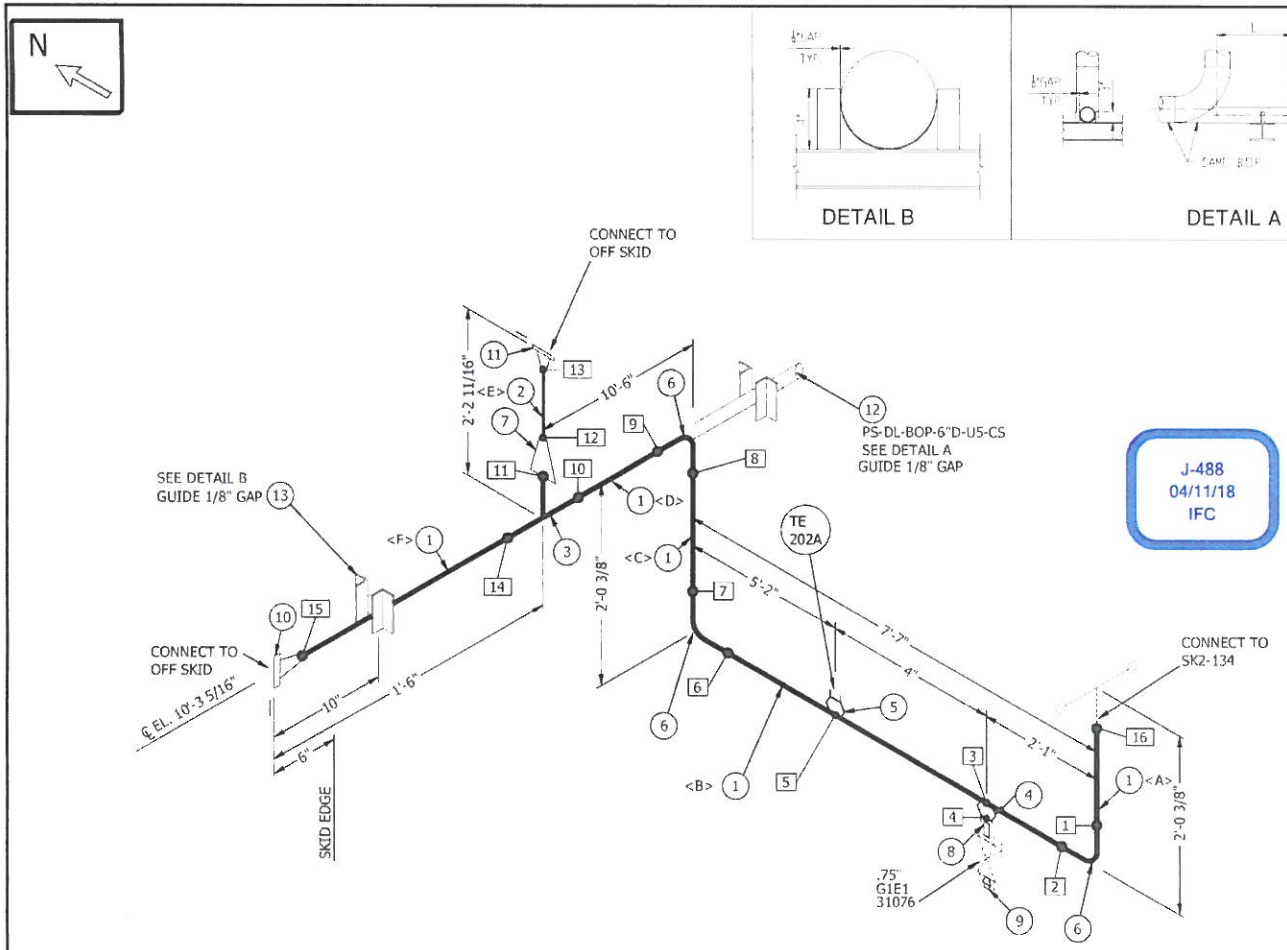
PH.: 918-481-5682

LINE No.	235-E1-CS-3" 1"C
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-235/236
DRAWN BY	COB
DATE DRAWN	01/10/18
JOB No.	488
SPOOL I.D. No.	SK2-135
REV.	0



J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-106 Gr. B, BBE 4204171	17'-3 1/16"
2	2	PIPE, XH, SMLS, A-106 Gr. B, BBE	1'-2"
3	6X3	TEE RED, BW, XH - XH, A-234 Gr. WPB	1
4	6X3/4	S-O-L, SW, 3000#, A-105	1
5	6X3/4	T-O-L, THRD, 3000#, A-105	1
6	6	ELL 90 LR, BW, XH, A-234 Gr. WPB	3
7	3X2	RED CONC, BW, XH - XH, A-234 Gr. WPB	1
8	3/4	NIPPLE, S/160, SMLS, A-106 Gr. B, x 3" LG, POE-TOE (3" LG)	1
9	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
10	6	FLG, RTJWN, 900#, XH, A-105	1
11	2	FLG, RTJWN, 900#/1500#, XH, A-105	1
12	6	(1) PIPE, 3" STD, SMLS, x 30" LG. A-106 Gr. B (1) END PL, 1/4" THK x 3 3/8" O.D. A-36 (L=18"), (2) ANGLE, 2" x 2"x 1/4"x3" LG. A-36	1
13	4	ANGLE, 2" x 2" x 1/4" x 4" LG. A-36	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	CM
2	6"	BW	
3	3/4"	LET	
4	3/4"	SW	
5	3/4"	LET	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	6"	BW	
11	3"	BW	
12	2"	BW	
13	2"	BW	
14	6"	BW	
15	6"	BW	
16	6"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	9 3/4"	BEVEL	BEVEL
B	6"	6'-1"	BEVEL	BEVEL
C	6"	6 3/8"	BEVEL	BEVEL
D	6"	9'-3 3/8"	BEVEL	BEVEL
E	2"	1'-2"	BEVEL	BEVEL
F	6"	6 9/16"	BEVEL	BEVEL

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	1265 Psig							
OPER. TEMP.	72°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR FW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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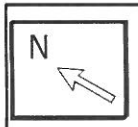
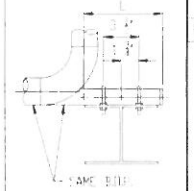
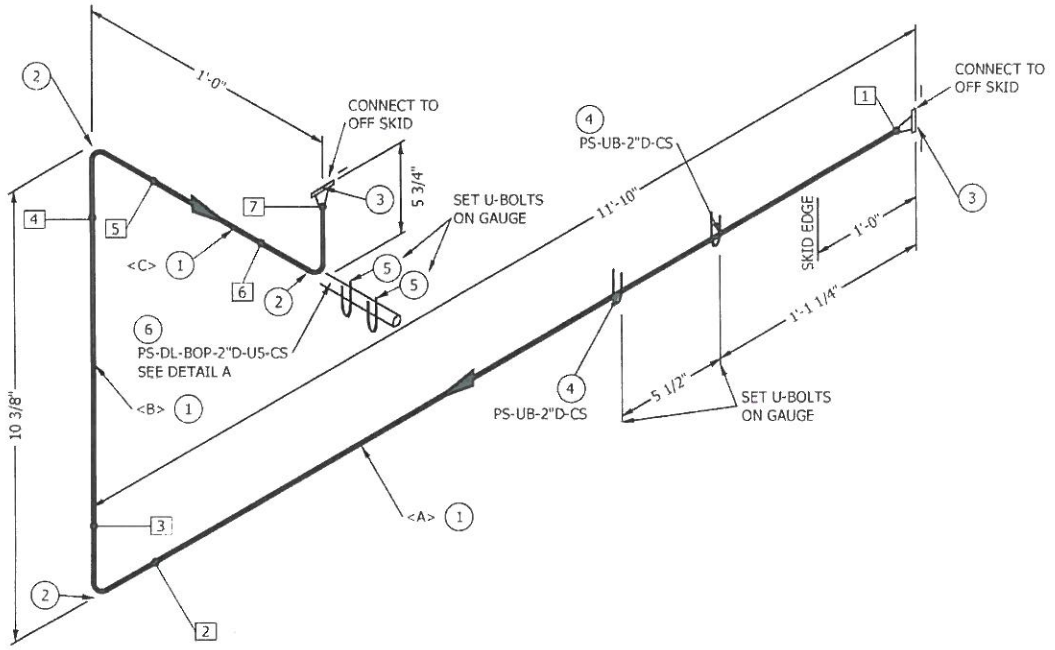
Fax: 918-481-7422

UNIT No.	216-E1-CS-6"
ASSEMBLY DRAWING	SC6R-402
PARTS DRAWING	***-231
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
SPOOL ID No.	SK2-137
REV.	0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-137







BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY.	SAP No.
1	2	PIPE, XH, SMLS, A-106 Gr. B, BBE D04408	12'-2 5/8"	
2	2	ELL 90 LR, BW, XH, A-234 Gr. WPB	3	
3	2	FLG, RFWN, 300#, XH, A-105	2	
4	2	U-BOLT FOR 2" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	2	
5	1 1/2	U-BOLT FOR 1 1/2" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	2	
6	2	(1) PIPE, 1 1/2" XH, SMLS, x 1'-1 11/16" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 1 3/4" O.D. A-36 (L=10 11/16")	1	

WELD MAPPING

MARK	SIZE	TYPE	WELDER
1	2"	BW	CC
2	2"	BW	
3	2"	BW	
4	2"	BW	
5	2"	BW	
6	2"	BW	
7	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	2"	11'-4 1/4"	BEVEL	BEVEL
B	2"	4 3/8"	BEVEL	BEVEL
C	2"	6"	BEVEL	BEVEL

J-488
04/11/18
IFC

DESIGN PRESS.	650 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	245 Psig							
OPER. TEMP.	130°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	3/5/18	COR	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD CAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD CAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SCRIBED ON.

UOP Russell
Honeywell
uop
7055 S. Yale, Suite 210
Tulsa, Oklahoma 74136
Phone 918-491-5682
Fax 918-491-7427

LINE No. PSV-001 (B1-CS)
ASSEMBLY DRAWING ***-450
PMD DRAWING ***-233L
DRAWN BY COR
DATE DRAWN 3/5/18
JOB No. 488
SPOOL ID No. SK2-138
REV. 0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\WIP\CRYO\SK2\SK2-138

J-488 SK2

SPOOLS

PIPE MTRs

ILJ459 / D04462 / 1.5A106XHF / 1-1/2 XH A106B SMLS PIPE

CERTIFICATE NO	: DQ20171109366
DATE OF ISSUE	: 09.NOV.2017
CUSTOMER	:
CONTRACT(P/O) NO	: 189710-00
COMMODITY	: SEAMLESS CARBON STEEL HOT FINISHED PIPE
STANDARD	: ASTM A53 2012 Edition/A106 2015 Edition// ASME SA53/SA106 2015 Edition

INSPECTION CERTIFICATE

EN10204-3.1 ■ / EN10204-3.2 □

ILJIN Steel Corporation
Jeonju Plant Address
1746 Hoguk-ro, Imsil-eup, Imsil-gun, Jeollabuk-do, Korea 556-805
TEL : 82-63-730-4574 / FAX : 82-63-730-4798

SUPPLIER | ILJIN STEEL Corporation

NO.	W/O (HEAT NO.)	ORDER SIZE ID	OD	WT	LENGTH	QUANTITY PCS	MASS kg / pcs	MASS TOTAL(M/T)	TOTAL LENGTH	Manufacturing Process *1	Pipe End (Type) *2	HEAT TREATMENT *3	Grade	REMARK
1	ST17100019 (D04462)	1.500 inch	1.900 inch	0.200 inch	21 ft	293	5	10.140	6153 ft	HF	PEP	-	ASTM A53 B ASTM A106 B ASME SA53 B ASME SA106 B	1. THE HARDNESS DESCRIBED HEREIN COMPLIANCE WITH NACE MR-0175/MR-0103(MAX.22HRC) 2015 EDITION 2. THERE ARE NO WELDING REPAIR ON PIPES 3. WE HEREBY CERTIFY THAT THERE ARE NO MERCURY, MERCURY COMPOUNDS, MERCURY BEARING INSTRUMENTS AND NO MERCURY EQUIPMENT HAVE BEEN USED ON OUR PIPES 4. *R - CHEMICAL COMPOSITION REQUIREMENT FOLLOWS NEXT - ASTM A53 : TABLE 1 (REMARK C) - ASTM A106 : TABLE 1 (REMARK B) 5. Billet Source: South Korea (SeAH Besteel, 522, Oehang-ro, Gunsan-si, Jeollabuk-do, Korea 573-711)
	TOTAL					293	5	10.140	6,153					

NO	W/O (HEAT NO.)	STATUS	CHEMICAL COMPOSITION(%) C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al	Ti	V	Nb	B	CEQ	NDT	HYDRO-STATIC TEST Sec.	PRESSURE	TENSILE TEST (GAGE LENGTH : 50.0±0.1mm) Width	YS 0.5% EUL	TS	EL	IMPACT TEST (ASTM E23) Energy (1) Temp. (J) Unit: Joule	HARDNESS (ASTM E18) ■ HRB □ HRC L.J HB L.J HV	BENDING TEST	FLATTENING TEST	FLARING TEST	DWT	HYDRO-BURST	VISUAL	DIMENSION	DRIFT TEST	STRAIGHTNESS
		*4	X100		*R	X1000		X100				X1000						*10			*F	0.5% EUL			*T	*L				5kg X 2m Temp. °C	Temp. °C				
Spec.		MAX	25		135	35	35	40	40	15	40			80			0.50	EC UT	5	2500	19.05	1.0						180°								
		MIN		10	40																	240	415	30.0				90°	31.01							
1	ST17100019 (D04462)	LA	19	24	117	11	4	12	5	1	10	21	27	5	2	0.7	0.42																			
		BA	19	26	115	10	4	14	5	1	9	21	27	3	1	0.4	0.42																			
		PA	19	26	117	10	3	14	5	1	10	22	28	4	1	0.5	0.42	*G	*G			440	567	52.9			86.9	*G	*G							
																						429	551	53.2			86.3									
																											86.3									

NOTE

*1 - NF : Normalizing Forming / HF : Hot Finished / CF : Cold Finished
*2 - BEP : Bevelled End / PEP : Plain End
*3 - A : As Rolled / SRA : Stress Relieved Annealing / Q+T : Quenched & Tempered / N+T : Normalized & Tempered / N : Normalized / Iso : Isothermal Annealing
*4 - LA : Ladle Analysis / BA : Billet Analysis / PA : Product Analysis
*5 - Cu+Ni+Cr+Mo+V
*6 - Nb+V
*7 - Nb+V+Ti
*8 - Cr+Ni
*9 - C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15
*10 - UT : Ultrasonic Test / EC : Eddy Current T / MT : Magnetic Particle Test/ EM : Electro
*P - Tubular or Plate Type of ASTM E8 Fig 12
*F - Full Section Type of ASTM E8 Fig 11
*G - Good / *L - Longitudinal / *T - Transverse

Third party Section

- WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTABLE.
- THE QUALITY SYSTEM OF OUR WORKS HAS BEEN ASSESSED AND REGISTERED AS MEETING THE REQUIREMENTS OF ISO 9001. ANY WELDING HAS NOT BEEN PERFORMED ON THE MATERIAL.
- THIS CERTIFICATION IS INTENDED ONLY FOR PRODUCTS LISTED. MODIFICATION TO OR UNAUTHORIZED USE OF THIS CERTIFICATION IS STRICTLY PROHIBITED. OFFENSES MAY BE REGARDED AS FORGERY OF DOCUMENTS AND BE SUBJECT TO CRIMINAL PROSECUTION.

YOUNG KYU SEO
Manager of Q.M Dept.

18-0666 J-488 SK2 Pipe Mtrs

ArcelorMittal

A02 **Inspection certificate "3.1" (EN 10 204)**

A03 Document No.: 32515/16 Page: 1/2

A07	Customer's Order (P.O.) No./Item No.: 165608-00/10098521	A08	Manufacturer's Works Order No.: 40277/0/16
A11	Supplier's Order No.: 3151002086	A10	Advice - Note No.: 8150008597, 8150007129
B05, B12/13	Quantity delivered: pcs / bdls: 535; mtrs / feet: 10301.837; B13 Actual mass kgs / lbs: 17078	A06	Customer / Consignee: ArcelorMittal International America, LLC, 1 S. Dearborn Street, 60603-9888 CHICAGO, USA
B09-11	Dimensions: 1.900 X 0.200"		
B02	Steel designation: Grade 6 Grade B		

B01, B03, B04 Product, conditions and terms of delivery:
Seamless steel pipes acc. to ASME B36.10M-15 / ASTM A333/A333M-15 Grade 6 / ASME SA333/SA333M-15 Grade 6 / ASTM A53/A53M-12 Grade B / ASME SA53/SA53M-12 Grade B / ASTM A106/A106M-15 Grade B / ASTM SA106/SA106M-15 Grade B, NACE MR0175/ISO 15156-09 / NACE MR0103-12, with plain ends, protected with plastic caps, surface lacquered.
Normalized hot finished. **Certified acc. to EN 10204/3.1-2004.**

A04, B05 Marking: Manufacturer's mark, mill inspector's stamp

AMTP OSTRAVA (3)

C71-92 Heat chemical analysis (%) C70 Steel made by basic oxygen process, fully killed, strand cast.

B07 Heat No.:	C	MN	SI	P	S	CU	NI	CR	MO	V	TI	NB	CEQ
78376K	0.18	1.17	0.231	0.014	0.008	0.06	0.03	0.04	0.007	0.001	0.001	0.004	0.39

Z09 [X] continues on page 2/2

Test results:

B07 Heat No. C00 Specimen No. / C04 Requirements:		C11 Yield Point (psi)	C12 Tensile Strength (psi)	C13 Elongation % (2")	C40-43 Impact test L-3,33-5 ft-lb / -60°F				C30-32 Hardness HRB
Grade 6		min. 35000	min. 60200	min. 24					max. 99
Grade B		min. 35000	min. 60000	min. 22					
		Longitudinal strip specimen 3/4"			Ø	min			
78376K		45252	70053	32.0	19	19	18	21	76.5
		46847	74114	28.7					
		45977	72519	27.7					
		49313	73099	30.2					

Z09 [X] continues on page 2/2

D01	Visual and dimensional inspection with satisfactory results	X	D51	Hydraulic test - min. test pressure psi / sec 2500 / 5
C50	Flattening test - satisfactory	X	D02	The pipes tested on tightness by NDT in acc. to
C51	Expanding test - satisfactory			
C52	Bending test - satisfactory	X		
C53	Ring expanding test - satisfactory		D03	Nondestructive Electromagnetic Testing
C54	Ring tensile test - satisfactory			

PRESENTED DATA WAS CONVERTED FROM SI UNIT SYSTEM.

MSNA Order No.: 165608-00/10098521 **Customer name :** **Vessel name : STAR ISMENE**

Z01 All pipes conform to the above mentioned standards and ordering requirements and agreements.

Z02 Date of issue 3.11.2016/CE Tel.:+420 595683644

ArcelorMittal
ArcelorMittal Tubular Products Ostrava a.s. Vratimovská 689, 707 02 Ostrava 7

Bc. Petr Pastucha
Work's Inspector
Z02 Validation

A01 ArcelorMittal Tubular Products Ostrava a.s.
A05 QA Department
Vratimovská 689
707 02 Ostrava-Kunčice
Czech Republic

E.2. 2574/16/15/P

EN ISO 9001:2008 / EN ISO 14001:2004
Certificate Reg. No. 04 100 ... / 04 104 ...

ArcelorMittal

Inspection certificate "3.1" (EN 10 204)

A03 Document No: **32515/16**

C71-92 Heat chemical analysis (%)

B07 Heat No.	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	V	Ti	Nb	C_{eq}
79975K	0.16	1.11	0.206	0.011	0.010	0.07	0.04	0.05	0.008	0.001	0.001	0.004	0.37

Test results:

B07 Heat No. C00 Specimen No. / C04 Requirements:		psi C11 Yield Point	psi C12 Tensile Strength	% (2") C13 Elongation	C40-43 Impact Test Ø	C40-43 Impact Test min.	C30-32 Hardness
79975K		44672	69908	31.6	19	18 18 21	72.4
		45687	69618	33.2			
		47717	72374	30.8			
		45107	68893	29.7			
		46702	70778	30.1			
		48267	68893	33.7			
		48267	69183	32.0			
		47137	70923	32.4			
		45252	70778	30.7			
		44362	70198	32.5			

Z02 Date of issue 3.11.2016/CE

Tel.:++420 595683644

ArcelorMittal

ArcelorMittal Tubular Products Ostrava a.s.
Vratimovská 689, 707 02 Ostrava 7

Bc. Petr Pastucha
Work's Inspector
Z02 Validation

A01 ArcelorMittal Tubular Products Ostrava a.s.
A05 QA Department
Vratimovská 689
707 02 Ostrava-Kunčice
Czech Republic

E.z. 2574/16/15/P

TŘINECKÉ ŽELEZÁRNY
MORAVIA STEEL

Sheet : 1/ 5

A03 Document No.:
A 2016/12/003005-JAN

1519482

A01, A05
Manufacturer: TŘINECKÉ ŽELEZÁRNY,a.s. /Průmyslová 1000 /Staré Město /739 61 Třinec /Czech Republic
Production mill : VT – VÁLCOVNA TRUB / Výstavní 1132 / 706 02 Ostrava – Vítkovice / Czech Republic

A07 Purchaser's order No.:	A08 Works order No./ Contract No.:	A06 Consignee:
60094	9700245396 0041414435 / 176	

A10 Advice-Note No.:
16/12/001283/01 06.12.2016

A02 Type of inspection document:
Inspection certificate 3.1, EN 10204:2004

B01, B03-B11 Product, product dimensions, specification	B09, B13 Quantity	B02.1 Steel designation	B02.2 Product / Dimensional standard
Seamless Steel Line Pipes Hot Rolled	24 pcs	X52N/PSL2	API SPEC 5L 45. EDITION
	984.50 ft	Gr.B	ASTM A106/A106M 11/2015
10.750 in x 0.365 in	18839 kgs	Gr.B	ASTM A53/A53M 03/2012
		Gr.6	ASTM A333/A333M 03/2016
		Gr.B	ASME SA106/SA106M 07/2015
		Gr.C	ASME SA106/SA106M 07/2015
		Gr.B	ASME SA53/SA53M 07/2015
		Gr.C	ASTM A106/A106M 11/2015
		Gr.6	ASME SA333/SA333M 07/2015
			ASME B36.10 08/2015

B04 Product delivery condition:
normalized

B03 Supplementary requirements:
PED 2014/68/EU (No.: 07/202/0190/WZ/0812/16)
Manufacturer declares that is certified according to Article 4.3, Annex I of Directive 2014/68/EU by the notified body TÜV NORD reg. No 0045. Certificate is valid until September 2019.
Tolerance on Outside Diameter +- 0.75%
Beveled ends 30° +5°/-0°, root face 1,6mm +/-0,8mm, With monogram API

B14 Letter of credit:
MILL TEST CERTIFICATE
Description of Goods and/or Services:
PRIME NEWLY PRODUCED SEAMLESS STEEL LINE PIPE, ACCORDING TO ASTM/ASME A/SA53-B, A/SA 106-B/C, A/SA 333 GR.6, API5L X52N (PSL-2). CERTIFIED TO NACE MR0175, MR0103, PED 97/23/EC-SECT 4.3. EN 10204 3.1, MILL LACQUER COATED, BEVELED ENDS WITH PLASTIC CAPS.

Z02 Confirmed: Marta Uhrová, Ing.,
Head of Attestation, Releasing and External inspection VT, independent authorized agent

Z02

Ostrava-Vítkovice
08.12.2016

tel.: 0042059/560/2160

TŘINECKÉ ŽELEZÁRNY, a.s.

Z03 Independent authorized agent

38873
lot6

TŘINECKÉ ŽELEZÁRNY
MORAVIA STEEL

A03 Document No.:
A 2016/12/003005-JAN

A01, A05
Manufacturer: TŘINECKÉ ŽELEZÁRNY,a.s. /Průmyslová 1000 /Staré Město /739 61 Třinec /Czech Republic
Production mill : VT – VÁLCOVNA TRUB / Výstavní 1132 / 708 02 Ostrava – Vítkovice / Czech Republic

TOTAL QUANTITY: 10,300 FT/183 MT
SHIPPING TERMS: CIF, LO HOUSTON, TX, USA.

SIZE (IN)	WT (IN)	QTY (FT)/MT	LENGTH (FT)
6.000	.280W S40	2,000/17	38-42
6.000	.432W S80	1,200/16	38-42
8.000	.322W S40	1,500/19	38-42
8.000	.500W S80	1,000/20	38-42
10.000	.365W	1,000/18	38-42
10.000	.500 W	600/15	38-42
12.000	.375W	1,000/22	38-42
12.000	.500W	500/15	38-42
14.000	.375W	1,000/25	38-42
14.000	.500W	500/16	38-42

OD TOLERANCE: +/- 0.75 PERCENT.
WT TOLERANCE: +15/-12.5 PERCENT

Requirements :

B07.1 Heat No.	B07.2 Specimen No.	C10* Specimen shape	C11 Yield Strength R10.5 psi	C12 Tensile Strength Rm psi	C13 Elongation 2" %	C14 Reduction of area Z %
			52200-76900	70000-110200	min 30	
		C02 Specimen direction: L	C03 Test temperature(°F): 70		C15 Test method:	ASTM A370
T45432	61688/P	P	54389	75275	44.2	-
T45432	61689/P	P	57435	78175	42.8	-
T47853	61678/P	P	55694	76290	41.6	-
B07.1 Heat No.	B07.2 Specimen No.	C10* Specimen shape	C11 Yield Strength ReH psi	C12 Tensile Strength Rm psi	C13 Elongation A5 %	C14 Reduction of area Z %
			52200-76900	70000-110200	min 14	
		C02 Specimen direction: L	C03 Test temperature(°F): 70		C15 Test method:	EN ISO 6892-1 B30
T45432	61688/P	P	62221	77305	32.6	-
T47853	61678/P	P	61641	77595	30.9	-

* P - Flat specimen
K - Round specimen

Z02 Confirmed: Marta Uhrová, Ing.
Head of Attestation, Releasing and External Inspection VT, independent authorized agent

Z02

Ostrava-Vítkovice :
06.12.2016

tel.: 00420/59/560/2160

Z03 Independent authorized agent

38873
2042

TŘINECKÉ ŽELEZÁRNY
MORAVIA STEEL

A03 Document No.:
A 2016/12/003005-JAN

A01, A05
Manufacturer: TŘINECKÉ ŽELEZÁRNY,a.s. /Průmyslová 1000 /Staré Město /739 61 Třinec /Czech Republic
Production mill : VT - VÁLCOVNA TRUB / Výstavní 1132 / 706 02 Ostrava - Vítkovice / Czech Republic

B07.1 Heat No.	B07.2 Specimen No.	C40 Impact test KV ftLb		C44 Lateral expandit mm		C45 Shear fracture area %	
		C41 0.295in x 0.394in					
		C02 Specimen direction: L		C03 Test temperature(°F): -50		C46 Test method: ASTM A370	
		C42 Individual values	C43 Mean value	C44.1 Individual values	C44.2 Mean value	C45.1 Individual values	C45.2 Mean value
T45432	61688/P	-181 -178 170	-176				
T47853	61678/P	136 136 127	133				

B07.1 Heat No.	B07.2 Specimen No.	C40 Impact test KV ftLb		C44 Lateral expandit mm		C45 Shear fracture area %	
		C41 0.295in x 0.394in					
		C02 Specimen direction: T		C03 Test temperature(°F): 32		C46 Test method: ASTM A370	
		C42 Individual values	C43 Mean value	C44.1 Individual values	C44.2 Mean value	C45.1 Individual values	C45.2 Mean value
T45432	61688/P	-181 143 143	-156				
T47853	61678/P	-211 -195 -186	-197				

B07.1 Heat No.	B07.2 Specimen No.	C40 Impact test KV2 ftLb		C44 Lateral expandit mm		C45 Shear fracture area %	
		C41 0.295in x 0.394in					
		C02 Specimen direction: L		C03 Test temperature(°F): 68		C46 Test method: ISO 148-1	
		C42 Individual values	C43 Mean value	C44.1 Individual values	C44.2 Mean value	C45.1 Individual values	C45.2 Mean value
T45432	61688/P	141 142 150	145				
T47853	61678/P	145 135 130	136				

B07.1 Heat No.	B07.2 Specimen No.	C30 Hardness HBW NACE MR0175-2009,NACE MR0103-2012		
		max 237		
		C33 Test method: ISO 6506-1		
		C31 Individual values	C32 Mean value	
T45432	61688/P	146 144 143	144	
T47853	61678/P	148 148 137	144	

C70 Steelmaking process:
Basic oxygen furnace
Vacuum degassed

Z02 Confirmed. Marta Uhrová, Ing.,
Head of Attestation, Releasing and External Inspection VT, Independent authorized agent

Z02

Ostrava-Vítkovice ,
08.12.2016

tel : 00420/59/560/2180

Z03 Independent authorized agent

38873
3016

TŘINECKÉ ŽELEZÁRNY
MORAVIA STEEL

A03 Document No.:
A 2016/12/003005-JAN

A01, A06
Manufacturer: TŘINECKÉ ŽELEZÁRNY,a.s. /Průmyslová 1000 /Staré Město /739 61 Třinec /Czech Republic
Production mill : VT – VÁLCOVNA TRUB / Výstavní 1132 / 708 02 Ostrava – Vítkovice / Czech Republic

C71-C92
Heat chemical analysis in %:

Ceq max.: 0.43

B07.1 Heat No.	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	V	Ti	Al	Nb	B	Ceq		
T45432	0.17	1.15	0.20	0.012	0.003	0.05	0.02	0.19	0.005	0.037	0.001	0.029	0.001	0.0005	0.41		
T47853	0.16	1.15	0.20	0.014	0.004	0.05	0.03	0.18	0.007	0.035	0.001	0.031	0.001	0.0005	0.40		

Product chemical analysis in %:

Ceq max.: 0.43

B07.1 Heat No.	B07.2 Specimen No.	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	V	Ti	Al	Nb	B	Ceq
T45432	61688/P	0.17	1.14	0.20	0.011	0.002	0.05	0.02	0.19	0.006	0.037	0.001	0.029	0.001	0.0004	0.41
T45432	61689/P	0.17	1.14	0.20	0.010	0.001	0.05	0.02	0.19	0.006	0.038	0.001	0.029	0.001	0.0004	0.41
T47853	61678/P	0.17	1.15	0.19	0.014	0.003	0.04	0.02	0.18	0.006	0.037	0.001	0.030	0.001	0.0003	0.41

C60, D01, D02-D50, D51
Other requirements:

Visual and dimensional inspection		- satisfactory
Flattening test	ASTM A 530/A 999	- satisfactory
Hydrostatic test - test pressure	2970 psi/5s	- satisfactory
Ultrasonic testing 100% of pipes	ASTM E213 5 % L+T	- satisfactory
Residual magnetism	API 5L	- satisfactory

B15 Supplementary information:
Heat No.: T45432 - 23 pcs, 945.16 ft, 18074 kgs
Heat No.: T47853 - 1 pcs, 39.34 ft, 765 kgs

80 % of capacity of the Charpy Impact Machine was exceeded at the Impact Test Values (see values marked with " – ").

MECHANICAL PROPERTIES (TENSILE AND YIELD STRENGTH IN PSI, IMPACT TEST AND ELONGATION VALUE SHALL BE SPECIFIED)
STATEMENT 'MATERIAL HAS NO CONTAMINATION BY MERCURY, NO LEAD, NO ASBESTOS, AND NO REPAIR BY WELDING.'
COUNTRY OF ORIGIN OF RAW MATERIAL - CZECH REPUBLIC.
COUNTRY OF ORIGIN OF ACTUAL MANUFACTURE AND COUNTRY OF MELT - CZECH REPUBLIC.
LATEST EDITION AND ADDENDA
STATEMENT 'MATERIAL FURNISHED ON THIS PURCHASE ORDER SHALL NOT HAVE COME IN DIRECT CONTACT WITH MERCURY, ANY OF ITS COMPOUNDS, OR ANY MERCURY-BEARING DEVICES DURING THE MANUFACTURING PROCESS, TESTS, OR INSPECTIONS.
"NO WELD REPAIR HAS BEEN PERFORMED ON TUBES" STATEMENT

Z02 Confirmed: Marta Uhrová, Ing.
Head of Attestation, Releasing and External Inspection VT, Independent authorized agent

TŘINECKÉ ŽELEZÁRNY, a.s.

Z03

Ostrava-Vítkovice :
08.12.2016

tel.: 00420/59/550/2160

Z03 Independent authorized agent

38873
4646

TŘINECKÉ ŽELEZÁRNY
MORAVIA STEEL

A03 Document No.:
A 2016/12/003005-JAN

A01, A05
Manufacturer: TŘINECKÉ ŽELEZÁRNY,a.s. /Průmyslová 1000 /Staré Město /739 61 Třinec /Czech Republic
Production mill : VT – VÁLCOVNA TRUB / Výstavní 1132 / 706 02 Ostrava – Vítkovice / Czech Republic

The Mass Activity value of Ionizing Radiation in the Heat Analysis doesn't exceed 100 Bq/kg.
The hardness test values in HBW conform to the request max. 22 HRC (max. 237 HBW).
Grain size 5 - 12 acc.to ASTM E112: guaranteed
Width of gauge length of the tension test specimen at a room temperature - 1.5 in /ASTM A370/.
Data mentioned in USC Units were converted from SI Units.
Appendix: Heat treatment report.

Z01
ALL PRODUCTS MEET REQUIREMENTS OF ABOVE MENTIONED STANDARDS AND REQUIREMENTS SPECIFIED IN ORDER. THE DECLARATION IS ISSUED UNDER THE SOLE RESPONSIBILITY OF THE SUPPLIER.

A04 Manufacturer's mark:

Z05
Electronical version of this document is protected by the electronical signature according to Law No. 227/2000Coll.

Z02 Confirmed: Marta Uhrová, Ing.,
Head of Attestation, Releasing and External inspection VT, independent authorized agent

Z02

Ostrava-Vítkovice ,
06.12.2016

tel.: 00420/59/560/2160

Z03 Independent authorized agent

38673
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TŘINECKÉ ŽELEZÁRNY MORAVIA STEEL		HEAT TREATMENT REPORT Appendix at Inspection certificate 3.1 A 2016/12/003005-JAN	
DIMENSION [inch]:	10.750x0.365	SHOP ORDER No.:	9700245396
HEAT No. :		T45432 T47853	
MATERIAL SPECIFICATION AND GRADE :		X52N Gr.6 Gr.B Gr.C	
TYPE OF HEAT TREATMENT :		NORMALIZED	
MINIMUM TEMPERATURE:		1652°F	

Ostrava-Vítkovice: 08.12.2016

Independent authorized agent

tel: 00420/59/560/2160

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VSB

INSPECTION CERTIFICATE
EN 10204.3.1

No.: 30025095

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Vallourec Soluções Tubulares do Brasil S.A.
Distrito Industrial, s/n - Jeceaba - MG - 35498-000 - Brasil

Trading Company: Sumitomo Corporation
NSSMC work s/n.: JYYS11870000
Buyer: Nippon Steel & Sumitomo Metal Corporation
Buyer Order s/n.: 7P18S226906
Customer: SUMITOMO CORPORATION OF AMERICAS
Customer Order No / Item: RCH-222327/6
Inspection Company: Vallourec Soluções Tubulares do Brasil S.A.

Destination Country: USA
Work Order: 5167[illegible]/10
Material Number: 702747

Size (O.D. X W.T.): 12.750 inch X 0.375 inch
Grade: X42R # B # B
Standard: API SPEC 5L, 12.2012, 45TH EDITION # PSL 2

In accordance also to the standards:
ASTM A106M - 15 / ASTM A 530 - 12 / ASME SA-106M - 15 / ASTM A 530M - 12 / ASME SA-53M - 15 / ASME SA-530M - 15
Description of products: HOT ROLLED CARBON STEEL SEAMLESS PIPE - HEAT TREATMENT - AS ROLLED, BEVELED ENDS 30 DEG. Heat Treatment : AS ROLLED , BEVELED ENDS 30 DEG.

Tolerance (Pipe Ends): Outside Diameter:- 0.063 " / + 0.063 "

Tolerances: Outside Diameter: - 0.75 % / + 0.75 %
Tolerances: Wall Thickness: - 12.5 % / + 15.0 %
External Surface Protection: UV-VARNISH
Pipes Ends Protector: POLYETHYLENE CAP WITH HOLE
Length: RANDOM: 42.0 FT / 44.0 FT
Acceptance Length: RANDOM, 10 %, 38.0 FT / 42.0 FT
Standard Marking:
PAINT STENCILED: VSB LOGO API SPEC 5L 0867 API MONOGRAM MONTH/YEAR ASTM/ASME A/SA-106 A/SA-53 12.750 0.375 BR/X42R PSL2 SMLS JYYS11870000 HEAT NUMBER PIPE TALLY NO LENGTH B S
TESTED 2110 PSI/NDE WEIGHT NSSMC LOGO
Shipping Marking:
SUMITOMO CORPORATION OF AMERICAS HOUSTON P.O. NO. RCH-222327 MADE IN BRAZIL

VS

INSPECTION CERTIFICATE EN 10204.3.1

No.: 30025095 Sheet: 2 / 6

Vallourec Soluções Tubulares do Brasil S.A.
Distrito Industrial, s/n - Jeceaba - MG - 35498-000 - Brasil

Heat No.	Pieces	Length(m)	Weight(kgf)	Length(ft)	Weight(lbf)
173201	40	532,67	40007	1747,6	88200
173202	64	842,66	62948	2764,8	138779
173[illegible]	80	1064,53	79064	[illegible]	174303
173204	103	1367,03	101781	4484	224392
173207	10	131,97	9818	432,9	21646
TOTAL	297	3939,16	293618	12922,8	647320

The product is satisfactory in the following tests/inspections:
Dimensional # Visual # Flattening Test # Electromagnetic Test : API 5L, L2(N5)L/O L4(N12,5)L/I #Maximum Residual Magnetism : 30 GAUSS # Hydrostatic Test : 2110.0 PSI 5 s #

CHEMICAL COMPOSITION (%) Process: Electric Arc Furnace (EAF), heats fully killed

CEQ:C+Mn/6+(Cr+Mo+V)/5 +(Ni+Cu)/15
CE1:Cr + Cu + Mo + Ni + V CE2:Nb + V

			C	Mn	P	S	Si	Ni	Cr	Mo	Cu	V	Nb	B	Ti	Ceq	CE1	CE2
equired	Ladle Analysis	Min.		0.29			0.10											
		Max.	0.20	1.20	0.025	0.015	0.40	0.30	0.30	0.15	0.40	0.06	0.05	0.001	0.04	0.42	1.00	0.06
	Product Analysis	Min.		0.29			0.10											
		Max.	0.20	1.20	0.025	0.015	0.40	0.30	0.30	0.15	0.40	0.06	0.05	0.001	0.04	0.42	1.00	0.06
eat No.	Pipe No.																	
3201		Ladle	0.15	1.10	0.012	0.004	0.27	0.04	0.14	0.03	0.10	0.03	0.00	0.000	0.00	0.38	0.34	0.03
	101110	Check2	0.15	1.09	0.011	0.004	0.27	0.04	0.14	0.03	0.09	0.03	0.00	0.000	0.00	0.38	0.33	0.03
	401110	Check1	0.14	1.09	0.011	0.004	0.27	0.04	0.14	0.03	0.09	0.03	0.00	0.000	0.00	0.37	0.33	0.03
3202		Ladle	0.14	1.11	0.012	0.005	0.28	0.04	0.13	0.03	0.09	0.03	0.00	0.000	0.00	0.37	0.32	0.03
	401120	Check1	0.15	1.10	0.012	0.006	0.28	0.04	0.13	0.03	0.09	0.03	0.00	0.000	0.00	0.38	0.32	0.03
	501120	Check2	0.16	1.12	0.010	0.005	0.28	0.04	0.13	0.03	0.08	0.03	0.00	0.000	0.00	0.39	0.31	0.03
3203		Ladle	0.15	1.10	0.011	0.004	0.27	0.04	0.13	0.04	0.08	0.03	0.00	0.000	0.00	0.38	0.32	0.03
	201110	Check2	0.16	1.08	0.011	0.005	0.28	0.04	0.13	0.03	0.08	0.03	0.00	0.000	0.00	0.39	0.31	0.03

VS

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Vallourec Soluções Tubulares do Brasil S.A.
Distrito Industrial, s/n - Jeceaba - MG - 35498-000 - Brasil

			C	Mn	P	S	Si	Ni	Cr	Mo	Cu	V	Nb	B	Ti	Ceq	CE1	CE2
Required	Heat Analysis	Min.		0.29			0.10											
		Max.	0.20	1.20	0.025	0.015	0.40	0.30	0.30	0.15	0.40	0.06	0.05	0.001	0.04	0.42	1.00	0.06
	Product Analysis	Min.		0.29			0.10											
		Max.	0.20	1.20	0.025	0.015	0.40	0.30	0.30	0.15	0.40	0.06	0.05	0.001	0.04	0.42	1.00	0.06
Heat No.	Pipe No.																	
	403110	Check1	0.16	1.11	0.011	0.004	0.28	0.05	0.13	0.04	0.08	0.04	0.00	0.000	0.00	0.40	0.34	0.04
73204		Ladle	0.15	1.11	0.012	0.007	0.28	0.04	0.13	0.05	0.08	0.03	0.00	0.000	0.00	0.39	0.33	0.03
	501110	Check1	0.16	1.12	0.009	0.003	0.27	0.05	0.13	0.04	0.08	0.03	0.00	0.000	0.00	0.40	0.33	0.03
	501120	Check2	0.15	1.09	0.010	0.004	0.28	0.05	0.13	0.04	0.08	0.03	0.00	0.000	0.00	0.38	0.33	0.03
73207		Ladle	0.15	1.10	0.017	0.006	0.28	0.05	0.14	0.04	0.10	0.03	0.00	0.000	0.00	0.39	0.36	0.03
	201110	Check1	0.15	1.10	0.013	0.006	0.28	0.05	0.12	0.02	0.08	0.03	0.00	0.000	0.00	0.38	0.30	0.03
	501110	Check2	0.15	1.09	0.015	0.005	0.28	0.05	0.14	0.03	0.09	0.03	0.00	0.000	0.00	0.38	0.34	0.03

: Combined Elements

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Vallourec Soluções Tubulares do Brasil S.A.
Distrito Industrial, s/n - Jeceaba - MG - 35498-000 - Brasil

TENSILE TEST S.Direction: Longitudinal Test Temperature: Room Temperature Gage Length: 1.0" YS Method: 0.50 %
Type of specimen: STRIP 1.5" WIDTH Thickness: 0.375"

			YS (Psi)	TS (Psi)	E %
Required		Min.	42100	70000	28.0
		Max.	71800	95000	
Test No.	Pipe no.	Position of Sample			
3201	101110	Bottom	59200	81200	39.0
3202	503120	Bottom	57300	80100	39.0
3203	201110	Bottom	61200	81900	38.0
3204	501120	Top	57700	79600	39.0
3204	502250	Bottom	58200	79500	39.0
3207	501110	Top	62800	82200	40.0

YS-yield strength; TS-tensile strength; E-Elongation;

IMPACT TEST Test Specimen: CHARPY 10X55X7.5 V NOTCH Direction: Transverse Temperature: 32°F Striking up: 0.315 "

			AE1 (Ftlb)	AE2 (Ftlb)	AE3 (Ftlb)	SA AVG (Ftlb)	SA1 (%)	SA2 (%)	SA3 (%)	SA AVG (%)	LE1 (Mils)	LE2 (Mils)	LE3 (Mils)	LE AVG (Mils)
Required		Min.	11	11	11	15								
		Max.												
Test No.	Pipe No.	Position of Sample												
3201	101110	Bottom	42	49	41	44.3	46	58	55					
3202	503120	Bottom	46	38	35	39.1	48	46	44					
3203	201110	Bottom	46	49	38	45.0	49	58	60					
3204	501120	Top	49	68	56	57.5	62	76	68					
3204	502250	Bottom	38	40	49	42.8	50	49	63					
3207	501110	Top	46	50	44	46.5	61	62	56					

Absorbed energy; SA-shear area; LE-lateral expansion

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Vallourec Soluções Tubulares do Brasil S.A.
Distrito Industrial, s/n - Jeceaba - MG - 35498-000 - Brasil

HARDNESS HV10

	Individual	Average	Variation
Required			
Min			
Max	2		

Test No.	Pipe No.	Position Sample		OW 1	OW 2	OW 3	OW 4	OW AVG	MW 1	MW 2	MW 3	MW 4	MW AVG	IW 1	IW 2	IW 3	IW 4	IW AVG	AVG Variation Total
73201	401110	Top	Q1	159.0	160.0	160.0	162.0		171.0	172.0	169.0	172.0		177.0	173.0	173.0	174.0		
73202	402110	Top	Q1	158.0	159.0	158.0	159.0		165.0	168.0	168.0	169.0		163.0	163.0	163.0	165.0		
73203	403110	Top	Q1	158.0	157.0	157.0	158.0		166.0	166.0	163.0	167.0		162.0	163.0	163.0	160.0		
73204	402250	Top	Q1	157.0	158.0	157.0	156.0		164.0	165.0	164.0	167.0		169.0	165.0	168.0	163.0		
73204	501110	Bottom	Q1	159.0	159.0	159.0	158.0		174.0	174.0	168.0	171.0		175.0	172.0	175.0	174.0		
73207	201110	Bottom	Q1	157.0	159.0	157.0	160.0		173.0	171.0	172.0	174.0		167.0	166.0	167.0	168.0		

OW - Outer WALL; MW - Middle Wall; IW - Inner Wall;

REMARKS:

THIS DOCUMENT PRESENTED WAS CONVERTED FROM SI MEASUREMENT SYSTEM USED FOR THE ORIGINAL INSPECTION
Since October 1st of 2016, VSB changed the company name from Vallourec Sumitomo Tubos do Brasil Ltda. to
Vallourec Soluções Tubulares do Brasil S.A. (Jeceaba Plant), and changed the company logo. Please note that products marked with
the old company logo maybe included in the orders shipped after October, depending on the actual date of production.
NACE MR0103-2012/MR0175/ISO15156-2/2009: SATISFACTORY
MANUFACTURED FROM FULLY KILLED CARBON STEEL
ASTM A106-C AND ASME SA106-C : GUARANTEED#NO WELD REPAIR

VS

INSPECTION CERTIFICATE
EN 10204.3.1

No.: 30025095

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'allourec Soluções Tubulares do Brasil S.A.
Distrito Industrial, s/n - Jeceaba - MG - 35498-000 - Brasil

'e hereby certify that this product has been manufactured and examined in accordance with all requirements of the standards and specifications and all the results were found to be satisfactory.

his testimonial and certificate respectively is recorded by a computer system and is valid without gnature. Alteration or use for others products are regarded as falsification of documents and will be bject to criminal jurisdiction

QUALITY CONTROL DEPARTMENT
FAX: +55 [illegible]
Email: carlos.horta@vstubos.com

Carlos Eduardo Lima Horta
Technical Responsible
Date : 07.11.2017

ІНТЕРПАЙП НТЗ

ПАТ "ІНТЕРПАЙП НИЖНЬОДНІПРОВСЬКИЙ ТРУБОПРОКАТНИЙ ЗАВОД"
Україна, м. Дніпропетровськ, вул. Стальна, 21
Тел./факс +38 (056) 34-90-99

Заказчик
Customer

Сертификат № 4/534
Certificate №
INSPECTION CERTIFICATE ACC. TO EN 10204-2004/3.1

Контракт №
Contract №

Заказ № 631360/101
Customer order № 13-1360
Customer order #: PO #10415

№ транспортного средства ВТ 6933 АТ / ВТ 6341 ХТ
№ vehicle

Лист 1 Листов 1
Sheet Sheets

Наименование и код товара Description and code of goods	НД Standard	Термообработка Heat treatment
SEAMLESS STEEL HOT-ROLLED PIPE FOR LOW-TEMPERATURE SERVICE	ASTM A106/A 106M-2011/ ASME SA106-2010/ ASTM A53/A 53M-2012/ ASME SA53-2010/ ASTM A333/A333M-2011/ ASME SA333/A333M-2010 "acc. to latest editions"	Normalized

Маркировка/ Marking: INTERPIPE NTRP ASTM A106/ASME SA106/ASTM A53/ASME SA53/ASTM A333/ASME SA333 B/C/6 dimensions pipe S NDE length pipe weight pipe Heat number Hot-Rolled 49.61 lb/ft pipe number PO#10415

№ п.п. p. №	Номер плавки Number of heat	Номер партии Number of lot	Марка стали Grade steel	Размеры, дюйм (мм) Dimensions, in. (mm) Диаметр O.D.	Тол. Ст. W.T.	Длина фут (м) Length ft. (m)	Метраж фут (м) Metreage ft. (m)	К-во труб, шт Q-ty of pipes, pcs	Вес, фунт (т) Weight, lb. (t) Брутто Gross	Нетто Net
										Actual weight
1.	1133589	1	B/C/6	12.750" NPS 12"	0.375" Sch 0.375"	38.1-39.4	76.5	2	3968.3	3946.3
				(323.9)	(9.53)	(11.60-12.00)	(23.31)	2	(1.800)	(1.790)

Показатели качества товара Quality characteristics of goods

№ п.п. p. №	Номер плавки Number of heat	Химический состав, массовая доля % Chemical composition, mass fraction % C x 100	Si x 100	Mn x 100	S x 1000	P x 1000	Cr x 100	Ni x 100	Cu x 100	Mo x 1000	V x 1000	Al x 1000	Nb x 1000
1.	1133589 H	18	29	80	4	12	5	11	22	10	5	45	10
	1133589 P	18	26	85	6	11	6	10	21	11	5	42	0
		18	24	82	4	9	6	9	19	10	5	41	0

Cr+Cu+Ni+Mo+V ≤ 1 %

Продолжение на обороте The continuation on the back

INTERPIPE NTRP

PJSC "INTERPIPE NIZHNEDNEPROVSKY TUBE ROLLING PLANT"
UKRAINE, Dnepropetrovsk, Stalnaya str.
Tel./fax: +38 (0562) 34-90-99

Тип образца Type of specimen	Размеры образца Dimensions of specimen	Ориентация образца Orientation of specimen
Strip	Ширина, width: 1 1/2" (38.1 mm) Длина, length: 2" (50.8 mm)	Longitudinal

Механические свойства Mechanical properties

№ п.п. p. No	Номер плавки Number of heat	Номер партии Number of lot	Предел прочности, PSI (MPa) Tensile strength, PSI (MPa)	Предел текучести, PSI (MPa) Yield strength, PSI (MPa)	Удлинение, % Elongation, %	Сплющивание Flattening	Испытание на изгиб Bend test
1.	1133589	1	80 931 (558.0) 81 217 (560.0)	58 220 (401.4) 59 017 (406.9)	38.6 37.6	Ok. Ok.	Ok.

№ п.п. p. No	Номер плавки Number of heat	Номер партии Number of lot	Размеры образца Dimensions of specimen mm	Мин. работа разрушения, фунт-фут (Дж) Min Charpy Energy, Ft – Lbs, (J)				Испытание, Температура -58 °F / -48 °C Test Temperature -58 °F / -48 °C
				поперечн. Transverse		продольн. Longitudinal		
				полномер. full size	неполномер. Non-stand.	полномер. full size	неполномер. Non-stand.	
1.	1133589	1	10x7.5x55		69.5 66.6 66.6 67.6 (94.2)(90.3)(90.3)-(91.6) 63.7 65.1 65.1 64.6 (86.3)(88.3)(88.3)-(87.6)			

Гидравлическое давление, PSI (MPa) Hydrostatic test pressure, PSI (MPa)	Время выдержки, сек Duration, sec

Номера труб (пакетов):
Number of pipes (packages):

1. 1133589 NI 51 56

Total: 2 pipes. 1 package.

Примечания:
Note: 1. We hereby certify that the all the above pipes have been manufactured, sampled, tested and inspected in strict compliance with ASTM A106/A106M-2011/ASME SA106-2010/ASTM A53/A53M-2012/ASME SA53-2010/ASTM A333/A333M-2011/ASME SA333/A333M-2010 (acc. to latest editions) and have been found to meet the requirements and terms of the standard and contract.
2. Nondestructive ultrasonic test – without remarks.
3. Pipes with plastic caps.
4. Dispatch was effected according to physical weight.
5. Certificate 4/4698 is invalid.

04.02.2014

Дата/ Date Печать/Stamp Подпись/Signature

INSPECTION CERTIFICATE

EN10204-3.1 ☐ / EN10204-3.2 ☐

ILJIN Steel Corporation
Jeonju Plant Address
1746 Hoguk ro, Imsil-eup, Imsil gun, Jeollabuk-do, Korea 556-805
TEL 82-63-730-4574 / FAX 82-63-730-4798

CERTIFICATE NO	IJQ20171109296
DATE OF ISSUE	09 NOV 2017
CUSTOMER	
CONTRACT(P/O) NO	P20384
COMMODITY	SEAMLESS CARBON STEEL HOT FINISHED PIPE
STANDARD	ASTM A53 2012 Edition/A106 2015 Edition// ASME SA53/SA106 2015 Edition

SUPPLIER: ILJIN STEEL Corporation

NO	W/O (HEAT NO.)	ORDER SIZE ID	OD	WT	LENGTH	QUANTITY PCS	MASS lbs / ft	MASS TOTAL (lbs/ft)	TOTAL LENGTH	Manufacturing Process *1	Pipe End (Type) *2	HEAT TREATMENT *3	Grade	REMARK
1	ST17090161 (D04408)	1.939	2.375"	0.218 "	42	445	5.03	94,010.70	18690.00 '	HF	BEP	N/A	ASTM A53 B ASTM A106 B & C ASME SA53 B ASME SA106 B & C	1 THE HARDNESS DESCRIBED HEREIN COMPLIANCE WITH NACE MR-0175/MR-0103(MAX.22HRC) 2015 EDITION. 2 *R CHEMICAL COMPOSITION REQUIREMENT FOLLOWS HEAT ASTM A53B TABLE 1 (REMARK C) - ASTM A106B/C TABLE 1 (REMARK B) 3 NO WELD REPAIR WAS PERFORMED 4 NO MERCURY MERCURY COMPOUNDS OR MERCURY BEARING INSTRUMENTS AND/OR EQUIPMENT HAVE BEEN USED IN ANY MANNER WHICH MIGHT CAUSE CONTAMINATION IN MANUFACTURE ASSEMBLY OR TEST OF MATERIAL
		TOTAL				445	5.03	94010.70	18,690.00					

NO	W/O (HEAT NO.)	STATUS	CHEMICAL COMPOSITION(%) C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al	Ti	V	Nb	B	U4	VN	V1	V2	CEQ	NDT	HYDRO-STATIC TEST	TENSILE TEST (GAGE LENGTH 50.0±0.1mm) Width	YS	TS	EL	IMPACT TEST (ASTM E23)	HARDNESS (ASTM E18)	BENDING TEST	FLATT-ENING TEST	FLARING TEST	OWT	HYDRO-BURST	VISUAL	DIMENSION	DRIFT TEST	STRAIGHTNESS
		*4	X100		*R	X1000		X100				X1000					*5	*6	*7	*8	*9	*10	Sec	PRESSURE psi	*L	*P	MPa	MPa	%	Energy (1) Temp °C (2) Unit	*T	*L								
Spec		MAX	.27		1.20	.15	.35	.40	.40	.15	.40			.10			1.0				0.50	EC UT	5	2500	19.05		275	485	28.8			180°								
		MIN		.10	.40																									90°								
1	ST17090161	LA	.19	.24	1.16	.13	.04	.11	.05	.02	.07	.19	.23	.04	.02	0.04	0.03				0.42																	
	(D04408)	BA	.17	.25	1.16	.09	.03	.12	.04	.02	.07	.19	.25	.03	.01	0.01	0.03				0.40																	
		PA	.17	.25	1.17	.10	.03	.12	.05	.02	.08	.20	.23	.03	.02	0.02	0.03				0.41	*G	*G			475 482	583 581	32.7 31.9			88.0 88.1 88.0	*G	*G				*G	*G		*G

NOTE

*1 - NF Normalizing Formed / HF Hot Finished / CF Cold Finished
*2 BEP Beveled End / PEP Plain End
*3 - A As Rolled / SRA Stress Relieved Annealing / Q+T Quenched & Tempered / N+T Normalized & Tempered / N Normalized / Iso Isothermal Annealing
*4 LA Ladle Analysis / BA Billet Analysis / PA Product Analysis
*5 - Cu+Ni+Cr+Mo+V
*6 - Nb+V
*7 - Nb+V+Ti
*8 Cr+Ni
*9 - C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15
*10 UT Ultrasonic Test / EC Eddy Current Test / MT Magnetic Particle Test/ EM Electro Magnetic Inspection
*P - Tubular or Plate Type of ASTM E8 Fig.12
*F Full Section Type of ASTM E8 Fig.11
*G Good / *L Longitudinal / *T - Transverse

Third party Section

- WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTABLE
- THE QUALITY SYSTEM OF OUR WORKS HAS BEEN ASSESSED AND REGISTERED AS MEETING THE REQUIREMENTS OF ISO 9001. ANY WELDING HAS NOT BEEN PERFORMED ON THE MATERIAL
- THIS CERTIFICATION IS INTENDED ONLY FOR PRODUCTS LISTED. MODIFICATION TO OR UNAUTHORIZED USE OF THIS CERTIFICATION IS STRICTLY PROHIBITED. OFFENSES MAY BE REGARDED AS FORGERY OF DOCUMENTS AND BE SUBJECT TO CRIMINAL PROSECUTION.

YOUNG KYU SEO
Manager of Q.M Dept

NIK362 / 1144852 / 2.0A333XHF / 2 XH SA333 GR 6 PIPE

ИНТЕРПАЙП
НИКО ТЬЮБ

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
"ИНТЕРПАЙП НИКО ТЬЮБ"
Украина, г. Никополь, пр. Трубников, 56
Тел./факс +38 (05662) 2-10-70

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ No 5380
INSPECTION CERTIFICATE No 5380
EN 10204:2004/ 3.1

Грузополучатель / Consignee: North American Interpipe, Inc. 1800 West Loop South, Suite 1350, Houston, Texas 77027, USA

Контракт № / Contract №: 14-1289 (07-14-21218)

Страна / Country: USA

Дата / Date: 31.10.2014г.

№ транспортного средств / № vehicle: BT3649BA/BT0088XP

Лист / Sheet: 1 Листов / Sheets: 1

ТРЕБОВАНИЯ / REQUIREMENTS: ASTM A106/A106M-2011/ ASME SA106-2010/ ASTM A333/A333M-2011/ ASME SA333-2010
Трубы стальные бесшовные горячекатаные для трубопроводов
Наименование товара / Description of goods: SEAMLESS STEEL HOT ROLLEED PIPES FOR PIPELINES

№ поз. / Item №	Марка стали / Steel grade краткое обозн. / brief designation	Код товара / code of goods	Номер пакет / bundle numbe	Номера плавок / Heats umbers	Номера партий / Lots number	Размеры / Dimensions: диаметр / diameter мм / mm	диаметр / diameter дюйм / inch	толщина / wall thickness мм / mm	толщина / wall thickness дюйм / inch	длина / length мм / mm	длина / length фут / ft	Количество / Quantity: шт / QTY pcs.	метраж / metreage м / m	метраж / metreage фут / ft	масса / weight кг / kg брутто / gross	масса / weight кг / kg нетто / net	масса / weight фунт / lb брутто / gross	масса / weight фунт / lb нетто / net
1.	6/B	29376900	4	1144852	7162	60.3	2.375	5.5	0.218	11600-12500	38,1'-41,0'	37	446,59	1465,17	3 370	3 360	7 430	7 408
2.	"	"	5	1144852	7162	60.3	2.375	5.5	0.218	"	"	37	446,59	1465,17	3 340	3 330	7 363	7 341
3.	"	"	7	1144852	7179	60.3	2.375	5.5	0.218	"	"	18	210,60	690,93	1 600	1 590	3 527	3 505
4.	6/B	29376900	8	1144852	7179	60.3	2.375	5.5	0.218	11600-12500	38,1'-41,0'	16	210,60	690,93	1 600	1 590	3 527	3 505
						NPS 2"		SCH 80		TOTAL: BUNDLES:		110 4	1314,38	4312,20	9 910	9 870	21 847	21 759

INTERPIPE
NIKO TUBE

LIMITED LIABILITY COMPANY
"INTERPIPE NIKO TUBE"
UKRAINE, Nikopol, 56, Trubnikov ave. Tel./fax +38 (05662) 2-10-70

NIK362 / 1144852 / 2.0A333XHF / 2 XH SA333 GR 6 PIPE

Инспекционный сертификат № 5380
Inspection certificate № 5380
Показатели качества товара
Quality characteristics

Лист . Sheet 1 Листов Sheets 1

Номера плавок Numbers of heats	ХИМИЧЕСКИЙ СОСТАВ %% - CHEMICAL COMPOSITION %%											з-д поставщик
	C x100	Si x100	Mn x100	S x1000	P x1000	Cr x100	Ni x100	Ti x1000	Mo x1000	Cu x100	V x1000	
1144852	18	27	84	3	12	6	12	19	12	21	5	ТОВ "МЗ "Днепросталь"

Анализ плавки согласно сертификата завода-изготовителя
Heat analysis acc.to the manufacturer certificate.

РЕЗУЛЬТАТЫ ИСПЫТАНИЙ - TEST RESULTS

Номер позиции Position №	Lots numbers Номер партии	Механические свойства - Mechanical properties					
		Условный предел текучести Conventional yield strength	Предел прочности при растяжении на разрыв Tensile strength	Относительное удлинение Percent elongation	Тест на ударную вязкость Шарпи t=-45°C test t=-45°C		Механические испытания произведены на продольных образцах Mechanical test was performed on longitudinal standart Ширина образца,мм/дюйм-19,0/3/4" Breaadth of standart,mm/inch Длина образца,мм/дюйм-50,0/2" Length of standart,mm/inch
		Н/мм2 N/mm2 PSI	Н/мм2 N/mm2 PSI	%	ФутФунт lb/ft	Дж J	
		min 240/ 35000	min 415/ 60000	min 20.5			
1.	7162	376 / 55000	517 / 75000	38.0	52 56 63 63 58 58	70 76 85 85 79 79	
2.	7179	371 / 54000	512 / 74000	35.0	56 58 58 63 56 58	76 79 79 85 76 79	

Трубы испытаны согласно требованиям ASTM A106/A106M-2011/ ASME SA106-2013/ASTM A333/A333M-2011/ASME SA333-2010, результаты удовлетворительные
Tubes test according to requirements ASTM A106/A106M-2011/ ASME SA106-2013/ASTM A333/A333M-2011/ASME SA333-2010, result satisfactory.

Герметичность: ГИДРОИСПЫТАНИЕ УДОВЛЕТВОРИТЕЛЬНО, ИСПЫТАТЕЛЬНОЕ ДАВЛЕНИЕ 17,2MPa/2500PSI
ВРЕМЯ ВЫДЕРЖКИ НЕ МЕНЕЕ 5 СЕКУНД.
Leak-proofness: HYDROSTATIC TEST SATISFACTORY MINIMUM HYDRO-PRESSURE 17,2MPa/2500PSI
DURATION NOT LESS THEN 5SEC.

Технологические свойства- Technological properties
Pipes are bending tested with satisfactory result.
Трубыпрошли испытание на загиб с удовлетворительным результатом.
Pipes are beveled.
Трубы отгружены с фаской.

Состояние поставки (поверхность) Трубы без покрітия. Трубы отгружены с колпачками.
Delivery condition (surface) Pipes are beveled. Pipes have caps.

Visual inspection of external and internal surfaces was performed with satisfactory results
Визуальный контроль наружной и внутренней поверхности выполнен с удовлетворительными результатами

All products were sampled, tested and inspected in accordance with specification(s) and found to meet the requirement.
Material is free mercury contamination.
Material is certified to ASTM A106-08/ASME SA106
Weld repair is not permitted.
Все продукты были отобраны, испытаны и проверены в соответствии со спецификациями.
Материал не содержит радиоактивных элементов и ртуть.
Материал сертифицирован по ASTM A106-08/ASME SA106
Ремонт сваркой запрещен.

Примечание: Ваши предложения по улучшению продукции просим направлять на эл. адрес Vladimir.Lysenko@nstp.interpipe.biz, по факсу +380566221070 или по телефону +380566639371 .При переписке просим ссылаться на номер сертификата
Note: You are requested to submit your proposals concerning product quality improvement to the following e-mail address:
Vladimir.Lysenko@nstp.interpipe.biz, fax +380566221070 or phone +380566639371 . Please, refer in your mails to the certificate number.

Дата
Date 31.10.2014г.

Подпись

Inspector

REVIEWED by
I.KLOKOV
03.11.2014

LLC "BUREAU VERITAS UKRAINE"
DNEPROPETROVSK QSH DEPARTMENT

Э.Р. Т.Могоz

ISC837 / 1700766 / 3.0A106STDA / 3 STD A106B SMLS PIPE

ArcelorMittal South Africa Limited
Tubular Products
273 Genl. Hertzog Rd,
Peacehaven Vereeniging 1939
P O Box 48 Vereeniging 1930
South Africa

Telephone +27 (0)16 450 4220
Fax +27 (0)16 423 4906

MATERIAL TEST CERTIFICATE
SEAMLESS TUBE

Licensed under API Spec 5L and 5CT
5L - 0319
5CT - 0419

ISO 9001: 2008
DE-395997 QM

Test Certificate
EN 10204:2004 TYPE 3.1

ArcelorMittal

Customer:	Lee Supply Co., LLC	Customer Order/Contract No:	SUS4 155457
Order No:	4000023284	Material No:	1000038304
Certificate Reference No:	040062154224	Cast/Heat No:	1700766
Product:	FULLY KILLED HOT FINISHED CARBON STEEL SEAMLESS TUBES		
Specification:	ISO3183:2012/API 5L:2012 L245/L290/B/X42 PSL1 ASTM A53B.12 A106B/C.15 A530.12 ASME SA53B.15 SA106B/C.15 SA530.15		
Product Marking:	ARCELORMITTAL SA ISO3183/Spec 5L-0319 MONOGRAM 05-17 ASTM/ASME A/SA106B/C A53B 3.500 0.216 40.000 L245/B L290/X42 PSL1 SMLS TESTED 3000 psi CAST NO: 1700766 PROD/O NO: T0342328410 MADE IN SOUTH AFRICA NDE		

General Information

Quantity	Mass	Dimensions			Total Length
		Tube OD	Thickness	Length	
208	63,175.370(lb)	3.500(")	0.216(")	40.000 (ft)	8,320.000(ft)

Steel making process	Final Rolling Operation
	As Rolled
Basic Oxygen Furnace	Final hot rolling finished above 1580°F and cooled in still air

Chemical Composition

R22-(V+Nb+Ti) R24-(Nb+V)

Element(%)	C	Si	Mn	S	P	Cr	Ni	Mo	Cu	V	Al	Ti	Sn	Ca	N	B	Nb	CE	R22	R24
Minimum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maximum	0.200	-	1.30	0.030	0.030	0.50	0.50	0.150	0.500	-	-	-	-	-	-	-	-	0.41	0.15	0.060
Heat	0.178	0.26	0.88	0.008	0.015	0.02	0.01	0.001	0.005	0.003	0.032	0.001	0.001	0.0016	0.0068	0.0005	0.0005	0.33	0.00	0.004
Product	0.1777	0.2630	0.8760	0.0077	0.0152	0.0250	0.0110	0.0010	0.0050	0.0034	0.0319	0.0010	0.0014	0.0016	0.0068	0.0005	0.0005	0.3306	0.0049	0.0039
Product (ADD)	0.1777	0.2630	0.8760	0.0077	0.0152	0.0250	0.0110	0.0010	0.0050	0.0034	0.0319	0.0010	0.0014	0.0016	0.0068	0.0005	0.0005	0.3306	0.0049	0.0039

Mechanical Properties

Specification Limits	UTS (Rm) MPa	UTS (Rm) psi	Yield (0.5%) MPa	Yield (0.5%) psi	% EL 2 inch
Minimum		70000		42000	30.0
Maximum		-		-	-
(1) Actual		70343		43366	38.0
(2) Actual		70923		42786	40.0
(3) Actual					
(4) Actual					

	UTS (Rm) MPa	UTS (Rm) psi	Yield (0.5%) MPa	Yield (0.5%) psi	% EL 2 inch
(5) Actual					
(6) Actual					
(7) Actual					
Orientation & type of tensile test			Longitudinal, Strip		
Width of tensile piece (inch)			0.75 Inch		
Orientation of impact test piece					

OTHER TESTS	
Category	Result
Hydrostatic	3000 psi for 5 Sec
NDI: EMI	PASS - ASTM E570 - 12.5% NOTCH
NDI: UT	UT not required
HV 22 lbs	150 153 154

Remarks:

Material in accordance with NACE MR0175:2015/ISO15156-2:2015, MR0103:2015. Dimensions to ASME B36.10M-2015.
The material conform to the hot yield strength requirements as per ASME, Sect II, Pt D, Table Y-1, 2015. All the material conform to the visual and dimensional requirements and is made to a suitable fine grain practice.

Quality Assurance Manager: PJ Venter *Date of Release: 2017.05.26* *Certified by:*

I hereby certify that the material was manufactured, tested and inspected to and fully comply with the requirements of referenced specifications. No changes, amendments or additions may be made to this document. Any changes which are effected shall invalidate this certificate.

CERTIFICATE NO.	: IJQ20161208101
DATE OF ISSUE	: 08.DEC.2016
CUSTOMER	:
CONTRACT(P/O) NO.	: P20174
COMMODITY	: SEAMLESS CARBON STEEL HOT FINISHED PIPE
STANDARD	: ASTM A53 2012 Edition/A106 2015 Edition/ A333 2015 Edition // ASME SA53/SA106/SA333 2015 Edition

INSPECTION CERTIFICATE

EN10204-3.1 ■ / EN10204-3.2 □

Page 1 / 1

ILJIN Steel Corporation

Jeonju Plant Address

1746 Hoguk-ro, Imsil-eup, Imsil-gun, Jeollabuk-do, Korea 556-805

TEL : 82-63-730-4574 / FAX : 82-63-730-4798

SUPPLIER	ILJIN STEEL Corporation

NO	W/O (HEAT NO)	ORDER SIZE ID	OD	WT	LENGTH	QUANTITY PCS	MASS lbs / ft	TOTAL (lbs/ft)	TOTAL LENGTH	Manufacturing Process *1	Pipe End (Type) *2	HEAT TREATMENT *3	Grade	REMARK
1	ST16110110 (D03309)	3.068 " (77.9 mm)	3.500" (88.9 mm)	0.216 " (5.49 mm)	42 ' (12802 mm)	56	7.58 (11.28 kg)	17,828.16 (8094.00 kg)	2352.00 ' (716.89 M)	NF	BEP	N/A	ASTM A53 B ASTM A106 B & C ASTM A333 Gr 1&6 ASME SA53 B ASME SA106 B & C ASME SA333 Gr 1&6	1 THE HARDNESS DESCRIBED HEREIN COMPLIANCE WITH NACE MR-0175/MR-0103(MAX 22HRC) 2 *R - CHEMICAL COMPOSITION REQUIREMENT FOLLOWS NEXT - ASTM A106B&C TABLE 1 (REMARK B) - ASTM A333 GR 1&6 , TABLE 1 (REMARK A) 3 NO WELD REPAIR WAS PERFORMED 4 NO MERCURY, MERCURY COMPOUNDS OR MERCURY BEARING INSTRUMENTS AND/OR EQUIPMENT HAVE BEEN USED IN ANY MANNER WHICH MIGHT CAUSE CONTAMINATION IN MANUFACTURE, ASSEMBLY, OR TEST OF MATERIAL 5 IMPACT TEST SAMPLE THICKNESS 5 mm 6 NORMALIZING FORMING TEMP ASTM A333 4.1.1 (845 ~ 945 °C) 7 BILLET SOURCE SOUTH KOREA
	TOTAL					56	7.58	17828.16	2,352.00					

NO	W/O (HEAT NO)	STATUS	C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al	Ti	V	Nb	B	U4	VN	V1	V2	CEQ
		*4	X100		*R	X1000		X100				X1000					*5	*6	*7	*8	*9
Spec		MAX	25		135	25	25	40	40	15	40			80			1.0				0.50
		MIN		10	40																
1	ST16110110 (D03309)	LA	20	26	118	10	5	9	5	1	9	18	24	5	2	0.5	0.2				0.43
		BA	18	27	113	9	5	9	4	1	9	17	25	4	2	0.5	0.2				0.40
		PA	18	27	114	9	5	9	4	1	9	18	25	4	3	0.5	0.2				0.40

NO	NDT *10		HYDRO-STATIC TEST Sec	PRESSURE psi	TENSILE TEST (GAGE LENGTH 50.8±0.13mm) Width *L *F	YS 0.2% offset MPa	TS MPa	EL %	IMPACT TEST (ASTM E23) Energy (1) Temp -45 °C (2) Unit J *T	*L	HARDNESS (ASTM E18) ■ HRB □ HRC □ HB □ HV	BENDING TEST	FLATTENING TEST H=(1+e)t/(e+t/O.D)	FLARING TEST	DWT 5kg X 2m Temp °C	HYDRO-BURST MPa Temp °C	VISUAL	DIMENSION	DRIFT TEST	STRAIGHTNESS
Spec	EC	UT	5	2500	19.05	275	485	29.5		8			44.37							
1		*G	*G			482	590	32.3		100.5	88.0		*G				*G	*G		*G
						473	608	30.6		97.9	88.0									
										96.2	87.5									

NOTE

*1 - NF : Normalizing Forming / HF : Hot Finished / CF : Cold Finished
*2 - BEP : Bevelled End / PEP : Plain End
*3 - A : As Rolled / SRA : Stress Relieved Annealing
Q+T : Quenched & Tempered / N+T : Normalized & Tempered
N : Normalized / Iso : Isothermal Annealing

*4 - LA : Ladle Analysis / BA : Billet Analysis / PA : Product Analysis
*5 - Cu+Ni+Cr+Mo+V
*6 - Nb+V
*7 - Nb+V+Ti
*8 - Cr+Ni
*9 - C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15

*10 - UT : Ultrasonic Test / EC : Eddy Current Test /
MT : Magnetic Particle Test/ EM : Electro Magnetic Inspection
*P - Tubular or Plate Type of ASTM E8 Fig.12
*F - Full Section Type of ASTM E8 Fig 11
*G - Good / *L - Longitudinal / *T - Transverse

Third party Section

◆ WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTABLE
◆ THE QUALITY SYSTEM OF OUR WORKS HAS BEEN ASSESSED AND REGISTERED AS MEETING THE REQUIREMENTS OF ISO 9001, ANY WELDING HAS NOT BEEN PERFORMED ON THE MATERIAL
◆ THIS CERTIFICATION IS INTENDED ONLY FOR PRODUCTS LISTED MODIFICATION TO OR UNAUTHORIZED USE OF THIS CERTIFICATION IS STRICTLY PROHIBITED OFFENSES MAY BE REGARDED AS FORGERY OF DOCUMENTS AND BE SUBJECT TO CRIMINAL PROSECUTION

YOUNG KYU SEO

Manager of Q.M Dept.

10

ArcelorMittal South Africa Limited
Tubular Products
273 Genl. Hertzog Rd,
Peacehaven Vereeniging 1939
P O Box 48 Vereeniging 1930
South Africa

Telephone +27 (0)16 450 4220
Fax +27 (0)16 423 4906

MATERIAL TEST CERTIFICATE
SEAMLESS TUBE

EN10204: 2004 Type 3.1
Licensed under

ArcelorMittal

Customer:	Lee Supply Co., LLC	Customer Order/Contract No:	SUSO 156824
Order No:	4000024274	Material No:	1000042255
Certificate Reference No:	040062251290	Cast/Heat No:	1707384
Product:	FULLY KILLED HOT FINISHED CARBON STEEL SEAMLESS TUBES		Page 1 of 1
Specification:	ISO3183:2012/API 5L:12 L245/L290/B/X42 PSL1 ASTM A53B:12 A106B/C:15 A530:12 ASME SA53B:15 SA106B/C:15 SA530:15		
Product Marking:	ARCELORMITTAL SA ISO3183/Spec 5L-0319 MONOGRAM 11-17 ASTM/ASME A/SA106B/C A53B 3.500 0.300 40.000 L245/B L290/X42 PSL1 SMLS TESTED 3000 psi CAST NO: 1707384 PROD/O NO: T0942427410 NDE MADE IN SOUTH AFRICA		

General Information

Quantity	Mass	Dimensions			Total Length	Steel making process	Final Rolling Operation
		Tube OD	Thickness	Length			As Rolled
114	46,829.275(lb)	3.500(")	0.300(")	40.000 (ft)	4,560.000(ft)	Basic Oxygen Furnace	Final hot rolling finished above 1580°F and cooled in still air

Chemical Composition

R22-(V+Nb+Ti) R24-(Nb+V)

Element(%)	C	Si	Mn	S	P	Cr	Ni	Mo	Cu	V	Al	Ti	Sn	Ca	N	B	Nb	CE	PCM	R22	R24
Minimum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maximum	0.280	-	1.30	0.030	0.030	0.50	0.50	0.150	0.500	-	-	-	-	-	-	-	-	0.41	-	0.15	0.060
Heat	0.130	0.24	1.03	0.004	0.010	0.13	0.01	0.057	0.008	0.032	0.037	0.017	0.000	0.0016	0.0104	0.0003	0.0010	0.35	0.20	0.05	0.033
Product	0.1300	0.2400	1.0300	0.0040	0.0100	0.1300	0.0130	0.0567	0.0050	0.0320	0.0370	0.0173	0.0001	0.0016	0.0104	0.0003	0.0010	0.3466	-	0.0503	0.0330
Product (ADD)	0.1300	0.2400	1.0300	0.0040	0.0100	0.1300	0.0130	0.0567	0.0050	0.0320	0.0370	0.0173	0.0001	0.0016	0.0104	0.0003	0.0010	0.3466	-	0.0503	0.0330

Mechanical Properties

Specification Limits	UTS (Rm) MPa	UTS (Rm) psi	Yield (0.6%) MPa	Yield (0.6%) psi	% EL 2 inch
Minimum		70000		42000	30.0
Maximum		-		-	-
(1) Actual		70923		48877	39.0
(2) Actual		71503		49458	42.0
(3) Actual					
(4) Actual					

	UTS (Rm) MPa	UTS (Rm) psi	Yield (0.5%) MPa	Yield (0.5%) psi	% EL 2 inch
(5) Actual					
(6) Actual					
(7) Actual					

Orientation & type of tensile test	Longitudinal, Strip
Width of tensile piece (inch)	0.75 inch
Orientation of impact test piece	

OTHER TESTS	
Category	Result
Flattening	Passed
Hydrostatic	3000 psi for 5 Sec
NDI: EMI	PASS - ASTM E570 - 12.5% NOTCH
NDI: UT	UT not required
HV 22 lbs	153 153 155

Remarks:

Material in accordance with NACE MR0175:15/ISO15156-2:15, MR0103:15. Dimensions to ASME B36.10M:15. End finish to ASME B16.25:15. Material conforms to the hot yield strength requirements as per ASME ,Sect II, Pt D, Table Y-1, 2015. Material conforms to the visual and dimensional requirements and is made to a suitable fine grain practice.

Quality Assurance Manager, Certification: R Van Vuuren *Date of Release: 2017.11.14* *Certified by:*

We hereby certify that the material was manufactured, tested and inspected to and fully comply with the requirements of referenced specifications. No changes, amendments or additions may be made to this document. Any changes which are effected shall invalidate this certificate.

Tenaris

INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1: 2013)

Number / Número: 845483 | Page / Página: 1 / 8

Date / Día: March 30, 2017

Siderca S.A.I.C.
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Customer / Cliente:	Customer's Order Item / Orden Cliente - Item:	Customer's Reference / Ref. del Cliente:	Manufacturer's Works Order N° / Confirmación de Venta:
	214168-00007	N/A	51575/06

Manufacturing Process / Proceso de Manufactura:	Product Type / Tipo de Producto:	Surface / Superficie:
SEAMLESS HOT ROLLED	SMLS CARBON STEEL PIPE	INT BARE /EXT VARNISHED

Standard or Specification / Normas o Especificaciones:	Steel Grade / Grado de acero:	Ends / Extremos:
ASTM/ASME A/SA 333/106 +NACE MR0175/0103+TQ N°4 - 20013061 + PED 97/23/EC	1/6/B	BEVELLED AT 30 DEG. ASTM

Dimensions / Dimensiones:	Schedule / Cédula:	Length / Longitud:	Quantity / Cantidad: 113 Pcs/pz		Nominal Weight / Peso Nominal:
3 1/2 X 0.300 INCH	080		4541.63 FT	47355 LB	10.25 LB/FT
88.90 X 7.62 MM		11.6/12.8 m	1384.29 MTS	21480 KG	15.27 KG/M

TENSILE TEST / ENSAYO DE TENSION

Heat N° / Colada N°	Sample N° / Muestra N°	Zone / Zona	Lot N° / Lote N°	Pipe N° / Tubo N°	Specimen condition / Condición de la probeta				Specimen dimensions / Dimensiones de la probeta		Test temp / Temp. ensayo	Y.S. Eal 0.50 % Min: 35 Max: —	U.T.S. Req. Min: 60 Max: —	Elongation / Alargamiento Lo 2"		
					Ls	Sc	Type / Tipo	Ori	Size / Tamaño	Area / Sección					Min.	Obt.
									In	In2	°F	ksi	ksi	mm	%	%
42316	2783382	E1	62002	3	B	AM	St	L	0.755 x 0.302	0.230	RT	46.7	65.9	50,8	34.0	36.4
42316	2783383	E1	62002	5	B	AM	St	L	0.744 x 0.299	0.225	RT	48.7	66.6	50,8	34.0	35.6
79271	2783290	E1	62000	5	B	AM	St	L	0.754 x 0.295	0.225	RT	46.5	66.7	50,8	34.0	35.7
79271	2783291	E2	62000	45	B	AM	St	L	0.75 x 0.31	0.235	RT	46.7	67.3	50,8	34.0	36.7
79271	2783292	E2	62000	96	B	AM	St	L	0.754 x 0.303	0.231	RT	46.0	66.0	50,8	34.0	36.4
79271	2783293	E1	62000	25	B	AM	St	L	0.757 x 0.304	0.232	RT	47.5	66.3	50,8	34.0	35.8
79271	2783294	E1	62000	65	B	AM	St	L	0.75 x 0.291	0.220	RT	46.3	66.4	50,8	34.0	35.3
79271	2783358	E1	62001	103	B	AM	St	L	0.75 x 0.308	0.233	RT	46.3	66.3	50,8	34.0	35.7
79271	2783363	E2	62001	105	B	AM	St	L	0.752 x 0.315	0.239	RT	46.0	66.4	50,8	34.0	36.5

AM: As manufactured / Según proceso de fabricación	Lo: Initial length / Longitud inicial	Obt: Obtained / Obtenido	Sc: Specimen condition / Condición de la probeta
B: Body / Cuerpo	Ls: Location of sample / Ubicación de la muestra	Ori: Orientation / Orientación	St: Strip specimen / Muestra rectangular
E1 / E2: Ends of Sampling / Extremos de Muestra	Max: Maximum / Máximo	Req: Required / Requerido	U.T.S: Ultimate tensile strength / Resistencia
L: Longitudinal / Longitudinal	Min: Minimum / Mínimo	RT: Room temperature / Temperatura ambiente	Y.S. Yield strength / Fluencia

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INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1: 2013)

Number / Número: 845483 | Page / Página: 2 / 8

Date / Día: March 30, 2017

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	214168-00007	N/A	51575/06

Manufacturing Process / Proceso de Manufactura:	Product Type / Tipo de Producto:	Surface / Superficie:
SEAMLESS HOT ROLLED	SMLS CARBON STEEL PIPE	INT BARE /EXT VARNISHED

Standard or Specification / Normas o Especificaciones:	Steel Grade / Grado de acero:	Ends / Extremos:
ASTM/ASME A/SA 333/106 +NACE MR0175/0103+TQ N°4 - 20013061 + PED 97/23/EC	1/6/B	BEVELLED AT 30 DEG. ASTM

Dimensions / Dimensiones:	Schedule / Cédula:	Length / Longitud:	Quantity / Cantidad: 113 Pcs/pz		Nominal Weight / Peso Nominal:
3 1/2 X 0.300 INCH	080		4541.63 FT	47355 LB	10.25 LB/FT
88.90 X 7.62 MM		11.6/12.8 m	1384.29 MTS	21480 KG	15.27 KG/M

CHEMICAL COMPOSITION / COMPOSICION QUIMICA

Composition % / Composición %

Heat N° / Colada N°	Sample N° / Muestra N°	Lot N° / Lote N°	Pipe N° / Tubo N°		C	Mn	Si	Cr	Mo	Al sol	Cu	P	Ni	V	Al	Sn	As	Nb	Ti	Pb	Sb	Co	S	Zr	Bi	Ca	B	N	Mg	W	Ce.1	F.1
				H Max	22	135	--	30	12	--	40	25	400	80	--	--	--	20	--	--	--	--	250	--	--	--	--	--	--	--	40	10,000
				Min	--	40	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
				P Max	22	135	--	30	12	--	40	25	400	80	--	--	--	20	--	--	--	--	250	--	--	--	--	--	--	--	40	10,000
				Min	--	40	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
42316				H	11	108	24	4	2	3	11	9	45	5	30	8	2	3	3	1	1	7	10	30	20	19	1	48	6	20	31	2,200
42316	2783382	62002	3	P	12	109	25	4	3	2	10	10	44	4	34	9	2	1	3	1	1	7	14	29	22	21	2	52	4	20	33	2,180
79271				H	11	108	22	6	2	2	14	8	57	4	28	11	5	3	3	1	2	7	10	10	20	11	1	59	8	20	32	2,810
79271	2783294	62000	65	P	12	108	23	7	2	3	14	8	56	4	30	10	4	1	2	1	2	7	9	20	22	14	2	52	5	20	33	2,900
79271	2783290	62000	5	P	12	109	23	7	2	3	14	9	57	4	30	10	4	1	2	1	2	7	10	20	22	14	2	55	5	20	33	2,910
79271	2783291	62000	45	P	12	108	23	7	2	3	14	8	56	4	30	10	4	1	2	1	2	7	7	20	22	14	2	55	5	20	33	2,900
79271	2783293	62000	25	P	12	108	23	7	2	3	14	8	56	4	30	10	4	1	2	1	2	7	9	20	22	13	2	56	5	20	33	2,900
79271	2783292	62000	96	P	12	108	23	7	2	3	14	8	56	4	30	10	4	1	2	1	2	7	9	20	22	14	2	55	5	20	33	2,900
79271	2783358	62001	103	P	12	108	24	7	2	2	13	8	55	4	30	10	4	1	2	1	2	7	8	20	22	16	2	55	5	20	33	2,790

Ce.1: C+(Mn/6)+(Cr+Mo+V)/5+(Ni+Cu)/15

F.1: Cr+Cu+Mo+Ni+V

H: Heat / Colada

Max: Maximum / Máximo

Min: Minimum / Mínimo

P: Product / Producto

SID336 / 792/1 / 3.0A333XHA / 3 XH SA333 GR 6 PIPE

Tenaris

INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1: 2013)

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Date / Día: March 30, 2017

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	214168-00007	N/A	51575/06

Manufacturing Process / Proceso de Manufactura:	Product Type / Tipo de Producto:	Surface / Superficie:
SEAMLESS HOT ROLLED	SMLS CARBON STEEL PIPE	INT BARE /EXT VARNISHED

Standard or Specification / Normas o Especificaciones:	Steel Grade / Grado de acero:	Ends / Extremos:
ASTM/ASME A/SA 333/106 +NACE MR0175/0103+TQ N°4 - 20013061 + PED 97/23/EC	1/6/B	BEVELLED AT 30 DEG. ASTM

Dimensions / Dimensiones:	Schedule / Cédula:	Length / Longitud:	Quantity / Cantidad: 113 Pcs/pz		Nominal Weight / Peso Nominal:
3 1/2 X 0.300 INCH	080		4541.63 FT	47355 LB	10.25 LB/FT
88.90 X 7.62 MM		11.6/12.8 m	1384.29 MTS	21480 KG	15.27 KG/M

SUPERFICIAL HARDNESS / DUREZA SUPERFICIAL

Heat N° / Colada N°	Sample N° / Muestra N°	Zone / Zona	Lot N° / Lote N°	Pipe N° / Tubo N°	Ls	External / Externa Scale / Escala: HBW/2.5/187.5 Req. Min: -- Req. Max: 237
42316	2783382	E1	62002	3	B	132
42316	2783383	E1	62002	5	B	140
79271	2783291	E2	62000	45	B	151
79271	2783292	E2	62000	96	B	148
79271	2783358	E1	62001	103	B	155
79271	2783363	E2	62001	105	B	166

B: Body / Cuerpo — E1 / E2: Ends of Sampling / Extremos de Muestra — Lc: Location of sample / Ubicación de la muestra

IMPACT TEST / ENSAYO DE IMPACTO

Type/Tipo: Charpy V — Orientation/Orientación: L — Unit / Unidad: ft.lb

Position/Posición: — Temp: 32 — Unit/Unidad: °F — Ind.Min.Req: 7 — Req.Min.Avg: 10

Heat N° / Colada N°	Sample N° / Muestra N°	Lot N° / Lote N°	Pipe N° / Tubo N°	Ls	Sc	T.T °F	Size / Tamaño In	Results / Resultados 1	2	3	Avg
42316	2783382	62002	3	B	AM	32	0.39 x 0.2	97	106	89	97
79271	2783292	62000	96	B	AM	32	0.39 x 0.2	83	83	99	88
79271	2783358	62001	103	B	AM	32	0.39 x 0.2	91	89	107	95

AM: As manufactured / Según proceso de fabricación — Ind. Min. Req: Individual Minimum Required / Requerido Mínimo Individual — Lc: Location of sample / Ubicación de la muestra — Sc: Specimen condition / Condición de la probeta

Avg: Average / Promedio — Req. Min. Avg: Required minimum average / Promedio mínimo requerido — T.T: Test temperature / Temperatura de ensayo

B: Body / Cuerpo — L: Longitudinal / Longitudinal — Temp: Temperature / Temperatura

Tenaris

INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1: 2013)

Number / Número:	Page / Página:
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Date / Día: March 30, 2017

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Customer / Cliente	Customer's Order Item / Orden Cliente - Item.	Customer's Reference / Ref. del Cliente:	Manufacturer's Works Order N° / Confirmación de Venta:
	214168-00007	N/A	51575/06

Manufacturing Process / Proceso de Manufactura:	Product Type / Tipo de Producto:	Surface / Superficie:
SEAMLESS HOT ROLLED	SMLS CARBON STEEL PIPE	INT BARE /EXT VARNISHED

Standard or Specification / Normas o Especificaciones	Steel Grade / Grado de acero:	Ends / Extremos:
ASTM/ASME A/SA 333/106 +NACE MR0175/0103+TQ N°4 - 20013061 + PED 97/23/EC	1/6/B	BEVELLED AT 30 DEG. ASTM

Dimensions / Dimensiones:	Schedule / Cédula:	Length / Longitud:	Quantity / Cantidad: 113 Pcs/pz		Nominal Weight / Peso Nominal:
3 1/2 X 0.300 INCH	080		4541.63 FT	47355 LB	10.25 LB/FT
88.90 X 7.62 MM		11.6/12.8 m	1384.29 MTS	21480 KG	15.27 KG/M

IMPACT TEST / ENSAYO DE IMPACTO

Type/Tipo: Charpy V | Orientation/Orientación: L | Unit / Unidad: ft.lb
Position/Posición: | Temp: -65.2 | Unit/Unidad: °F | Ind.Min.Req: 5 | Req.Min.Avg: 7

Heat N° Colada N°	Sample N° Muestra N°	Lot N° Lote N°	Pipe N° Tubo N°	Ls	Sc	T.T °F	Size / Tamaño in	Results / Resultados 1	2	3	Avg.
42316	2783382	62002	3	B	AM	-65.2	0.39 x 0.2	91	83	83	86
79271	2783292	62000	96	B	AM	-65.2	0.39 x 0.2	78	83	79	80
79271	2783358	62001	103	B	AM	-65.2	0.39 x 0.2	106	111	80	99

AM: As manufactured / Según proceso de fabricación
Avg: Average / Promedio
B: Body / Cuerpo
Ind. Min. Req: Individual Minimum Required / Requerido Mínimo Individual
L: Longitudinal / Longitudinal
Ls: Location of sample / Ubicación de la muestra
Req. Min. Avg: Required minimum average / Promedio mínimo requerido
Sc: Specimen condition / Condición de la probeta
T.T: Test temperature / Temperatura de ensayo
Temp: Temperature / Temperatura

Type/Tipo: Charpy V | Orientation/Orientación: L | Unit / Unidad: ft.lb | Shear area / Área dúctil %: Ind.Min.Req: -- Req.Min.Avg: -- | Lateral Expansion/Expansión Lateral mils: Ind.Min.Req: -- Req.Min.Avg: --
Position/Posición: | Temp: -59.8 | Unit/Unidad: °F | Ind.Min.Req: 5 Req.Min.Avg: 7

Heat N° Colada N°	Sample N° Muestra N°	Lot N° Lote N°	Pipe N° Tubo N°	Ls	Sc	T.T °F	Size / Tamaño in	Results / Resultados 1	2	3	Avg.	Results / Resultados 1	2	3	Avg.	Results / Resultados 1	2	3	Avg.
42316	2783382	62002	3	B	AM	-59.8	0.39 x 0.2	80	63	93	78	100	100	100	100	59.0	76.0	80.0	71.7
79271	2783292	62000	96	B	AM	-59.8	0.39 x 0.2	107	106	95	103	100	100	100	100	71.0	71.0	82.0	74.7
79271	2783358	62001	103	B	AM	-59.8	0.39 x 0.2	88	90	80	86	100	100	100	100	81.0	84.0	64.0	76.3

AM: As manufactured / Según proceso de fabricación
Avg: Average / Promedio
B: Body / Cuerpo
Ind. Min. Req: Individual Minimum Required / Requerido Mínimo Individual
L: Longitudinal / Longitudinal
Ls: Location of sample / Ubicación de la muestra
Req. Min. Avg: Required minimum average / Promedio mínimo requerido
Sc: Specimen condition / Condición de la probeta
T.T. Test temperature / Temperatura de ensayo
Temp: Temperature / Temperatura

SID330 / 79271 / 3.0A333XHA / 3 XH SA333 GR 6 PIPE

Tenaris

INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1: 2013)

Number / Número:	Page / Página:
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Date / Día: March 30, 2017	

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	214168-00007	N/A	51575/06

Manufacturing Process / Proceso de Manufactura:	Product Type / Tipo de Producto:	Surface / Superficie:
SEAMLESS HOT ROLLED	SMLS CARBON STEEL PIPE	INT BARE /EXT VARNISHED

Standard or Specification / Normas o Especificaciones:	Steel Grade / Grado de acero:	Ends / Extremos:
ASTM/ASME A/SA 333/106 +NACE MR0175/0103+TQ N°4 - 20013061 + PED 97/23/EC	1/6/B	BEVELLED AT 30 DEG. ASTM

Dimensions / Dimensiones:	Schedule / Cédula:	Length / Longitud:	Quantity / Cantidad: 113 Pcs/pz		Nominal Weight / Peso Nominal:
3 1/2 X 0.300 INCH	080		4541.63 FT	47355 LB	10.25 LB/FT
88.90 X 7.62 MM		11.6/12.8 m	1384.29 MTS	21480 KG	15.27 KG/M

FLATTENING TEST / ENSAYO DE APLASTAMIENTO

Standard / Norma:

Heat N° Colada N°	Lot N° Lote N°	Sample N° Muestra N°	Ls	Result Resultado
42316	62002	2783382	B	Good / Bueno
42316	62002	2783383	B	Good / Bueno
79271	62000	2783290	B	Good / Bueno

Standard / Norma:

Heat N° Colada N°	Lot N° Lote N°	Sample N° Muestra N°	Ls	Result Resultado
79271	62000	2783291	B	Good / Bueno
79271	62000	2783292	B	Good / Bueno
79271	62000	2783293	B	Good / Bueno

Standard / Norma:

Heat N° Colada N°	Lot N° Lote N°	Sample N° Muestra N°	Ls	Result Resultado
79271	62000	2783294	B	Good / Bueno
79271	62001	2783358	B	Good / Bueno
79271	62001	2783363	B	Good / Bueno

B: Body / Cuerpo   Ls: Location of sample / Ubicación de la muestra

HYDROSTATIC TEST / PRUEBA HIDRAULICA

Pressure / Presión		Time / Tiempo	Results / Resultado
Unit / Unidad.	Value / Valor	Seconds / Segundos	
psi	2,500	5	Satisfactory / Satisfactorio

Tenaris

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Date / Día: March 30, 2017

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Manufacturing Process / Proceso de Manufactura:	Product Type / Tipo de Producto:	Surface / Superficie:
SEAMLESS HOT ROLLED	SMLS CARBON STEEL PIPE	INT BARE /EXT VARNISHED

Standard or Specification / Normas o Especificaciones:	Steel Grade / Grado de acero:	Ends / Extremos:
ASTM/ASME A/SA 333/106 +NACE MR0175/0103+TQ N°4 - 20013061 + PED 97/23/EC	1/6/B	BEVELLED AT 30 DEG. ASTM

Dimensions / Dimensiones:	Schedule / Cédula:	Length / Longitud	Quantity / Cantidad: 113 Pcs/pz		Nominal Weight / Peso Nominal:
3 1/2 X 0.300 INCH	080		4541.63 FT	47355 LB	10.25 LB/FT
88.90 X 7.62 MM		11.6/12.8 m	1384.29 MTS	21480 KG	15.27 KG/M

HEAT TREATMENT / TRATAMIENTO TÉRMICO

Heat treatment / Tratamiento térmico: Pipe / Tubo
Quench media of heat treatment process / Medio de enfriamiento del tratamiento térmico:
Temperature Scale / Escala de Temperatura: celcius

Type / Tipo	Temperature / Temperatura	Tolerance / Tolerancia		Permanence / Permanencia (Mins.)
Normalized / Normalizado	890	-20	30	24

SPECIAL REQUIREMENTS / REQUERIMIENTOS ESPECIALES

Condition / Condición	Description / Descripción
End protectors / Protector de extremo	NON LIFTABLE CLOSED PLASTIC PROTECTOR FOR FLAT / BEVELED PIPE. SUPPLIER METALCENTRO.

SUPPLEMENTARY INFORMATION / INFORMACION SUPLEMENTARIA

Supplementary Information / Información Suplementaria	
"MELTED AND MANUFACTURED BY TENARIS SIDERCA - ARGENTINA"	"FUNDIDO Y FABRICADO POR TENARIS SIDERCA - ARGENTINA"
"ACIERAGE PROCESS"	"PROCESO DE ACERACIÓN"
STEEL MAKING PROCESS: E.A.F./L.F. AND CONTINUOUS CASTING - FULL ALUMINUM KILLED AND FINE GRAIN PRACTICE	FABRICACIÓN DE ACERO: FUNDICIÓN POR ARCO ELECTRICO Y COLADO CONTINUO - ACERO CALMADO AL ALUMINIO Y PRACTICA DE GRANO FINO
THE LF PRACTICE INCLUDES ARGON RINSE AND A FINAL INJECTION OF CALCIUM SILICIDE WIRE FOR MICROINCLUSION SHAPE CONTROL.	-LA PRÁCTICA DE AFINO EN EL HORNO - CUCHARA INCLUYE AGITACION POR ARGON Y UNA INYECCIÓN FINAL DE UNA VARILLA DE SILICIURO DE CALCIO PARA OBTENER UNA FORMA GLOBULAR DE EVENTUALES MICROINCLUSIONES.
-MATERIAL FREE FROM MERCURY CONTAMINATION.	-MATERIAL LIBRE DE CONTAMINACIÓN DE MERCURIO.

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Este certificado se emite mediante sistema computarizado y es validado con firma electrónica. El certificado original posee impreso el logo Tenaris color verde. En caso de que el poseedor del certificado entregue una copia, deberá garantizar la conformidad con el original haciéndose responsable por cualquier uso ilegal o indebido. Cualquier alteración y/o falsificación estará sujeta a la ley.

SID336 / 7921 / 3.0A333XHA / 3 XH SA333 GR 6 PIPE

Tenaris

INSPECTION CERTIFICATE

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	214168-00007	N/A	51575/06

Manufacturing Process / Proceso de Manufactura:	Product Type / Tipo de Producto:	Surface / Superficie:
SEAMLESS HOT ROLLED	SMLS CARBON STEEL PIPE	INT BARE /EXT VARNISHED

Standard or Specification / Normas o Especificaciones:	Steel Grade / Grado de acero:	Ends / Extremos:
ASTM/ASME A/SA 333/106 +NACE MR0175/0103+TQ N°4 - 20013061 + PED 97/23/EC	1/6/B	BEVELLED AT 30 DEG. ASTM

Dimensions / Dimensiones	Schedule / Cédula	Length / Longitud	Quantity / Cantidad: 113 Pcs/pz		Nominal Weight / Peso Nominal:
3 1/2 X 0.300 INCH	080		4541.63 FT	47355 LB	10.25 LB/FT
88.90 X 7.62 MM		11.6/12.8 m	1384.29 MTS	21480 KG	15.27 KG/M

SUPPLEMENTARY INFORMATION / INFORMACIÓN SUPLEMENTARIA

Supplementary Information Información Suplementaria	
"ROLLING PROCESS" -MANUFACTURING PROCESS : SEAMLESS HOT ROLLED "CONTROLS" -VISUAL AND DIMENSIONAL INSPECTION : SATISFACTORY. "MATERIAL CONDITIONS" -NOT REPAIRED BY WELDING "STANDARDS" -EDICIÓN DE LA NORMA: ASTM A 106/A106M - 2015 -EDITION OF REGULATION: ASTM A 333/A333M-16 -EDITION REGULATION: ASME SA 106/ 2013 -EDITION REGULATION: ASME SA 333/ 2013 -EDITION OF REGULATION: NACE MR-01-03 EDITION 2012. -EDITION OF REGULATION: NACE MR 01-75 -2011 - ISO 15156-2 : 2009	"PROCESO DE LAMINACIÓN" -FABRICACIÓN DE TUBO: LAMINADO EN CALIENTE Y SIN COSTURA. "CONTROLES" -CONTROL VISUAL Y DIMENSIONAL: SATISFACTORIO. "CONDICIONES DEL MATERIAL" -NO REPARADO POR SOLDADURA "NORMAS" -EDICION DE LA NORMA : ASTM A106/A 106M - 2015 -EDICION DEL ANORMA ASTM A 333/A333M - 16 -EDICIÓN DE LA NORMA: ASME SA 106/ 2013 -EDICIÓN DE LA NORMA: ASME SA 333/ 2013 - EDICIÓN DE LA NORMA: NACE MR-01-03 EDICION 2012 -EDICIÓN DE LA NORMA: NACE MR 01-75 : 2011 - ISO 15156-2 : 2009

Additional Information Informacion Adicional	Additional Information Informacion Adicional
NON DESTRUCTIVE TEST: SATISFACTORY INSPECTION METHODS: E.M.I. LONG. (EXT.) NOTCH 5%. STATEMENT SHOWING THAT MATERIAL IS FULLY KILLED AND MADE TO FINE GRAIN PRACTICE.	CHARTY IMPACT TEST. VALUE OF ABSORBED ENERGY IN FOOTPOUNDS. MATERIAL COMPLIES WITH ALL REQUIREMENTS OF THE ORDER. SEE ATTACHED CERTIFICATE OF APPROVAL

Tenaris

INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1: 2013)

Number / Número:	Page / Página:
845483	8 / 8

Date / Día: March 30, 2017

Siderca S.A.I.C.
Dr. Jorge A. Simini 250
(B2804MHA) Campana
Buenos Aires, Argentina
(54) 3489 433100 tel
(54) 3489 433406 fax

Customer / Cliente:	Customer's Order Item / Orden Cliente - Item:	Customer's Reference / Ref. del Cliente:	Manufacturer's Works Order N° / Confirmación de Venta:
	214168-00007	N/A	51575/06

Manufacturing Process / Proceso de Manufactura:	Product Type / Tipo de Producto:	Surface / Superficie:
SEAMLESS HOT ROLLED	SMLS CARBON STEEL PIPE	INT BARE /EXT VARNISHED

Standard or Specification / Normas o Especificaciones:	Steel Grade / Grado de acero	Ends / Extremos:
ASTM/ASME A/SA 333/106 +NACE MR0175/0103+TQ N°4 - 20013061 + PED 97/23/EC	1/6/B	BEVELLED AT 30 DEG. ASTM

Dimensions / Dimensiones:	Schedule / Cédula:	Length / Longitud:	Quantity / Cantidad: 113 Pcs/pz		Nominal Weight / Peso Nominal:
3 1/2 X 0.300 INCH	080		4541.63 FT	47355 LB	10.25 LB/FT
88.90 X 7.62 MM		11.6/12.8 m	1384.29 MTS	21480 KG	15.27 KG/M

MARKING-/-MARCACIÓN

Marking Marcación	Marking Marcación
& = Monogram / Monogram SIDERCA - NNNNN = Número de tubo / Nbr of pipe - LLL = Longitud / length - PPP = Peso / Weight	@ = Monogram / Monogram API - MM.YY = Mes / Año Month / Year - Y/T = Año / Trimestre Year / Quarter - HNXXXXX = Colada / Heat

Stenciling (Pipe) Estarcido (Tubo)	Stenciling (Pipe) Estarcido (Tubo)
TENARIS SD ASTM/ASME A/SA 106/333 1/6/B S HF LT-40F 3 X5 SCH 80 NDE/ 2500PSI PO 214168 HNXXXXX	NNNNN LLLL MADE IN ARGENTINA

This is to certify that the product described here has been manufactured, sampled, tested, and inspected in accordance with purchaser order requirements. This certificate is not a declaration of origin nor may it be used as a declaration of origin.

Por el presente certificamos que el material aquí descrito ha sido fabricado, muestreado, ensayado e inspeccionado de acuerdo a los requisitos de su orden de compra. Este certificado no es, ni puede ser usado, como una declaración de origen.

	CUSTOMER . THIRD PARTY	TENARIS QUALITY DEPARTMENT SIGNATURE	
	INSPECTION COMPANY COMPAÑÍA DE INSPECCIÓN Company Name: N/A Employee Name: N/A	QUALITY CERTIFICATION DEPT. DEPTO. DE CERTIFICACIÓN DE CALIDAD GONZALEZ Esteban	CHIEF OF QUALITY CERTIFICATION DEPT. RESPONSABLE DEL DEPTO. DE CERTIFICACIÓN DE CALIDAD GAJO Gabriel

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Este certificado se emite mediante sistema computarizado y es validado con firma electrónica. El certificado original posee impreso el logo Tenaris color verde. En caso de que el poseedor del certificado entregue una copia, deberá garantizar la conformidad con el original haciéndose responsable por cualquier uso ilegal o indebido. Cualquier alteración y/o falsificación estará sujeta a la ley.

AJU56 / 58130K / 4.0A106STDF / 4 STD A106B SMLS PIPE

AMJ-QFM-QMO-LBT-066 Rev 0

A01 ArcelorMittal Tubular Products Jubail
Crossroads 305 & 308 P.O. Box 10080
Jubail 2 Industrial City 31961
Kingdom of Saudi Arabia

MILL TEST CERTIFICATE
A02 EN 10204-3.1

A03 MTC No . 99001155 - 10
A11 Certificate date: 12.10.2017

ArcelorMittal

A06.1 Customer: ArcelorMittal International
1 S. Dearborn Street
60603Chicago, IL

A06.2 Recipient:

A07 Packing List No: 0099001155

A10 Customer PO/ Date :10103550 / 19 July 2017

A08.1 S.O. Number: 0030000382 Items: 20

A08.2 Invoice no: 0175000288

A12. Total No Pipes 22

A13. Total Length 839.56 Ft

A14. Total Weight: 9207 Lb

B01, B09 - B11
Product : Seamless Line Pipe,

B03.6 Product specification: ASTM A106 Gr B/C -15 /ASME SA106 Gr B/C -15 / API 5L Gr B/X42 PSL 1 - 45th Edition 2012

B03.1 NPS/ Inch	B03.2	B03.3	B03.4	B03.4a	B03.5
SIZE: 4 x 0.237"	SIZE in mm: 114.3 OD x 6.02 WT	Length: 37 ' - 42' DRL	Part No.:	Item No.: 20	End Condition: BE - Bevel Ends, 30.0 deg
B07.0	**B07.1**	**B07.2.1**	**B07.2.2**	**B07.3**	**B07.4**
Heat no. 58130K	Quality Lot Number: QL0005793	Steel Supplier : AM OSTRAVA AS	Number of pipes: 22	Total length:839.56 Ft	Weight: 9207 Lb

C70 Chemical composition %

	C	Mn	Si	S	P	Cr	Ni	Mo	Al	Cu	Nb	V	B	Ti	Ca	CE IIW	Nb+V	Nb+V+Ti		
Min		0.2900	0.1000																	
Max	0.2800	1.3500		0.0300	0.0300	0.4000	0.4000	0.1500		0.4000		0.0800	0.0010				0.0600	0.1500		
Heat : 58130K	0.1800	1.3000	0.1900	0.0020	0.0110	0.0600	0.0300	0.0020	0.0270	0.0500	0.0020	0.0010	0.0001	0.0010	0.0020	0.4100	0.0030	0.0040		
Pipe Id : EDWF002	0.19	1.29	0.20	0.001	0.011	0.049	0.026	0.005	0.026	0.047	0.0011	0.0040	0.0001	0.0004	0.0021	0.42	0.005	0.006		
Pipe Id : EDWF003	0.19	1.28	0.20	0.001	0.010	0.048	0.026	0.004	0.026	0.047	0.0010	0.0040	0.0001	0.0003	0.0018	0.41	0.005	0.005		

Mechanical properties

M01 Heat no.	M02 Quality Lot	Pipe Id	Specimen Type	Orientation T/L	Specimen Width/Dia	YS 0.5%EUL	UTS	%E 50.8 mm												
					[INCH]	[PSI]	[PSI]	[%]												
		MIN				42100	70000	23												
		MAX																		
58130K	QL0005793	EDWF002	Strip	L	1.00	52143	78959	35.93												

G01 NDT test : Full body UT as per ASTM E213 & End MPT as per ASTM E709, Ultrasonic Long Ext - 12.5 %, Ultrasonic Long Int - 12.5 %, Ultrasonic Tran Ext - 12.5 %, Ultrasonic Tran Int - 12.5, End MPI- Both Ends ,Wall thickness Scan- 100 %.

G02 .0 Hydro test:: STD, 2,660 PSI, 5 second - SATISFACTORY

G02.1 Color Code : NA

R01
End MPT carried out by Fluorescent Technique (Ends 350 mm)
Pipe supplied with Transparent Lacquer Coating

B12
Mn 1.35 % Max is permitted as per ASTM A106 Table 1 / API 5L Table 4.

B13 Steel Melting Practice -EAF-LRF-VD-CC, Al & Si, Killed, Fine grain Practice

L01 Marking on pipe : ArcelorMittal Jubail API Spec 5L 1026 API MONO MO-YR ASTM/ASME A/SA 106 GR B/C 4.500 0.237 (4 NPS SCH 40) B/X42 PSL1 SMLS PIPE :XXXXX 2660 PSI H:XXXXXXX Ln:XX.XX FT Wt:XXXX Lb PO: 23.241 AMI PO: 10103550 ITEM # 20, COO:KSA

Z01 We here with certify that the material is tested and complies to the product specification and customer requirement

Z02.3 Quality management system. ISO 9001, ISO 17025, APIQ1 ISO 18001, ISO 14001

Z02.4 API LICENSE NUMBER API 5L - 1026, API 5CT - 1675

Z02.5: End Squareness ≤1.60MM
Residual Magnetism ≤ 30.0 Gs

Z2.5.1 Prepared By

Z2.5.2 Approved By
for Md Tabrak Quraan

Q.C. Head

ArcelorMittal Tubular Products Jubail

z02.6 L-Longitudinal, T-Transverso, YS-Yield Strength, UTS-Tensile Strength, Rc-Rectangular; Rd-Round; Fls-Full Screen; Hrd-Hardness, %E-Elongation, B-Body, U-Upset End, J-Joules, SA-Shear Area , MO-YR –Month-Year

4500237L6_D03308

CERTIFICATE NO.	: UQ20161127148
DATE OF ISSUE	: 27.NOV.2016
CUSTOMER	:
CONTRACT(P/O) NO.	: P20174
COMMODITY	: SEAMLESS CARBON STEEL HOT FINISHED PIPE
STANDARD	: ASTM A53 2012 Edition/A106 2015 Edition/ A333 2015 Edition // ASME SA53/SA106/SA333 2015 Edition

INSPECTION CERTIFICATE

EN10204-3.1 ■ / EN10204-3.2 □

Page 1 / 1

ILJIN Steel Corporation

Jeonju Plant Address

1746 Hoguk-ro, Imsil-eup, Imsil-gun, Jeollabuk-do, Korea 556-805

TEL : 82-63-730-4574 / FAX : 82-63-730-4798

SUPPLIER	ILJIN STEEL Corporation

NO.	W/O (HEAT NO.)	ORDER SIZE ID	OD	WT	LENGTH	QUANTITY PCS	MASS lbs / ft	MASS TOTAL (lbs/ft)	TOTAL LENGTH	Manufacturing Process *1	Pipe End (Type) *2	HEAT TREATMENT *3
1	ST16110094 (D03308)	4.026 " (102.3 mm)	4.500" (114.3 mm)	0.237 " (6.02 mm)	42 ' (12802 mm)	125	10.80 (16.07 kg)	56,700.00 (25742.00 kg)	5250.00 ' (1600.20 M)	NF	BEP	N/A
		TOTAL				125	10.80	56700.00	5,250.00			

Grade: ASTM A53 B; ASTM A106 B & C; ASTM A333 Gr.1&6; ASME SA53 B; ASME SA106 B & C; ASME SA333 Gr.1&6

REMARK

1. THE HARDNESS DESCRIBED HEREIN COMPLIANCE WITH NACE MR-0175/MR-0103(MAX 22HRC)
2. *R - CHEMICAL COMPOSITION REQUIREMENT FOLLOWS NEXT
   - ASTM A106B&C TABLE 1 (REMARK B)
   - ASTM A333 GR.1&6 - TABLE 1 (REMARK A)
3. NO WELD REPAIR WAS PERFORMED
4. NO MERCURY, MERCURY COMPOUNDS OR MERCURY BEARING INSTRUMENTS AND/OR EQUIPMENT HAVE BEEN USED IN ANY MANNER WHICH MIGHT CAUSE CONTAMINATION IN MANUFACTURE, ASSEMBLY, OR TEST OF MATERIAL
5. IMPACT TEST SAMPLE THICKNESS : 5 mm
6. NORMALIZING FORMING TEMP . ASTM A333 4 3 1.3 (845 ~ 945 ℃)
7. BILLET SOURCE. SOUTH KOREA

NO.	W/O (HEAT NO.)	STATUS	CHEMICAL COMPOSITION(%) C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al	Ti	V	Nb	B	U4	VN	V1	V2	CEQ	NDT	HYDRO -STATIC TEST	TENSILE TEST (GAGE LENGTH - 50 ㎜±0.13mm)				IMPACT TEST (ASTM E23)		HARDNESS (ASTM E18)	BENDING TEST	FLATTENING TEST	FLARING TEST	DWT	HYDRO -BURST	VISUAL	DIMENSION	DRIFT TEST	STRAIGHTNESS
			Sec.	PRESSURE psi	Width *L	YS 0.2% offset *F MPa	TS MPa	EL %	Energy (L) Temp -45 ℃ (T) Unit Joule *T	*L	■ HRB □ HRC □ HB □ HV		H=(L+T)/V (t+t/OD)		5kg X 2m Temp . ℃	MPa Temp ℃							
		*4	X100		*R	X1000		X100				X1000					*5	*6	*7	*8	*9	*10																	
Spec		MAX	25		135	25	25	40	40	15	40			80			1.0				0.50	EC	UT																
		MIN		10	40																																	
1	ST16110094 (D03308)	LA	20	24	120	13	6	10	4	1	7	19	23	4	2	0.5	0.2				0.43			5	2800	1905													
		BA	19	25	119	12	7	11	4	1	8	19	26	3	4	0.4	0.2				0.42																	
		PA	19	25	121	12	7	11	4	1	8	20	26	3	4	0.4	0.2				0.42	*G	*G				415	534	34.1		87.3	85.6		*G			*G	*G		*G
																											417	538	34.0		88.6	85.1								
																															89.7	85.5							

NOTE

*1 - NF : Normalizing Forming / HF : Hot Finished / CF : Cold Finished
*2 - BEP : Bevelled End / PEP : Plain End
*3 - A : As Rolled / SRA : Stress Relieved Annealing / Q+T : Quenched & Tempered / N+T : Normalized & Tempered / N : Normalized / Iso : Isothermal Annealing
*4 - LA : Ladle Analysis / BA : Billet Analysis / PA . Product Analysis
*5 - Cu+Ni+Cr+Mo+V
*6 - Nb+V
*7 - Nb+V+Ti
*8 - Cr+Ni
*9 - C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15
*10 - UT : Ultrasonic Test / EC : Eddy Current Test / MT : Magnetic Particle Test/ EM : Electro Magnetic Inspection
*P - Tubular or Plate Type of ASTM E8 Fig 12
*F - Full Section Type of ASTM E8 Fig 11
*G - Good / *L - Longitudinal / *T - Transverse

Third party Section

- WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTABLE
- THE QUALITY SYSTEM OF OUR WORKS HAS BEEN ASSESSED AND REGISTERED AS MEETING THE REQUIREMENTS OF ISO 9001, ANY WELDING HAS NOT BEEN PERFORMED ON THE MATERIAL
- THIS CERTIFICATION IS INTENDED ONLY FOR PRODUCTS LISTED MODIFICATION TO OR UNAUTHORIZED USE OF THIS CERTIFICATION IS STRICTLY PROHIBITED OFFENSES MAY BE REGARDED AS FORGERY OF DOCUMENTS AND BE SUBJECT TO CRIMINAL PROSECUTION

YOUNG KYU SEO

Manager of QM Dept.:

BOLY PIPE CO., LTD.

MILL TEST CERTIFICATES

EN10204/3.1

Address: 7/342 M.6, T.Mapyangpon A.Pluakdaeng,
Rayong, 21140, Thailand
Phone Number:+66-33-010-907,+66-33-010-909

BL/QR12-02

CUSTOMER		PRODUCT	PRIME NEWLY PRODUCED SEAMLESS LINE PIPE
PURCHASER		PO.NO	BWS17BPT026
Standard	ASTM A53-GRADE B 2012/ASME SA53-GRADE B 2015,ASTM A106-GRADE B 2015/ASME SA106-GRADE B 2015 ASTM A106-GRADE C 2015/ASME SA106-GRADE C 2015 API 5L B/X42 PSL-1 45th ASTM A530-2012 NACE MR-0175/ISO15156	INVOICE.NO:	BWS17BPT026-1A / API Cert. NO. 5L-0956
Grade	B+C/X42	L/C NO.:	DATE 2017/10/12

Size(OD*WT)	6.625"x0.280"	Length range	40'(-0/+2")	Total Length (FT)	17853.64	Total Bundles	66	Order Quantity (MT)	150.000		
Total Joints	437	Total Weight (MT)	155.148	Delivery Condition		CHAMFER		Making Method	Hot Finished, Seamless		

No.	Heat No.	* 1	Chemical Composition (%) 1=X10,2=X100,3=X1000,4=X10000,5=X100000														Batch No.	Mechanical Properties				Impact Test (Temperature)					Hardness	Quantity		Length	Weight
			* 2	2 C	2 Si	2 Mn	3 P	3 S	2 Cr	2 Ni	2 Cu	3 Mo	3 V	3 Ti	3 Nb	3 Al		* 3	* 4	Rt0.5	Rm	A%	Size	1	2	3	AVG	HB (AVG)	Bundle	Jts	FT	MT
	min																min	Ksi		42	70	24.5									
	max			28		105	30	30	40	40	40	150	80				max											<225				
1	17607172		H	18	24	95	18	9	36	2	2	8	22	8	4	33	YN11709167			51.2	77.3	30.6						190.4	28	190	7781.13	87.444
			P	18	24	95	19	9	35	2	2	8	22	8	3	32																
			P	17	24	97	19	9	35	2	2	6	23	8	4	35																
2	17607173		H	18	25	95	19	8	34	3	2	6	25	5	4	30	YN11709168			51.0	76.4	33.5						192.8	34	226	9243.28	80.328
			P	18	24	94	19	8	34	3	2	7	23	5	4	32																
			P	18	24	95	19	7	34	3	2	7	26	5	5	30																
3	17607177		H	19	22	97	19	7	35	3	3	8	21	4	3	32	YN21709169			50.6	76.0	28.5						190	4	21	649.43	7.376
			P	18	22	97	19	8	35	3	3	8	20	4	3	31																
			P	18	22	97	19	7	35	3	3	7	20	4	3	32																

E.M.I	ASTM E570 L4 PASS	U.T	/	M.P.I	ASTM E709 PASS	Coating	PASS	Visual	PASS	Pipe ends Land(1.6±0.8)mm	PASS	Drift Test	/

Expansion	Residual Magnetism Measurement	Flattening	Bending	Hydrostatic Test (2670PSI/6s)	Chamfer Inspection (30±5)°	Heat Treatment	O.D Size	I.D Size	W.T.Measure
/	PASS	PASS	/	PASS	PASS	/	PASS	PASS	PASS

NOTES: G.L =Gauge Length *1 Process C= Electric Furnace & Continuous Casting *2 Chemical Composition H=Heat(ladle)Analysis *3 Sampling Position P=Pipe Body *4 Size 2= StripTX25mm

INSPECTORS TO

WE HEREBY CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED SAMPLED, TESTED AND INSPECTED IN ACCORDANCE WITH THE REQUIREMEN

THE ABOVE SPECIFICATIONS AND PURCHASE ORDER.WE HEREBY CERTIFY THAT THE MATERIAL ARE MERCURY FREE / NO WELD REPAIR FINE GRAIN PRACTICE,MEETS H

PER ANSI/NACE MR0175/ISO 15156:2009.MEETS HARDNESS FOR NACE MR-0103.THIS MILL TEST CERTIFICATE IS ISSUED BY BOLY PIPE CO,LTD AS THE MANUFACTURER.

COUNTRY OF MELT FOR BILLET:CHINA

Q:A Signature

NMP413 / 1170114 / 6.0A333STDF / 6 STD SA333 GR 6 PIPE

ІНТЕРПАЙП НТЗ

ПАТ"ІНТЕРПАЙП НИЖНЬОДНІПРОВСЬКИЙ ТРУБОПРОКАТНИЙ ЗАВОД"
Україна, м. Дніпропетровськ, вул. Столєтова, 21
Тел.: +38 (0562) 35-92-50. Факс:+38 (0562) 35-83-89

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 141/5
INSPECTION CERTIFICATE №
EN 10204-2004/3.1

Грузополучатель North American Interpipe, Inc. 1800 West Loop South, Suite 1350,
BUYER Houston, Texas 77027

Контракт №
Contract No

Страна USA
Country

PO#

Транспортное средство № 60434826 /70/
vehicle

№ заказа 771497/101
Order # COC16/1497

Дата 20.01.2017.
Date

Лист 2 / 2 Стр 3 / 4
Sheet Page

Наименование и код товара Description and code of goods	Требования НД Standard requirements	Класс поставки Class of delivery	Термообработка Heat treatment
Seamless steel hot-rolled pipes for pipelines	ASTM A106/A106M-2015 / ASME SA106/ SA106M-2015 / ASTM A53/A53M-2012 / ASME SA53/SA53M-2015 /ASTM A333/A333M-2018 / ASME SA333/SA333M-2015 /NACE MR0175-2015 / NACE MR0103-2012		Нормализация Normalized

№ поз Item No	Номера пакетов Package No	Номера труб Pipe No	Марка стали Steel Grade	Номера плавок Numbers of heats	Номера партий Numbers of lots	Размеры Dimensions			Количество Quantity			
			Краткое обозначение Brief Designation			диаметр diameter Дюйм Inch	толщина стенки wall thickness Дюйм Inch	длина length Фут Foot	метраж meterage Фут Foot	шт pieces	Фактический вес Actual weight брутто gross Фунт Pound	нетто net Фунт Pound
1	1/20	1-9	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	357,38	9	7 220	7 187
2	2/20	10-20	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	356,89	9	7 231	7 178
3	3/20	21-30	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	358,40	9	7 258	7 225
4	4/20	32-34; 36-42	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	358,83	9	7 258	7 225
5	5/20	43, 44, 47-52, 54	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	358,46	9	7 275	7 242
6	6/20	55-59; 61-63; 65	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	357,51	9	7 253	7 220
7	7/20	66-71, 73, 75, 77-79	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	357,15	9	7 249	7 196
8	8/20	80-97	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	358,88	9	7 218	7 185
9	10/20	99-104, 106, 108, 109	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	356,59	9	7 218	7 183
10	11/20	110, 112-118, 120	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	357,09	9	7 271	7 216
11	12/20	121-128; 130	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	357,22	9	7 203	7 169
12	13/20	131, 132; 134; 137, 139-143	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	356,92	9	7 222	7 189
13	14/20	146, 148-151	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	198,59	5	4 015	3 982
14	15/20	152; 154, 156, 157, 159, 161-164	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	357,15	9	7 209	7 176
15	16/20	165-169; 171-174	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	357,15	9	7 205	7 172
16	17/20	170, 175-177	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	158,63	4	3 210	3 177
17	18/20	178-185, 187	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	357,32	9	7 196	7 163
18	19/20	188-196	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	358,07	9	7 207	7 174
19	20/20	197-199	6/B/C	1170114	84	6,625	0,280	39,37 - 40,35	119,29	3	2 418	2 385

NPS 6 Sch 40

TOTAL	6195,50	156	125 334	124 644
BUNDLES	19			

INTERPIPE NTRP

PJSC"INTERPIPE NIZHNEDNEPROSKY TUBE ROLLING PLANT" 077969
UKRAINE, Dnepropetrovsk, 21, Stoletova str.
Tel.:+38 (0562) 35-92-50. Fax:+38 (0562) 35-83-89

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № / INSPECTION CERTIFICATE № 141/8

Лист / Sheets 2/2 Стр / Page 4/4

Химический состав по сертификатным данным на заготовку и результаты контрольных измерений
Heat analysis acc. to the billet manufacturer certificate & results of control analysis on pipes

Номер плавки / Heat Number	Laboratory	C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x1000	Ti x1000	V x1000	Nb x1000	B x1000	CEQ x100	Завод изготовитель заготовки / Manufacturer of billets
min			29	10	-				-							
max		28	106	-	25	25	30	40	40	120	40	80	20	1		
1170114	DneprSteel*	21	87	22	3	16	11	9	17	9	1	3	2	0.3		MP«Dneprosteel»LLC
1 1170114	NTRP**	22	92	22	4	17	11	9	17	10	5	5	1	0.3		
2 1170114	NTRP**	22	92	22	4	17	11	9	17	10	5	5	1	0.3		MP«Dneprosteel»LLC

*Анализ плавки согласно сертификата завода-изготовителя / *Heat analysis acc. to the manufacturer certificate ** контрольный анализ от труб / ** control analysis of pipes

Сталь спокойная с мелкозернистой структурой / Steel has been fully killed and made to fine grain practice

Электросталь непрерывной разливки / Steel has been produced by the EAF with continuous casting process

Способ плавки - сталь произведена на заводе ООО МЗ Днепросталь в электродуговой печи с последующей обработкой Украина, 49051 Днепропетровск ул. Винокурова 4 Тел./факс +38(056) 371 50 40 / Method of melting – steel is produced by "MP "DNEPROSTEEL" LLC in Electric Arc Furnace with further treatment, Ukraine, 49051 Dnipropetrovsk 4, Vinokurova St. Tel./fax +38(056) 371 50 40

Результаты испытаний – Test results

№ пп / Item No	Номера плавок / Numbers of heats	Номера партий / Numbers of lots	Предел прочности / Tensile strength, psi	Предел текучести / Yield strength, psi	Относительное удлинение / Relative elongation, %	Ориентация образцов / Specimens orientation	Ширина образца / Width of specimen, inch	Длина образца / Length of specimen, inch	Твердость / Hardness acc. to NACE MR0175-2015, NACE MR0103-2012: HRB	HRC	Ударный изгиб / Impact Test KV -50 °F Фут-Фунт / Ft-lb, № образца / Specimen No 1	2	3	Ср / Av	Размер образцов / Specimens size, mm
		min	70000	42000	28.0										
		max							100	22					
1-18	1170114	64	75670 76670	49748 50626	33,00 29,00	Продольная / Longitudinal	1	2,0	78.0 78.0 78.0	<22	33.6	35.4	35.4	34.8	5 x 10

Прочие виды контроля - Other types of tests

Вид испытания / Type of test	Параметры / Criteria	Результаты / Results NPS 6 sch 40
Испытание гидравлическим давлением / Hydrostatic test	NPS 6 sch 40 100% / 2030 PSI / 5 sec	Удовлетворительно / Acceptable
Неразрушающий контроль* / Non-destructive test 100%	Продольная риска 12,5% на наружной поверхности / Longitudinal notch with depth 12,5% NWT on external surface	Удовлетворительно / Acceptable
Сплющивание / Flattening	По стандарту / As per Standard	Удовлетворительно / Acceptable
Визуальный контроль наружной и внутренней поверхности / Visual inspection of external and internal surfaces	По стандарту / As per Standard	Удовлетворительно / Acceptable
Измерение геометрических параметров труб / Measurement of geometric parameters	По стандарту / As per Standard	Удовлетворительно / Acceptable

* Неконтролируемые концы труб обрезаны / Non-controlled ends are cut.

Состояние поставки - Delivery condition

Трубы произведены методом горячей деформации и нормализованы в диапазоне температур 845°C - 945°C, охлаждены на воздухе и соответствуют требованиям ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2016/ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012. Трубы не содержат свинец и ртуть. Ремонт сваркой запрещен.

Pipes produced by Hot Forming process and followed by normalizing at the temperature 845 deg C - 945 deg C cooled at air. Pipes are satisfied to the requirements of ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2016/ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012. Lead & Mercury Free. No Weld Repair.

Термообработка / Heat treatment	Нормализация / Normalized
Покрытие / Coating	Трубы покрыты черным лаком (UE 01-9602/2 код 15) / Pipes are coated with black varnish (UE 01-9602/2 code 15)
Концы / Ends	Трубы с фаской. Вид обработки концов (фаска/BE). Трубы отгружены с пластиковыми колпачками / Pipes with bevelled ends. End execution BE (Bevelled Ends). Pipes shipment with plastic caps

Страна происхождения Украина. / Country of origin Ukraine.

Этот сертификат предназначен только для перечисленных продуктов. Изменение или несанкционированное использование данного сертификата строго запрещено. Нарушение может рассматриваться как подделка документов и подлежит уголовному преследованию.
Ваши предложения по улучшению продукции просим направлять на эл.адрес
info@ae.interpipe.biz, fax +97148857412 or phone +97148126500

This certificate is only for the listed products. Modification or unauthorized use of the certificate is strictly prohibited. Violations can be considered as forgery and is subject to prosecution. You are requested to submit your proposals concerning product quality improvement to the following e-mail address
info@ae.interpipe.biz, fax +97148857412 or phone +97148126500

Specialist N.N.Tkalich phone +380 562 358535.

Дата / Date 20.01.2017 Специалист / Specialist М.М.Ткалич / M.M.Tkalich Подпись / Signature

ПАТ "ІНТЕРПАЙП НТЗ" 11 ВТК

BOLY PIPE CO., LTD.

MILL TEST CERTIFICATES

EN10204/3.1

Address: 7/342 M.6, T.Mapyangpon A.Pluakdaeng,
Rayong, 21140,Thailand
Phone Number:+66-33-010-907,+66-33-010-909

BL/QR12-02

CUSTOMER		PRODUCT	PRIME NEWLY PRODUCED SEAMLESS LINE PIPE
PURCHASER		PO.NO	BWS17BPT025
Standard	ASTM A53-GRADE B 2012/ASME SA53-GRADE B 2015,ASTM A106-GRADE B 2015/ASME SA106-GRADE B 2015 ASTM A106-GRADE C 2015/ASME SA106-GRADE C 2015 API 5L B/X42 PSL-1 45TH ASTM A530-2012 NACE MR-0175/ISO15156	INVOICE.NO:	BWS17BPT025-1A / API Cert. NO. 5L-0956
Grade	B+C/X42	L/C NO.:	DATE 2017/10/30

Size(OD*WT)	5.625"x0.432"	Length range	40'(-0/+2")	Total Length (FT)	10058.16	Total Bundles	51	Order Quantity (MT)	125.000
Total Joints	251	Total Weight (MT)	131.852	Delivery Condition		CHAMFER		Making Method	Hot Finished, Seamless

No.	Heat No.	* 1	Chemical Composition (%) 1=X10,2=X100,3=X1000,4=X10000,5=X100000														Batch No.	Mechanical Properties			Impact Test (Temperature)					Hardness	Quantity		Length	Weight
			* 2	2 C	2 Si	2 Mn	2 P	3 S	2 Cr	2 Ni	2 Cu	3 Mo	3 V	3 Ti	3 Nb	3 Al		* 3	* 4	Rt0.5	Rm	A%	Size	1	2	3	AVG	HB (AVG)	Bundle	Jts	FT	MT
	min																														
	max			28		106	30	30	40	40	40	150	80				min / max	Ksi		42	70	26.5					<225				
1	4204171	H	21	26	97	14	5	33	2	1	19	18	1	3	13		YX21410017			52.3	74.7	32.5					183.6	25	123	4927.69	64.848
		P	20	25	96	13	4	32	2	1	18	19	1	2	12																
		P	20	26	96	14	4	33	2	1	18	19	1	2	13																
2	4204423	H	19	25	97	13	3	31	1	1	15	16	1	2	15		YX11410006			53.9	76.0	35					189.6	22	108	4326.88	56.525
		P	20	24	98	12	3	33	1	1	14	18	1	2	13																
		P	19	24	98	12	4	32	1	1	14	16	1	1	16																
2	4204624	H	20	25	99	15	5	30	1	1	15	16	1	2	14		YX11410006			53.4	74.2	32					193.6	4	20	801.59	10.478
		P	20	24	98	16	5	31	1	1	15	17	1	1	15																
		P	21	24	98	15	4	32	1	1	15	18	1	1	12																

E.M.I	ASTM E570 L4 / PASS	U.T	/	M.P.I	ASTM E709 / PASS	Coating	PASS	Visual	PASS	Pipe ends Land(1.6±0.8)mm	PASS	Drift Test	/

Expension	Residual Magnetism Measurement	Flattening	Bending	Hydrostatic Test (4200PSI/5s)	Chamfer Inspection (30+5)°	Heat Treatment	O.D Size	I.D Size	W.T.Measure
/	PASS	PASS	/	PASS	PASS	/	PASS	PASS	PASS

NOTES: G.L.=Gauge Length *1 Process C= Electric Furnace & Continuous Casting *2 Chemical Composition H=Heat(ladle)Analysis *3 Sampling Position P=Pipe Body *4 Size 2= StripTX25mm

INSPECTORS TO

WE HEREBY CERTIFY THAT THE MATERIAL HEREIN DESCRIBED HAS BEEN MANUFACTURED SAMPLED, TESTED AND INSPECTED IN ACCORDANCE WITH THE REQUIREMEN

THE ABOVE SPECIFICATIONS AND PURCHASE ORDER.WE HEREBY CERTIFY THAT THE MATERIAL ARE MERCURY FREE / NO WELD REPAIR FINE GRAIN PRACTICE.MEETS H

PER ANSI/NACE MR0175/ISO 15156:2009.MEETS HARDNESS FOR NACE MR-0103.THIS MILL TEST CERTIFICATE IS ISSUED BY BOLY PIPE CO,LTD AS THE MANUFACTURER

COUNTRY OF MELT FOR BILLET:CHINA

Q.A Signature

NMP391 / 1162655 / 6.0A333XHF / 6 XH SA333 GR 6 PIPE

ІНТЕРПАЙП
НТЗ

ПАТ"ІНТЕРПАЙП НИЖНЬОДНІПРОВСЬКИЙ ТРУБОПРОКАТНИЙ ЗАВОД"
Україна, м. Дніпропетровськ, вул. Столєтова, 21
Тел./факс +38(0562) 34-90-99

Заказчик
Customer
North American Interpipe, Inc.
1800 West Loop South, Suite 1350,
Houston, Texas 77027, USA

Сертификат № 1532/5
Certificate №
INSPECTION CERTIFICATE ACC. TO EN 10204-2004/3.1

Контракт №
Contract №

Заказ № 760908/102
Customer order № COC16/0908
PO # 163591-00

№ транспортного средства 67870014 /69/
№ vehicle

Лист/ Sheet 2 Стр/Page 3
Листов/ Sheets 2 Страниц/ Pages 4

Наименование и код товара Description and code of goods	НД Standard	Термообработки Heat treatment
SEAMLESS STEEL HOT-ROLLED PIPES FOR PIPELINES	ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012	Without heat treatment

№ п.п р. No	Номер плавки Number of heat	Номер партии Number of lot	Марка стали Grade steel	Размеры, дюйм Dimensions, in.		Длина фут Length ft	Метраж, фут Metreage ft	К-во труб, шт Q-ty of pipes, pcs.	Вес, фунт Weight, lb	
				Диаметр O.D.	Тол. ст. W. T.				Брутто Gross	Нетто Net
			6/B/C						Actual weight	
1.	1162655	2337	"	6.625	0.432	39.70-40.03	278.58	7	8077.7	8011.6
2.	1162745	2361	"	4.500	0.531	38.06-38.39	878.58	23	20315.6	20183.4
						Total:	1157.16	30	28393.4	28195.0

Показатели качества товара *Quality characteristics of goods*

№ п.п. р. No	Номер плавки Number of heat	Химический состав, массовая доля % Chemical composition, mass fraction %										
		C x 100	Si x 100	Mn x 100	S x 1000	P x 1000	Cr x 100	Ni x 100	Cu x 100	Mo x 1000	V x 1000	Al x 1000
1.	1162655 H	24	22	87	3	12	8	9	15	8	2	35
	1162655 P	23	21	92	7	11	7	9	14	10	5	8
		22	21	92	7	9	7	9	14	10	5	8
2.	1162745 H	25	26	87	4	10	7	11	18	10	3	32
	1162745 P	26	25	89	6	8	7	11	20	13	5	37
		25	25	89	6	8	7	11	20	12	5	36

Cr+Cu+Ni+Mo+V ≤ 1 %

Продолжение на обороте The continuation on the back

INTERPIPE
NTRP

PJSC "INTERPIPE NIZHNEDNEPROVSKY TUBE ROLLING PLANT" 011423
UKRAINE, Dnepropetrovsk, 21, Stoletova str.
Tel./fax +38(0562) 34-90-99

Сертификат № 1532/5 Лист/ Sheet 2 Стр/Page 4
Certificate №

Тип образца Type of specimen	Размеры образца Dimensions of specimen	Ориентация образца Orientation of specimen
Strip	Ширина, width: 1" Длина, length: 2"	Longitudinal

Механические свойства Mechanical properties

№ п.п. р. No	Номер плавки Number of heat	Номер партии Number of lot	Предел прочности, PSI Tensile strength, PSI	Предел текучести, PSI Yield strength, PSI	Удлинение, % Elongation, %	Твердость по Роквеллу, Hardness, HRC	Твердость по Роквеллу, Hardness, HRB	Сплющивание Flattening	Испытание на изгиб Bend test
1.	1162655	2337	77326 70907	47165 43654	31.26 33.20	< 22	77.5	O.K.	
2.	1162745	2361	81094 81606	48992 49201	33.75 32.56	< 22	73.7	O.K.	

№ п.п. р. No	Номер плавки Number of heat	Номер партии Number of lot	Размеры образца Dimensions of specimen mm	Мин. Работа разрушения, футо-фунт Min. Charpy Energy, Ft.- Lbs. поперечный Transverse полномер. Full size	поперечный Transverse нестандар. Non-stand.	продольный Longitudinal полномер. Full size	продольный Longitudinal нестандар. Non-stand.	Испытательн. Температура (-50)°F Test Temperature (-50)°F	Площадь сдвига Shear area %
				Actual results		Actual results			
1.	1162655	2337	7.5x10	41.5 46.0 42.0 – 43.2					20
2.	1162745	2361	10x10	42.9 42.0 47.6 – 44.2					50

Гидроиспытательное давление, PSI Hydrostatic test pressure, PSI	Время выдержки, сек Duration, sec
2800	min. 5

Номера труб (пакетов):
Number of pipes (packages):

6.625 x 0.432	1162655 – 8/10 42-44, 9/10 45-48.
4.500 x 0.531	1162745 – 1/5 1-7, 2/5 8-11; 14-16, 3/5 17-22, 4/5 13; 23-24.

Total: 6 packages.

Примечания:
Note: 1. We hereby certify that above material has been manufactured, sampled, tested and inspected in accordance with ASTM A106/A106M-2015/ASME SA106/SA106M-2015/ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR 0175-2015/NACE MR 0103-2012 and has been found to meet requirements and terms of contract.
2. Nondestructive ultrasonic test – without remarks.
3. Pipes with plastic caps.
4. Pipes will be delivered with beveled ends.
5. Pipes are varnished with black lacquer "UE 01-9502/2" code 15.
6. Material have not been repaired by welding.
7. Dispatch was effected according to physical weight.
8. The presented data were converted from the applied measuring system (SI), used in the initial control.
9. Method of melting – steel is produced by "MP "DNEPROSTEEL" LLC in Electric Arc Furnace with further treatment. Ukraine, 49051, Dnipropetrovsk, 4, Vinokurova Str. Tel./fax +38(056) 371 50 40
10. Specialist T.V.Polozhevetc phone +380 562 358535.

Заместитель директора

ПАТ "ІНТЕРПАЙП НТЗ" ЗТК м. Дніпропетровськ

T.V.Polozhevetc

29.09.2016.
Дата/ Date

Печать/Stamp

Подпись/Signature

ИНТЕРПАЙП
НИКО ТЬЮБ

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
"ИНТЕРПАЙП НИКО ТЬЮБ"
Украина, г. Никополь, пр. Трубников, 56
Тел./факс +38 (0566) 639-379

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 0581/5
INSPECTION CERTIFICATE № 0581/5
EN 10204-2004/3.1

Грузополучатель / BUYER: North American Interpipe, Inc. 1800 West Loop South, Suite 1350, Houston, Texas 77027, USA

Контракт № / Contract #: COC16/1497

Страна / Country: USA

Заводской заказ / Production order #: N005910
Номер заказа клиента / Customer's ref #: P20173

Транспортное средство № / Vehicle №: AP0580CX/AP2767XO

Лист 1 / Sheet — Листов 1 / Sheets

Дата / Date: 31.01.2017г.

Наименование и вид товара / Description and code of goods	Наименование стандартов / Specifications	Класс поставки / Class of delivery	Тип резьбы / Thread type
Трубы стальные бесшовные горячекатаные для трубопроводов / Seamless steel hot-rolled pipes for pipelines	ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012		

№ поз. / Item No	Номер пакета / Bundle #	Номер труб / Pipe #	Марка стали / Grade — краткое обозначение / Brief Designation	Номер плавки / Heat #	Номер партии / Inspection Lot #	Размеры / Dimensions: диаметр / OD, дюйм / inch	толщина стенки / WT, дюйм / inch	длина / length, фут / ft	общая длина / Total length, фут / ft	шт / piece	Фактический вес / Actual weight: брутто / gross, фунт / lb	[illegible] / net, фунт / lb
1	17-38-02451		5/ B/ C	1170278	312	8.625	0.322	38.1	189.8	5	5 567	5 558
2.	17-38-02450		5/ B/ C	1170278	312	8.625	0.322	38.1	189.9	5	5 559	5 545
3.	17-38-02504		5/ B/ C	1170278	312	8.625	0.322	38.1	189.8	5	5 600	5 589
4.	17-38-02548		5/ B/ C	1170278	312	8.625	0.322	38.1	151.8	4	4 378	4 365
5.	17-38-02506		5/ B/ C	1170278	312	8.625	0.322	38.1	189.8	5	5 588	5 578
6.	17-38-02592		5/ B/ C	1170278	312	8.625	0.322	38.1	151.9	4	4 408	4 398
7	17-38-01418		5/ B/ C	1170069	117	8.625	0.322	38.1	189.4	5	5 534	5 523
8.	17-38-01419		5/ B/ C	1170069	117	8.625	0.322	38.1	189.5	5	5 523	5 512
9.	17-38-01421		5/ B/ C	1170069	117	8.625	0.322	38.1	113.8	3	3 373	3 362
			NPS 8	Sch 40 STD			TOTAL/ИТОГО		1686.7	41	46 827	46 428

BUNDLE/ПАКЕТОВ 9

INTERPIPE
NIKO TUBE

LIMITED LIABILITY COMPANY [illegible]
"INTERPIPE NIKO TUBE"
UKRAINE, Nikopol, 56, Trubnikov ave. Tel./fax +38 (0566) 639-379

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 6551/5
INSPECTION CERTIFICATE № 6551/5

Лист 1 Sheet — Листов 1 Sheets

Химический состав по сертификатным данным на заготовку и результаты контроля химического состава металла труб
Heat analysis acc. to the billet manufacturer certificate & results of chemical analysis of pipes

Номер плавки Heat #	Лаборатория Laboratory	C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x1000	V x1000	Nb x1000	CE x100	Завод изготовитель заготовки Steel supplier
min		-	29	10	-	-	-	-	-	-	-	-	-	
max		30	106	-	25	25	40	40	40	120	80	20	-	
1170069	DneprSteel	22	89.5	25	8	10	7.3	9.2	14.7	9	3	2	40.2	"MP"DNEPROSTEEL"LLC
	NIKOTUBE*	23	89	25	10	11	7	10	15	10	1	1	41.1	ООО"МЗ"Днепросталь"
	NIKOTUBE*	23	90	26	8	10	7	10	15	10	2	2	41.3	
1170278	DneprSteel	22.6	85.7	24.7	6	12	10.5	10.6	16.5	11	3	2	41	"MP"DNEPROSTEEL"LLC
	NIKOTUBE*	24	86	26	7	12	10	10	16	11	1	2	42.6	ООО"МЗ"Днепросталь"
	NIKOTUBE*	23	88	28	6	12	10	10	16	11	1	1	41.6	

Анализ плавки согласно сертификата завода-изготовителя/Heat analysis acc.to the manufacturer certificate,*-control analysis of pipes/*-контрольный анализ от труб.
Сталь произведена методом плавления в электродуговой печи с последующей непрерывной разливкой. Сталь полностью раскисленная и мелкозернистая. Сталь раскисленная алюминием. Адрес завода изготовителя заготовки: Украина, 49051, г.Днепропетровск, ул.Винокурова, 4/ Steel has been produced by the EAF with continuous casting process. Steel is fully killed and made to fine grain practice. Aluminium killed steel. The address of steel supplier: Ukraine,49051, Dnipropetrovsk, 4 Vinokurova str. При расчете углеродного эквивалента использована формула/When calculating the carbon equivalent the following formula was used:
CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Результаты испытаний труб - Test results for pipes

Механические свойства — Mechanical Properties

Номер плавки Heat#	Номер партии Lot#	Предел прочности Tensile strength	Предел текучести Yield strength	Относительное удлинение Elongation	Отношение σт/σв Ratio σт/σв	Ориентация образца Specimens orientation*	Ширина полосового образца Width of strip specimen	Диаметр цилиндрического образца Diameter of cylindrical specimen	Длина образца Length of specimen	Твердость Hardness Среднее значение Average (HRB)	(HRC)	Ориентация/Orientation*	Тип надреза, темпе ратура Type of notch, temperature	Нормативное/Min	Ср.значение Average	Площадь среза, Shear area	Размер образцов ** Specimens size **
		PSI	PSI	%	-		дюйм/ inch	дюйм/ inch	/ inch	HRB	HRC				Фут/Фунт	%	дюйм/ inch
	min	70000	40000	27.0	–					-	-			min			
	max	-	-	-	–					100	22						
1170069	117	74500	48500	38.5		L	1.500		1.970	83	<22	L	KV-60°F		30 28 30 av.29	5 5 5	0.394x0.263
		81000	53000	37.0		L	1.500		1.970	85	<22						
1170278	312	77500	50500	34.0		L	1.500		1.970	81	<22	L	KV-60°F		27 21 27 av 25	10 5 10	0.394x0.263
		79000	52500	34.0		L	1.500		1.970	83	<22						

* L - Продольный образец / Longitudinal specimen; T - поперечный образец / transverse specimen
** Результаты испытаний уменьшенных образцов пересчитаны на полноразмерные/Non-fullsize specimens results convert to fullsize (10x10mm)

Прочие виды контроля / Other tests

Вид испытания / Type of test	Параметры / Criteria	Результаты контроля /Test
Сплющивание / Flattening test	По стандарту / As per Standard**	Удовлетворительно / Satisfactory
Испытание гидравлическим давлением / Hydrostatic test	100% / 12,4 MPa / 1800 PSI / 10 sec - 219,1x8,18(8.625x0.322)	Удовлетворительно / Satisfactory
Неразрушающий контроль тела трубы / Non-destructive inspection full length body	Метод контроля / Method: Ультразвуковой контроль / UT inspection Продольная риска 12,5% на наружной и внутренней поверхности/ Longitudinal notch with depth 12,5% on external and internal surface**	Удовлетворительно / Satisfactory
Контроль концов труб / SEA inspection	Неконтролируемые концы труб обрезаны / Non-inspected ends are cutted**	Удовлетворительно / Satisfactory
Визуальный контроль / Visual inspection	По стандарту / As per Standard**	Удовлетворительно / Satisfactory
Контроль геометрических параметров / Dimensional inspection	По стандарту / As per Standard**	Удовлетворительно / Satisfactory

Состояние поставки / Delivery condition

Общие условия / General condition	Трубы изготовлены и испытаны в соответствии с требованиями ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012 и заказа / Pipes were produced and inspected according to requirements of ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012 and order's requirements
Состояние поставки / Delivery condition	Трубы произведены путем горячей деформации и нормализованы при температуре 845...945°C , охлаждение на воздухе/ Pipes produced by Hot Forming followed by normalizing at the temperature 845 deg C to 945 deg C cooled at air
Покрытие / Coating	Трубы покрыты черным лаком / Pipes are coated with black varnish
Фаска (если требуется) / Bevelled ends if required	Стандартная фаска / Bevel as per standard
Защита концов / Protection of pipe ends	Концы труб оснащены пластиковыми колпачками / The ends of pipes are equipped by plastic caps
Дополнительная информация / Additional information	Масса фактическая/ Actual weight. Ремонт сваркой запрещен. / No weld repair Объем партии не более чем 100 труб/ Quantity of pipes in the inspection lot is not more than 100 pieces Трубы не содержат ртуть и свинец. Material is free of mercury and lead

Страна происхождения: Украина. Country of origin: Ukraine.
Ваши предложения по улучшению продукции просим направлять на эл.адрес / Please send Your proposals for improving the product by e-mail or fax or by phone
Sergey.Pilchukov@nikopol.interpipe.biz fax +38(0566)... phone +38(0566)...
e-mail: info@ua.interpipe.biz Phone: 17133330333 Fax: 17133330333
Этот инспекционный сертификат относится только к перечисленной продукции. Внесение изменений или другое неправомерное использование сертификата ...
This inspection certificate is only for the listed products. Modification or ... is strictly prohibited. Violations can be considered as forgery and is subject to prosecution.
Инспекционный сертификат оформлен и проверен контролером ОТК
Inspection Certificate were drawn up and checked by the Certificate ...

ПРОВЕРЕНО
10.02.2017

Дата. Date: 31.01.2017

Подпись инспектора 3-й стороны / Signature of 3-rd Part Inspector

Подпись ОТК / Signature QCD

017665

ТОВ "ІНТЕРПАЙП НІКО ТЬЮБ" СЛУЖБА ЯКОСТІ м. Нікополь

NIK465 / 1170278 / 8.0A106STDF / 8 STD A106B SMLS PIPE

ИНТЕРПАЙП
НИКО ТЬЮБ

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
"ИНТЕРПАЙП НИКО ТЬЮБ"
Украина, г. Никополь, пр. Трубников, 56
Тел./факс +38 (0566) 639-379

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 0561/5
INSPECTION CERTIFICATE № 0561/5
EN 10204-2004/3.1

Грузополучатель / BUYER: North American Interpipe, Inc. 1800 West Loop South, Suite 1350, Houston, Texas 77027, USA

Контракт № / Contract #: COC16/1497

Заводской заказ / Production order #: N006910

Номер заказа клиента / Customer's ref #: P20173

Страна / Country: USA

Транспортное средство № / Vehicle №: AP6586CX/AP2767XO

Лист 1 / Sheet — Листов 1 / Sheets

Дата / Date: 31.01.2017г.

Наименование и код товара / Description and code of goods	Наименование стандартов / Specifications	Класс поставки / Class of delivery	Тип резьбы / Thread type
Трубы стальные бесшовные горячекатаные для трубопроводов / Seamless steel hot-rolled pipes for pipelines	ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012		

№ поз. / Item No	Номер пакета / Bundle #	Номер труб / Pipe #	Марка стали / Grade — краткое обозначение / Brief Designation	Номер плавки / Heat #	Номер партии / Inspection Lot #	Размеры / Dimensions: диаметр / OD, дюйм / inch	толщина стенки / WT, дюйм / inch	длина / length, фут / ft	общая длина / Total length, фут / ft	шт / piece	Фактический вес / Actual weight: брутто / gross, фунт / lb	нетто / net, фунт / lb
1	17-38-02451		6/ B/ C	1170278	312	8.625	0.322	38.1	189.8	5	5 567	5 558
2	17-38-02450		6/ B/ C	1170278	312	8.625	0.322	38.1	189.9	5	5 559	5 548
3	17-38-02504		6/ B/ C	1170278	312	8.625	0.322	38.1	189.8	5	5 600	5 589
4	17-38-02549		6/ B/ C	1170278	312	8.625	0.322	38.1	151.8	4	4 378	4 365
5	17-38-02505		6/ B/ C	1170278	312	8.625	0.322	38.1	189.8	5	5 588	5 578
6	17-38-02592		6/ B/ C	1170278	312	8.625	0.322	38.1	151.9	4	4 409	4 398
7	17-38-01418		6/ B/ C	1170069	117	8.625	0.322	38.1	189.4	5	5 534	5 523
8	17-38-01419		6/ B/ C	1170069	117	8.625	0.322	38.1	189.5	5	5 523	5 512
9	17-38-01421		6/ B/ C	1170069	117	8.625	0.322	38.1	113.8	3	3 373	3 362
			NPS 8	Sch 40 STD			TOTAL/ИТОГО		1555.7	41	46 627	46 423

BUNDLES/ПАКЕТОВ [illegible]

INTERPIPE
NIKO TUBE

LIMITED LIABILITY COMPANY
"INTERPIPE NIKO TUBE"
UKRAINE, Nikopol, 56, Trubnikov ave. Tel./fax: +38 (0566) 639-379

NIK465 / 1170278 / 8.0A106STDF / 8 STD A106B SMLS PIPE

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 0551/5
INSPECTION CERTIFICATE № 0551/5

Лист 1 Sheet   Листов 1 Sheets

Химический состав по сертификатным данным на заготовку и результаты контроля химического состава металла труб
Heat analysis acc. to the billet manufacturer certificate & results of chemical analysis of pipes

Номер плавки Heat #	Лаборатория Laboratory	C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x1000	V x1000	Nb x1000	CE x100	Завод изготовитель заготовки Steel supplier
min		-	29	10	-	-	-	-	-	-	-	-	-	
max		30	106	-	25	25	40	40	40	120	80	20	-	
1170069	DneprSteel	22	89.5	25	8	10	7.3	9.2	14.7	9	3	2	40.2	"MP"DNEPROSTEEL"LLC
	NIKOTUBE*	23	89	25	10	11	7	10	15	10	1	1	41.1	ООО"МЗ"Днепросталь"
	NIKOTUBE*	23	90	26	8	10	7	10	15	10	2	2	41.3	
1170278	DneprSteel	22.5	85.7	24.7	6	12	10.5	10.6	16.5	11	3	2	41	"MP"DNEPROSTEEL"LLC
	NIKOTUBE*	24	88	25	7	12	10	10	16	11	1	2	42.6	ООО"МЗ"Днепросталь"
	NIKOTUBE*	23	88	28	6	12	10	10	16	11	1	1	41.6	

Анализ плавки согласно сертификата завода-изготовителя/Heat analysis acc.to the manufacturer certificate,*-control analysis of pipes/*-контрольный анализ от труб.
Сталь произведена методом плавления в электродуговой печи с последующей непрерывной разливкой. Сталь полностью раскисленная и мелкозернистая. Сталь раскисленная алюминием. Адрес завода изготовителя заготовки: Украина, 49051, г.Днепропетровск, ул.Винокурова, 4/ Steel has been produced by the EAF with continuous casting process. Steel is fully killed and made to fine grain practice. Aluminium killed steel. The address of steel supplier: Ukraine,49051, Dnipropetrovsk, 4 Vinokurova str. При расчете углеродного эквивалента использована формула/When calculating the carbon equivalent the following formula was used:
CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Результаты испытаний труб - Test results for pipes

Механические свойства / Mechanical Properties — Испытание на растяжение / Tensile test; Испытание на удар / Impact test

Номер плавки Heat#	Номер партии Lot#	Предел прочности Tensile strength	Предел текучести Yield strength	Относительное удлинение Elongation	Отношение стар Ratio stan	Ориентация образца Specimens orientation*	Ширина плоского образца Width of strip specimen	Диаметр цилиндрического образца Diameter of cylindrical specimen	Длина образца Length of specimen	Твердость Hardness Среднее значение Average		Ориентация Orientation*	Тип надреза, темпе ратура Type of notch, temperature	Нормативная	Ср.значение Average	Площадь среза, Shear area	Размер образца ** Specimens size **
		PSI	PSI	%			дюйм/ inch	дюйм/ inch	/ inch	HRB	HRC				Фут/Фунт	%	дюйм/ inch
	min	70000	40000	27.0	-					-	-			min			
	max	-	-	-	-					100	22						
1170069	117	74500	45500	38.5		L	1.500		1.970	83	<22	L	KV -60°F		30 28 30 av 29	5 5 5	0.394x0.263
		81000	53000	37.0		L	1.500		1.970	85	<22						
1170278	312	77500	50500	34.0		L	1.500		1.970	81	<22	L	KV -60°F		27 21 27 av 25	10 5 10	0.394x0.263
		79000	52500	34.0		L	1.500		1.970	83	<22						

* L - Продольный образец / Longitudinal specimen, T - поперечный образец / transverse specimen
** Результаты испытаний уменьшенных образцов пересчитаны на полноразмерные/Non-fullsize specimens results convert to fullsize (10x10mm)

Прочие виды контроля / Other tests

Вид испытания / Type of test	Параметры / Criteria	Результаты контроля /Test
Сплющивание / Flattening test	По стандарту / As per Standard	Удовлетворительно / Satisfactory
Испытание гидравлическим давлением / Hydrostatic test	100% / 12,4 MPa / 1800 PSI / 10 sec - 219,1x8,18(8.626x0.322)	Удовлетворительно / Satisfactory
Неразрушающий контроль тела трубы / Non-destructive inspection full length body	Метод контроля / Method: Ультразвуковой контроль / UT inspection Продольная риска 12,5% на наружной и внутренней поверхности/ Longitudinal notch with depth 12,5% on external and internal surface**	Удовлетворительно / Satisfactory
Контроль концов труб / SEA Inspection	Неконтролируемые концы труб обрезаны / Non-inspected ends are cutted**	Удовлетворительно / Satisfactory
Визуальный контроль / Visual inspection	По стандарту / As per Standard**	Удовлетворительно / Satisfactory
Контроль геометрических параметров / Dimensional inspection	По стандарту / As per Standard**	Удовлетворительно / Satisfactory

Состояние поставки / Delivery condition

Общие условия / General condition	Трубы изготовлены и испытаны в соответствии с требованиями ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012 и заказа / Pipes were produced and inspected according to requirements of ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012 and order's requirements
Состояние поставки / Delivery condition	Трубы произведены путем горячей деформации и нормализованы при температуре 845...945°C , охлаждение на воздухе/ Pipes produced by Hot Forming followed by normalizing at the temperature 845 deg C to 945 deg C cooled at air
Покрытие / Coating	Трубы покрыты черным лаком / Pipes are coated with black varnish
Фаска (если требуется) / Bevelled ends if required	Стандартная фаска / Bevel as per standard
Защита концов / Protection of pipe ends	Концы труб оснащены пластиковыми колпачками / The ends of pipes are equipped by plastic caps
Дополнительная информация / Additional information	Масса фактическая/ Actual weight. Ремонт сваркой запрещен. / No weld repair Объем партии не более чем 100 труб/ Quantity of pipes in the inspection lot is not more than 100 pieces Трубы не содержат ртуть и свинец. /Material is free of mercury and lead

Страна происхождения: Украина. Country of origin: Ukraine.
Ваши предложения по улучшению продукции просим направлять на эл.адрес / Please send Your proposals for improving the product by e-mail or fax or by phone
Sergey.Pichakin@ntrp.interpipe.biz fax +38(0566)[illegible] phone +38(0566)[illegible]
e-mail: info@us.interpipe.biz Phone: [illegible] Fax: [illegible]
Этот инспекционный сертификат относится только к перечисленной [illegible] ... [illegible] сертификата [illegible]
This inspection certificate is only for the listed products. Modification [illegible] ... is strictly prohibited. Violations can be considered as forgery and is subject to pro[illegible]
Инспекционный сертификат сформирован и проверен контролем [illegible]
Inspection Certificate was drawn up and checked by the Certificate [illegible]

Дата / Date: 31.01.2017

10.02.2017

Подпись инспектора 3-й стороны / Signature of 3-rd Part Inspector

Подпись ОТК / Signature QCD

017645

ТОВ "ІНТЕРПАЙП НІКО ТЬЮБ" ... 3 ... СЛУЖБА ЯКОСТІ ... м. Нікополь

vallourec

Vallourec Tubos do Brasil S.A
Barreiro Plant - Av. Olinto Meireles, 65
ZIP 30640-010 - Belo Horizonte - MG - Brazil

EcoTube

ISO 9001 ISO 14001 ISO/TS 16949 OHSAS 18001 ISO 50001 BUREAU VERITAS Certification

Inspection Certificate

(According to DIN EN 10204.3.1)

N°.: 0030035505 Sheet 1 / 4

Customer: VALLOUREC USA CORPORATION

Country: USA

Material Number: 271282
Work Order: 391164/0100
Customer Order: 21006447

Inspection: Vallourec Tubos do Brasil S.A.

PRODUCT: SEAMLESS STEEL PIPE, HOT FINISHED , BEVELED ENDS 30 DEG. , NORMALIZED
DIMENSIONS: 10.3/4" X 0.365" SCHEDULE: 040 GRADE: GR X52N # GR 6 # GR 1
STANDARD: API SPEC 5L, 12.2012, 45TH EDITION - PSL 2
IN ACCORDANCE ALSO TO THE STANDARDS: ASTM A 333 - 13 ASTM A 999 - 14 # ASME SA-333 - 13
SURFACE PROTECTION: EXTERNAL: LACQUER PIPE ENDS PROTECTOR: PLASTIC CAP
TOLERANCES: OUTSIDE DIAMETER (PIPE BODY): -0.031 " / + 0.081 " WALL THICKNESS: -0.046 " / + 0.055 "
LENGTH: RANDOM 40.0 FT - 44.0 FT
STANDARD MARKING: Paint stenciled in the pipe body: 391164/100 MANUFACTURER SPEC 5L-0150.4 API MONOGRAM MONTH/YEAR ASTM/ASME A/SA 333 10.3/4 X 0.365 X52N /6/1 PSL2 SMLS HEAT NUMBER LENGTH S SCH 040 LT -50F - "NACE MR 0175/NACE MR 0103"
SHIPPING MARKING: MADE IN BRAZIL * [illegible] - RCH-206118-EGR * VALLOUREC ORDER 21006447 * HOUSTON
TOLERANCES(PIPE ENDS): OUTSIDE DIAMETER: -0.031 " / + 0.054 "

Heat	Pieces
137316	45
137384	18
Total	63

THE PRODUCT IS SATISFACTORY IN THE FOLLOWING TESTS / INSPECTIONS: DIMENSIONAL # VISUAL # FLATTENING TEST # ENDS INSPECTION : MPI(WET) # HYDROSTATIC TEST: 20500.0 KPA 5 S # RESIDUAL MAGNETISM: MAX 30 GAUSS # ELETROMAGNETIC TEST : API 5L-N12.5,LONG,OUT/INS #

Chemical Composition (%)

Process: Basic Oxygen Furnace, heats fully killed

Ceq: C+ Mn/6+ (Cr+ Mo+ V)/5 + (Ni+ Cu)/15

PCM: COMPLETE

		C	Mn	P	S	Si	Ni	Cr	Mo	Al	Cu	V	Nb	B	Ti	Cn	Ceq	Pcm
Heat Analisys	Min		0.290			0.100												
	Max	0.220	1.350	0.020	0.010	0.350	0.300	0.300	0.120	0.040	0.400	0.080	0.020	0.0005	0.040	0.0060	0,430	0,25
Product Analisys	Min		0.290			0.100												
	Max	0.220	1.350	0.020	0.010	0.350	0.300	0.300	0.120	0.040	0.400	0.080	0.020	0.0005	0.040	0.0060	0,430	0,25
Heat	Control Lot																	
137316	030002599973	0.11	1.35	0.010	0.002	0.30	0.01	0.14	0.09	0.028	0.010	0.054	0.016	0.0004	0.002	0.0016	0.393	0.21
	Check 1	0.12	1.35	0.010	0.002	0.28	0.01	0.15	0.10	0.030	0.008	0.053	0.014	0.0003	0.002	0.0013	0.409	0.20
	Check 2	0.12	1.35	0.011	0.002	0.28	0.01	0.15	0.10	0.029	0.007	0.053	0.013	0.0003	0.002	0.0013	0.410	0.21
137384	030002600037	0.11	1.31	0.012	0.001	0.28	0.01	0.14	0.10	0.029	0.010	0.052	0.015	0.0003	0.002	0.0018	0.388	0.21
	Check 1	0.12	1.33	0.013	0.002	0.28	0.01	0.15	0.10	0.029	0.008	0.051	0.013	0.0003	0.002	0.0015	0.402	0.19

vallourec

EcoTube

ISO 9001
ISO 14001
ISO/TS 16949
OHSAS 18001
ISO 50001
BUREAU VERITAS
Certification

Inspection Certificate

(According to DIN EN 10204.3.1)

Nº.: 0030035505

Chemical Composition (%)

Process: Basic Oxygen Furnace, heats fully killed

Ceq: C+ Mn/6+ (Cr+ Mo+ V)/5 + (Ni+ Cu)/15 PCM: COMPLETE

		C	Mn	P	S	Si	Ni	Cr	Mo	Al	Cu	V	Nb	B	Ti	Ca	Ceq	Pcm
Heat Analisys	Min		0.290			0.100												
	Max	0.220	1.350	0.020	0.010	0.350	0.300	0.300	0.120	0.040	0.400	0.080	0.020	0.0005	0.040	0.0060	0,430	0,25
Product Analisys	Min		0.290			0.100												
	Max	0.220	1.350	0.020	0.010	0.350	0.300	0.300	0.120	0.040	0.400	0.080	0.020	0.0005	0.040	0.0060	0,430	0,25
Heat	Control Lot																	
	Check 2	0.12	1.32	0.013	0.001	0.28	0.01	0.15	0.10	0.031	0.007	0.051	0.013	0.0003	0.002	0.0018	0.401	0.20

Ceq: Carbon Equivalent; PCM: Parameter for crack measu

Tensile Test

Specimen Direction: Longitudinal Temperature: Room Temperature Gage Length: L0= 2" Method:Elong.Total Under Load 0,50 %

Heat	Control Lot	Type of Specimen	Area (Sqin)	YS (PSI)	TS (PSI)	E (%)
	Required: Min			52200	66700	35
	Max			76900	110200	
137316	030002599973	STRIP WIDTH 38,1 MM	0.6	57435	78610	40
		STRIP WIDTH 38,1 MM	0.7	57440	78620	39
137384	030002600037	STRIP WIDTH 38,1 MM	0.5	56564	78755	38
		STRIP WIDTH 38,1 MM	0.7	56570	78767	40

YS-Yield Strength; TS-Tensile Strength; E-Elongation;

Hardness Test

Scale: HV10

Heat	Control Lot		
	Required: Min		
	Max	250,0	
137316	030002599973	150,0	151,0
137384	030002600037	165,0	167,0

vallourec

EcoTube

Inspection Certificate
(According to DIN EN 10204.3.1)
N°.: 0030035505 Sheet:3 / 4

Impact Test

Test Specimen: CHARPY 10X55X7.5 V Direction: Longitudinal Temperature: -49°F Striking tup: 0.315"
NOTCH

		AE1 (Ftlb)	AE2 (Ftlb)	AE3 (Ftlb)	AE4 (Ftlb)	AE5 (Ftlb)	AE Avg (Ftlb)
Required: Min		13	13	13			15
Max							
Heat	Control Lot						
137316	030002599973	189	196	207			197
137384	030002600037	193	198	205			199

AE - Absorbed Energy:

Impact Test

Test Specimen: CHARPY 10X55X7.5 V Direction: Transverse Temperature: 32°F Striking tup: 0.315"
NOTCH

		AE1 (Ftlb)	AE2 (Ftlb)	AE3 (Ftlb)	AE4 (Ftlb)	AE5 (Ftlb)	AE Avg (Ftlb)
Required: Min		11	11	11			15
Max							
Heat	Control Lot						
137316	030002599973	205	200	204			204
137384	030002600037	199	198	199			199

AE - Absorbed Energy:

Grain Size Test

Method: ASTM E-112

	Min
Required:	5
Heat Control Lot	
137316 030002599973	8
137384 030002600037	8

Remarks:
MATERIAL IN ACCORDANCE WITH NACE MR 0175
PAR. 3.2/ISO 15156-2, ANNEX A.2.1.2/NACE MR0103 PAR.2.1. ALL LATEST EDITIONS

vallourec

EcoTube

ISO 9001
ISO 14001
ISO/TS 16949
OHSAS 18001
ISO 50001
BUREAU VERITAS
Certification

BUREAU VERITAS
3828

Inspection Certificate
(According to DIN EN 10204.3.1)
Nº.: 0030035505 Sheet 4 / 4

MATERIAL:-
- NO WELD REPAR - FREE OF MERCURY
- FINE GRAIN PRACTICE
- FULLY KILLED STEEL
- STEEL MELT COUNTRY OF ORIGIN - BRAZIL
- MATERIAL IN ACCORDANCE TO PED

The data presented were converted from SI measurement system, used for the original inspection.

We hereby certify that this product has been manufactured and examined in accordance with all reqnirements of the standards and specifications and all the results are found to be satisfactory. This testimonial and certificate respectively is recorded by a computer system and is valid without signature. Alteration or use for others products are regarded as falsification of documents and will be subject to criminal jurisdiction.

QUALITY CONTROL DEPARTMENT
FAX: (55-31) 3328-2617
e-mail:gustavo.pinheiro@vallourec.com

DR. GUSTAVO ALVES PINHEIRO - CREA/MG-109170/D
TECHNICAL RESPONSIBLE

DATE
05.24.2016

ECO TUBES: The tubes from Vallourec do Brasil S.A. are manufactured with steel which uses charcoal as a source of energy in its production. This coal comes from more than 100,000 ha of forest planted by Vallourec Florestal Ltda.. With the acquisition of 48.2 ton(s) os steel tubes from Vallourec do Brasil S.A., your company contributed to the reduction of the greenhouse effect, avoiding the accumulation of 86.8 ton(s) of Carbon Dioxide CO2 in the atmosphere.

ИНТЕРПАЙП
НИКО ТЬЮБ

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
"ИНТЕРПАЙП НИКО ТЬЮБ"
Украина, г. Никополь, пр. Трубников, 56
Тел./факс +38 (0566) 639-379

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 0169/5
INSPECTION CERTIFICATE № 0169/5
EN 10204-2004/3.1

Грузополучатель / BUYER: North American Interpipe, Inc. 1800 West Loop South, Suite 1360, Houston, Texas 77027, USA

Контракт № / Contract #: COC16/1497

Страна / Country: USA

Заводской заказ № / Production order #: 008910

Номер заказа клиента / Customer's ref #: PAULSEN PIPE P20173

Транспортное средство № / Vehicle №: AE1776AX/AE8250XP

Дата / Date: 16.01.2017

Лист 1 / Sheet; Листов 1 / Sheets

Наименование и код товара / Description and code of goods	Наименование стандартов / Specifications	Класс поставки / Class of delivery	Тип резьбы / Thread type
Трубы стальные бесшовные горячекатаные для трубопроводов / Seamless steel hot-rolled pipes for pipelines	ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012		

№ поз. / Item No	Номер пакета / Bundle #	Номера труб / Pipe #	Марка стали / Grade — краткое обозначение / Brief Designation	Номер плавки / Heat #	Номер партии / Inspection Lot #	Размеры / Dimensions — диаметр / OD, дюйм / inch	толщина стенки / WT, дюйм / inch	длина / length, фут / ft	общая длина / Total length, фут / ft	шт / piece	Фактический вес / Actual weight — брутто / gross, фунт / lb	нетто / net, фунт / lb
1.	17-38-00703		6/ B/ C	1163935	51	12.750	0.375	38.1	37.9	1	1 920	1 918
2.	17-38-00698		6/ B/ C	1163936	51	12.750	0.375	38.1	113.5	3	5 941	5 930
3.	17-38-00699		6/ B/ C	1163935	51	12.750	0.375	38.1	113.7	3	5 853	5 842
4.	17-38-00700		6/ B/ C	1163935	51	12.750	0.375	38.1	113.7	3	5 853	5 842
5.	17-38-00702		6/ B/ C	1163935	51	12.750	0.375	38.1	37.9	1	1 898	1 896
6.	17-38-00701		6/ B/ C	1163935	51	12.750	0.375	38.1	113.7	3	5 776	5 765
7.	17-38-00697		6/ B/ C	1163935	51	12.750	0.375	38.1	113.6	3	5 765	5 754
8.	17-38-00668		6/ B/ C	1163935	51	12.750	0.375	38.1	113.7	3	5 787	5 776
9.	17-38-00670		6/ B/ C	1163935	51	12.750	0.375	38.1	113.6	3	5 853	5 842
			NPS 12	Sch STD			TOTAL/ИТОГО		871.5	23	44 648	44 565

BUNDLES/ПАКЕТОВ 9

INTERPIPE
NIKO TUBE

LIMITED LIABILITY COMPANY
"INTERPIPE NIKO TUBE"
UKRAINE, Nikopol, 56, Trubnikov ave. Tel./fax +38 (0566) 639-379

NIK445 / 1163935 / 12.0A333STDF / 12 STD SA333 GR 6 PIPE

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 0198/Б
INSPECTION CERTIFICATE № 0198/Б

Лист 1 Sheet | Листов 1 Sheets

Химический состав по сертификатным данным на заготовку к результаты контроля химического состава металла труб
Heat analysis acc. to the billet manufacturer certificate & results of chemical analysis of pipes

Номер плавки Heat #	Лаборатория Laboratory	Химический состав в % Chemical composition %										Завод изготовитель заготовки Steel supplier
		C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x1000	V x1000	
min		-	29	10	-	-	-	-	-	-	-	
max		30	106	-	35	35	40	40	40	150	80	
1163935	OneprSteel	17.2	87.3	26.5	5	8	5.6	8.3	13.6	8	3	"MP"DNEPROSTEEL"LLC
	NIKOTUBE*	18	87	27	5	8	5	8	13	8	2	ООО"МЗ"Днепросталь"
	NIKOTUBE*	18	87	26	5	8	5	8	13	8	2	

Анализ плавки согласно сертификата завода-изготовителя/Heat analysis acc to the manufacturer certificate."-control analysis of pipes/*-контрольный анализ от труб.
Сталь произведена методом плавления в электродуговой печи с последующей непрерывной разливкой. Сталь полностью раскисленная и мелкозернистая. Сталь раскисленная алюминием. Адрес завода изготовителя заготовки. Украина, 49051, г.Днепропетровск, ул.Винокурова, 4/ Steel has been produced by the EAF with continuous casting process. Steel is fully killed and made to fine grain practice. Aluminium killed steel. The address of steel supplier: Ukraine,49051, Dnipropetrovsk, 4 Vinokurova str.

Результаты испытаний труб - Test results for pipes

Номер плавки Heat#	Номер партии Lot#	Механические свойства Mechanical Properties: Испытание на растяжение Tensile test: Предел прочности Tensile strength	Предел текучести R0,5 Yield strength R0,5	Относительное удлинение Elongation	Отношение отказ Ratio отказ	Ориентация образца Specimens orientation*	Ширина полосового образца Width of strip specimen	Диаметр цилиндрического образца Diameter of cylindrical specimen	Длина образца Length of specimen	Твердость Hardness Среднее значение Average		Испытание на удар / Impact test: Ориентация Orientation*	Тип надреза, температура Type of notch, temperature	Норматив Norm	Среднее значение Average	Площадь сдвига, Shear area	Размер образца ** Specimens size **
		PSI	PSI	%			дюйм/ inch	дюйм/ inch	дюйм / inch	HRB	HRC				Дж/J	%	дюйм/ inch
	min	70000	40000	-	-					-	-			min			
	max	-	-	-	-					100	22						
1163935	51	71000	48700	42.0		L	1.500		1.970	78	<22	L	KV -50°F		160 159 143 av.154	100 100	0.394x0.295
		72000	49700	40.0		L	1.500		1.970	78	<22						

L - Продольный образец / Longitudinal specimen; T - поперечный образец / transverse specimen
** Результаты испытаний уменьшенных образцов пересчитаны на полноразмерные/Non-fullsize specimens results convert to fullsize (10x10mm)

Прочие виды контроля / Other tests

Вид испытания / Type of test	Параметры / Criteria	Результаты контроля /Test results
Сплющивание / Flattening test	По стандарту / As per Standard``	Удовлетворительно / Satisfactory
Испытание гидравлическим давлением / Hydrostatic test	100% / 4,7 MPa / 1400 PSI / 10 sec ``	Удовлетворительно / Satisfactory
Неразрушающий контроль тела трубы / Non-destructive inspection full length body	Метод контроля / Method. Ультразвуковой контроль / UT inspection Продольная риска 12,5% на наружной и внутренней поверхности/ Longitudinal notch with depth 12,5% on external and internal surface``	
Контроль концов труб / SEA inspection	Неконтролируемые концы труб обрезаны / Non-inspected ends are cutted``	
Визуальный контроль / Visual inspection	По стандарту / As per Standard``	Удовлетворительно / Satisfactory
Контроль геометрических параметров / Dimensional inspection	По стандарту / As per Standard``	Удовлетворительно / Satisfactory

Состояние поставки / Delivery condition

Общие условия / General condition	Трубы изготовлены и испытаны в соответствии с требованиями ASTM A106/A106M-2015/ / SME SA106/SA106M-2015 ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012 и заказа / Pipes were produced and inspected according to requirements of ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012 and order's requirements
Состояние поставки / Delivery condition	Трубы произведены путем горячей деформации и нормализованы при температуре 845...945°C , охлаждение на воздухе/ Pipes produced by Hot Forming followed by normalizing at the temperature 845 deg C to 945 deg C cooled at air
Покрытие / Coating	Трубы покрыты черным лаком / Pipes are coated with black varnish
Фаска (если требуется) / Beveled ends if required	Стандартная фаска / Bevel as per standard
Защита концов / Protection of pipe ends	Концы труб оснащены пластиковыми колпачками / The ends of pipes are equipped by plastic caps
Дополнительная информация / Additional information	Масса фактическая/ Actual weight. Ремонт сваркой запрещен. / No weld repair. Объем партии не более чем 100 труб/ Quantity of pipes in the inspection lot is not more then 100 pieces Трубы не содержат ртуть и свинец. /Material is free of mercury and lead

Страна происхождения: Украина / Country of origin: Ukraine

Ваши предложения по улучшению продукции просим направлять на эл.адрес / Please send Your proposals for improving the product by e-mail or fax or by phone
Sergey.Filchakov@nstp.interpipe.biz fax→38(0566)639379 phone→38(0566)638649
e-mail: info@us.interpipe.biz Phone: 17133330333 Fax: 17133330330

Этот инспекционный сертификат относится только к перечисленной в нем продукции. Недопустимо внесение изменений или другое неправомерное использование сертификата. This inspection certificate is only for the listed products. Modification or unauthorized use of the certificate is strictly prohibited. Violations can be considered as forgery and is subject to prosecution
Инспекционный сертификат сформирован и проверен контролером сертификатором ЧУМАЧЕНКО В.Д.
Inspection Certificate was drawn up and checked by the Certificate Inspector CHUMACHENKO V.D.

Дата: 16.01.2017
Date:

Подпись инспектора 3-й стороны :
Signature of 3-rd Part Inspector:

Подпись ОТК
Signature QCO

REVIEWED by I. KUKOV 18.01.2017

UNITED STATES STEEL CORPORATION

TUBULAR PRODUCTS
CERTIFIED TEST REPORT
(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 02/17/16
TIME: 08:39:36
SERIAL NO: F0099536
EBS NO: 2001423156 1

MILL ORDER/ITEM NO	SHIPPERS NO.	P.O. NUMBER	VEHICLE ID
DR93682 01		154876-00	

SOLD TO ADDRESS

MAIL TO ADDRESS

VENDOR
UNITED STATES STEEL CORP
FAIRFIELD TUBULAR OPERATIONS
5700 VALLEY ROAD
P.O. BOX 599
FAIRFIELD, AL 35064

SPECIFICATION AND GRADE

SMLS STANDARD PIPE ASTM A106-14 GRADE B, ASTM A333-13 GRADE 1/6, ASME SA106-2013 GRADE B, ASME SA333-2013 GRADE 1/ 6 TEXAS PIPE & SUPPLY SPEC US-333F REV 1 DTD 5/22/14 AND TECH COM 131402601 DTD 6/12/14 REG MILL COAT PE BEV 30 DEGREE APPLICABLE REQUIREMENTS OF NACE MR0103-2012 ED AND NACE MR0175/ISO 15156-2 2009 ED

MATERIAL COND: NORMALIZED

O.D.: 8.625 (219.075) in (mm)

WALL: 0.322 (8.178) in (mm)

PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL(SEC)
			IN	MIN: 35,000 MAX: 58,000		MIN: 60,000 MAX:	MAX:	MIN: 35.0	MIN: MAX: 99.0	1570	5
X02753	STRIP/L/B	NR	1.5	49,200	.50	71,500	0.69	48.0	75.5	1570	5
X02753	STRIP/L/B	NR	1.5	50,000	.50	71,500	0.70	46.3			
		**	END OF DATA THIS SHEET			**					

LEGEND: L - LONGITUDINAL, U - UPSET, T - TRANSVERSE, NM - NORMALIZED, QT - QUENCH & TEMPERED, SR - STRESS RELIEVED, AR - AS ROLLED, TR - THERMOMECHANICAL ROLLED, B - BODY, W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.*
X02753	HEAT		16	100	007	005	22	01	00	03	02	031		00	0003	002	001					
X02753	PROD		17	99	007	005	23	01	00	04	02	032		00	0003	002	001					
X02753	PROD		18	100	008	005	23	01	00	04	02	033		00	0003	002	001					
			** END OF DATA THIS SHEET **																			

*C.E. IS BASED ON THE FOLLOWING EQUATION(S):

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT. ELEMENTS REPORTED IN MASS FRACTION (%)

USS1417 / X02753 / 8.0A333STDD / 8 STD SA333 GR 6 PIPE

UNITED STATES STEEL CORPORATION — TUBULAR PRODUCTS

CERTIFIED TEST REPORT

(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 02/17/16
TIME: 08:39:36
SERIAL NO: F0099536
EBS NO: 2001423156 1

MILL ORDER/ITEM NO	SHIPPERS NO.	P.O. NUMBER	
DR93682 01		154876-00	

MATERIAL COND: NORMALIZED

O.D.: 8.625 (219.075) in (mm)

WALL: 0.322 (8.178) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING											
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F			7	7	7	9				
X02753	OK				L	B	- 60	2/3	N	78	56	82	72	100	100	100	100
X02753	OK																
			** END OF DATA THIS SHEET **														

LEGEND L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD ____ OD/ID ____X L ____ L/T __X 10.0/10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		ID ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)	X	MPI __X UT ____
SPECIAL END AREA (SEA) INSP		MPI ____ UT ____
FULL LENGTH DRIFT		DRIFT MANDREL SIZE:

ADDITIONAL NOTES/COMMENTS

ALL MELTING AND MANUFACTURING TOOK PLACE IN THE USA.
MANUFACTURED IN AN ISO 9001 CERTIFIED FACILITY - CERTIFICATE #30727.
NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY
** END OF DATA **

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: MICHAEL HENRY - MANAGER, Q A

DATE 02/17/16

**

UNITED STATES STEEL CORPORATION

TUBULAR PRODUCTS
ADDITIONAL COMMENTS SHEET

DATE: 02/17/16
TIME: 08:39:39
PAGE: 1 OF 1

MILL ORDER/ITEM NO	SHIPPERS NO.	P.O. NUMBER	HEAT	
DR93682 01		154876-00		SERIAL NUMBER: F0099536

SOLD TO ADDRESS	MAIL TO ADDRESS	VENDOR
		UNITED STATES STEEL CORP FAIRFIELD TUBULAR OPERATIONS P.O. BOX 599 FAIRFIELD ALABAMA 35064

HEAT X02753 - MELTED AT:FAIRFIELD WORKS, FAIRFIELD, AL 35064
END OF DATA

VS
Rua Industrial s/n - Distrito Industrial
Jeceaba - MG
35498-000 – Brasil

INSPECTION CERTIFICATE

EN 10204.3.1

No.: 30018887

Trading Company: Sumitomo Corporation
NSSMC work No.: JYYS03910000
Buyer: Nippon Steel & Sumitomo Metal Corporation
Buyer Order No.: 3P183274206
Customer: SUMITOMO CORPORATION OF AMERICA
Customer Order No / Item: 30457 / 6
Inspection Company: Vallourec & Sumitomo Tubos do Brasil Ltda.

Destination Country: USA
Work Order: 808 / 10
Material Number: 700656

Size (O.D. X W.T.): 8.625 inch X 0.500 inch
Grade: X/2 # B # B
Standard: API SPEC 5L, 10.2012, 45TH EDITION # PSL 1

In accordance also to the standards:
ASTM A106 - 11 / ASME SA-106 - 10, ADDENDA 2011 / ASTM A 53 - 12 / ASTM A 530 - 10 / ASME SA-53 - 10, ADDENDA 2011
Description of Products: SEAMLESS STEEL PIPE Heat Treatment : AS ROLLED , BEVELED ENDS 30 DEG.
External Surface Protection: UV-VARNISH
Tolerances: Outside Diameter: - 0.75 % / + 0.75 %
Length: RANDOM: 40.0 FT / 42.0 FT

Pipes Ends Protector: POLYETHYLENE CAP WITH HOLE
Wall Thickness: - 12.5 % / + 15.0 %

Acceptance Length: RANDOM, 10 %, 38.0 FT / 40.0 FT
Standard Marking:
PAINT STENCILED: VSB LOGO API SPEC. 5L 0807 API MONOGRAM MONTH/YEAR ASTM/ASME A/SA-106 A/SA-53 8.625 0.500 S/X42 PSL 1 S/W,S /JYYS039 10000 HEAT NUMBER PIPE TALLY NO LENGTH B S TESTED 2970 PSI/NDE WEIGHT NSSMC LOGO
Shipping Marking:
SUMITOMO CORPORATION OF AMERICA HOUSTON P O. NO. 30457 MADE IN BRAZIL

Heat No.	Min.allowed tempering temperature (°F)	Pieces	Length(m)	Weight(kgf)	Length(ft)	Weight(lbf)
103199	N/A	145	1837.63	117917	6028.7	259961
103200	N/A	149	1890.48	121614	6202.1	268114
103966	N/A	84	1025.32	65912	3364	145313
103967	N/A	134	1697.84	109065	5570.7	240449
103968	N/A	149	1888.10	121324	6198.4	267472
103969	N/A	128	1625.50	104659	5337.6	230739
103970	N/A	86	1103.68	71035	3620.2	156610
Total		874	11088.55	711526	36319.7	1568658

The product is satisfactory in the following tests/inspections:
Dimensional # Visual # Flattening Test # Flux Leakage Electromagn. Test : API 5L,LONG,N5 EXT # Maximum Residual Magnetism : 30 GAUSS # Hydrostatic Test : 2970.0 PSI 5 s #

CHEMICAL COMPOSITION (%) Process: Electric Arc Furnace (EAF), heats fully killed
Ceq: C+Mn/6+(Cr+Mo+V)/5 +(Ni+Cu)/15
CE1: Cr + Cu + Mo + Ni + V CE2: Nb + V CE3: Nb + V + Ti

VS
VALLOUREC & SUMITOMO TUBOS DO BRASIL
Rua Industrial s/n - Distrito Industrial
Jeceaba - MG
35488-000 – Brasil

INSPECTION CERTIFICATE No.: 30018887
EN 10204.3.1

			C	Mn	P	S	Si	Ni	Cr	Mo	Cu	V	Nb	B	Ti	Ceq	CE1	CE2	CE3
Required:	Ladle analysis	Min.		0.29			0.10												
		Max.	0.23	1.20	0.030	0.030		0.40	0.40	0.15	0.40	0.08		0.001		0.43	1.00	0.08	0.15
	Product analysis	Min.		0.29			0.10												
		Max.	0.23	1.20	0.030	0.030		0.40	0.40	0.15	0.40	0.08		0.001		0.43	1.00	0.08	0.15
Heat No.	Pipe No.																		
103199		Ladle	0.18	1.04	0.011	0.004	0.27	0.02	0.05	0.00	0.05	0.02	0.000	0.000	0.002	0.37	0.14	0.02	0.02
	201120	check1	0.19	1.05	0.011	0.003	0.26	0.02	0.06	0.00	0.05	0.02	0.000	0.001	0.002	0.38	0.14	0.02	0.02
	301120	check2	0.19	1.05	0.011	0.003	0.27	0.02	0.06	0.00	0.06	0.03	0.000	0.001	0.002	0.39	0.17	0.03	0.03
103200		Ladle	0.19	1.04	0.012	0.004	0.26	0.03	0.05	0.01	0.06	0.02	0.000	0.000	0.002	0.39	0.17	0.02	0.02
	306110	check1	0.20	1.04	0.011	0.004	0.26	0.03	0.05	0.01	0.06	0.02	0.000	0.001	0.002	0.40	0.17	0.02	0.02
	406120	check2	0.20	1.04	0.012	0.004	0.25	0.04	0.05	0.01	0.06	0.02	0.000	0.001	0.002	0.40	0.18	0.02	0.02
103966		Ladle	0.18	1.03	0.012	0.002	0.23	0.03	0.10	0.01	0.03	0.02	0.000	0.001	0.002	0.38	0.19	0.02	0.02
	104210	check2	0.19	1.04	0.011	0.002	0.23	0.03	0.10	0.01	0.03	0.02	0.000	0.001	0.002	0.38	0.19	0.02	0.02
	502210	check1	0.19	1.05	0.012	0.001	0.23	0.03	0.10	0.01	0.03	0.02	0.000	0.001	0.002	0.40	0.19	0.02	0.02
103967		Ladle	0.18	1.04	0.013	0.002	0.24	0.02	0.08	0.01	0.03	0.02	0.000	0.001	0.002	0.38	0.18	0.02	0.02
	104110	check2	0.18	1.05	0.012	0.002	0.23	0.02	0.08	0.01	0.03	0.02	0.000	0.001	0.002	0.38	0.18	0.02	0.02
	405120	check1	0.18	1.05	0.012	0.002	0.23	0.02	0.08	0.01	0.03	0.02	0.000	0.001	0.002	0.38	0.18	0.02	0.02
103968		Ladle	0.19	1.03	0.015	0.003	0.24	0.03	0.09	0.02	0.04	0.02	0.000	0.001	0.002	0.39	0.20	0.02	0.02
	101120	check2	0.19	1.05	0.014	0.003	0.24	0.02	0.09	0.01	0.03	0.02	0.000	0.001	0.002	0.39	0.17	0.02	0.02
	106120	check1	0.19	1.06	0.016	0.003	0.24	0.03	0.09	0.02	0.04	0.02	0.000	0.001	0.002	0.40	0.20	0.02	0.02
103969		Ladle	0.18	1.03	0.013	0.003	0.23	0.03	0.07	0.01	0.05	0.03	0.000	0.001	0.001	0.38	0.19	0.03	0.03
	106120	check2	0.19	1.06	0.013	0.003	0.23	0.03	0.08	0.01	0.05	0.03	0.000	0.001	0.002	0.40	0.20	0.03	0.03
	405110	check1	0.19	1.06	0.012	0.003	0.23	0.03	0.07	0.01	0.04	0.03	0.000	0.001	0.001	0.39	0.18	0.03	0.03
103970		Ladle	0.19	1.02	0.013	0.003	0.23	0.03	0.08	0.01	0.05	0.03	0.000	0.001	0.002	0.39	0.20	0.03	0.03
	303120	check2	0.19	1.06	0.013	0.003	0.23	0.03	0.08	0.01	0.05	0.03	0.000	0.001	0.002	0.40	0.20	0.03	0.03
	401130	check1	0.19	1.05	0.012	0.003	0.23	0.03	0.08	0.01	0.05	0.03	0.000	0.001	0.002	0.39	0.20	0.03	0.03

CE: Combined Elements ; Ceq: Carbon Equivalent ;

TENSILE TEST S.Direction: Longitudinal — Temperature: Room Temperature — Gage Length: L0=2" — YS method:0.50 %
Type of specimen: STRIP 1.5" WIDTH — Thickness: 0.500"

				YS (Psi)	TS (Psi)	E %	RA %	YS/TS
Required			Min.	42100	60200	30.0		
			Max.					
Heat No.	Pipe no.	Position of Sample						
103199	201120	Top		52200	78500	40.0		
103200	306110	Bottom		53800	82200	40.0		
103966	502210	Bottom		51100	79000	40.0		
103967	405120	Bottom		48700	76000	41.0		
103968	106120	Bottom		49900	77300	41.0		
103969	405110	Bottom		52400	79800	40.0		
103970	303120	Bottom		51200	78000	40.0		

VSB2912 / 101966 / 8.0A106XHF / 8 XH A106B SMLS PIPE

VS
VALLOUREC & SUMITOMO TUBOS DO BRASIL
Rua Industrial s/n - Distrito Industrial
Jeceaba - MG
35498-000 - Brasil

INSPECTION CERTIFICATE No.: 30018887 Sheet: 3 / 3
EN 10204.3.1

TS-yield strength; TS-tensile strength; E-Elongation

REMARKS

THE DATA PRESENTED WAS CONVERTED FROM SI MEASUREMENT SYSTEM USED FOR THE ORIGINAL INSPECTION

NACE MR0103-2012/MR0175/ISO15156-2/2009: SATISFACTORY # MANUFACTURED FROM FULLY KILLED CARBON STEEL

We hereby certify that this product has been manufactured and examined in accordance with all requirements of the standards and specifications and all the results are found to be satisfactory.

This testimonial and certificate respectively is recorded by a computer system and is valid without signature. Alteration or use for others products are regarded as falsification of documents and will be subject to criminal jurisdiction.

QUALITY CONTROL DEPARTMENT
FAX: +55 31 2141 5365
e-mail: carlos.horta@vstubos.com

Carlos Eduardo Lima Horta
Technical Responsible

Date
12.12.2013

Rua Felipe Vieira 1328
Carlos Horta
P/ Gerente Qualidade - TQU VSB

NIK461 / 1170306 / 8.0A106XHF / 8 XH A106B SMLS PIPE

ИНТЕРПАЙП
НИКО ТЬЮБ

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
"ИНТЕРПАЙП НИКО ТЬЮБ"
Украина, г. Никополь, пр. Трубников, 56
Тел./факс +38 (05662) 2-10-70

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 1792/Б
INSPECTION CERTIFICATE № 1792/Б
EN 10204-2004/3.1 / ISO 10474-2013

Грузополучатель BUYER: North American Interpipe, Inc. 1800 West Loop South, Suite 1350, Houston, Texas 77027, USA

Контракт № Contract #: COC16/1679

Страна Country: USA

Заводской заказ № Production order #: 008260

Транспортное средство № Vehicle №: 65488124

Номер заказа клиента Customer's ref: #PO#10P23015

Дата Date: 11.04.2017г.

Лист Sheet: 1 Листов Sheets: 1

Наименование и код товара Description and code of goods				Наименование стандартов Specifications							Класс поставки Class of delivery	Тип резьбы Thread type
Трубы стальные бесшовные горячекатаные для нефтегазопроводов Seamless steel hot-rolled pipes for oil and gas pipelines				API Spec 5L - 2012/ ASTM A106/A106M-2015/ ASME SA106/SA106M-2015 / ASTM A53/A53M-2012/ ASME SA53/SA53M-2015 / NACE MR0175-2015/ NACE MR0103-2012							PSL1	
№ поз. Item No	Номер пакета Bundle #	Номера труб Pipe #	Марка стали Grade: краткое обозначение Brief Designation	Номер плавки Heat #	Номер партии Inspection Lot #	Размеры Dimensions: диаметр OD, дюйм inch	толщина стенки WT, дюйм inch	длина length, фут ft	общая длина Total length, фут ft	шт piece	Фактический вес Actual weight: брутто gross, фунт lb	нетто net, фунт lb
1.	17-38-04547		B/ X42	1170306	472	8.625	0.500	38.0-40.0	114.8	3	5 016	5 004
	NPS 8		Sch 80 XS					TOTAL/ИТОГО	114.8	3	5 016	5 004
								BUNDLES/ПАКЕТОВ 1				
2.	17-38-07458		B/ X42	1171091	909	8.625	0.500	20.0-21.0	145.7	7	6 528	6 504
3.	17-38-07457		B/ X42	1171091	909	8.625	0.500	20.0-21.0	145.9	7	6 548	6 526
4.	17-38-07454		B/ X42	1171091	909	8.625	0.500	20.0-21.0	145.8	7	6 526	6 504
5.	17-38-07456		B/ X42	1171091	909	8.625	0.500	20.0-21.0	145.8	7	6 526	6 504
6.	17-38-07451		B/ X42	1171086	913	8.625	0.500	20.0-21.0	146.0	7	6 515	6 493
7.	17-38-07455		B/ X42	1171091	909	8.625	0.500	20.0-21.0	145.8	7	6 515	6 493
8.	17-38-07435		B/ X42	1171091	909	8.625	0.500	20.0-21.0	146.3	7	6 515	6 493
9.	17-38-07487		B/ X42	1171091	909	8.625	0.500	20.0-21.0	145.9	7	6 504	6 482
10.	17-38-07486		B/ X42	1171091	909	8.625	0.500	20.0-21.0	146.0	7	6 537	6 515
11.	17-38-07469		B/ X42	1171091	909	8.625	0.500	20.0-21.0	146.4	7	6 548	6 526
12.	17-38-07470		B/ X42	1171091	909	8.625	0.500	20.0-21.0	146.4	7	6 548	6 526
	NPS 8		Sch 80 XS					TOTAL/ИТОГО	1605.5	77	71 742	71 500
								BUNDLES/ПАКЕТОВ 11				
								TOTAL/ИТОГО	1720.3	80	76 758	76 504
								BUNDLES/ПАКЕТОВ 12				

INTERPIPE
NIKO TUBE

LIMITED LIABILITY COMPANY
"INTERPIPE NIKO TUBE"
UKRAINE, Nikopol, 56, Trubnikov ave. Tel./fax +38 (05662) 2-10-70

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 1792/Б
INSPECTION CERTIFICATE № 1792/Б

Лист 1 Sheet — Листов 2 Sheets

Химический состав по сертификатным данным на заготовку и результаты контроля химического состава металла труб
Heat analysis acc. to the billet manufacturer certificate & results of chemical analysis of pipes

Номер плавки Heat #	Лаборатория Laboratory	Химический состав в % Chemical composition % C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x100	Ti x1000	V x1000	Nb x1000	Al x1000	CE x100	Завод изготовитель заготовки Steel supplier
min		-	29	10	-	-	-	-	-	-	-	-	-	-	-	
max		28	106	-	30	30	40	40	40	150	-	80	-	-	-	
1170306	DneprSteel	17.7	51.8	25.1	5	9	11.5	10.6	16.6	10	2	2	2	37	30.7	"MP"DNEPROSTEEL"LLC ООО"МЗ"Днепросталь"
	NIKOTUBE*	18	52	27	5	8	12	10	17	10	3	1	1	39	31.1	
1171086	NIKOTUBE*	18	53	27	5	9	12	10	17	10	3	1	1	39	31.3	
	DneprSteel	20	87	24	2	11	10	10	16	10	1	2	2	25	38.5	"MP"DNEPROSTEEL"LLC ООО"МЗ"Днепросталь"
	NIKOTUBE*	21	87	26	3	10	10	10	17	13	3	1	1	27	39.6	
1171091	NIKOTUBE*	21	86	26	3	10	10	10	17	13	3	1	1	27	39.4	
	DneprSteel	18	48	27	4	9	12	11	18	10	1	1	2	37	30.6	"MP"DNEPROSTEEL"LLC ООО"МЗ"Днепросталь"
	NIKOTUBE*	19	49	30	6	9	13	11	17	12	3	1	1	42	31.9	
	NIKOTUBE*	19	49	29	6	9	12	11	18	12	3	1	1	41	31.8	

Анализ плавки согласно сертификата завода-изготовителя/Heat analysis acc.to the manufacturer certificate.*-control analysis of pipes/*-контрольный анализ от труб.
Сталь произведена методом плавления в электродуговой печи с последующей непрерывной разливкой. Сталь полностью раскисленная и мелкозернистая. Сталь раскисленная алюминием. Адрес завода изготовителя заготовки: Украина, 49051, г.Днепропетровск, ул.Винокурова, 4/ Steel has been produced by the EAF with continuous casting process. Steel is fully killed and made to fine grain practice. Aluminium killed steel, The address of steel supplier: Ukraine,49051, Dnipropetrovsk, 4 Vinokurova str.
При расчете углеродного эквивалента использована формула:/When calculating the carbon equivalent the following formula was used:
CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15

Результаты испытаний труб - Test results for pipes

Номер плавки Heat#	Номер партии Lot#	Механические свойства Mechanical Properties: Испытание на растяжение Tensile test: Предел прочности Tensile strength	Предел текучести R0,5 Yield strength R0,5	Относительное удлинение Elongation	Отношение отсв Ratio отсв	Ориентация образцов Specimens orientation*	Ширина полосового образца Width of strip specimen	Диаметр цилиндрического образца Diameter of cylindrical specimen	Длина образца Length of specimen	Твердость Hardness Среднее значение Average		Испытание на удар /Impact test: Ориентация*Orientation*	Тип надреза, темпе ратура Type of notch, temperature	Норматив/Norm	Ср.значение Average	Площадь сдвига, Shear area	Размер образцов ** Specimens size **
	min	PSI 60200	PSI 42100	% 30.0	-		дюйм/ inch	дюйм/ inch	дюйм inch	HRB - 100	HRC - 22			min		%	дюйм/ inch
	max	-	-	-	-												
1170306	472	67500	44400	40.0		L	1.500		1.970	78 80 78 av.79	<22						
										80 78 79 av.79	<22						
1171086	913	76000	47500	35.5		L	1.500		1.970	84 83 83 av.83	<22						
										83 83 83 av.83	<22						
1171091	909	68500	45600	37.0		L	1.500		1.970	78 79 77 av.78	<22						
										77 77 76 av.77	<22						

* L - Продольный образец / Longitudinal specimen; T - поперечный образец / transverse specimen
** Результаты испытаний уменьшенных образцов пересчитаны на полноразмерные/Non-fullsize specimens results convert to fullsize (10x10mm)

Прочие виды контроля / Other tests

Вид испытания / Type of test	Параметры / Criteria	Результаты контроля /Test results
Сплющивание / Flatten'ng test	По стандарту / As per Standard**	Удовлетворительно / Satisfactory
Испытание гидравлическим давлением / Hydrostatic test	100% / 20,5 MPa / 2970 PSi / 10 sec *	Удовлетворительно / Satisfactory
Визуальный контроль / Visual inspection	По стандарту / As per Standard**	Удовлетворительно / Satisfactory
Контроль геометрических параметров / Dimensional inspection	По стандарту / As per Standard**	Удовлетворительно / Satisfactory

NIK461 / 1170306 / 8.0A106XHF / 8 XH A106B SMLS PIPE

ИНТЕРПАЙП
НИКО ТЬЮБ

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
"ИНТЕРПАЙП НИКО ТЬЮБ"
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ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 1792/Б
INSPECTION CERTIFICATE № 1792/Б

Лист 2 Sheet Листов 2 Sheets

Состояние поставки / Delivery condition

Общие условия / General condition	Трубы изготовлены и испытаны в соответствии с требованиями API Spec 5L - 2012/ ASTM A106/A106M-2015/ ASME SA106/SA106M-2015 / ASTM A53/A53M-2012/ ASME SA53/SA53M-2015 / NACE MR0175-2015/ NACE MR0103-2012 и заказа / Pipes were produced and inspected according to requirements of API Spec 5L - 2012/ ASTM A106/A106M-2015/ ASME SA106/SA106M-2015 / ASTM A53/A53M-2012/ ASME SA53/SA53M-2015 / NACE MR0175-2015/ NACE MR0103-2012 and order's requirements
Состояние поставки / Delivery condition	Pipes produced by Hot Forming followed by normalizing at the temperature 845 deg C to 945 deg C cooled at air/Трубы произведены путем горячей деформации и нормализованы при температуре 845...945°С, охлаждены на воздухе
Покрытие / Coating	Трубы покрыты черным лаком / Pipes are coated with black varnish
Фаска (если требуется) / Bevelled ends if required	Стандартная фаска / Bevel as per standard
Защита концов / Protection of pipe ends	Концы труб оснащены пластиковыми колпачками / The ends of pipes are equipped by plastic caps
Дополнительная информация / Additional information	Масса фактическая/ Actual weight. Ремонт сваркой запрещен. / No weld repair. Объем партии не более чем 200 труб/ Quantity of pipes in the inspection lot is not more then 200 pieces. Сумма концентрации Nb, V, Ti менее 0,150% / The sum of concentration Nb, V, Ti less 0.150%.

Страна происхождения: Украина. Country of origin: Ukraine.
Ваши предложения по улучшению продукции просим направлять на эл.адрес / Please send Your proposals for improving the product by e-mail or fax or by phone
Sergey.Filchakov@nstp.interpipe.biz fax +38(0566)639379 phone +38(0566)638649
e-mail: info@us.interpipe.biz Phone: 17133330333 Fax: 17133330330
Этот инспекционный сертификат относится только к перечисленной в нем продукции. Недопустима внесение изменений или другое неправомерное использование сертификата.
This inspection certificate is only for the listed products. Modification or unauthorized use of the certificate is strictly prohibited. Violations can be considered as forgery and is subject to prosecution
Инспекционный сертификат сформирован и проверен контролером сертификатором МОРОЗ Н.А.
/Inspection Certificate was drawn up and checked by the Certificate Inspector MOROZ N.A.
Дата 17.04.2017
Date:

Подпись инспектора 3-й стороны :
Signature of 3-rd Part Inspector:

Подпись ОТК
Signatures QCD:

INTERPIPE
NIKO TUBE

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"INTERPIPE NIKO TUBE"
UKRAINE, Nikopol, 56, Trubnikov ave. Tel./fax +38 (05662) 2-10-70

NIK461 / 1170306 / 8.0A106XHF / 8 XH A106B SMLS PIPE

NIK460 / 1174593 / 8.0A333XHF / 8 XH SA333 GR 6 PIPE

ИНТЕРПАЙП
НИКО ТЬЮБ

ОБЩЕСТВО С ОГРАНИЧЕННОЙ ОТВЕТСТВЕННОСТЬЮ
"ИНТЕРПАЙП НИКО ТЬЮБ"
Украина, г. Никополь, пр. Трубников, 56
Тел./факс +38 (05662) 2-10-70

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 6565/Б
INSPECTION CERTIFICATE № 6565/Б
EN 10204-2004/3.1

Грузополучатель / BUYER: North American Interpipe, Inc. 1800 West Loop South, Suite 1350, Houston, Texas 77027, USA

Контракт № / Contract #: COC17/1154

Заводской заказ №008108
Production order #
Номер заказа клиента
Customer's ref #P20398

Страна / Country: USA

Транспортное средство № / Vehicle №: BH8083HO/BH8828XK

Лист / Sheet: 1 Листов / Sheets: 1

Дата / Date: 25.11.2017г.

Наименование и код товара / Description and code of goods	Наименование стандартов / Specifications	Класс поставки / Class of delivery	Тип резьбы / Thread type
Трубы стальные бесшовные горячекатаные для трубопроводов Seamless steel hot-rolled pipes for pipelines	ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012		

№ поз. / Item No	Номер пакета / Bundle #	Номера труб / Pipe #	Марка стали / Grade: краткое обозначение / Brief Designation	Номер плавки / Heat #	Номер партии / Inspection Lot #	Размеры / Dimensions: диаметр / OD, дюйм / inch	толщина стенки / WT, дюйм / inch	длина / length, фут / ft	общая длина / Total length, фут / ft	шт / piece	Фактический вес / Actual weight: брутто / gross, фунт / lb	нетто / net, фунт / lb
1.	17-38-27415		6/ B/ C	1174593	3457	8.625	0.500	38.2	152.4	4	6 812	6 801
2.	17-38-27416		6/ B/ C	1174593	3457	8.625	0.500	38.2	152.8	4	6 834	6 823
3.	17-38-27417		6/ B/ C	1174593	3457	8.625	0.500	38.2	37.8	1	1 700	1 698
4.	17-38-27414		6/ B/ C	1174593	3457	8.625	0.500	38.2	152.4	4	6 812	6 801
5.	17-38-27413		6/ B/ C	1174593	3457	8.625	0.500	38.2	152.3	4	6 878	6 867
6.	17-38-27419		6/ B/ C	1174593	3457	8.625	0.500	38.2	152.5	4	6 812	6 801
7.	17-38-27420		6/ B/ C	1174593	3457	8.625	0.500	38.2	152.0	4	6 834	6 823
8.	17-38-27450		6/ B/ C	1174593	3457	8.625	0.500	38.2	38.0	1	1 700	1 698
		NPS 8		Sch 80 XS			TOTAL/ИТОГО		990.2	26	44 382	44 312
							BUNDLES/ПАКЕТОВ 8					

INTERPIPE
NIKO TUBE

LIMITED LIABILITY COMPANY
"INTERPIPE NIKO TUBE"
UKRAINE, Nikopol, 56, Trubnikov ave. Tel./fax +38 (05662) 2-10-70

NIK460 / 1174593 / 8.0A333XHF / 8 XH SA333 GR 6 PIPE

ИНСПЕКЦИОННЫЙ СЕРТИФИКАТ № 6565/Б
INSPECTION CERTIFICATE № 6565/Б

Лист 1 Sheet | Листов 1 Sheets

Химический состав по сертификатным данным на заготовку и результаты контроля химического состава металла труб
Heat analysis acc. to the billet manufacturer certificate & results of chemical analysis of pipes

Номер плавки Heat #	Лаборатория Laboratory	Химический состав в % Chemical composition %													Завод изготовитель заготовки Steel supplier
		C x100	Mn x100	Si x100	S x1000	P x1000	Cr x100	Ni x100	Cu x100	Mo x1000	Ti x1000	V x1000	Nb x1000	Al x1000	
min		-	29	10	-	-	-	-	-	-	-	-	-	-	
max		30	106	-	25	25	30	40	40	120	-	80	20	-	
1174593	DneprSteel	22	97	28	5	10	7	10	15	11	20	3	3	41	"MP"DNEPROSTEEL"LLC
	NIKOTUBE*	23	92	26	2	11	9	9	15	9	16	1	1	38	ООО"МЗ"Днепросталь"
	NIKOTUBE*	23	92	26	2	11	9	9	15	9	15	1	1	37	

Анализ плавки согласно сертификата завода-изготовителя/Heat analysis acc.to the manufacturer certificate.*-control analysis of pipes/*-контрольный анализ от труб.
Сталь произведена методом плавления в электродуговой печи с последующей непрерывной разливкой. Сталь полностью раскисленная и мелкозернистая. Сталь раскисленная алюминием. Адрес завода изготовителя заготовки: Украина, 49051, г.Днепропетровск, ул.Винокурова, 4/ Steel has been produced by the EAF with continuous casting process. Steel is fully killed and made to fine grain practice. Aluminium killed steel. The address of steel supplier: Ukraine,49051, Dnipropetrovsk, 4 Vinokurova str.

Результаты испытаний труб - Test results for pipes

Номер плавки Heat#	Номер партии Lot#	Механические свойства Mechanical Properties: Испытание на растяжение Tensile test: Предел прочности Tensile strength	Предел текучести Yield strength	Относительное удлинение Elongation	Отношение отрез Ratio отрез	Ориентация образцов Specimens orientation*	Ширина полосового образца Width of strip specimen	Диаметр цилиндрического образца Diameter of cylindrical specimen	Длина образца Length of specimen	Твердость Hardness Среднее значение Average		Испытание на удар /Impact test: Ориентация*Orientation*	Тип надреза, темпе ратура Type of notch, temperature	Норматив/Norm	Ср.значение Average	Площадь сдвига, Shear area	Размер образцов ** Specimens size **
		PSI	PSI	%			дюйм/ inch	дюйм/ inch	дюйм/ inch	HRB	HRC				фут/фунт ft/lb	%	дюйм/ inch
		min 70000	40000	29.0	-					-	-			min			
		max -	-	-	-					100	22						
1174593	3457	78300	49500	38.0		L	1.500		1.970	80 79 79 av.79	<22	L	KV -49°F	13	15 15 16 av.15	5 5 5	0.394x0.394
		78300	49500	39.5		L	1.500		1.970	80 80 79 av.80	<22						

* L - Продольный образец / Longitudinal specimen; T - поперечный образец / Transverse specimen
** Результаты испытаний уменьшенных образцов пересчитаны на полноразмерные/Non-fullsize specimens results convert to fullsize (10x10mm)

Прочие виды контроля / Other tests

Вид испытания / Type of test	Параметры / Criteria	Результаты контроля /Test results
Сплющивание / Flattening test	По стандарту / As per Standard``	Удовлетворительно / Satisfactory
Испытание гидравлическим давлением / Hydrostatic test	100% / 19.3 MPa / 2800 PSI / 10 sec``	Удовлетворительно / Satisfactory
Визуальный контроль / Visual inspection	По стандарту / As per Standard``	Удовлетворительно / Satisfactory
Контроль геометрических параметров / Dimensional inspection	По стандарту / As per Standard``	Удовлетворительно / Satisfactory

Состояние поставки / Delivery condition

Общие условия / General condition	Трубы изготовлены и испытаны в соответствии с требованиями ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012 и заказа / Pipes were produced and inspected according to requirements of ASTM A106/A106M-2015/ ASME SA106/SA106M-2015/ ASTM A53/A53M-2012/ ASME SA53/SA53M-2015/ ASTM A333/A333M-2016/ ASME SA333/SA333M-2015/ NACE MR0175-2015/ NACE MR0103-2012 and order's requirements
Состояние поставки / Delivery condition	Pipes produced by Hot Forming followed by normalizing at the temperature 845 deg C to 945 deg C cooled at air/Трубы произведены путем горячей деформации и нормализованы при температуре 845...945°С, охлаждены на воздухе
Покрытие / Coating	Трубы покрыты черным лаком / Pipes are coated with black varnish
Фаска (если требуется) / Bevelled ends if required	Стандартная фаска / Bevel as per standard
Защита концов / Protection of pipe ends	Концы труб оснащены пластиковыми колпачками / The ends of pipes are equipped by plastic caps
Дополнительная информация / Additional information	Масса фактическая/ Actual weight. Ремонт сваркой запрещен. / No weld repair. Объем партии не более чем 200 труб/ Quantity of pipes in the inspection lot is not more then 200 pieces. Трубы не содержат ртуть и свинец. /Material is free of mercury and lead. Страна производства заготовки - Украина./Country of melt - Ukraine.

Страна происхождения: Украина. Country of origin: Ukraine
Ваши предложения по улучшению продукции просим направлять на эл.адрес / Please send Your proposals for improving the product by e-mail or fax or by phone
Sergey.Filchakov@nstp.interpipe.biz fax +38(0568)639379 phone +38(0568)638649
e-mail: info@us.interpipe.biz Phone: 17133330333 Fax: 17133330330
Этот инспекционный сертификат относится только к перечисленной в нем продукции. Недопустимо внесение изменений или другое неправомерное использование сертификата.
This inspection certificate is only for the listed products. Modification or unauthorized use of the certificate is strictly prohibited. Violations can be considered as forgery and is subject to prosecution.
Инспекционный сертификат сформирован и проверен контролером сертификатором ВИТЬКО Л.В.
Inspection Certificate was drawn up and checked by the Certificate Inspector VITKO L.V.
Дата. 25.11.2017
Date
Подпись инспектора 3-й стороны :
Signature of 3-rd Part Inspector:
Подпись ОТК
Signature QCD

ТОВ "НІНТЕРПАЙП НІКОТЬЮБ" СЛУЖБА ЯКОСТІ м. Нікополь

ISM8 / 01531 / 8.0A333XHF / 8 XH SA333 GR 6 PIPE

ISMT LIMITED
Solutions You Can Trust

TEST CERTIFICATE ACC TO EN: 10204: 3.1 — **Format No.** QFB-QU-14/R-01

Customer : ISMT E

Consignee :

Test Certificate No. : EP328451 Date: 17-NOV-2017
W.O. No. : HFHP158457
Invoice No. : EAP1754824 Date: 17-NOV-2017
Pre Shipment Invoice No. : PCMP562636

P.O.No : 001925-2773 Date: 02-AUG-2017
Customer Item: SR.NO.7 07-2773-8" X .500" X DRL A106 GR. B SMLS (IMP) 43.43#
Specification : ASTM A53/A53M-12/A106/A106M-15 Grade B/ASTM A333/333M-15 Grade 1& 6 /ASME BPVC SA-53/SA53M/SA-106/SA-106M Grade B/ASME BPVC SA-333/SA 333M Grade 1& 6 SECTION II,PART A Edition 2015 & NACE MR 0175/MR 0103

Product : HOT FINISHED NORMALISED SEAMLESS STEEL PIPE
Ends : BEVELLED ENDS
Bearing No. / Part No.: NA
Heat Number : 01531 Steel Grade : BS 3059
Batch Number : BPH467
Steel Supplier: SLRM
Manufacturing Route : BF-EOF-LRF-VD-CCM-EMS

Dimensions			Tolerance		
	MM	Inch	+Ve	-Ve	JOM
OD :	219.100	8.626	1.600	-0.790	MM
ID :	193.700	7.626	0.000	0.000	MM
WT :	12.700	0.500	10.000	-10.000	P

Quantity		
Number	Meter / Feet	Weight
18	225.150 / 738.717	14.590 Ton

Length: D/ 12192.000 - 12801.600 MM. D/40.002 - 42.002 Feet

Chemical Analysis :

Elements	UOM	Min	Max	Mill	Product1	Product2
C	%		0.3000	0.1400	0.1400	0.1350
Si	%	0.1000		0.2500	0.2500	0.2400
S	%		0.0250	0.0060	0.0060	0.0050
P	%		0.0250	0.0140	0.0130	0.0140
Mn	%	0.2900	1.3500	1.1200	1.1100	1.1200
Ni	%		0.4000	0.0130	0.0110	0.0120
Cr	%		0.3000	0.0310	0.0300	0.0310
Mo	%		0.1200	0.0070	0.0070	0.0060
Cu	%		0.4000	0.0140	0.0140	0.0130
Sn	%			0.0007	0.0007	0.0006
Al	%			0.0340	0.0340	0.0330
Ti	%			0.0015	0.0015	0.0014
V	%		0.0800	0.0040	0.0040	0.0030
As	%			0.0017	0.0017	0.0016
Ca	%			0.0007	0.0006	0.0007
Nb	%		0.0200	0.0004	0.0004	0.0003
CE	%			0.3369	0.3349	0.3313

Mechanical Properties : ASTM A 370

	YS (ReH) MPa 0.2%	U.T.S.(Rm) MPa	% E (A) 50.00MM	Hardness BHN	
Min	240.00	415.00	30.00		
Max				237.00	
1	359.24	461.17	37.92	131 - 133	
2	358.36	461.66	37.90	131 - 133	

Sample Orientation : Longitudinal
Tensile Specimen Type : Strip Gauge Width(mm) 19.05

Impact Properties : ASTM E 23

Test Type : Charpy V Notch

Specimen Orientation	Temp (°C)	Size (mm)	Value (Joules) 1.	2.	3.	Avg	<---Reqd.---> Min	Avg
Longitudinal	-45	55x10x10	92	92	110	98	14	18

Flattening Test (As Per Specn.) : Ok

Leakage Flux (As Per ASTM E570) : Ok

Hydraulic Test (As Per Specn.) : Ok 2500 PSI

Remarks :

NO WELD REPAIR PERFORMED. MATERIAL FREE FROM RADIOACTIVE CONTAMINATION.

ISM8 / 01531 / 8.0A333XHF / 8 XH SA333 GR 6 PIPE

ISMT LIMITED

Solutions You Can Trust

TEST CERTIFICATE ACC TO EN: 10204: 3.1	Format No. QFB-QU-14/R-01
Customer : ISMT E A/C Consignee :	Test Certificate No. :EP328451 Date: 17-NOV-2017 W.O. No. :HFHP158457 Invoice No. :EAP1754824 Date: 17-NOV-2017 Pre Shipment Invoice No. : PCMP562636

We hereby Certify that the material described above conforms to specifications & Purchase Order

A.B.DEOKATE
JUNIOR SUPERVISOR
Authorized signatory

ISMT Tube Plant B
B-13, MIDC, Baramati - 413 133, Maharashtra, India.
Phone : +91 2112 243861 - 65 | Fax : +91 2112 243873
www.ismt.com

[| 4500842637 | J488XX | E61772] | [LN: 22] | T0412921-1 | SNI1.580S304/L |

製品検査証明書
INSPECTION CERTIFICATE

新日鐵住金株式会社
NIPPON STEEL & SUMITOMO METAL CORPORATION

本　　社：〒100-8071 東京都千代田区丸の内二丁目６番１号
HEAD OFFICE：2-6-1 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8071 JAPAN
大分製鐵所［光地区］：〒743-8510 山口県光市大字島田３４３４番地
OITA WORKS [HIKARI AREA]
：3434,SHIMATA,HIKARI-SHI,YAMAGUCHI,743-8510,JAPAN

注　文　者：
SHIPPER　K&J TUBULAR CORPORATION

注文者照合番号：
REFERENCE No.　HBS1710X

契 約 番 号：
CONTRACT No.　4-848-N3-5-0-E908

商　品　名：HOT FINISHED SEAMLESS STAINLESS STEEL
COMMODITY　PIPE

規　　格：ASTM A312/ASME SA-312 GRADE
SPECIFICATION　TP304/TP304L/ASTM A376/ASME SA-376 GRADE TP304

需 要 家：MARUBENI-ITOCHU TUBULARS AMERICA INC.
CUSTOMER

需要家管理番号：
CUSTOMER'S CONTROL No.

旅　　主：
CLIENT

証 明 書 番 号：
CERTIFICATE No.　14120165-03E

発 行 年 月 日：
DATE OF ISSUE　14-12-19

特　　記：PO HR054732, A312-14, SA-312/A376/SA-376-13, NO WELD REPAIR, MERCURY NOT DETECTABLE, MIL-P-24691/3, A262/E, P
NOTE　ED97/23/EC, COUNTRY OF MELT: JAPAN, PICKLED & PASSIVATED

E07

行番 ITEM No.	寸法 SIZE	員数 NUMBER OF PRODUCT	質量 MASS Kg	U曲げ半径 U-BEND RADIUS (mm)	検査番号 INSPECTION No. 年 YEAR	製造番号 MANUFACTURING No.	規格区分 DIVISION OF STANDARD	製鋼番号 CAST No.	化学成分 CHEMICAL COMPOSITION (%) C*	Si	Mn	P*	S*	Ni	Cr	Mo	Co	引張試験 TENSILE TEST テスト片 TEST SPECIMEN	方向 ORIENTATION	耐力 YS KSI	引張強さ TS	伸び EL*	扁平試験 FLATTENING TEST	曲げ試験 BENDING TEST	逆曲げ試験 REVERSE FLATTENING TEST	硬さ試験 HARDNESS TEST HV	水圧試験 HYDROSTATIC TEST	IGC A262 PR. E		
								MIN						8001800						30	75	35								
								MAX	35	75	200	45	30	1100	2000											248				
04	N2'XS40SX38'*42'	69	4754		4	9NDTPD	E61738	H	28	48	104	32	4	802	1803		23	G	L	43	89	59	G			161		G		
05	N2'XS80SX38'*42'	96	9111		4	9NDTPC	E61734	H	25	48	105	33	2	801	1807		23	G	L	39	89	60	G			164		G		
05	"	32	3033		4	9NDTPC	E61738	H	28	48	104	32	4	802	1803		23	G	L	40	90	57	G			160		G		
05	"	4	380		4	9NDTPC	E61760	H	20	48	103	33	4	905	1800		22	G	L	37	85	60	G			148		G		
06	N3'XS10SX38'*42'	52	4262		4	9NDTPR	E61367	H	18	51	105	31	4	900	1800		22	G	L	34	78	59	G			149		G		

外観・寸法　VISUAL & DIMENSIONS：GOOD

非破壊検査　NON-DESTRUCTIVE INSPECTION
ET(A999 DRILLED HOLES)：G.

熱 処 理　HEAT TREATMENT
SH　MIN. 1900DEG. F X 30SEC.　RAPID COOLING

NACE MR0175/0103 ISO15156 HARDNESS ONLY
EN10204 3.1
THE VALUE OF HYDROSTATIC TEST IS ASSURED BY SUBSTITUTING N.D.I. FOR HYDROSTATIC TEST

技術 NOTES *1 JIS(4:No.4, 5:No.5, 1:No.11, A:No.12A, B:No.12B, C:No.13B), Strip(E:1/2in width, F:3/4in width, G:1in width), I:Full Section,
*2 L：縦方向 Longitudinal, T：横方向 Transverse, GL：標点距離 Gauge Length
YS:Yield Strength, TS:Tensile Strength, EL：Elongation, G：合格 Good
CIT: シャルピー衝撃試験 Charpy Impact Test, CRT: 腐食試験 Corrosion Test
AGS / FGS: オーステナイトフェライト結晶粒度 Austenitic / Ferritic Grain Size No.
SP: サルファプリント Sulphur Print, AP: 透磁率 Amplitude Permeability
NMI: 非金属介在物 Non Metallic Inclusion, HNT: 硬入性試験 Hardenability Test
MDT: 脱炭層深さ試験 Measuring Decarburized Depth Test
H/P: 溶鋼分析/製品分析 Heat Analysis / Product Analysis
SH: 固溶化熱処理 Solution Heat-treatment, BT: 曲げ Bend Test
ET/UT/PT:渦流/超音波/浸透探傷試験 Eddy Crent / Ultrasonic / Penetrant Test

上記注文品は、御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。
WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.
お問合せ先　CONTACT ADDRESS：PIPE-IPP@JP.NSSMC.COM

SURVEYOR TO

S. Saito
斉藤 俊太郎　SHUNTARO SAITO
大分製鐵所　品質保証室長
HEAD OF DEPARTMENT
QUALITY ASSURANCE DEPT.
OITA WORKS

[| 4500842637 | J488XX | | 119E] | [LN: 23] | T0412921-1 | BR1040S04/LX |

BRISMET
BRISTOL METALS, LLC

390 Bristol Metals Rd,
Bristol, TN 37620

MILL TEST REPORT

RM ID NUMBER
431379
SALES ORDER / RLS
20174883602
CERT ID / REV
23540

SOLD TO:
INDUSTRIAL PIPING SPEC
PO BOX 581270
TULSA, OK 74158-1270

CUSTOMER P.O.	CUSTOMER PART	HEAT NO.
TP547985		119E

DESCRIPTION: 3301000040304312120
10" WELDED PIPE SCHED 40S TP304/TP304L (UNS#S30400/S30403) A312 X-RAY DOUBLE RANDOM LENGTH

CERTIFICATION REQUIREMENTS

ENGINEERING
ASTM A312-17 ASME SA312-15

HYDRO PRESSURE
1000 PSI

HEAT TREAT
Annealed at 1900 - 2000 Deg F. and water quenched to below 800 Deg. F. in less than 3 minutes.

Chemical		Mechanical	
Test	Result	Test	Result
Carbon	.0199	431379	
Manganese	1.73	Elongation	52
Phosphorus	.0285	Hardness RB	87.
Sulfur	.0114	Tensile	90360
Silicon	.263	Yield	50000
Nickel	8.0645		
Chromium	18.065	X-Ray	Pass
Molybdenum	.3225	Tension	Pass
Nitrogen	.0752	TG Face Bend	Pass
Country of Origin	USA		

This report shall not be altered or reproduced, except in full, without the prior written approval of Bristol Metals LLC. This test report represents the actual attributes of the items furnished and all items were manufactured, sampled, inspected, and tested in full compliance with applicable specifications and your purchase order.
Certification is in accordance with EN10204:2004 type 3.1.
Chemical content is % by weight. Mechanical test results are in English units (inches and pounds).
No weld repairs have been performed on the base material.
Hardness in accordance with NACE MR0175/ISO 15156-3:2009 and MR0103-2012 and material is free of cold work to enhance mechanical properties.
Pipe is Pickled and Passivated in accordance with ASTM A380.
Bristol Metals has a Quality Management System in place that is in compliance with ISO 9001:2008.
In compliance with Pressure Equipment Directive (PED) 2014/68/EU as Category 1 material unless otherwise stated.
Bristol Metals does not add mercury or radioactive materials during any manufacturing process.
NAFTA country of origin: USA. Pipe/Tube Manufactured in the USA. Raw Material Melt Source: USA
FAR BAA - Complies, DFARS BAA -Complies, FAR TAA – Complies.
Pipe/Tube has been double welded using an EFW process.
QF-576

Date Printed: 08/28/2017

Jam R. Bain III

Quality Assurance Manager

[| 4500842637 | J488XX | 5034055 | 518687-4249541] | [LN: 24] | T0412921-1 | BR210S04/L |

BRISTOL METALS, LLC

390 Bristol Metals Rd.
Bristol, TN 37620

MILL TEST REPORT

RM ID NUMBER
4249541
SALES ORDER / RLS
201808584903
CERT ID / REV
34576

SOLD TO:
INDUSTRIAL PIPING SPEC
PO BOX 581270
TULSA, OK 74158-1270

CUSTOMER P.O.	CUSTOMER PART	HEAT NO.
TP570939		518687

DESCRIPTION: 33002000103043120202
2" WELDED PIPE SCHED 10S TP304/TP304L (UNS# S30400/S30403) A312 DOUBLE RANDOM LENGTH

CERTIFICATION REQUIREMENTS

ENGINEERING
ASTM A312-17 ASME SA312-17

HYDRO PRESSURE
1400 PSI

HEAT TREAT
Annealed at 1900 Min. Deg F. and water quenched to below 800 Deg. F. in less than 3 minutes.

Chemical		Mechanical	
Test	Result	Test	Result
Carbon	.025	4249541	
Manganese	1.74	Elongation	54
Phosphorus	.027	Hardness RB	83
Sulfur	.012	Tensile	96301
Silicon	.52	Yield	46265
Nickel	8.04		
Chromium	18.19		
Molybdenum	.26	Tension	Pass
Nitrogen	.073	Flattening	Pass
Country of Origin	USA		

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Certification is in accordance with EN10204:2004 type 3.1.
Chemical content is % by weight. Mechanical test results are in English units (inches and pounds).
No weld repairs have been performed on the base material.
Hardness in accordance with NACE MR0175/ISO 15156-3:2009 and MR0103-2012 and material is free of cold work to enhance mechanical properties.
Pipe is Pickled and Passivated in accordance with ASTM A380.
Bristol Metals has a Quality Management System in place that is in compliance with ISO 9001:2008.
In compliance with Pressure Equipment Directive (PED) 2014/68/EU as Category 1 material unless otherwise stated.
Bristol Metals does not add mercury or radioactive materials during any manufacturing process.
NAFTA country of origin: USA. Pipe/Tube Manufactured in the USA. Raw Material Melt: USA
FAR BAA - Complies, DFARS BAA -Complies, FAR TAA – Complies. This product is in full compliance with the American Iron and Steel requirement of P.L. 113-76 and as mandated in EPA's State Revolving Funds Program
Pipe/Tube has been double welded using an EFW process.

QF-576

Date Printed: 02/22/2018

Quality Assurance Manager

[| 4500842637 | J488XX | 5034056 | OC513085] | [LN: 25] | T0412921-1 | WE240S04/L |

MATERIAL TEST REPORT

Sold To: 2425000	Ship To: 2425000
INDUSTRIAL PIPING SPECIALISTS/TULSA 606 N. 145TH EAST AVE. TULSA OK 74116	INDUSTRIAL PIPING SPECIALISTS/TULSA 606 N. 145TH EAST AVE. TULSA OK 74116

Purchase Order:	tp538110
Sales Order:	216359
Material:	M063237515400 A/SA312 T304L 2.000" Sch. 40
Delivery / File Nbr:	80371051

Description: ASTM A312-17 ASME SA312-15
WELDED STAINLESS STEEL PIPE, TP304/TP304L

Test: REVERSE BEND TEST PASSED. FLATTENING TEST PASSED. REVERSE FLATTENING TEST PASSED. FLARE TEST PASSED. NDT ELECTRIC TESTED TO ASTM A999, TEST METHOD E426 USING A DRILL-HOLE REF. STD. HYDRO TEST NOT PERFORMED. . .75" WIDTH STRIP 2" GAUGE LGTH . HYDRO TEST NOT PERFORMED. .75" WIDTH STRIP 2" GAUGE LGTH

Heat Number: OC513085

		%
CARBON	LDL	0.023
MANGANESE	LDL	1.280
PHOSPHORUS	LDL	0.029
SULFUR	LDL	0.001
SILICON	LDL	0.380
NICKEL	LDL	8.040
CHROMIUM	LDL	18.140

Ultimate (PSI)	89,008 / 89,884
Yield (PSI)	44,070 / 44,710
Elongation (%)	64 / 66
Hardness (RB)	82 / 82

We hereby certify that the above figures are correct as contained in the records of the company and that each batch has been manufactured, sampled, tested and inspected in accordance with the applicable specification stated above. This Document conforms to the requirements of Specification EN 10204 Inspection Document Type 3.1.
Webco does not use mercury in testing or production of its stainless steel products.
According to our records and to the best of Webco's knowledge, understanding and belief, this product was not contaminated during manufacture in our facilities.
This document was prepared by means of electronic processing and isvalid without signature.

Date: 06/01/2017

Tucker Melvin
KST Quality Manager
tmelvin@webcoindustries

18256 West HWY 66
Kellyville OK 74039

[| 4500842637 | J488XX | 5034058 | 232R] | [LN: 26] | T0412921-1 | BR310S04/L |

BRISTOL METALS, LLC

390 Bristol Metals Rd.
Bristol, TN 37620

MILL TEST REPORT

RM ID NUMBER
721361
SALES ORDER / RLS
20174883602
CERT ID / REV
23541

SOLD TO:
INDUSTRIAL PIPING SPEC
PO BOX 581270
TULSA, OK 74158-1270

CUSTOMER P.O.	CUSTOMER PART	HEAT NO.
TP547985		232R

DESCRIPTION: 3300300010304312020
3" WELDED PIPE SCHED 10S TP304/TP304L (UNS# S30400/S30403) A312 DOUBLE RANDOM LENGTH

CERTIFICATION REQUIREMENTS

ENGINEERING
ASTM A312-17 ASME SA312-15

HYDRO PRESSURE
1000 PSI

HEAT TREAT
Annealed at 1900 - 2000 Deg F. and water quenched to below 800 Deg. F. in less than 3 minutes.

Chemical		Mechanical	
Test	Result	Test	Result
Carbon	.0168	721361	
Manganese	1.783	Elongation	54
Phosphorus	.0255	Hardness RB	86
Sulfur	.0118	Tensile	90850
Silicon	.2725	Yield	45320
Nickel	8.0785		
Chromium	18.194		
Molybdenum	.288	Tension	Pass
Nitrogen	.0828	TG Face Bend	Pass
Country of Origin	USA		

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Certification is in accordance with EN10204:2004 type 3.1.
Chemical content is % by weight. Mechanical test results are in English units (inches and pounds).
No weld repairs have been performed on the base material.
Hardness in accordance with NACE MR0175/ISO 15156-3:2009 and MR0103-2012 and material is free of cold work to enhance mechanical properties.
Pipe is Pickled and Passivated in accordance with ASTM A380.
Bristol Metals has a Quality Management System in place that is in compliance with ISO 9001:2008.
In compliance with Pressure Equipment Directive (PED) 2014/68/EU as Category 1 material unless otherwise stated.
Bristol Metals does not add mercury or radioactive materials during any manufacturing process.
NAFTA country of origin: USA. Pipe/Tube Manufactured in the USA. Raw Material Melt Source: USA
FAR BAA - Complies, DFARS BAA -Complies, FAR TAA – Complies.
Pipe/Tube has been double welded using an EFW process.
QF-576

Date Printed: 08/28/2017

Jam R. Bam

Quality Assurance Manager

[| 4500842637 | J488XX | 5034059 | 475B-2483451] | [LN: 27] | T0412921-1 | BR340S04/L |

BRISTOL METALS, LLC

390 Bristol Metals Rd.
Bristol, TN 37620

MILL TEST REPORT

RM ID NUMBER
2483451
SALES ORDER / RLS
201707407607
CERT ID / REV
33589

SOLD TO:
INDUSTRIAL PIPING SPEC
PO BOX 581270
TULSA, OK 74158-1270

CUSTOMER P.O.	CUSTOMER PART	HEAT NO.
TP563562		475B

DESCRIPTION: 3300300040304312020
3" WELDED PIPE SCHED 40S TP304/TP304L (UNS# S30400/S30403) A312 DOUBLE RANDOM LENGTH

CERTIFICATION REQUIREMENTS

ENGINEERING
ASTM A312-17 ASME SA312-17

HYDRO PRESSURE
1900 PSI

HEAT TREAT
Annealed at 1900 Min. Deg F. and water quenched to below 800 Deg. F. in less than 3 minutes.

Chemical		Mechanical	
Test	Result	Test	Result
Carbon	.0144	2483451	
Manganese	1.773	Elongation	51
Phosphorus	.0315	Hardness RB	85
Sulfur	.0118	Tensile	90310
Silicon	.2475	Yield	46110
Nickel	8.0955		
Chromium	18.213		
Molybdenum	.3205	Tension	Pass
Nitrogen	.0815	TG Face Bend	Pass
Country of Origin	USA		

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No weld repairs have been performed on the base material.
Hardness in accordance with NACE MR0175/ISO 15156-3:2009 and MR0103-2012 and material is free of cold work to enhance mechanical properties.
Pipe is Pickled and Passivated in accordance with ASTM A380.
Bristol Metals has a Quality Management System in place that is in compliance with ISO 9001:2008.
In compliance with Pressure Equipment Directive (PED) 2014/68/EU as Category 1 material unless otherwise stated.
Bristol Metals does not add mercury or radioactive materials during any manufacturing process.
NAFTA country of origin: USA. Pipe/Tube Manufactured in the USA. Raw Material Melt: USA
FAR BAA - Complies, DFARS BAA -Complies, FAR TAA – Complies. This product is in full compliance with the American Iron and Steel requirement of P.L. 113-76 and as mandated in EPA's State Revolving Funds Program
Pipe/Tube has been double welded using an EFW process.
QF-576

Date Printed: 02/06/2018

James R. Barnett

Quality Assurance Manager

[| 4500842637 | J488XX | 5034061 | 282N] | [LN: 28] | T0412921-1 | BR410S04/L |

BRISMET
BRISTOL METALS, LLC

390 Bristol Metals Rd.
Bristol, TN 37620

MILL TEST REPORT

RM ID NUMBER
895212
SALES ORDER / RLS
20173409602
CERT ID / REV
23537

SOLD TO:
INDUSTRIAL PIPING SPEC
PO BOX 581270
TULSA, OK 74158-1270

CUSTOMER P.O.	CUSTOMER PART	HEAT NO.
TP538674		282N

DESCRIPTION: 3300400010304312020
4" WELDED PIPE SCHED 10S TP304/TP304L (UNS# S30400/S30403) A312 DOUBLE RANDOM LENGTH

CERTIFICATION REQUIREMENTS

ENGINEERING
ASTM A312-17 ASME SA312-15

HYDRO PRESSURE
800 PSI

HEAT TREAT
Annealed at 1900 - 2000 Deg F. and water quenched to below 800 Deg. F. in less than 3 minutes.

Chemical		Mechanical	
Test	Result	Test	Result
Carbon	.0187	895212	
Manganese	1.768	Elongation	50
Phosphorus	.028	Hardness RB	84.
Sulfur	.0121	Tensile	91020
Silicon	.2385	Yield	45880
Nickel	8.013		
Chromium	18.1355		
Molybdenum	.28	Tension	Pass
Nitrogen	.0832	TG Face Bend	Pass
Country of Origin	USA		

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Hardness in accordance with NACE MR0175/ISO 15156-3:2009 and MR0103-2012 and material is free of cold work to enhance mechanical properties.
Pipe is Pickled and Passivated in accordance with ASTM A380.
Bristol Metals has a Quality Management System in place that is in compliance with ISO 9001:2008.
In compliance with Pressure Equipment Directive (PED) 2014/68/EU as Category 1 material unless otherwise stated.
Bristol Metals does not add mercury or radioactive materials during any manufacturing process.
NAFTA country of origin: USA. Pipe/Tube Manufactured in the USA. Raw Material Melt Source: USA
FAR BAA - Complies, DFARS BAA -Complies, FAR TAA – Complies.
Pipe/Tube has been double welded using an EFW process.
QF-576

Date Printed: 08/28/2017

Jam R. Bam

Quality Assurance Manager

[| 4500842637 | J488XX | 5034065 | 516135-2167994] | [LN: 30] | T0412921-1 | BR640S04/LX |

BRISTOL METALS, LLC

390 Bristol Metals Rd.
Bristol, TN 37620

MILL TEST REPORT

RM ID NUMBER
2167994
SALES ORDER / RLS
20174215705
CERT ID / REV
25436

SOLD TO:
INDUSTRIAL PIPING SPEC
PO BOX 581270
TULSA, OK 74158-1270

CUSTOMER P.O.	CUSTOMER PART	HEAT NO.
TP543925		516135

DESCRIPTION: 3300600040304312120
6" WELDED PIPE SCHED 40S TP304/TP304L (UNS# S30400/S30403) A312 X-RAY DOUBLE RANDOM LENGTH

CERTIFICATION REQUIREMENTS

ENGINEERING
ASTM A312-17 ASME SA312-15

HYDRO PRESSURE
1300 PSI

HEAT TREAT
Annealed at 1900 - 2000 Deg F. and water quenched to below 800 Deg. F. in less than 3 minutes.

Chemical		Mechanical	
Test	Result	Test	Result
Carbon	.028	2167994	
Manganese	1.78	Elongation	54
Phosphorus	.028	Hardness RB	82
Sulfur	.0113	Tensile	92095
Silicon	.57	Yield	45685
Nickel	8.04		
Chromium	18.15	X-Ray	Pass
Molybdenum	.31	Tension	Pass
Nitrogen	.073	TG Face Bend	Pass
Country of Origin	USA		

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NAFTA country of origin: USA. Pipe/Tube Manufactured in the USA. Raw Material Melt Source: USA
FAR BAA - Complies, DFARS BAA -Complies, FAR TAA – Complies.
Pipe/Tube has been double welded using an EFW process.
QF-576

Date Printed: 09/25/2017

Jan R. Bauman

Quality Assurance Manager

BRISTOL METALS, LLC

390 Bristol Metals Rd.
Bristol, TN 37620

MILL TEST REPORT

RM ID NUMBER
245540
SALES ORDER / RLS
20160065804
CERT ID / REV
7942

SOLD TO:
INDUSTRIAL PIPING SPEC - SHIP TO
606 N. 145TH EAST AVE
TULSA, OK 74116

CUSTOMER P.O.	CUSTOMER PART	HEAT NO.
TP505911		049N

DESCRIPTION: 3300400040304312020
4" WELDED PIPE SCHED 40S TP304/TP304L (UNS# S30400/S30403) A312 DOUBLE RANDOM LENGTH

CERTIFICATION REQUIREMENTS

ENGINEERING
ASTM A312-16 ASME SA312-15

HYDRO PRESSURE
1600 PSI

HEAT TREAT
Annealed at 1900 - 2000 Deg F. and water quenched to below 800 Deg. F. in less than 3 minutes.

Chemical

Test	Result
Carbon	.0206
Manganese	1.724
Phosphorus	.0275
Sulfur	.0128
Silicon	.2375
Nickel	8.027
Chromium	18.1575
Molybdenum	.3425
Nitrogen	.0816
Country of Origin	USA

Mechanical

Test	Result
Tensile	90350
Yield	46090
Elongation	51.14
Hardness RB	85
Tension	Pass
TG Face Bend	Pass

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Pipe is Pickled and Passivated in accordance with ASTM A380.
Bristol Metals has a Quality Management System in place that is in compliance with ISO 9001:2008.
In compliance with Pressure Equipment Directive (PED) 97/23/EC as Category 1 material unless otherwise stated.
Bristol Metals does not add mercury or radioactive materials during any manufacturing process.
NAFTA country of origin: USA. Pipe/Tube Manufactured in the USA. Raw Material Melt Source: USA
FAR BAA - Complies, DFARS BAA -Complies, FAR TAA – Complies.
Pipe/Tube has been double welded using an EFW process.

QF-576

Date Printed: 11/10/2016

James R. Barnett

Quality Assurance Manager

J-447

SK2 Assy
Spools

ISTI
Weld Procedures

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Welding Procedure Specification (WPS)

WPS No.: 1001 Date: 1/24/2007 Rev.: 5 Date: 1/5/2017 Page: 1 of 2

By: Rod Hall Date Signed: 1/5/2017

Supporting PQR's: P1-P1-1001 Rev.2 (1/5/17)

Welding Process(es) / Type(s): GTAW / Manual

Joints (QW-402)

Joint Design: Groove and fillet welds

Joint Type	Backing	Root Opening	Groove Angle	Root Face	Groove Radius
Single-V groove	No backing	3/16" max	50 deg min	1/8" max	-
Single bevel	No backing	3/16" max	45 deg min	1/8" max	-
Single-V groove	Gouged & back welded	1/4" max	50 deg min	3/16" max	-
Double bevel	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Double-V groove	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Square groove	T-joint	1/32" max	-	-	-
Square groove	No backing	3/32" max	-	-	-

Fillet Welds: All fillet sizes on all base metal thicknesses and all diameters.

Retainers: None

SEE ENGINEERING DRAWINGS FOR MISALIGNMENT TOLERANCES. INTERNAL MISALIGNMENT TO BE 1/4" OF WALL THICKNESS, NOT TO EXCEED 1/8" MAX.

WELD JOINT DESCRIPTIONS SHOWN ARE NOT INCLUSIVE OF ALL THOSE FOUND ON A JOB. WELD JOINT DESIGN REFERENCE IN AN ENGINEERING SPECIFICATION OR A DESIGN DRAWING SHALL TAKE PRECEDENCE OVER WELD JOINTS SHOWN IN THIS WPS.

Base Metals (QW-403)

P-No.: 1 Group No.: 1, 2 Thickness Range (in.): 0.1875 to 1.5000

to P-No.: 1 Group No.: 1, 2

Filler Metals (QW-404)

Spec. No. (SFA): 5.18

AWS No. (Class): ER70S-6

Filler Metal Use: Filler Metal Used

F No.: 6 A No.: 1 (Conforms to QW-422)

Weld Metal Thickness Range: 1.5000 in. maximum

Flux Type: N/A

Flux Trade Name: N/A

Consumable Insert: None

Other:

Flux: None

Product Form: Bare (Solid)

Strip Thickness or Width (in.) : N/A

ISTI Plant Services

Welding Procedure Specification (WPS)

WPS No.: 1001 Date: 1/24/2007 Rev.: 5 Date: 1/5/2017 Page: 2 of 2

Positions (QW-405)

Position of Joint: All Positions

Weld Progression: Vertical up

Postweld Heat Treatment (QW-407)

Type: No PWHT will be performed

Temperature Range: None °F

Time Range: None

Preheat (QW-406)

Preheat Temp. Min.: 75 °F

Interpass Temp. Max.: 450 °F

Preheat Maintenance: None

When Base Metal Preheat is < 50°F, preheat to 150°F minimum

Gas (QW-408)

Gas Composition / Flow Rate

Shielding: 100% Argon / 23-30 CFH

Trailing: None

Backing: None

Electrical Characteristics (QW-409)

Current Type / Polarity: DCEN (straight)

Pulsed Current: None

Tungsten Electrode Type and Size: EWTh-2 / 3/32

Mode of Metal Transfer for GMAW(FCAW): N/A

Max. Heat Input (J/in): None

Energy/Power: CC

Technique (QW-410)

Thermal Processes: -

String or Weave Bead: Stringer and weave bead

Orifice or Gas Cup Size: #5 to #10

Initial and Interpass Cleaning: With wire brush clean 1 inch (25 mm) on both sides of weld joint

Method of Back Gouging: When required, grind until all defects are removed.

Oscillation: N/A

Contact Tube to Work Distance: N/A

Single or Multiple Passes (per side): Multipass

Single or Multiple Electrodes: N/A

Peening: None

No Autogenous Welding is permitted.

GTAW Bead Width limited to 4.5x the rod diameter.

Process Welding Parameters

Weld Layer(s) and/or Pass(es)	Process	Filler Metal		Current		Voltage Range	Travel Speed Range (in/min)
		Class	Diameter (in.)	Type / Polarity	Amperage Range		
Any	GTAW	ER70S-6	1/16	DCEN (straight)	70-150	17-22	Var.
Any	GTAW	ER70S-6	3/32	DCEN (straight)	80-180	18-23	Var.
Any	GTAW	ER70S-6	1/8	DCEN (straight)	130-275	20-25	Var.
Any	GTAW	ER70S-6	3/16	DCEN (straight)	200-375	21-27	Var.

Notes

*Rev. 1: Corrected Preheat to match PQR and added Hardness Results to PQR.

**Rev. 2: Added Preheat temperature for 1-1/4" to 1-1/2" thickness and verify chemical analysis for ER70S-6.

***Rev. 3: Method of confirming ER70S-6 chemical analysis & misalignment limitations (A-No. Verification confirmed by OEM documentation.)

****Rev. 4: Added "No Autogenous Welding is permitted" comment, and "GTAW bead width is limited to 4.5x the rod diameter" comment.

*****Rev. 5: Added NACE MR0175 Vickers Hardness to PQR.

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Procedure Qualification Record (PQR)

PQR No.: **PI-PI-1001 Rev.2 (1/5/17)** WPS No.: **1001 Rev. 5** Date: **1/24/2007** Page: **1 of 2**

Welding Process(es) / Type(s): **GTAW / Manual**

Joints (QW-402)

Weld Type: Groove weld
Single-V groove
Backing: Open butt, no back weld
Root Opening: 5/32 in. Root Face: 0 in.
Groove Angle: 60 °

Base Metals (QW-403)

Material Spec., Type or Grade:
SA-516, Grade 70 to SA-516, Grade 70
P-No.: 1 Group No.: 2 to P-No.: 1 Group No.: 2
Thickness of Test Coupon (in.): 0.750

Filler Metals (QW-404)

SFA Specification: 5.18
AWS Classification: ER70S-6
Filler Metal Use: Filler Metal Used
Filler Metal F-No: 6
Weld Metal Analysis A-No: 1 (Conforms to QW-422)
Size of Filler Metal (in.): 3/32
Weld Deposit 't' (in.): 0.750
Filler Metal Product Form: Bare (Solid)
Consumable Insert: None
Flux: None

Positions (QW-405)

Position of Joint: 1G - Flat
Weld Progression: N/A

Preheat (QW-406)

Preheat Temp.: 75 °F
Interpass Temp.: 450 °F
Preheat Maintenance: None

Postweld Heat Treatment (QW-407)

Type: No PWHT performed
Temperature: None °F
Time: None hr

Gas (QW-408)

Gas Composition / Flow Rate
Shielding: 100% Argon / 25 CFH
Trailing: None
Backing: None

Electrical Characteristics (QW-409)

Current / Polarity: DCEN (straight)
Amps: 142
Volts: 15
Tungsten Type / Size: EWTh-2 / 3/32
Heat Input: N/R
Pulsed Current: None

Technique (QW-410)

Travel Speed (in/min): 3
Thermal Processes: (1)No
String/Weave Bead: Stringer and weave bead
Oscillation: N/A
Mult./Single Pass (per side): Multipass
Mult./Single Electrode: N/A
Nozzle/Gas Cup Size: 6

(1) *Rev. 1 (2/22/2010): Added Brinell Hardness to PQR.
**Rev. 2 (1/5/2017): Added NACE MR0175 Vickers Hardness to PQR - Lab #M170003 Welder: Mando Tang.
**SEE LAB REPORT FOR ACTUAL HARDNESS READING LOCATIONS.

ISTI Plant Services

Procedure Qualification Record (PQR)

PQR No.: P1-P1-1001 Rev.2 (1/5/17)

Tensile Test (QW-150)

Specimen No.	Width (in.)	Thickness (in.)	Area (in^2)	Ultimate Total Load (lb)	Ultimate Stress (PSI)	Failure Type and Location
1	0.755	0.753	0.5685	41250	72559	Ductile - BM
2	0.757	0.752	0.5693	42050	73863	Ductile - BM

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.2 Side bend	Passed	QW-462.2 Side bend	Passed
QW-462.2 Side bend	Passed	QW-462.2 Side bend	Passed
None		None	

Hardness Test - Brinell/Vickers hardness

Location	Readings								
	1	2	3	4	5	6	7	8	9
SA-516, Grade 70 BM (Brinell)	165	163	159	159	158	167			
SA-516, Grade 70 HAZ (Brinell)	174	175	176	168	169	171			
Weld metal (Brinell)	189	191	186						
SA-516, Grade 70 BM (Vickers)	163.8	161.2	162.4	173.2					
SA-516, Grade 70 HAZ (Vickers)	180.9	189.3	256.3	225.2	227.9	209.9	233.6	232.4	188.7
SA-516, Grade 70 HAZ (Vickers).	197.8								
Weld metal (Vickers)	193.6	181.1	247.9	234.5	181.1				

Visual Examination: Acceptable

Jimmy Dick 102124579
Andres Garcia 102126206
Mando Tang M170003

Welder's Name: J. Dick-4579 A. Garcia-6206 M. Tang-0003 ID: _____ Stamp: _____

Welding of coupon was witnessed by: ISTI Plant Services

Tests Conducted By: Tulsa Gamma Ray, Inc. Test ID.: See Above

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Approved By: _____ 1/5/2017
Date

TULSA GAMMA RAY, INC.
INSPECTION DIVISION
1127 S. Lewis Avenue Tulsa, OK 74104-3900
Phone 918-585-3228 Fax 918-584-5598

TEST REPORT

PQR# P1-P1-1001
WPS# 1001
Lab No. 102124579
Material SA516-70
Thickness 0.750"

Date 1-24-07

TENSILE TEST (QW-150)

SPECIMEN NO.	WIDTH	THICKNESS	AREA	ULTIMATE TOATL LOAD (LB)	ULTIMATE UNIT STRESS (PSI)	TYPE OF FAILURE & LOCATION
1	0.755	0.753	0.5685	41250	72559	Ductile-Base
2	0.757	0.752	0.5693	42050	73863	Ductile-Base

GUIDED BEND TESTS (QW-160)

TYPE AND FIGURE NO.	RESULTS
1 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
2 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
3 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
4 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"

Welder Jimmy Dick

ISTI PLANT SERVICES
Client

Submitted by John Phillips

TULSA GAMMA RAY, INC.

1127 S Lewis Ave Tulsa, OK 74104
918.585.3228

MECHANICAL TEST REPORT

☐ Welder Qualification ☒ Weld Procedure Evaluation

Organization	ISTI PLANT SERVICES	**LAB #**	102126206
Base Metal Type	SA516-70	**PWHT**	N.A.
Coupon Thickness	0.500"	**PQR#**	P1-P1-1001
WPS No.	1001	**Filler**	ER70S-6
Weld Process	GTAW	**Position**	1G
Welder's Name	ANDRES GARCIA		

BENDS

Specimen Number	Bend Type	Results/Comments
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A

TENSILE TESTS

Specimen Number	Specimen Size	Specimen Area sq. in.	Load at Failure PSI	Ultimate Tensile PSI	Break Location
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A

HARDNESS IN BHN

Material 1			Heat Affected Zone			Weld Metal		
1	2	3	1	2	3	1	2	3
165	163	159	174	175	176	189	191	186
Material 2			**Heat Affected Zone**					
1	2	3	1	2	3			
159	158	167	168	169	171			

CHARPY V-NOTCH IMPACT TESTING

Specimen Number	Specimen Type	Specimen Size	Temp. F	Value Ft./Lbs.	Lateral Expansion	Percent Shear
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Other Tests Performed: NONE

Heat Treatment per ASME Sec. VIII Div. I UCS-56, Impacts per UG-84.
All test performed in accordance to methods specified in ASME SA-370 & ASME Sec. IX.

Signature JOHN PHILLIPS John Phillips Date 2-22-10

American Piping Inspection, Metallurgical Lab
18501 E. Admiral Pl. Catoosa, Oklahoma 74015
Office: (918) 266-4130

Form: MR-8
Established: 10/2/16
Revision: 0
Date: 10/2/16

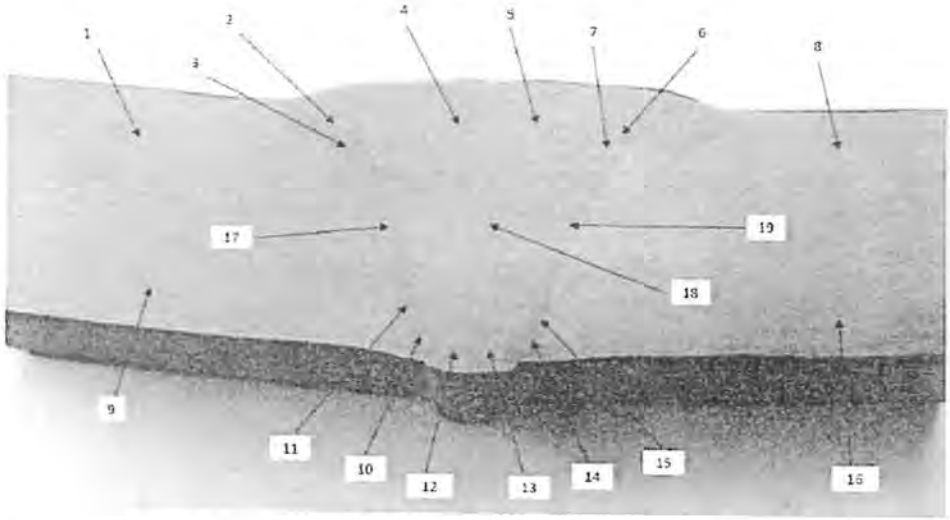
Mechanical/Lab Test Report

Organization:	ISTI Plant Services	Lab Number:	M170003 Rev. 0
Base Material:	1 SA-106 GRB to 2 SA-106 GRB	Heat Number:	N/A
Coupon Dimension:	6.625" O.D. x 0.562" Pos. 1GR	Welder Name/ID:	Mando Tang ID. N/A
WPS/PQR #:	1001	Process(es):	GTAW
Filler Metal:	ER70S-6	PWHT:	N/A

Vickers Hardness (HV10)

Indention Number	Location	Hardness Value	Indention Number	Location	Hardness Value	Indention Number	Location	Hardness Value
1	BM	163.8	11	HAZ	209.9	N/A		
2	HAZ	180.9	12	WM	247.9	N/A		
3	HAZ	189.3	13	WM	234.5	N/A		
4	WM	193.6	14	HAZ	233.6	N/A		
5	WM	181.1	15	HAZ	232.4	N/A		
6	HAZ	256.3	16	BM	173.2	N/A		
7	HAZ	225.2	17	HAZ	188.7	N/A		
8	BM	161.2	18	WM	181.1	N/A		
9	BM	162.4	19	HAZ	197.8	N/A		
10	HAZ	227.9	N/A			N/A		
	Average BM:	165.15		Average HAZ:	214.2		Average WM:	207.64

For Reference Only



Comments

Other Tests: N/A

All testing performed in accordance with the methods specified in NACE MR0175

Approved by: Eric Darge Date: 1/5/2017 Signature: Eric Darge

Title: Certified Associate Welding Inspector

IST1 Plant Services
17207 East 21st Street
Tulsa, OK 74134

Welding Procedure Specification (WPS)

WPS No.: 1003. Date: 11/15/2006 Rev.: 4 Date: 1/5/2017 Page: 1 of 2
By: Date Signed: 1/5/2017
Supporting PQR's: **P1-P1-1003 Rev.4 (1/5/2017)**
Welding Process(es) / Type(s): **(1) GTAW / Manual (2) FCAW / Semiautomatic**

Joints (QW-402)
Joint Design: Groove and fillet welds

Joint Type	Backing	Root Opening	Groove Angle	Root Face	Groove Radius
Single-V groove	No backing	3/16" max	50 deg min	1/8" max	-
Single bevel	No backing	3/16" max	45 deg min	1/8" max	-
Single-V groove	Gouged & back welded	1/4" max	50 deg min	3/16" max	-
Double bevel	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Double-V groove	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Square groove	T-joint	1/32" max	-	-	-
Square groove	No backing	3/32" max	-	-	-

Fillet Welds: All fillet sizes on all base metal thicknesses and all diameters.
Retainers: None
Groove weld joint details to be approved by Company Representative.

WELD JOINT DESCRIPTIONS SHOWN ARE NOT INCLUSIVE OF ALL THOSE FOUND ON A JOB. WELD JOINT DESIGN REFERENCE IN AN ENGINEERING SPECIFICATION OR A DESIGN DRAWING SHALL TAKE PRECEDENCE OVER WELD JOINTS SHOWN IN THIS WPS.

Base Metals (QW-403)
P-No.: 1 Group No.: 1 or 2 Thickness Range (in.): 0.1875 to 8.0000
to P-No.: 1 Group No.: 1 or 2

*Rev. 1 (10/15/2009): Added SI Materials designation to supporting PQR line per customer requuest.
**Rev. 2 (9/18/2015): Clarified weld progression, added maximum Hardness Note, and updated to latest Prowrite format.
***Rev. 3 (4/11/2016): claified GTAW Chemistry verification, Tube to Work Contact Distance, grinding if needed between passes ,added preheat ranges, group 2 designation & groove weld joint detail approval by Company Representative statement.
****Rev. 4 (1/5/17): Added NACE MR0175 Vickers Hardness to PQR.

Filler Metals (QW-404)
Spec. No. (SFA): (1) 5.18 (2) 5.20
AWS No. (Class): (1) ER70S-6 (2) E71T-12M
Filler Metal Use:(1) Filler Metal Used
F No.: (1 & 2) 6 A No.: (1 & 2) (verify chemistry)
Weld Metal Thickness Range: (1) 0.2500 in. maximum (2) 8.0000 in. maximum No Pass Greater Than ½" Allowed
Flux Type: N/A
Flux Trade Name: N/A
Consumable Insert: (1) No consumable insert used
Other:
Flux: (1) No flux used
Product Form: (1) Bare (Solid) (2) Flux cored
Supplemental Filler Metal: (2) None
Strip Thickness or Width (in.) : N/A

ISTI Plant Services

Welding Procedure Specification (WPS)

WPS No.: 1003. Date: 11/15/2006 Rev.: 4 Date: 1/5/2017 Page: 2 of 2

Positions (QW-405)

Position of Joint: (1 & 2) All Positions

Weld Progression: (1 & 2) Vertical up

Preheat (QW-406)

Preheat Temp. Min.: 70 °F

Interpass Temp. Max.: 400 °F

Preheat Maintenance: None

70°F< 1.00", 175°F > 1.00"

Postweld Heat Treatment (QW-407)

Type: No PWHT will be performed

Temperature Range: None °F

Time Range: None

Gas (QW-408)

Gas Composition / Flow Rate

Shielding: (1) 100% Argon / 23-30 CFH

(2) 75% Argon, 25% CO2 / 23-30 CFH

Trailing: (1 & 2) None

Backing: (1 & 2) None

Electrical Characteristics (QW-409)

Current Type / Polarity: (1) DCEN (straight) (2) DCEP (reverse)

Pulsed Current: (1) No pulsed current used

Tungsten Electrode Type and Size: (1) EWTh-2 / 3/32 (2) N/A

Mode of Metal Transfer for GMAW(FCAW): (1) N/A (2) Globular arc

Max. Heat Input (J/in): (1 & 2) None

Technique (QW-410)

Thermal Processes: (1 & 2) -

String or Weave Bead: (1 & 2) Stringer and weave bead

Orifice or Gas Cup Size: (1) #5 to #10 (2) 3/8" to 5/8"

Initial and Interpass Cleaning: Grind or wire brush clean 1 inch 925mm) on both sides of weld joint

Method of Back Gouging: When required, grind until all defects are removed.

Oscillation: N/A

Contact Tube to Work Distance: (2) 5/8" - 7/8"

Single or Multiple Passes (per side): (1) Multipass (2) -

Single or Multiple Electrodes: N/A

Peening: (1 & 2) None

(1) ER70S-6 chemistry to be verified bt Typical MTR from filler metal manufacturer.

Process Welding Parameters

Weld Layer(s) and/or Pass(es)	Process	Filler Metal		Current		Voltage Range	Travel Speed Range (in/min)
		Class	Diameter (in.)	Type / Polarity	Amperage Range		
Any	GTAW	ER70S-6	1/16	DCEN (straight)	70-150	n/r	Var.
Any	GTAW	ER70S-6	3/32	DCEN (straight)	80-180	n/r	Var.
Any	GTAW	ER70S-6	1/8	DCEN (straight)	130-275	n/r	Var.
Any	GTAW	ER70S-6	3/16	DCEN (straight)	200-375	n/r	Var.
Any	FCAW	E71T-12M	0.035	DCEP (reverse)	120-200	19-24	Var.
Any	FCAW	E71T-12M	0.045	DCEP (reverse)	150-225	22-26	Var.
Any	FCAW	E71T-12M	1/16	DCEP (reverse)	175-275	25-28	Var.
Any	FCAW	E71T-12M	5/64	DCEP (reverse)	200-400	26-32	Var.
Any	FCAW	E71T-12M	3/32	DCEP (reverse)	300-500	26-34	Var.

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Procedure Qualification Record (PQR)

PQR No.: P1-P1-1003 Rev.4 (1/5/2017) WPS No.: 1003. Date: 11/15/2006 Page: 1 of 2

Welding Process(es) / Type(s): (1) GTAW / Manual (2) FCAW / Semiautomatic

Joints (QW-402)

Weld Type: Groove weld
Single-V groove
Backing: Open butt, no back weld
Root Opening: 1/8 in. Root Face: - in.
Groove Angle: 60 °

Base Metals (QW-403)

Material Spec., Type or Grade:
SA-516, Grade 70 to SA-516, Grade 70
P-No.: 1 Group No.: 2 to P-No.: 1 Group No.: 2
Thickness of Test Coupon (in.): 1.500

Filler Metals (QW-404)

SFA Specification: (1) 5.18 (2) 5.20
AWS Classification: (1) ER70S-6 (2) E71T-12M
Filler Metal Use: (1) Filler Metal Used
Filler Metal F-No: (1 & 2) 6
Weld Metal Analysis A-No: (1 & 2) (verify chemistry)
Size of Filler Metal (in.): (1) 3/32 (2) 0.045
Weld Deposit 't' (in.): (1) 0.125 (2) 1.375
Pass Greater Than ½": (2) No
Filler Metal Product Form: (1) Bare (Solid) (2) Flux cored
Supplemental Filler Metal: (2) None
Consumable Insert: (1) None

Positions (QW-405)

Position of Joint: (1 & 2) 1G - Flat
Weld Progression: (1 & 2) N/A

Preheat (QW-406)

Preheat Temp.: 32 °F
Interpass Temp.: 500 °F
Preheat Maintenance: None

Postweld Heat Treatment (QW-407)

Type: No PWHT performed
Temperature: None °F
Time: None hr

Gas (QW-408)

Gas Composition / Flow Rate
Shielding: (1) 100% Argon / 25 CFH
(2) 75% Argon, 25% CO2 / 25 CFH
Trailing: (1 & 2) None
Backing: (1 & 2) None

Electrical Characteristics (QW-409)

Current / Polarity: (1) DCEN (straight) (2) DCEP (reverse)
Amps: (1) 140 (2) 160
Volts: (1) 15 (2) 26
Tungsten Type / Size: (1) EWTh-2 / 3/32 (2) N/A
Transfer Mode: (2) Globular arc
Wire Feed Speed (in/min): (2) 300
Heat Input: (1 & 2) N/R

Technique (QW-410)

Travel Speed (in/min): (1) 3 (2) 4
Thermal Processes: (1 & 2) No
String/Weave Bead: (1 & 2) Stringer and weave bead
Oscillation: (1 & 2) N/A
Mult./Single Pass (per side): (1 & 2) Multipass
Mult./Single Electrode: (1 & 2) N/A
Nozzle/Gas Cup Size: (2) .625
Contact Tube to Work Dist.: (2) 3/4

(1) *Rev. 1 (4/3/08): Added Brinell Hardness
**Rev. 2 (10/15/09): Added SI Material
***Rev. 3 (9/18/15): Updated to latest Prowrite Format.

(2) ****Rev. 4 (1/7/2017): Added NACE MRO175 Vickers Hardness to PQR - Lab #M170005 Welder: Arturo Vallejo.
****SEE LAB REPORT FOR ACTUAL HARDNESS READING LOCATIONS

ISTI Plant Services

Procedure Qualification Record (PQR)

PQR No.: P1-P1-1003 Rev.4 (1/5/2017)

Tensile Test (QW-150)

Specimen No.	Width (in.)	Thickness (in.)	Area (in^2)	Ultimate Total Load (lb)	Ultimate Stress (PSI)	Failure Type and Location
1	0.758	1.521	1.15	84350	73300	Ductile - BM
2	0.753	1.527	1.15	83850	72900	Ductile - BM

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.2 Side bend	Passed	QW-462.2 Side bend	Passed
QW-462.2 Side bend	Passed	QW-462.2 Side bend	No defects noted
None		None	

Hardness Test - Brinell/Vickers hardness

Location	Readings								
	1	2	3	4	5	6	7	8	9
SA-516, Grade 70 BM (Brinell)	264	266	258	267	263	269			
SA-516, Grade 70 HAZ (Brinell)	275	273	270	276	275	281			
Weld metal (Brinell)	281	281	289						
SA-106, Grade B BM (Vickers)	159.7	167.5	175.6	169					
SA-106, Grade B HAZ (Vickers)	197.4	199.1	233.6	223.6	178.1	176.1	194.6	186.6	172.9
SA-106, Grade B HAZ (Vickers).	174								
Weld metal (Vickers)	194.3	188.7	184.6	189.9	172.7				

Visual Examination: Acceptable

Welders/Lab Numbers
Jimmy Dick Lab# 102124377
Erik Medrando Lab# 102126341
Arturo Vallejo Lab# W170005

Welder's Name: J. Dick -4377 E. Medrando-6341 A. Vallejo-7005 ID: _____ Stamp: _____

Welding of coupon was witnessed by: ISTI Plant Services

Tests Conducted By: Tulsa Gamma Ray Test ID.: See Above

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Approved By: Rod Wolfe 1/5/2017
Date

TULSA GAMMA RAY, INC.
INSPECTION DIVISION
1127 S. Lewis Avenue Tulsa, OK 74104-3900
Phone 918-585-3228 Fax 918-584-5598

TEST REPORT

PQR# P1-P1-1003
WPS# 1003
Lab No. 102124377
Material SA516-70
Thickness 1.500"

Date 11-15-06

TENSILE TEST (QW-150)

SPECIMEN NO.	WIDTH	THICKNESS	AREA	ULTIMATE TOATL LOAD (LB)	ULTIMATE UNIT STRESS (PSI)	TYPE OF FAILURE & LOCATION
1	0.758"	1.521"	1.15	84,350	73,300	Ductile-Base
2	0.753"	1.527"	1.15	83,850	72,900	Ductile-Base

GUIDED BEND TESTS (QW-160)

	TYPE AND FIGURE NO.		RESULTS
#1	SIDE BEND	QW-462.2	NO DEFECT GREATER THAN 1/8". "PASSED"
#2	SIDE BEND	QW-462.2	NO DEFECT GREATER THAN 1/8". "PASSED"
#3	SIDE BEND	QW-462.2	NO DEFECT GREATER THAN 1/8". "PASSED"
#4	SIDE BEND	QW-462.2	NO DEFECT GREATER THAN 1/8". "PASSED"

Welder Jimmy Dick

ISTI PLANT SERVICES
Client

JP
Submitted by John Phillips

All test performed in accordance to methods specified in ASTM A370 & ASME Sec. IX

TULSA GAMMA RAY, INC.

1127 S Lewis Ave Tulsa, OK 74104
918.585.3228

MECHANICAL TEST REPORT

☐ Welder Qualification ☒ Weld Procedure Evaluation

Organization	ISTI PLANT SERVICES	**LAB #**	102126341
Base Metal Type	SA106B	**PWHT**	N.A.
Coupon Thickness	6" Sch 120 (6.625" x 0.562")	**PQR#**	P1-P1-1003
WPS No.	1003	**Filler**	ER70S-6/E71T-12M
Weld Process	GTAW/FCAW	**Position**	6G
Welder's Name	Erik Medrando		

BENDS

Specimen Number	Bend Type	Results/Comments
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A

TENSILE TESTS

Specimen Number	Specimen Size	Specimen Area sq. in.	Load at Failure PSI	Ultimate Tensile PSI	Break Location
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A

HARDNESS IN BHN

Material 1			Heat Affected Zone			Weld Metal		
1	2	3	1	2	3	1	2	3
264	266	258	275	273	270	281	281	289
Material 2			**Heat Affected Zone**					
1	2	3	1	2	3			
267	263	269	276	275	281			

CHARPY V-NOTCH IMPACT TESTING

Specimen Number	Specimen Type	Specimen Size	Temp. F	Value Ft./Lbs.	Lateral Expansion	Percent Shear
NONE	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Other Tests Performed: NONE

Heat Treatment per ASME Sec. VIII Div 1 UCS-56. Impacts per UG-84.
All test performed in accordance to methods specified in ASME SA-370 & ASME Sec. IX.

Signature JOHN PHILLIPS JP

Date 4-3-08

American Piping Inspection, Metallurgical Lab
18501 E. Admiral Pl. Catoosa, Oklahoma 74015
Office: (918) 266-4130

Form: MR-8
Established: 10/2/16
Revision: 0
Date: 10/2/16

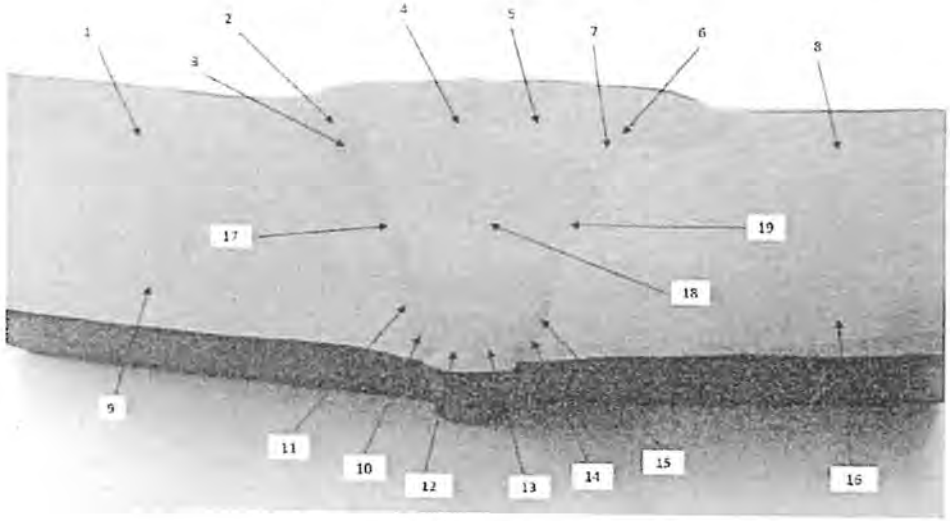
Mechanical/Lab Test Report

Organization:	ISTI Plant Services	Lab Number:	M170005 Rev. 0
Base Material:	1 SA-106 GRB to 2 SA-106 GRB	Heat Number:	N/A
Coupon Dimension:	6.625" O.D. x 0.562" Pos. 1GR	Welder Name/ID:	Arturo Vallejo ID. N/A
WPS/PQR #:	1003	Process(es):	GTAW/FCAW
Filler Metal:	ER70S-6/E71T-12M	PWHT:	N/A

Vickers Hardness (HV10)

Indention Number	Location	Hardness Value	Indention Number	Location	Hardness Value	Indention Number	Location	Hardness Value
1	BM	159.7	11	HAZ	176.1	N/A		
2	HAZ	197.4	12	WM	184.6	N/A		
3	HAZ	199.1	13	WM	189.9	N/A		
4	WM	194.3	14	HAZ	194.6	N/A		
5	WM	188.7	15	HAZ	186.6	N/A		
6	HAZ	233.6	16	BM	169	N/A		
7	HAZ	223.6	17	HAZ	172.9	N/A		
8	BM	167.5	18	WM	172.7	N/A		
9	BM	175.6	19	HAZ	174	N/A		
10	HAZ	178.1	N/A			N/A		
	Average BM:	167.95		Average HAZ:	193.6		Average WM:	186.04

For Reference Only



Comments

Other Tests: N/A

All testing performed in accordance with the methods specified in NACE MR0175

Approved by: Eric Darge Date: 1/5/2017 Signature:

Title: Certified Associate Welding Inspector

ISTI Plant Services
17207 East 21st Street
Tulsa, Ok 74134

Welding Procedure Specification (WPS)

WPS No.: 1004. Date: 10/16/2006 Rev.: 4 Date: 1/5/2017 Page: 1 of 2

By: Date Signed: 1/5/2017

Supporting PQR's: P1-P1-1004 Rev. 4 (1/5/2017)

Welding Process(es) / Type(s): (1) GMAW / Semiautomatic (2) FCAW / Semiautomatic

Joints (QW-402)

Joint Design: Groove and fillet welds

Joint Type	Backing	Root Opening	Groove Angle	Root Face	Groove Radius
Single-V groove	No backing	3/16" max	50 deg min	1/8" max	-
Single bevel	No backing	3/16" max	45 deg min	1/8" max	-
Single-V groove	Gouged & back welded	1/4" max	50 deg min	3/16" max	-
Double bevel	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Double-V groove	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Square groove	T-joint	1/32" max	-	-	-
Square groove	No backing	3/32" max	-	-	-

Fillet Welds: All fillet sizes on all base metal thicknesses and all diameters.

Retainers: None

All groove weld joint details musdt be approved by Company Representative.

WELD JOINT DESCRIPTIONS SHOWN ARE NOT INCLUSIVE OF ALL THOSE FOUND ON A JOB. WELD JOINT DESIGN REFERENCE IN AN ENGINEERING SPECIFICATION OR A DESIGN DRAWING SHALL TAKE PRECEDENCE OVER WELD JOINTS SHOWN IN THIS WPS.

Base Metals (QW-403)

P-No.: 1 Group No.: 1 or 2 Thickness Range (in.): 0.1875 to 8.0000

to P-No.: 1 Group No.: 1 or 2

*Rev. 1 (7/5/2007): Deleted SA516-70 Material Spec
**Rev. 2 (9/10/2015): Updated to latest Prowrite Format
***Rev. 3 (4/11/2016): Updated contact to work distances, corrected GMAW mode of transfer to reflect actual Volts &Amps used, added Group 2 designation of P Number & added groove weld joint detail approval by Company Representative statement.
****Rev. 4 (1/5/2017): Added NACE MR0175 Vickers Hardness to PQR.

Filler Metals (QW-404)

Spec. No. (SFA): (1) 5.18 (2) 5.20

AWS No. (Class): (1) ER70S-6 (2) E71T-12M

F No.: (1 & 2) 6 A No.: (1 & 2) (verify chemistry)

Weld Metal Thickness Range: (1) 0.2500 in. maximum No Pass Greater Than ½" Allowed
(2) 8.0000 in. maximum No Pass Greater Than ½" Allowed

Flux Type: N/A

Flux Trade Name: N/A

Consumable Insert: N/A

Other:

Product Form: (1) Bare (Solid) (2) Flux cored

Supplemental Filler Metal: (1 & 2) None

Strip Thickness or Width (in.) : N/A

ISTI Plant Services

Welding Procedure Specification (WPS)

WPS No.: 1004. Date: 10/16/2006 Rev.: 4 Date: 1/5/2017 Page: 2 of 2

Positions (QW-405)

Position of Joint: (1 & 2) All Positions

Weld Progression: (1 & 2) Vertical up

Preheat (QW-406)

Preheat Temp. Min.: 70 °F

Interpass Temp. Max.: 400 °F

Preheat Maintenance: None

Postweld Heat Treatment (QW-407)

Type: No PWHT will be performed

Temperature Range: None °F

Time Range: None

Gas (QW-408)

Gas Composition / Flow Rate

Shielding: (1 & 2) 75% Argon, 25% CO2 / 32-42 CFH

Trailing: (1 & 2) None

Backing: (1 & 2) None

Electrical Characteristics (QW-409)

Current Type / Polarity: (1 & 2) DCEP (reverse)

Tungsten Electrode Type and Size: (1 & 2) N/A

Mode of Metal Transfer for GMAW(FCAW): (1 & 2) Globular arc

Max. Heat Input (J/in): (1 & 2) None

Technique (QW-410)

Thermal Processes: (1 & 2) -

String or Weave Bead: (1 & 2) Stringer and weave bead

Orifice or Gas Cup Size: (1 & 2) 3/8" to 5/8"

Initial and Interpass Cleaning: Grind or wire brush clean 1 inch (25 mm) on both sides of weld joint

Method of Back Gouging: When required, grind until all defects are removed.

Oscillation: N/A

Contact Tube to Work Distance: (1) 1/2 to 3/4"" (2) 5/8" to 7/8"

Single or Multiple Passes (per side): (1) Multipass (2) -

Single or Multiple Electrodes: N/A

Peening: (1 & 2) None

Process Welding Parameters

Weld Layer(s) and/or Pass(es)	Process	Filler Metal		Current		Voltage Range	Travel Speed Range (in/min)
		Class	Diameter (in.)	Type / Polarity	Amperage Range		
Any	GMAW	ER70S-6	0.035	DCEP (reverse)	100-175	23-26	Var.
Any	GMAW	ER70S-6	0.045	DCEP (reverse)	150-250	23-27	Var.
Any	GMAW	ER70S-6	1/16	DCEP (reverse)	200-300	24-28	Var
Any	FCAW	E71T-12M	0.035	DCEP (reverse)	120-200	19-24	Var.
Any	FCAW	E71T-12M	0.045	DCEP (reverse)	150-225	22-26	Var.
Any	FCAW	E71T-12M	1/16	DCEP (reverse)	175-275	25-28	Var.
Any	FCAW	E71T-12M	5/64	DCEP (reverse)	200-400	26-32	Var.
Any	FCAW	E71T-12M	3/32	DCEP (reverse)	300-500	26-34	Var.

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Procedure Qualification Record (PQR)

PQR No.: P1-P1-1004 Rev. 4 (1/5/2017) WPS No.: 1004. Date: 1/5/2017 Page: 1 of 2

Welding Process(es) / Type(s): (1) GMAW / Semiautomatic (2) FCAW / Semiautomatic

Joints (QW-402)

Weld Type: Groove weld
Single-V groove
Backing: Open butt, no back weld
Root Opening: 1/8 in. Root Face: - in.
Groove Angle: 60 °

Base Metals (QW-403)

Material Spec., Type or Grade:
SA-516, Grade 70 to SA-516, Grade 70
P-No.: 1 Group No.: 2 to P-No.: 1 Group No.: 2
Thickness of Test Coupon (in.): 1.500

Filler Metals (QW-404)

SFA Specification: (1) 5.18 (2) 5.20
AWS Classification: (1) ER70S-6 (2) E71T-12M
Filler Metal F-No: (1 & 2) 6
Weld Metal Analysis A-No: (1 & 2) (verify chemistry)
Size of Filler Metal (in.): (1 & 2) 0.035
Weld Deposit 't' (in.): (1) 0.125 (2) 1.375
Pass Greater Than ½": (1 & 2) No
Filler Metal Product Form: (1) Bare (Solid) (2) Flux cored
Supplemental Filler Metal: (1 & 2) None

Positions (QW-405)

Position of Joint: (1 & 2) 1G - Flat
Weld Progression: (1 & 2) N/A

Preheat (QW-406)

Preheat Temp.: 70 °F
Interpass Temp.: 400 °F
Preheat Maintenance: None

Postweld Heat Treatment (QW-407)

Type: No PWHT performed
Temperature: None °F
Time: None hr

Gas (QW-408)

Gas Composition / Flow Rate
Shielding: (1 & 2) 75% Argon, 25% CO2 / 35 CFH
Trailing: (1 & 2) None
Backing: (1 & 2) None

Electrical Characteristics (QW-409)

Current / Polarity: (1 & 2) DCEP (reverse)
Amps: (1) 110 (2) 160
Volts: (1) 20 (2) 26
Tungsten Type / Size: (1 & 2) N/A
Transfer Mode: (1 & 2) Globular arc
Heat Input: (1 & 2) N/R

Technique (QW-410)

Travel Speed (in/min): (1) 4 (2) 5
Thermal Processes: (1 & 2) No
String/Weave Bead: (1 & 2) Stringer and weave bead
Oscillation: (1 & 2) N/A
Mult./Single Pass (per side): (1 & 2) Multipass
Mult./Single Electrode: (1 & 2) N/A
Nozzle/Gas Cup Size: (1 & 2) 3/8
Contact Tube to Work Dist.: (1 & 2) 1/2

(1)
*Rev. 1: Corrected FCAW Weld Metal Thickness.
**Rev. 2 (4/8/2008): Added Brinell Hardness.

(2) ***Rev. 3 (9/10/2015): Updated to latest Prowrite Format.
****Rev. 4 (1/5/2017): Added NACE MR0175 Vickers Hardness to PQR - Lab #W170004 Welder: Arturo Vallejo
****SEE LAB REPORT FOR ACTUAL HARDNESS READING LOCATIONS.

ISTI Plant Services

Procedure Qualification Record (PQR)

PQR No.: P1-P1-1004 Rev. 4 (1/5/2017)

Tensile Test (QW-150)

Specimen No.	Width (in.)	Thickness (in.)	Area (in^2)	Ultimate Total Load (lb)	Ultimate Stress (PSI)	Failure Type and Location
1	0.756	1.526	1.15	85425	74300	Ductile - BM
2	0.751	1.520	1.14	83450	73200	Ductile - BM

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.2 Side bend	Passed	QW-462.2 Side bend	Passed
QW-462.2 Side bend	Passed	QW-462.2 Side bend	Passed
None		None	

Hardness Test - Brinell/Vickers Hardness

Location	Readings								
	1	2	3	4	5	6	7	8	9
SA-516, Grade 70 BM (Brinell)	174	168	163	169	168	171			
SA-516, Grade 70 HAZ (Brinell)	174	168	171	175	182	183			
Weld metal (Brinell)	182	183	181						
SA-106, Grade B BM (Vickers)	177.2	181.7	184	179.7					
SA-106, Grade B HAZ (Vickers)	253.9	244.8	211.7	205.4	184.6	186.6	174	184.3	181.4
SA-106, Grade B HAZ (Vickers),	189.6								
Weld metal (Vickers)	187.2	192.7	181.9	167	175.6				

Jimmy Dick-102124379
Mike Littrell-102126352
Arturo Vallejo-W170004

Welder's Name: J. Dick-4379 M. Littrell-6352 A. Vallejo-004 ID: _____ Stamp: _____

Welding of coupon was witnessed by: ISTI Plant Services

Tests Conducted By: Tulsa Gamma Ray Test ID.: See Above

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Approved By: _____ 1/5/2017
Date

TULSA GAMMA RAY, INC.
INSPECTION DIVISION
1127 S. Lewis Avenue Tulsa, OK 74104-3900
Phone 918-585-3228 Fax 918-584-5598

TEST REPORT

PQR# P1-P1-1004
WPS# 1004
Lab No. 102124379
Material SA516-70
Thickness 1.500"

Date 10-16-06

Weld Process GMAW/FCAW (ER70S-6/E71T-12M)

TENSILE TEST (QW-150)

SPECIMEN NO.	WIDTH	THICKNESS	AREA	ULTIMATE TOATL LOAD (LB)	ULTIMATE UNIT STRESS (PSI)	TYPE OF FAILURE & LOCATION
1	0.756	1.526	1.15	85425	74300	Ductile-BM
2	0.751	1.520	1.14	83450	73200	Ductile-BM

GUIDED BEND TESTS (QW-160)

TYPE AND FIGURE NO.	RESULTS
1 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
2 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
3 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
4 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"

Welder Jimmy Dick

ISTI PLANT SERVICES
Client

Submitted by John Phillips

TULSA GAMMA RAY, INC.

1127 S Lewis Ave Tulsa, OK 74104
918.585.3228

MECHANICAL TEST REPORT

☒Welder Qualification ☒Weld Procedure Evaluation

Organization	ISTI plant Services	LAB #	102126352
Base Metal Type	SA106B	PWHT	NONE
Coupon Thickness	6" S/120 (6.625" x .562"wall)		
WPS No.	1004	Weld Process	GMAW/FCAW
Welder's Name	Mike Littrell	ID#	N/A

BENDS

Specimen Number	Bend Type	Results/Comments	
1	Side Bend	No Relevant Indications	PASSED
1	Side Bend	No Relevant Indications	PASSED
3	N/A	N/A	
4	N/A	N/A	

TENSILE TESTS

Specimen Number	Specimen Size	Specimen Area sq. in.	Load at Failure PSI	Ultimate Tensile PSI	Break Location
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A

HARDNESS IN BHN

Material 1			Heat Affected Zone			Weld Metal		
1	2	3	1	2	3	1	2	3
174	168	163	174	168	171	182	183	181
Material 2			**Heat Affected Zone**					
1	2	3	1	2	3			
169	1268	171	175	182	183			

CHARPY V-NOTCH IMPACT TESTING

Specimen Number	Specimen Type	Specimen Size	Temp. F	Value Ft./Lbs.	Lateral Expansion	Percent Shear
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Other Tests Performed: NONE

All test performed in accordance to methods specified in ASME SA-370 & ASTM Sec. IX.

Signature John Phillips JP Date 4-8-08

American Piping Inspection, Metallurgical Lab

18501 E. Admiral Pl. Catoosa, Oklahoma 74015
Office: (918) 266-4130

Form: MR-8
Established: 10/2/16
Revision: 0
Date: 10/2/16

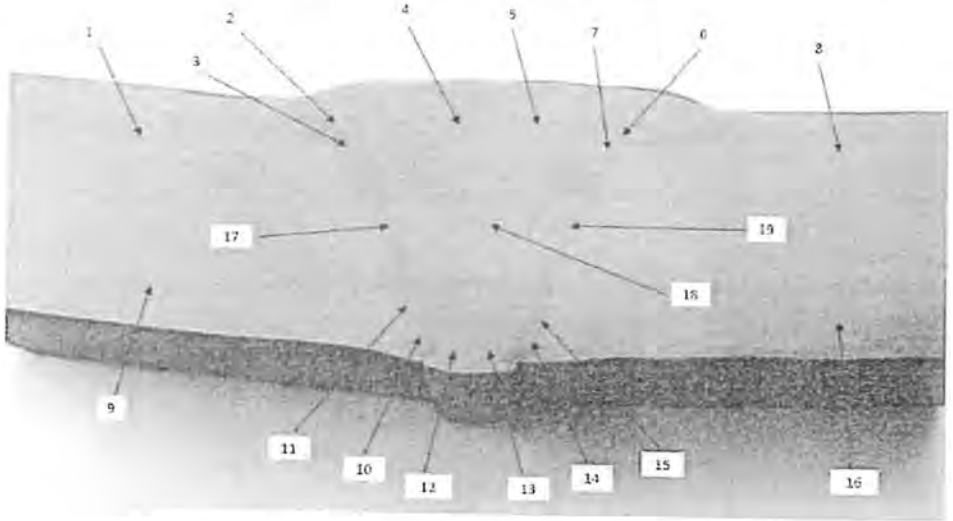
Mechanical/Lab Test Report

Organization:	ISTI Plant Services	Lab Number:	W170004 Rev. 0
Base Material:	1 SA-106 GRB to 2 SA-106 GRB	Heat Number:	N/A
Coupon Dimension:	6.625" O.D. x 0.562" Pos. IGR	Welder Name/ID:	Arturo Vallejo ID. N/A
WPS/PQR #:	1004	Process(es):	GMAW/FCAW
Filler Metal:	ER70S-6/E71T-12M	PWHT:	N/A

Vickers Hardness (HV10)

Indention Number	Location	Hardness Value	Indention Number	Location	Hardness Value	Indention Number	Location	Hardness Value
1	BM	177.2	11	HAZ	186.6	N/A		
2	HAZ	253.9	12	WM	171.9	N/A		
3	HAZ	244.8	13	WM	167	N/A		
4	WM	187.2	14	HAZ	174	N/A		
5	WM	192.7	15	HAZ	184.3	N/A		
6	HAZ	211.7	16	BM	179.7	N/A		
7	HAZ	205.4	17	HAZ	181.4	N/A		
8	BM	181.7	18	WM	175.6	N/A		
9	BM	184	19	HAZ	189.6	N/A		
10	HAZ	184.6	N/A			N/A		
	Average BM:	180.65		Average HAZ:	201.63		Average WM:	178.88

For Reference Only



Comments

Other Tests: N/A

All testing performed in accordance with the methods specified in NACE MR0175

Approved by: Josh Mattox Date: 1/5/2017 Signature:

Title: Certified Welding Inspector

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Welding Procedure Specification (WPS)

WPS No.: 1005 Date: 11/20/2006 Rev.: 7 Date: 1/23/2018 Page: 1 of 2

By: Rob Hola Date Signed: 1/23/2018

Supporting PQR's: P8-P8-1005-SS ; P8-P8-1005-SS-Supplemental

Welding Process(es) / Type(s): GTAW / Manual

Joints (QW-402)

Joint Design: Groove and fillet welds

Joint Type	Backing	Root Opening	Groove Angle	Root Face	Groove Radius
Single-V groove	No backing	3/16" max	50 deg min	1/8" max	-
Single bevel	No backing	3/16" max	45 deg min	1/8" max	-
Single-V groove	Gouged & back welded	1/4" max	50 deg min	3/16" max	-
Double bevel	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Double-V groove	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Square groove	T-joint	1/32" max	-	-	-
Square groove	No backing	3/32" max	-	-	-

Fillet Welds: All fillet sizes on all base metal thicknesses and all diameters.

Retainers: None

SEE ENGINEERING DRAWINGS FOR MISALIGNMENT TOLERANCES. INTERNAL MISALIGNMENT TO BE 1/4 OF WALL THICKNESS, NOT TO EXCEED 1/8" MAX.

WELD JOINT DESCRIPTIONS SHOWN ARE NOT INCLUSIVE OF ALL THOSE FOUND ON A JOB. WELD JOINT DESIGN REFERENCE IN AN ENGINEERING SPECIFICATION OR A DESIGN DRAWING SHALL TAKE PRECEDENCE OVER WELD JOINTS SHOWN IN THIS WPS.

Base Metals (QW-403)

P-No.: 8 Group No.: 1 Thickness Range (in.): 0.1875 to 8.0000

to P-No.: 8 Group No.: 1

Rev. 1 11/8/08 Added Filler Metal to Base Metal direction.
Rev. 2 9/24/14 Added Backing Gas maintenance notation.
Rev. 3 7/12/16 Clarified no autogenous welding allowed and GTAW bead width limited to 4.5x filler metal diameter.
Rev. 4 7/28/16 Corrected typo from Rev. 3. Weld wire from ER70S-6 to ER308L
Rev. 5 10/20/17 Removed preheat rquirement and lowered interpass temperature to -350°F.
Rev. 6 12/7/17 Added PQR P8-P8-1005-SS-Supplemental to include NACR MR0175 hardness.
Rev. 7 1/23/18 Corrected SFA # to 5.9 & added filler metal to base metal claification

Filler Metals (QW-404)

Spec. No. (SFA): 5.9

AWS No. (Class): ER308L or ER316L

Filler Metal Use: Filler Metal Used

F No.: 6 A No.: 8

Weld Metal Thickness Range: 8.0000 in. maximum

Flux Type: N/A

Flux Trade Name: N/A

Consumable Insert: None

Other:

Flux: None

Product Form: Bare (Solid)

Strip Thickness or Width (in.) : N/A

ISTI Plant Services

Welding Procedure Specification (WPS)

WPS No.: 1005 Date: 11/20/2006 Rev.: 7 Date: 1/23/2018

Positions (QW-405)

Position of Joint: All Positions

Weld Progression: Vertical up

Postweld Heat Treatment (QW-407)

Type: No PWHT will be performed

Temperature Range: None °F

Time Range: None

Preheat (QW-406)

Preheat Temp. Min.: 50 °F

Interpass Temp. Max.: 350 °F

Preheat Maintenance: None

Gas (QW-408)

Gas Composition / Flow Rate

Shielding: 100% Argon / 27-36 CFH

Trailing: None

Backing: 100% Argon / 23-30 CFH

Electrical Characteristics (QW-409)

Current Type / Polarity: DCEN (straight)

Pulsed Current: None

Tungsten Electrode Type and Size: EWTh-2 / 1/8

Mode of Metal Transfer for GMAW(FCAW): N/A

Max. Heat Input (J/in): None

Technique (QW-410)

Thermal Processes: -

String or Weave Bead: Stringer or weave bead

Orifice or Gas Cup Size: #5 to #10

Initial and Interpass Cleaning: With Stainless steel brush clean 2 inches (50 mm) on both sides of weld joint

Method of Back Gouging: When required, grind until all defects are removed.

Oscillation: N/A

Contact Tube to Work Distance: N/A

Single or Multiple Passes (per side): Multipass

Single or Multiple Electrodes: N/A

Peening: None

Backing gas must be maintained through 2nd pass or until 0.250" weld deposit achieved.
No Autogenous welding allowed
GTAW Bead Width limited to 4.5x the filler metal diameter.

Process Welding Parameters

Weld Layer(s) and/or Pass(es)	Process	Filler Metal		Current		Voltage Range	Travel Speed Range (in/min)
		Class	Diameter (in.)	Type / Polarity	Amperage Range		
Any	GTAW	ER308L	3/16	DCEN (straight)	200-375	n/r	Var.
Any	GTAW	ER316L	1/8"	DCEN (straight)	130-275	n/r	Var.
Any	GTAW	ER308L	3/32	DCEN (straight)	80-180	n/r	Var.
Any	GTAW	ER316L	3/16	DCEN (straight)	200-375	n/r	Var.
Any	GTAW	ER308L	1/8	DCEN (straight)	130-275	n/r	Var.
Any	GTAW	ER316L	3/32	DCEN (straight)	80-180	n/r	Var.

Notes

Filler Metal to Base Metal
Filler Metal ER308L allowable for 304 & 304L Base Metal.
Filler Metal ER316L allowable for 316 & 316L Base Metal

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Procedure Qualification Record (PQR)

PQR No.: P8-P8-1005-SS WPS No.: 1005 Date: 11/20/2006 Page: 1 of 2

Welding Process(es) / Type(s): GTAW / Manual

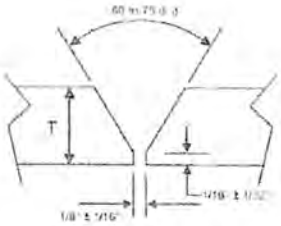
Joints (QW-402)

Weld Type: Groove weld
Single-V groove

Backing: Open butt, no back weld

Root Opening: 5/32 in. Root Face: 0 in.

Groove Angle: 37.5 °



SINGLE VEE GROOVE

Base Metals (QW-403)

Material Spec., Type or Grade:

SA-240, Type 304L to SA-240, Type 304L

P-No.: 8 Group No.: 1 to P-No.: 8 Group No.: 1

Thickness of Test Coupon (in.): 1.500

Filler Metals (QW-404)

SFA Specification: 5.9
AWS Classification: ER308L
Filler Metal Use: Filler Metal Used
Filler Metal F-No: 6
Weld Metal Analysis A-No: 8
Size of Filler Metal (in.): 1/8
Weld Deposit 't' (in.): 1.500
Filler Metal Product Form: Bare (Solid)
Consumable Insert: None
Flux: None

Positions (QW-405)

Position of Joint: 1G - Flat
Weld Progression: N/A

Preheat (QW-406)

Preheat Temp.: 50 °F
Interpass Temp.: 300 °F
Preheat Maintenance: None

Postweld Heat Treatment (QW-407)

Type: No PWHT performed
Temperature: None °F
Time: None hr

Gas (QW-408)

Gas Composition / Flow Rate

Shielding: 100% Argon / 30 CFH
Trailing: None
Backing: 100% Argon / 25 CFH

Electrical Characteristics (QW-409)

Current / Polarity: DCEN (straight)
Amps: 180
Volts: NR
Tungsten Type / Size: EWTh-2 / 1/8
Heat Input: N/R
Pulsed Current: None

Technique (QW-410)

Travel Speed (in/min): NR
Thermal Processes: (1)No
String/Weave Bead: Stringer bead
Oscillation: N/A
Mult./Single Pass (per side): Multipass
Mult./Single Electrode: N/A
Nozzle/Gas Cup Size: 6

Additional Welding Parameters

Layer(s) and/or Pass(es)	Process	Filler Metal AWS Classification	Filler Metal Size (in.)	Current Type / Polarity	Current Amperage Range	Voltage Range	Travel Speed Range (in/min)
ALL	GTAW	ER308L	1/8	DCEN (straight)	180	NR	NR

ISTI Plant Services

Procedure Qualification Record (PQR)

PQR No.: P8-P8-1005-SS

Tensile Test (QW-150)

Specimen No.	Width (in.)	Thickness (in.)	Area (in^2)	Ultimate Total Load (lb)	Ultimate Stress (PSI)	Failure Type and Location
1	0.755	1.520	1.15	93120	81000	Ductile - BM
2	0.753	1.523	1.15	94050	81800	Ductile - BM

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.2 Side bend	Acceptable	QW-462.2 Side bend	Acceptable
QW-462.2 Side bend	Acceptable	QW-462.2 Side bend	Acceptable
None		None	

Macro-Examination Test: None

Visual Examination: Acceptable

Liquid Penetration Test: None

Updated to latest ASME fromat by American Piping Inspection-Metlab 7/12/16

Welder's Name: Jimmy Dick ID: _____ Stamp: _____

Welding of coupon was witnessed by: ISTI Plant Services

Tests Conducted By: Tulsa Gamma Ray Test ID.: 102124373

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Approved By: _____ 11/20/2006
Date

TULSA GAMMA RAY, INC.
INSPECTION DIVISION
1127 S. Lewis Avenue Tulsa, OK 74104-3900
Phone 918-585-3228 Fax 918-584-5598

TEST REPORT

PQR# P8-P8-1005-SS
WPS# 1005
Lab No. 102124373
Material SA240-304L
Thickness 1.500"

Date 11-20-06

Weld Process GTAW ER308L

TENSILE TEST (QW-150)

SPECIMEN NO.	WIDTH	THICKNESS	AREA	ULTIMATE TOATL LOAD (LB)	ULTIMATE UNIT STRESS (PSI)	TYPE OF FAILURE & LOCATION
1	0.755	1.520	1.15	93120	81000	Ductile-BM
2	0.753	1.523	1.15	94050	81800	Ductile-BM

GUIDED BEND TESTS (QW-160)

TYPE AND FIGURE NO.	RESULTS
1 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
2 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
3 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"
4 SIDE BEND	NO DEFECT GREATER THAN 1/8". "PASSED"

Welder Jimmy Dick

ISTI PLANT SERVICES
Client

Submitted by John Phillips

American Piping Inspection, Metallurgical Lab
18501 E. Admiral Pl. Catoosa, Oklahoma 74015
Office: (918) 266-4130

Form: MR-16
Established: 10/2/16
Revision: 0
Date: 10/2/16

Mechanical/Lab Test Report

Organization:	ISTI Plant Services	Lab Number:	M170193 Rev. 0
Base Material:	1 SA-312 TP304L to 2 SA-312 TP304L	Heat Number:	N/A
Coupon Dimension:	10.750" O.D. x 0.325" Pos. IGR	Welder Name/ID:	Eulid Valezquez ID. N/A
WPS/PQR #:	1005	Process(es):	GTAW
Filler Metal:	ER308L	PWHT:	N/A

Charpy V-Notch Impact Test

Specimen Number	Specimen Size (mm)	V-Notch Location	Temperature (°F)	Impact Value (ft/lbs)	Lateral Expansion (mils)	Percent Shear (%)	Average (ft/lbs)
1	10 x 7.5	WM	-325	41	0.037	30	38.67
2	10 x 7.5	WM	-325	37	0.043	40	
3	10 x 7.5	WM	-325	38	0.043	20	
4	10 x 7.5	HAZ	-325	67	0.047	40	68
5	10 x 7.5	HAZ	-325	70	0.055	40	
6	10 x 7.5	HAZ	-325	67	0.048	45	
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							

Comments

*Pipe honed to 0.325" wall thickness by customer.
*Minimum thickness shall be 0.325" when used for Low-Temp. Sevice.

Other Tests: N/A

All testing performed in accordance with the methods specified in ASME SEC IX

Approved by: Eric Darge Date: 2/7/2017 Signature:

Title: Certified Associate Welding Inspector

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Procedure Qualification Record (PQR)

PQR No.: P8-P8-1005-SS-Supplemental WPS No.: 1005 Date: 12/2/2017 Page: 1 of 2
Welding Process(es) / Type(s): GTAW / Manual

Joints (QW-402)
Weld Type: Groove weld
Single-V groove
Backing: Open butt, no back weld
Root Opening: 0.125 in. Root Face: 0 in.
Groove Angle: 75 °

Base Metals (QW-403)
Material Spec., Type or Grade:
SA-312, TP304L to SA-312, TP304L
P-No.: 8 Group No.: 1 to P-No.: 8 Group No.: 1
Thickness of Test Coupon (in.): 0.432
Diameter of Test Coupon (in.): 6.625

Filler Metals (QW-404)
SFA Specification: 5.9
AWS Classification: ER308L
Filler Metal Use: Filler Metal Used
Filler Metal F-No: 6
Weld Metal Analysis A-No: 8
Size of Filler Metal (in.): 1/8
Weld Deposit 't' (in.): 0.432
Filler Metal Product Form: Bare (Solid)
Consumable Insert: None
Flux: None

Positions (QW-405)
Position of Joint: 1GR - Rotated
Weld Progression: N/A

Preheat (QW-406)
Preheat Temp.: 50 °F
Interpass Temp.: 300 °F
Preheat Maintenance: None

Postweld Heat Treatment (QW-407)
Type: No PWHT performed
Temperature: None °F
Time: None hr

Gas (QW-408)
Gas Composition / Flow Rate
Shielding: 100% Argon / 30 CFH
Trailing: None
Backing: 100% CO2 / 25 CFH

Electrical Characteristics (QW-409)
Current / Polarity: DCEN (straight)
Amps: 180
Volts: n/r
Tungsten Type / Size: EWTh-2 / 1/8
Heat Input: N/R
Pulsed Current: None

Technique (QW-410)
Travel Speed (in/min): n/r
Thermal Processes: (1)No
String/Weave Bead: Stringer bead
Oscillation: N/A
Mult./Single Pass (per side): Multipass
Mult./Single Electrode: N/A
Nozzle/Gas Cup Size: 6

ISTI Plant Services

Procedure Qualification Record (PQR)

PQR No.: P8-P8-1005-SS-Supplemental

Hardness Test - Vickers hardness

Location	Readings								
	1	2	3	4	5	6	7	8	9
SA-312, TP304L BM#1	1-240	9-242							
SA-312, TP304L HAZ#1	2-246	3-244	10-246	11-243	17-241				
Weld metal	4-241	5-243	12-248	13-247	18-245				
SA-312, TP304L HAZ#2	6-247	7-243	14-246	15-243	19-237				
SA-312, TP304L BM#2	8-238	16-235							

Macro-Examination Test: None

Visual Examination: Acceptable

Liquid Penetration Test: None

Refer to attached mechanical report diagram for individual hardness placement.

Welder's Name: Cardenas, Francisco ID: _____ Stamp: V8

Welding of coupon was witnessed by: ISTI Plant Services

Tests Conducted By: American Piping Inspection Test ID.: M172124

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Approved By: _____ 12/2/2017
Date

American Piping Inspection, Metallurgical Lab

18501 E. Admiral Pl. Catoosa, Oklahoma 74015
Office: (918) 266-4130

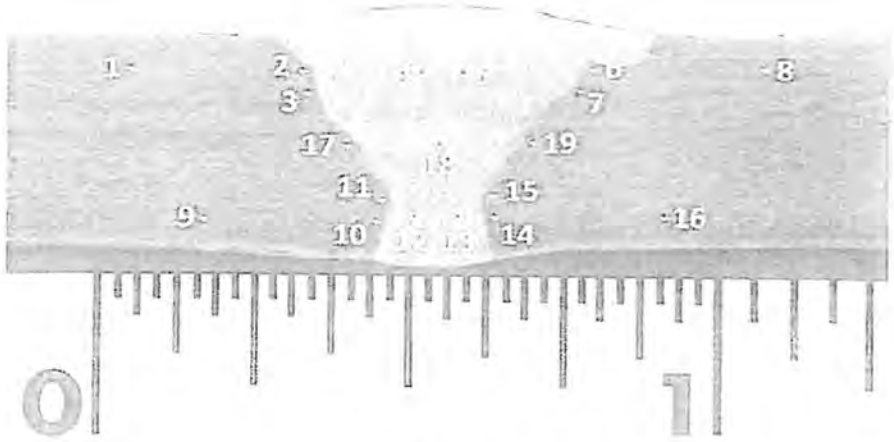
Form: MR-8
Established: 10/2/16
Revision: 0
Date: 10/2/16

Mechanical/Lab Test Report

Organization:	ISTI Plant Services	Lab Number:	M172124 Rev:
Base Material:	1 SA312-304L to 2 SA312-304L	Heat Number:	
Coupon Dimension:	6" Sch 80 (.432" WT) Pos. 1GR	Welder Name/ID:	Francisco Cardenas ID. V8
WPS/PQR #:	1005 / P8-P8-1005-SS	Process(es):	GTAW
Filler Metal:	ER308L	PWHT:	N/A

Vickers Hardness (HV10) Electrolytic 10% Oxalic Etch

Indention Number	Location	Hardness Value	Indention Number	Location	Hardness Value	Indention Number	Location	Hardness Value
1	BM	240	11	HAZ	243	N/A		
2	HAZ	246	12	WM	248	N/A		
3	HAZ	244	13	WM	247	N/A		
4	WM	241	14	HAZ	246	N/A		
5	WM	243	15	HAZ	243	N/A		
6	HAZ	247	16	BM	235	N/A		
7	HAZ	243	17	HAZ	241	N/A		
8	BM	238	18	WM	245	N/A		
9	BM	242	19	HAZ	237	N/A		
10	HAZ	246	N/A			N/A		
	Average BM:	238.75		Average HAZ:	243.6		Average WM:	244.3



Comments

Other Tests:

All testing performed in accordance with the methods specified in: NACE MR0175

Approved by: Jason Pierce Date: 12/2/2017 Signature:

Title: Laboratory Manager

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Welding Procedure Specification (WPS)

WPS No.: 1012 Date: 5/12/2007 Rev.: 1. Date: 6/30/2016 Page: 1 of 2

By: Date Signed: 6/30/2016

Supporting PQR's: P1-P1-1012

Welding Process(es) / Type(s): (1) GTAW / Manual (2) FCAW / Semiautomatic

Joints (QW-402)

Joint Design: Groove and fillet welds

Joint Type	Backing	Root Opening	Groove Angle	Root Face	Groove Radius
Single-V groove	No backing	3/16" max	50 deg min	1/8" max	-
Single bevel	No backing	3/16" max	45 deg min	1/8" max	-
Single-V groove	Gouged & back welded	1/4" max	50 deg min	3/16" max	-
Double bevel	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Double-V groove	Gouged & back welded	1/4" max	45 deg min	3/16" max	-
Square groove	T-joint	1/32" max	-	-	-
Square groove	No backing	3/32" max	-	-	-

Fillet Welds: All fillet sizes on all base metal thicknesses and all diameters.

Retainers: None

SEE ENGINEERING DRAWINGS FOR MISALIGNMENT TOLERANCES. INTERNAL MISALIGNMENT TO BE 1/4" OF WALL THICKNESS, NOT TO EXCEED 1/8" MAX.

WELD JOINT DESCRIPTIONS SHOWN ARE NOT INCLUSIVE OF ALL THOSE FOUND ON A JOB. WELD JOINT DESIGN REFERENCE IN AN ENGINEERING SPECIFICATION OR A DESIGN DRAWING SHALL TAKE PRECEDENCE OVER WELD JOINTS SHOWN IN THIS WPS.

Base Metals (QW-403)

P-No.: 1 Group No.: 1 Thickness Range (in.): 0.432 to 0.8640

to P-No.: 1 Group No.: 1

Filler Metals (QW-404)

Spec. No. (SFA): (1) 5.18 (2) 5.20

AWS No. (Class): (1) ER70S-6 (2) E71T-12M

Filler Metal Use: (1) Filler Metal Used

F No.: (1 & 2) 6 A No.: (1) (verify chemistry) (2) 1

Weld Metal Thickness Range: (1) 0.3750 in. maximum (2) 0.4890 in. maximum No Pass Greater Than ½" Allowed

Flux Type: N/A

Flux Trade Name: N/A

Consumable Insert: (1) None

Other:

Flux: (1) None

Product Form: (1) Bare (Solid) (2) Flux cored

Trade Name: (2) Kobelco Frontiarc-711

Supplemental Filler Metal: (2) None

Strip Thickness or Width (in.): N/A

ISTI Plant Services

Welding Procedure Specification (WPS)

WPS No.: 1012 Date: 5/12/2007 Rev.: 1. Date: 6/30/2016

Positions (QW-405)

Position of Joint: (1 & 2) All Positions

Weld Progression: (1 & 2) Vertical up

Preheat (QW-406)

Preheat Temp. Min.: 70 °F

Interpass Temp. Max.: 550 °F

Preheat Maintenance: None

When Base Metal is < 50°F, preheat to 150°F minimum
200°F for Base Metal 1-1/4" to 1-1/2"

Postweld Heat Treatment (QW-407)

Type: No PWHT will be performed

Temperature Range: None °F

Time Range: None

Gas (QW-408)

Gas Composition / Flow Rate

Shielding: (1) 100% Argon / 23-30 CFH
(2) 75% Argon, 25% CO2 / 32-42 CFH

Trailing: (1 & 2) None

Backing: (1 & 2) None

Electrical Characteristics (QW-409)

Current Type / Polarity: (1 & 2) DCEP (reverse)

Pulsed Current: (1) None

Tungsten Electrode Type and Size: (1) EWTh-2 / 3/32 (2) N/A

Mode of Metal Transfer for GMAW(FCAW): (1) N/A (2) Globular arc

Max. Heat Input (J/in): (1) 48280 (2) 30360

Technique (QW-410)

Thermal Processes: (1 & 2) -

String or Weave Bead: (1 & 2) Stringer and weave bead

Orifice or Gas Cup Size: (1) #5 to #10 (2) 3/8" to 5/8"

Initial and Interpass Cleaning: With wire brush clean 1 inch (25 mm) on both sides of weld joint

Method of Back Gouging: When required, grind until all defects are removed.

Oscillation: N/A

Contact Tube to Work Distance: (2) N/A

Single or Multiple Passes (per side): (1) Multipass (2) Multipass

Single or Multiple Electrodes: N/A

Peening: (1 & 2) None

(1) GTAW Chemistry verified by manufacturer's typical Material Test Report (MTR).
GTAW Bead Width limited to 4.5x rod diameter.
No Autogenous Welding allowed

Process Welding Parameters

Weld Layer(s) and/or Pass(es)	Process	Filler Metal		Current		Voltage Range	Travel Speed Range (in/min)
		Class	Diameter (in.)	Type / Polarity	Amperage Range		
Any	GTAW	ER70S-6	1/8	DCEP (reverse)	100-142	14-17	3-6
Any	FCAW	E71T-12M	0.045	DCEP (reverse)	90-110	20-23	5-7

Notes

*Rev. 1 6/30/16: Corrected A-No. Designation, Clarified FCAW Type, and adjusted GTAW/FCAW parameters, added "No single weld pass greater than 1/2"" note, added "No Autogenous Welding allowed" note, added GTAW bead width note, added B31.3 misalignment tolerance note and Preheat note, added GTAW Chemistry verified note, added "Kobelco Frontiarc-71I" to filler metals

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Procedure Qualification Record (PQR)

PQR No.: P1-P1-1012 WPS No.: 1012 Date: 5/22/2007 Page: 1 of 2

Welding Process(es) / Type(s): (1) GTAW / Manual (2) FCAW / Semiautomatic

Joints (QW-402)
Weld Type: Groove weld
Single-V groove
Backing: Open butt, no back weld
Root Opening: 5/32 in. Root Face: 0 in.
Groove Angle: 60 °

Base Metals (QW-403)
Material Spec., Type or Grade:
SA-333, Grade 6 to SA-333, Grade 6
P-No.: 1 Group No.: 1 to P-No.: 1 Group No.: 1
Thickness of Test Coupon (in.): 0.432
Diameter of Test Coupon (in.): 6.625

Filler Metals (QW-404)
SFA Specification: (1) 5.18 (2) 5.20
AWS Classification: (1) ER70S-6 (2) E71T-12M
Filler Metal Use: (1) Filler Metal Used
Filler Metal F-No: (1 & 2) 6
Weld Metal Analysis A-No: (1) (verify chemistry) (2) 1
Size of Filler Metal (in.): (1) 1/8 (2) 0.045
Weld Deposit 't' (in.): (1) 0.1875 (2) 0.2445
Pass Greater Than ½": (2) No
Filler Metal Product Form: (1) Bare (Solid) (2) Flux cored
Supplemental Filler Metal: (2) None
Consumable Insert: (1) None
Flux: (1) None

Positions (QW-405)
Position of Joint: (1 & 2) 6G - 45 degree pipe
Weld Progression: (1 & 2) Vertical up

Preheat (QW-406)
Preheat Temp.: 70 °F
Interpass Temp.: 550 °F
Preheat Maintenance: None

Postweld Heat Treatment (QW-407)
Type: No PWHT performed
Temperature: None °F
Time: None hr

Gas (QW-408)
Gas Composition / Flow Rate
Shielding: (1) 100% Argon / 25 CFH
(2) 75% Argon, 25% CO2 / 35 CFH
Trailing: (1 & 2) None
Backing: (1 & 2) None

Electrical Characteristics (QW-409)
Current / Polarity: (1 & 2) DCEP (reverse)
Amps: (1) 142 (2) 110
Volts: (1) 17 (2) 23
Tungsten Type / Size: (1) EWTh-2 / 3/32 (2) N/A
Transfer Mode: (2) Globular arc
Wire Feed Speed: (2) N/A
Heat Input: (1) 48280 J/in (2) 30360 J/in
Pulsed Current: (1) None

Technique (QW-410)
Travel Speed (in/min): (1) 3 (2) 5
Thermal Processes: (1 & 2) No
String/Weave Bead: (1 & 2) Stringer and weave bead
Oscillation: (1 & 2) N/A
Mult./Single Pass (per side): (1 & 2) Multipass
Mult./Single Electrode: (1 & 2) N/A
Nozzle/Gas Cup Size: (1) 6 (2) N/A
Contact Tube to Work Dist.: (2) N/A

ISTI Plant Services

Procedure Qualification Record (PQR)

PQR No.: P1-P1-1012

Tensile Test (QW-150)

Specimen No.	Width (in.)	Thickness (in.)	Area (in^2)	Ultimate Total Load (lb)	Ultimate Stress (PSI)	Failure Type and Location
1	0.506	0.419	0.2120	13570	64006	Ductile - BM
2	0.517	0.426	0.2202	14380	65292	Ductile - BM

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.3(a) Face bend	Passed	QW-462.3(a) Root bend	Passed
QW-462.3(a) Face bend	Passed	QW-462.3(a) Root bend	Passed
None		None	

Toughness Test (QW-170)

Specimen Number	Notch Location	Notch Type	Test Temp. (°F)	Impact Value (ft-lb)	Lateral Expansion		Drop Weight Break
					Shear %	Mils	
1	Base metal	"V"	-40	21	10	18	Yes
2	Base metal	"V"	-40	16	10	15	Yes
3	Base metal	"V"	-40	18	10	17	Yes
4	Weld metal	"V"	-40	34	20	36	Yes
5	Weld metal	"V"	-40	20	10	21	Yes
6	Weld metal	"V"	-40	17	10	20	Yes
7	HAZ	"V"	-40	129	40	76	Yes
8	HAZ	"V"	-40	124	40	87	Yes
9	HAZ	"V"	-40	138	40	79	Yes
1.	Weld metal	"V"	-50	18	30	8	No
2.	Weld metal	"V"	-50	24	20	10	No
3.	Weld metal	"V"	-50	25	30	20	No
4.	HAZ	"V"	-50	45	35	30	No
5.	HAZ	"V"	-50	10	10	8	No
6.	HAZ	"V"	-50	80	30	54	No

(2/7/2017): Added -50F CVN Impacts to PQR – Lab #M170192 Welder: Eduardo Rubalcaba

Welder's Name: Raul Meza ID: _____ Stamp: _____

Welding of coupon was witnessed by: ISTI Plant Services

Tests Conducted By: Tulsa Gamma Ray, Inc. Test ID.: 102125172

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Approved By: Rod Wold 5/22/2017

Date

TULSA GAMMA RAY, INC.

1127 S Lewis Ave Tulsa, OK 74104
918.585.3228

MECHANICAL TEST REPORT

☐ Welder Qualification ☒ Weld Procedure Evaluation

Organization	ISTI plant Services	**LAB #**	102125172
Base Metal Type	SA333 gr. 6	**PWHT**	NONE
Coupon Thickness	6" S/80 (6.625" x .432"wall)		
WPS No.	1012	**Weld Process**	GTAW/FCAW
Welder's Name	Raul Meza	**ID#**	

BENDS

Specimen Number	Bend Type	Results/Comments	
1	Root Bend	No Relevant Indications	PASSED
1	Face Bend	No Relevant Indications	PASSED
3	Root Bend	No Relevant Indications	PASSED
4	Face Bend	No Relevant Indications	PASSED

TENSILE TESTS

Specimen Number	Specimen Size	Specimen Area sq. in.	Load at Failure PSI	Ultimate Tensile PSI	Failure Type & Break Location
1	0.506" x 0.419"	0.2120	13570	64006	Ductile – Base Metal
2	0.517" x 0.426"	0.2202	14380	65292	Ductile – Base Metal
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A

HARDNESS IN BHN

Material 1			Heat Affected Zone			Weld Metal		
1	2	3	1	2	3	1	2	3
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

CHARPY V-NOTCH IMPACT TESTING

Specimen Number	Notch Type	Notch Location	Specimen Size	Temp. °F	Value Ft./Lbs.	Lateral Expansion Shear %	Lateral Expansion Mils	Drop Weight Break
1	"V"	BM	10mm x 10mm	-40	21	10	18	Yes
2	"V"	BM	10mm x 10mm	-40	16	10	15	Yes
3	"V"	BM	10mm x 10mm	-40	18	10	17	Yes
4	"V"	WM	10mm x 10mm	-40	34	20	36	Yes
5	"V"	WM	10mm x 10mm	-40	20	10	21	Yes
6	"V"	WM	10mm x 10mm	-40	17	10	20	Yes
7	"V"	HAZ	10mm x 10mm	-40	129	40	76	Yes
8	"V"	HAZ	10mm x 10mm	-40	124	40	87	Yes
9	"V"	HAZ	10mm x 10mm	-40	138	40	79	Yes

Other Tests Performed: NONE

All tests performed in accordance to methods specified in ASME SA-370 & ASTM Sec. IX.

Signature John Phillips

Date 5-22-07

American Piping Inspection, Metallurgical Lab
18501 E. Admiral Pl. Catoosa, Oklahoma 74015
Office: (918) 266-4130

Form: MR-16
Established: 10/2/16
Revision: 0
Date: 10/2/16

Mechanical/Lab Test Report

Organization:	ISTI Plant Services	Lab Number:	M170192 Rev. 0
Base Material:	1 SA-333 GR6 to 2 SA-333 GR6	Heat Number:	951029
Coupon Dimension:	6.625" O.D. x 0.432" Pos. IGR	Welder Name/ID:	Eduardo Rubalcaba ID. N/A
WPS/PQR #:	1012	Process(es):	GTAW/FCAW
Filler Metal:	ER70S-6/E71T-12MJ	PWHT:	N/A

Charpy V-Notch Impact Test

Specimen Number	Specimen Size (mm)	V-Notch Location	Temperature (°F)	Impact Value (ft/lbs)	Lateral Expansion (mils)	Percent Shear (%)	Average (ft/lbs)
1	10 x 10	WM	-50	18	0.008	30	22.33
2	10 x 10	WM	-50	24	0.010	20	
3	10 x 10	WM	-50	25	0.020	30	
4	10 x 10	HAZ	-50	45	0.030	35	45
5	10 x 10	HAZ	-50	10	0.008	10	
6	10 x 10	HAZ	-50	80	0.054	30	
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							
N/A							

Comments

Only one side of the HAZ tested since both base metals were the same Heat Number.

Other Tests: N/A

All testing performed in accordance with the methods specified in ASME SEC IX

Approved by: Eric Darge Date: 2/7/2017 Signature: 2/7/2017

Title: Certified Associate Welding Inspector

ISTI Plant Services

Tulsa, Ok.

QW-482 SUGGESTED FORMAT FOR WELDING PROCEDURE SPECIFICATIONS (WPS)

(See QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)

Company Name: ISTI Plant Services — Approved by / Date: 11-17-2014

WPS No: 1025 — Date: 11-17-2014 — Supporting PQR No. (s): P1-P1-1025a, P1-P1-1025b

Revision No. 0 — Date of Rev. ----

Welding Process(es): GTAW — Type: Manual (Automatic, Manual, Machine, or Semi-Auto)

JOINTS (QW-402)

Joint Design: All Allowable ASME Joint Configurations

Root Spacing:

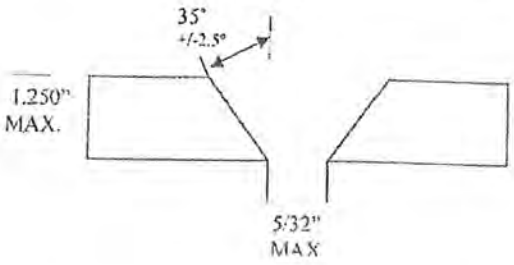
Backing: WITH OR WITHOUT

Backing Material (Type): PER CUSTOMER REQUIREMENT (Refer to both backing and retainers)

☐ Metal ☐ Nonfusing Metal

☐ Nonmetallic ☐ Other

Details



Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of weld groove may be specified.
(At the option of the Mfgr. / sketches may be attached to illustrate joint design, weld layers and bead sequence, e.g., for notch toughness procedures, for multiple process procedures, etc.)

V,J or U bevel grooves, fillets or other joints detailed on engineering drawings, production routing or repair procedures.

*BASE METALS (QW-403)

P-No. 1 — Group No. 1 or 2 — to P-No. 1 — Group No. 1 or 2

OR

Specification type and grade

to Specification type and grade

OR

Chem. Analysis and Mech. Prop

To Chem. Analysis and Mech. Prop

Thickness Range:

Base Metal: Groove 0.125" to 1.250" — Fillet UNLIMITED

Pipe Dia.: Range Groove UNLIMITED — Fillet UNLIMITED

Maximum Pass Thickness ≤ 1/2 in. (13mm) ☒ Yes ☐ No

Other: This procedure is qualified for low temperature service to -50°F

*FILLER METALS (QW-404)	1	2
Spec. No. (SFA)	5.18	
AWS No. (Class)	ER70S-6 Verify Chemistry	
F-No.	6	
A-No.	1 Verification confirmed by OEM Documentation	
Size of Filler Metals	3/32", 1/8"	
Filler Metal Product Form	Solid	
Supplemental Filler Metal	None	
Weld Metal		
Deposited Thickness:		
Groove	0.125" to 1.250"	
Fillet	Unlimited	
Electrode-Flux (Class)	N.A.	
Flux Type	No flux added to face of weld	
Flux Trade Name	N.A.	
Consumable Insert	None	
Other		

*Each base metal-filler metal combination should be recorded individually

ISTI Plant Services
Tulsa, Ok.

WPS No. 1025 Rev. 0

POSITIONS (QW-405)

Position of Groove	ALL
Welding Progression:	☒ Up ☐ Down
Position(s) of Fillet	ALL
Other	

POSTWELD HEAT TREATMENT (QW-407)

Temp Range	No PWHT Performed
Time Range	
Other	B31.3 Requires thickness greater than 3/4" to be PWHT

PREHEAT (QW-406)

Preheat Temp. Min.	75°F Min. / 200°F for thickness of 1 ¼" to 1 ½"
Interpass Temp. Max.	450°F
Preheat Maintenance	None
Other	N.A.

(Continuous or special heating where applicable should be recorded)

GAS (QW-408)

	Gas(es)	% Mixture	Flow Rate
Shielding	Argon	100	20-35 CFH
Trailing	N.A.	N.A.	N.A.
Backing	N.A.	N.A.	N.A.
Other	N.A.	N.A.	N.A.

Percent Composition

ELECTRICAL CHARACTERISTICS (QW-409)

Weld Layers	Process	Classification	Diameter	Current Type & Polarity	Amps (Range)	Wire Feed Speed (Range)	Energy or Power (Range)	Volts (Range)	Travel Speed (Range)	Other, Remarks, Addition
Any	GTAW	ER70S-6	3/32"	DCEN	130-160	N.A.	N.A.	15-19	5-8 ipm	
Any	GTAW	ER70S-6	1/8"	DCEN	140-170	N.A.	N.A.	16-20	6-9 ipm	

Amps and volts, or power or energy range should be recorded for each electrode size, position and thickness, etc.

Pulsing Current: No Pulsing Current Used

Heat Input (max.): 24000 J/in Max with 3/32" 23314 J/in Max with 1/8"

Amperage/voltage may be decreased or travel speed increased to maintain maximum heat input (Heat Input is a Nonessential Variable unless used for low temperature service.))

Tungsten Electrode Type and Size: EWTH-2 3/32", 1/8"
(Pure Tungsten, 2% Thoriated, etc.)

Mode of Metal Transfer for GMAW (FCAW): N.A.
(Spray arc, short circuiting arc, etc.)

Other:

TECHNIQUE (QW-410)

String or Weave Bead	Stringer or Weave
Orifice, Nozzle or Gas Cup Size	#5 to #10
Initial and Interpass Cleaning (Brushing, Grinding, etc.)	Grinding or wire brush as required
Method of Back Gouging	When required, grind until all defects are removed.
Oscillation	N.A.
Contact Tube to Work Distance	N.A.
Multiple or Single (per side)	Multiple
Multiple or Single Electrodes	Single
Electrode Spacing	N.A.
Peening	None Allowed
Misalignment	Misalignment shall not be greater than 1/4T

ISTI Plant Services
Tulsa,
Oklahoma

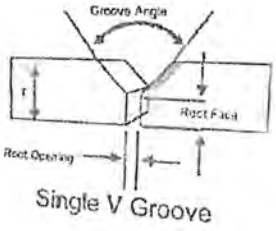
Procedure Qualification Record (PQR)

PQR No.: PI-PI-1025a WPS No.: 1025 Date: 11/17/2014 Page: 1 of 2

Welding Process(es) / Type(s): GTAW / Manual

Joints (QW-402)

Weld Type: Groove weld
Single-V groove
Backing: Open butt, no back weld
Root Opening: 0.125 in. Root Face: 0.0 in.
Groove Angle: 75 °



Single V Groove

Base Metals (QW-403)

Material Spec., Type or Grade:
SA-516-60/65/70 to SA-516-60/65/70
P-No.: 1 Group No.: 1 to P-No.: 1 Group No.: 2
Thickness of Test Coupon (in.): 0.250
Test Coupon certified to SA-516-60/65/70

Filler Metals (QW-404)

SFA Specification: 5.18
AWS Classification: ER70S-6
Filler Metal F-No: 6
Weld Metal Analysis A-No: (verify chemistry)
Size of Filler Metal (in.): 3/32
Weld Deposit 't' (in.): 0.250
Filler Metal Product Form: Bare (Solid)
Consumable Insert: None
Flux: None Added

Positions (QW-405)

Position of Joint: 3G - Vertical
Weld Progression: Vertical up

Preheat (QW-406)

Preheat Temp.: 75 °F
Interpass Temp.: 450 °F
Preheat Maintenance: None

Postweld Heat Treatment (QW-407)

Type: No PWHT performed
Temperature: None °F
Time: None hr

Gas (QW-408)

Gas Composition / Flow Rate
Shielding: 100% Argon / 25 CFH
Trailing: None
Backing: None

Electrical Characteristics (QW-409)

Current / Polarity: DCEN (straight)
Amps: 150
Volts: 17
Tungsten Type / Size: EWTh-2 / 3/32"
Heat Input: 24000 J/in
Pulsed Current: No Pulsed Current

Technique (QW-410)

Travel Speed (in/min): 6
Thermal Processes: No
String/Weave Bead: Stringer bead
Oscillation: N/A
Mult./Single Pass (per side): Multipass
Mult./Single Electrode: N/A
Nozzle/Gas Cup Size: 5

(1) Single Electrode

Additional Welding Parameters

Layer(s) and/or Pass(es)	Process	Filler Metal		Current		Voltage Range	Travel Speed Range (in/min)
		AWS Classification	Size (in.)	Type / Polarity	Amperage Range		
All	GTAW	ER70S-6	3/32	DCEN (straight)	150	16	6

ISTI Plant Services

Procedure Qualification Record (PQR)

PQR No.: P1-P1-1025a

Tensile Test (QW-150)

Specimen No.	Width (in.)	Thickness (in.)	Area (in^2)	Ultimate Total Load (lb)	Ultimate Stress (PSI)	Failure Type and Location
1	0.750	0.202	0.152	12263	80700	Ductile - BM
2	0.750	0.208	0.156	12705	81400	Ductile - BM

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.3(a) Face bend	Acceptable	QW-462.3(a) Root bend	Acceptable
QW-462.3(a) Face bend	Acceptable	QW-462.3(a) Root bend	Acceptable
None		None	

Toughness Test (QW-170)

Specimen Number	Notch Location	Notch Type	Test Temp. (°F)	Impact Value (ft-lb)	Lateral Expansion		Drop Weight Break
					Shear %	Mils	
1	Weld metal	"V"	-67	14	25	23	No
2	Weld metal	"V"	-67	15	30	23	No
3	Weld metal	"V"	-67	17	30	25	No
4	HAZ	"V"	-67	20	30	34	No
5	HAZ	"V"	-67	20	30	36	No
6	HAZ	"V"	-67	19	30	39	No

Hardness Test - Vickers hardness

Location	Readings								
	1	2	3	4	5	6	7	8	9
SA-516-60/65/70 BM-1 Root	17-170	18-171	19-171	20-173					
SA-516-60/65/70 BM-1 Top	1-170	2-183	3-188	4-1197					
SA-516-60/65/70 BM-2 Root	29-166	30-165	31-161	32-163					
SA-516-60/65/70 BM-2 Top	12-170	14-158	15-162	16-161					
SA-516-60/65/70 HAZ-1 Root	21-172	22-165							
SA-516-60/65/70 HAZ-1 Top	5-197	6-192							
SA-516-60/65/70 HAZ-2 Root	27-175	28-170							
SA-516-60/65/70 HAZ-2 Top	11-188	12-173							
Weld metal	7-189	8-191	9-193	10-191	23-152	24-151	25-158	26-160	

Macro-Examination Test: None

Visual Examination: Acceptable

Liquid Penetration Test: None

Vickers hardness in accordnace with NACE SP0472-2010 Figure 2 and 3

Charpy V Notch Specimen Size: 10mm x 5.0mm

Welder's Name: Eulid Valezquez ID: _____ Stamp: _____

PQR was done and welding of coupon was witnessed by: ISTI Plant Services

Tests Conducted By: Tulsa Gamma Ray, Inc. Test ID.: 102135828

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Prepared By: John Phillips 11/7/14 Procedure Specialist

Date

Accepted By: _____ 11/7/14 QC Manager

Date

TULSA GAMMA RAY, INC.

1127 S Lewis Ave Tulsa, OK 74104
918.585.3228

LAB / MECHANICAL TEST REPORT

☐ Welder Qualification ☒ Weld Procedure Evaluation

Organization	ISTI Plant Services	LAB #	102135828
Base Metal Type	SA516-60/65/70	PWHT	None
Coupon Thickness	0.250"	PQR#	P1-P1-1025a
WPS No.	1025	Filler	ER70S-6
Weld Process	GTAW	ID#	
Welder's Name	Eulid Valezquez	Position	3G-Up

BENDS

Specimen Number	Type of Bend	Results/Comments
1	FACE BEND #1	PASSED No Relevant Indications Greater Than 1/8"
2	FACE BEND #2	PASSED No Relevant Indications Greater Than 1/8"
3	ROOT BEND #1	PASSED No Relevant Indications Greater Than 1/8"
4	ROOT BEND #2	PASSED No Relevant Indications Greater Than 1/8"

TENSILE TESTS

Specimen Number	Specimen Size	Specimen Area sq. in.	Load at Failure (lbs.)	Ultimate Tensile (psi)	Type of Failure & Location
1	0.750" X 0.202"	0.152	12263	80700	Ductile-BM
2	0.750" X 0.208"	0.156	12705	81400	Ductile-BM

HARDNESS IN BHN

Base Material #1			Heat Affected Zone #1			Weld Metal		
1	2	3	1	2	3	1	2	3
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heat Affected Zone #2			**Base Material #2**					
1	2	3	1	2	3			
N/A	N/A	N/A	N/A	N/A	N/A			

CHARPY V-NOTCH IMPACT TESTING

Specimen Number	Specimen Type/Location	Specimen Size	Temp.	Value Ft./Lbs.	Lateral Expansion	Percent Shear	Drop Weight/ Break
1	V/Weld Metal	10mm x 5.0mm	-67°F	14	25	23	No
2	V/Weld Metal	10mm x 5.0mm	-67°F	17	30	23	No
3	V/Weld Metal	10mm x 5.0mm	-67°F	15	30	25	No
4	V/HAZ	10mm x 5.0mm	-67°F	20	30	34	No
5	V/HAZ	10mm x 5.0mm	-67°F	20	30	36	No
6	V/HAZ	10mm x 5.0mm	-67°F	19	30	39	No

Other Tests Performed: NONE

All tests performed in accordance to methods specified in ASME B31.3 & SEC IX.

Signature: John Phillips — Date: 11-17-2014

TULSA GAMMA RAY, INC.

1127 S Lewis Ave Tulsa, OK 74104
918.585.3228

LAB / MECHANICAL TEST REPORT

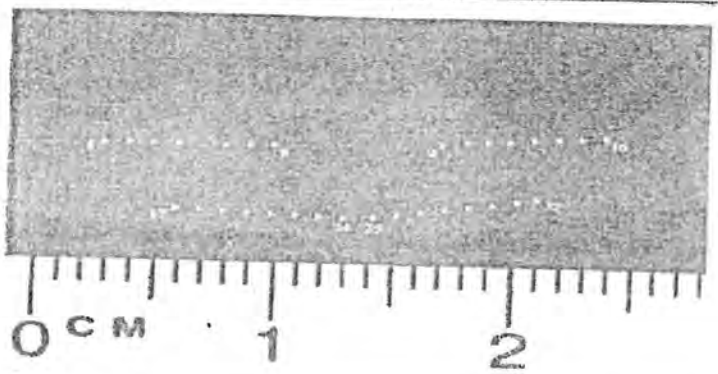
☐ Welder Qualification ☒ Weld Procedure Evaluation

Organization	ISTI Plant Services	LAB #	102135828
Base Metal Type	SA516-60/65/70	PWHT	None
Coupon Thickness	0.250"	PQR#	P1-P1-1025a
WPS No.	1025	Filler	ER70S-6
Weld Process	GTAW	ID#	
Welder's Name	Eulid Valezquez	Position	3G-Up

Microhardness Survey ASTM E384-11
NACE SP0472-2010, Figure 2 and 3

Reading Number	HIV Value	Reading Number	HIV Value
1	170	17	170
2	183	18	171
3	188	19	171
4	197	20	173
5	197	21	172
6	192	22	165
7	189	23	152
8	191	24	151
9	193	25	158
10	191	26	160
11	188	27	175
12	173	28	170
13	170	29	166
14	158	30	165
15	162	31	161
16	161	32	163

Vickers Hardness Survey 2% Nital



Other Tests Performed:	NONE

All tests performed in accordance to methods specified in ASME B31.3 & SEC IX.

Signature	John Phillips	Date	11-17-2014

ISTI Plant Services
Tulsa
Oklahoma

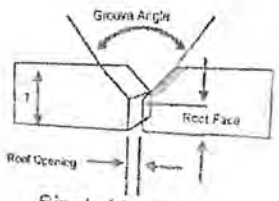
Procedure Qualification Record (PQR)

PQR No.: P1-P1-1025b WPS No.: 1025 Date: 11/17/2014 Page: 1 of 2

Welding Process(es) / Type(s): GTAW / Manual

Joints (QW-402)

Weld Type: Groove weld
Single-V groove
Backing: Open butt, no back weld
Root Opening: 0.125 in. Root Face: 0 in.
Groove Angle: 75 °



Single V Groove

Base Metals (QW-403)

Material Spec., Type or Grade:
SA-516-60/65/70 to SA-516-60/65/70
P-No.: 1 Group No.: 1 to P-No.: 1 Group No.: 2
Thickness of Test Coupon (in.): 0.625
Test Coupon certified to SA516-60/65/70

Filler Metals (QW-404)

SFA Specification: 5.18
AWS Classification: ER70S-6
Filler Metal F-No: 6
Weld Metal Analysis A-No: (verify chemistry)
Size of Filler Metal (in.): 1/8
Weld Deposit 't' (in.): 0.625
Filler Metal Product Form: Bare (Solid)
Consumable Insert: No Consumable Insert or Retainers used
Flux: No flux added

Positions (QW-405)

Position of Joint: 3G - Vertical
Weld Progression: Vertical up

Preheat (QW-406)

Preheat Temp.: 75 °F
Interpass Temp.: 450 °F
Preheat Maintenance: None

Postweld Heat Treatment (QW-407)

Type: No PWHT performed
Temperature: None °F
Time: None hr

Gas (QW-408)

Gas Composition / Flow Rate
Shielding: 100% Argon / 25 CFH
Trailing: None
Backing: None

Electrical Characteristics (QW-409)

Current / Polarity: DCEN (straight)
Amps: 160
Volts: 17
Tungsten Type / Size: EWTh-2 / 1/8
Heat Input: 23314 J/in
Pulsed Current: No Pulsed Current used

Technique (QW-410)

Travel Speed (in/min): 7
Thermal Processes: No
String/Weave Bead: Stringer bead
Oscillation: N/A
Mult./Single Pass (per side): Multipass
Mult./Single Electrode: N/A
Nozzle/Gas Cup Size: #5

(1) Single Electrode

Additional Welding Parameters

Layer(s) and/or Pass(es)	Process	Filler Metal		Current		Voltage Range	Travel Speed Range (in/min)
		AWS Classification	Size (in.)	Type / Polarity	Amperage Range		
Any	GTAW	ER70S-6	1/8	DCEN (straight)	160	17	7

ISTI Plant Services

Procedure Qualification Record (PQR)

PQR No.: PI-PI-1025b

Tensile Test (QW-150)

Specimen No.	Width (in.)	Thickness (in.)	Area (in^2)	Ultimate Total Load (lb)	Ultimate Stress (PSI)	Failure Type and Location
1	0.750	0.504	0.378	29906	79100	Ductile - BM
2	0.750	0.554	0.416	32876	79000	Ductile - BM

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.2 Side bend	Acceptable	QW-462.2 Side bend	Acceptable
QW-462.2 Side bend	Acceptable	QW-462.2 Side bend	Acceptable
None		None	

Toughness Test (QW-170)

Specimen Number	Notch Location	Notch Type	Test Temp. (°F)	Impact Value (ft-lb)	Lateral Expansion		Drop Weight Break
					Shear %	Mils	
1	Weld metal	"V"	-50	123	55	71	No
2	Weld metal	"V"	-50	125	60	71	No
3	Weld metal	"V"	-50	95	30	59	No
4	HAZ	"V"	-50	37	30	22	No
5	HAZ	"V"	-50	35	30	20	No
6	HAZ	"V"	-50	30	25	21	No

Hardness Test - Vickers hardness

Location	Readings								
	1	2	3	4	5	6	7	8	9
SA-516-60/65/70 BM-1 Root	17-168	18-170	19-174	20-177					
SA-516-60/65/70 BM-1 Top	1-150	2-161	3-176	4-205					
SA-516-60/65/70 BM-2 Root	29-175	30-177	31-174	32-172					
SA-516-60/65/70 BM-2 Top	13-208	14-190	15-162	16-159					
SA-516-60/65/70 HAZ-1 Root	21-185	22-188							
SA-516-60/65/70 HAZ-1 Top	5-229	6-233							
SA-516-60/65/70 HAZ-2 Root	27-189	28-187							
SA-516-60/65/70 HAZ-2 Top	11-242	12-236							
Weld Metal	7-233	8-223	9-245	10-240	23-182	24-194	25-191	26-185	

Macro-Examination Test: None

Visual Examination: Acceptable

Liquid Penetration Test: None

Vickers hardness in accordance with NACE SP0472-2010 Figure 2 and 3.

Charpy V Notch Specimen Size: 10mm x 10mm.

Welder's Name: Eulid Valezquez ID: _____ Stamp: _____

PQR was done and welding of coupon was witnessed by: ISTI Plant Services

Tests Conducted By: Tulsa Gamma Ray, Inc. Test ID.: 102135826

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Prepared By: John Phillips 11/17/14 Date Procedure Specialist

Accepted By: Rodfold 11/17/14 Date QC Manager

TULSA GAMMA RAY, INC.

1127 S Lewis Ave Tulsa, OK 74104
918.585.3228

LAB / MECHANICAL TEST REPORT

☐ Welder Qualification ☒ Weld Procedure Evaluation

Organization	ISTI Plant Services	LAB #	102135826
Base Metal Type	SA516-60/65/70	PWHT	None
Coupon Thickness	0.625"	PQR#	P1-P1-1025b
WPS No.	1025	Filler	ER70S-6
Weld Process	GTAW	ID#	
Welder's Name	Eulid Valezquez	Position	3G-Up

BENDS

Specimen Number	Type of Bend	Results/Comments
1	SIDE BEND #1	PASSED No Relevant Indications Greater Than 1/8"
2	SIDE BEND #2	PASSED No Relevant Indications Greater Than 1/8"
3	SIDE BEND #3	PASSED No Relevant Indications Greater Than 1/8"
4	SIDE BEND #4	PASSED No Relevant Indications Greater Than 1/8"

TENSILE TESTS

Specimen Number	Specimen Size	Specimen Area sq. in.	Load at Failure (lbs.)	Ultimate Tensile (psi)	Type of Failure & Location
1	0.750" X 0.504"	0.378	29906	79100	Ductile-BM
2	0.750" X 0.554"	0.416	32876	79000	Ductile-BM

HARDNESS IN BHN

Base Material #1			Heat Affected Zone #1			Weld Metal		
1	2	3	1	2	3	1	2	3
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Heat Affected Zone #2			**Base Material #2**					
1	2	3	1	2	3			
N/A	N/A	N/A	N/A	N/A	N/A			

CHARPY V-NOTCH IMPACT TESTING

Specimen Number	Specimen Type/Location	Specimen Size	Temp.	Value Ft./Lbs.	Lateral Expansion	Percent Shear	Drop Weight/ Break
1	V/Weld Metal	10mm x 10mm	-50°F	123	71	55	No
2	V/Weld Metal	10mm x 10mm	-50°F	125	71	60	No
3	V/Weld Metal	10mm x 10mm	-50°F	95	59	30	No
4	V/HAZ	10mm x 10mm	-50°F	37	22	30	No
5	V/HAZ	10mm x 10mm	-50°F	35	20	30	No
6	V/HAZ	10mm x 10mm	-50°F	30	21	25	No

Other Tests Performed: NONE

All tests performed in accordance to methods specified in ASME B31.3 & SEC IX.

Signature: John Phillips — Date: 11-17-2014

TULSA GAMMA RAY, INC.

1127 S Lewis Ave Tulsa, OK 74104
918.585.3228

LAB / MECHANICAL TEST REPORT

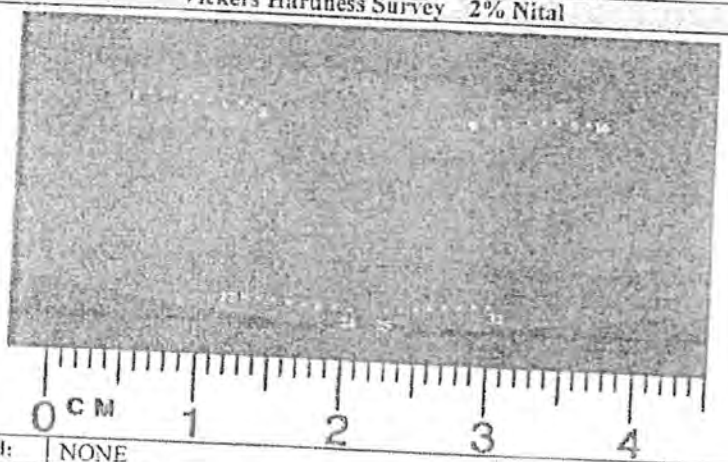
☐ Welder Qualification ☒ Weld Procedure Evaluation

Organization	ISTI Plant Services	LAB #	102135826
Base Metal Type	SA516-60/65/70	PWHT	None
Coupon Thickness	0.625"	PQR#	P1-P1-1025b
WPS No.	1025	Filler	ER70S-6
Weld Process	GTAW	ID#	
Welder's Name	Eulid Valezquez	Position	3G-Up

Microhardness Survey ASTM E384-11
NACE SP0472-2010, Figure 2 and 3

Reading Number	HIV Value	Reading Number	HIV Value
1	150	17	168
2	161	18	170
3	176	19	174
4	205	20	177
5	229	21	185
6	233	22	188
7	233	23	182
8	223	24	194
9	245	25	191
10	240	26	185
11	242	27	189
12	236	28	187
13	208	29	175
14	190	30	177
15	162	31	174
16	159	32	172

Vickers Hardness Survey 2% Nital



Other Tests Performed: NONE

All tests performed in accordance to methods specified in ASME B31.3 & SEC IX.

Signature: John Phillips — Date: 11-17-2014

J-447

SK2 Assy
Spools

ISTI
Welder Qualifications

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Rendals, Justin Stamp: HZ
Test WPS No.: 1001 Rev.: 3 WPQ No.: _____ Date: 2/24/2017
Welding process(es) / type(s) used: GTAW / Manual
Type of joint welded: Pipe Groove weld Joint type(s) qualified: Groove and Fillet Welds
Base metal(s) welded: SA-106, Grade B to SA-106, Grade B

Welder Variables (QW-350)	Actual Values Used	Range Qualified
P- or S-Number to P- or S-Number	P-No. 1 to P-No. 1	P-1 thru P-15F,P-34 & P-4X
Base metal thickness (in.)	0.218	WPS Limits
Pipe diameter (in.)	2.375	1.00" minimum
	GTAW / Manual	**GTAW / Manual**
Backing **	No backing used	With or without backing
AWS classification	ER70S-6	
Filler metal specification (SFA)	5.18	5.xx
Filler metal F-No.	6	F-No. 6
Filler metal product form	Bare (Solid)	Bare / metal cored
Consumable insert	No insert used	Without insert only
Deposit thickness (in.) [>= 3 layers]	0.218 [N/A]	0.4360" maximum
Welding position	6G - 45 degree pipe	All Positions
Weld progression	Vertical up	Vertical up (n4)
Backing gas	No backing gas used	With or Without backing gas
GTAW welding current / polarity	DCEN (straight)	DCEN (straight)

Machine Welding Variables (QW-360)	Actual Values Used	Range Qualified
Direct / remote visual control	N/A	N/A
Automatic voltage control	N/A	N/A
Automatic joint tracking	N/A	N/A
Welding position	N/A	N/A
Consumable insert	N/A	N/A
Backing **	N/A	N/A
Single / multiple pass per side	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base material thicknesses and pipe diameters of any size.
** Welds with backing include fillets and double-welded groove welds.
Notes: (n4) The root pass, when removed to sound weld metal in preparation for welding the second side, and the cover or wash pass may be up or down.

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.3(a) Face bend	Passed	QW-462.3(a) Root bend	Passed
QW-462.3(a) Face bend	Passed	QW-462.3(a) Root bend	Passed
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Volumetric test results: None
Welding test conducted by: ISTI Plant Services
Mechanical/Radiographic tests conducted by: American Piping Inspection Lab test no.: W170118

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Approved By: Rod Holden Organization: ISTI Plant Services
2/24/2017
Date

ISTI Plant Services
17207 East 21st Street
Tulsa OK 74134

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Rendals, Justin Stamp: HZ

Test WPS No.: 1004 Rev.: 3 WPQ No.: ______ Date: 2/24/2017

Welding process(es) / type(s) used: GMAW / Semiautomatic and FCAW / Semiautomatic

Type of joint welded: Pipe Groove weld Joint type(s) qualified: Groove and Fillet Welds

Base metal(s) welded: SA-106, Grade B to SA-106, Grade B

Welder Variables (QW-350)	Actual Values Used		Range Qualified	
P- or S-Number to P- or S-Number	P-No. 1 to P-No. 1		P-1 thru P-15F,P-34 & P-4X	
Base metal thickness (in.)	0.562		WPS Limits	
Pipe diameter (in.)	6.625		2.875" minimum	
	GMAW / Semiauto	FCAW / Semiauto	GMAW / Semiauto	FCAW / Semiauto
Backing **	No backing used	Backing used	With or without backing	With backing only
AWS classification	ER70S-6	E71T-12M		
Filler metal specification (SFA)	5.18	5.20	5.xx	5.xx
Filler metal F-No.	6	6	F-No. 6	F-No. 6
Filler metal product form	N/A	N/A	N/A	N/A
Consumable insert	N/A	N/A	N/A	N/A
Deposit thickness (in.) [>= 3 layers]	0.125 [N/A]	0.437 [N/A]	0.2500" maximum	0.8740" maximum
Welding position	1GR - Rotated	1GR - Rotated	Flat only	Flat only
Weld progression	N/A	N/A	N/A	N/A
Backing gas	No backing gas used	No backing gas used	W/WO backing gas	W/WO backing gas
GMAW / FCAW transfer mode	Globular arc	Globular arc	Spray, Pulsed, or Globular	Spray, Pulsed, or Globular

Machine Welding Variables (QW-360)	Actual Values Used		Range Qualified	
Direct / remote visual control	N/A	N/A	N/A	N/A
Automatic voltage control	N/A	N/A	N/A	N/A
Automatic joint tracking	N/A	N/A	N/A	N/A
Welding position	N/A	N/A	N/A	N/A
Consumable insert	N/A	N/A	N/A	N/A
Backing **	N/A	N/A	N/A	N/A
Single / multiple pass per side	N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base material thicknesses and pipe diameters of any size.
** Welds with backing include fillets and double-welded groove welds.
Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.2 Side bend	Passed	QW-462.2 Side bend	Passed
None		None	
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194

Volumetric test results: None

Welding test conducted by: ISTI Plant Services

Mechanical/Radiographic tests conducted by: American Piping Inspection Lab test no.: W170119

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Organization: ISTI Plant Services

Approved By: [signature] 2/24/2017
Date

ProWrite 2015 Form 013 - Format C

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: **Hughart, Jesse** Stamp: _ H8
Test WPS No.: **1001** Rev.: 0 WPQ No.: _____ Date: 4/7/2017
Welding process(es) / type(s) used: GTAW / Manual
Type of joint welded: Pipe Groove weld Joint type(s) qualified: Groove and Fillet Welds
Base metal(s) welded: SA-106, Grade B to SA-106, Grade B

Welder Variables (QW-350)	Actual Values Used	Range Qualified
P- or S-Number to P- or S-Number	P-No. 1 to P-No. 1	P-1 thru P-15F,P-34 & P-4X
Base metal thickness (in.)	0.218	WPS Limits
Pipe diameter (in.)	2.375	1.00" minimum
	GTAW / Manual	**GTAW / Manual**
Backing **	No backing used	With or without backing
AWS classification	ER70S-6	
Filler metal specification (SFA)	5.18	5.xx
Filler metal F-No.	6	F-No. 6
Filler metal product form	Bare (Solid)	Bare / metal cored
Consumable insert	No insert used	Without insert only
Deposit thickness (in.) [>= 3 layers]	0.218 [N/A]	0.4360" maximum
Welding position	6G - 45 degree pipe	All Positions
Weld progression	Vertical up	Vertical up (n4)
Backing gas	No backing gas used	With or Without backing gas
GTAW welding current / polarity	DCEN (straight)	DCEN (straight)

Machine Welding Variables (QW-360)	Actual Values Used	Range Qualified
Direct / remote visual control	N/A	N/A
Automatic voltage control	N/A	N/A
Automatic joint tracking	N/A	N/A
Welding position	N/A	N/A
Consumable insert	N/A	N/A
Backing **	N/A	N/A
Single / multiple pass per side	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base material thicknesses and pipe diameters of any size.
** Welds with backing include fillets and double-welded groove welds.
Notes: (n4) The root pass, when removed to sound weld metal in preparation for welding the second side, and the cover or wash pass may be up or down.

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.3(a) Face bend	Passed	QW-462.3(a) Root bend	Passed
QW-462.3(a) Face bend	Passed	QW-462.3(a) Root bend	Passed
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Volumetric test results: None
Welding test conducted by: ISTI Plant Services
Mechanical/Radiographic tests conducted by: American Piping Inspection Lab test no.: W170232

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Organization: ISTI Plant Services

Approved By: _____ 4/10/17 Date

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Lopez, Jaime Stamp: JL

Test WPS No.: 1001 Rev.: 0 WPQ No.: _____ Date: 8/2/2017

Welding process(es) / type(s) used: GTAW / Manual

Type of joint welded: Pipe Groove weld Joint type(s) qualified: Groove and Fillet Welds

Base metal(s) welded: SA-106, Grade B to SA-106, Grade B

Welder Variables (QW-350)	Actual Values Used	Range Qualified
P- or S-Number to P- or S-Number	P-No. 1 to P-No. 1	P-1 thru P-15F,P-34 & P-4X
Base metal thickness (in.)	0.218	WPS Limits
Pipe diameter (in.)	2.375	1.00" minimum
	GTAW / Manual	GTAW / Manual
Backing **	No backing used	With or without backing
AWS classification	ER70S-6	
Filler metal specification (SFA)	5.18	5.xx
Filler metal F-No.	6	F-No. 6
Filler metal product form	Bare (Solid)	Bare / metal cored
Consumable insert	No insert used	Without insert only
Deposit thickness (in.) [>= 3 layers]	0.218 [N/A]	0.4360" maximum
Welding position	6G - 45 degree pipe	All Positions
Weld progression	Vertical up	Vertical up (n4)
Backing gas	No backing gas used	With or Without backing gas
GTAW welding current / polarity	DCEN (straight)	DCEN (straight)

Machine Welding Variables (QW-360)	Actual Values Used	Range Qualified
Direct / remote visual control	N/A	N/A
Automatic voltage control	N/A	N/A
Automatic joint tracking	N/A	N/A
Welding position	N/A	N/A
Consumable insert	N/A	N/A
Backing **	N/A	N/A
Single / multiple pass per side	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base material thicknesses and pipe diameters of any size.
** Welds with backing include fillets and double-welded groove welds.
Notes: (n4) The root pass, when removed to sound weld metal in preparation for welding the second side, and the cover or wash pass may be up or down.

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.3(a) Face bend	Passed	QW-462.3(a) Root bend	Passed
QW-462.3(a) Face bend	Passed	QW-462.3(a) Root bend	Passed
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194

Volumetric test results: None

Welding test conducted by: ISTI Plant Services

Mechanical/Radiographic tests conducted by: American Piping Inspection Lab test no.: M171154

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Organization: ISTI Plant Services

Approved By: _____ 8/2/17 Date

ISTI Plant Services
17207 East 21st Street
Tulsa, OK 74134

Welder or Welding Operator Performance Qualification (WPQ)

Welder's Name: Lopez, Jaime Stamp: JL
Test WPS No.: 1004 Rev.: 3 WPQ No.: _____ Date: 8/2/2017
Welding process(es) / type(s) used: GMAW / Semiautomatic and FCAW / Semiautomatic
Type of joint welded: Pipe Groove weld Joint type(s) qualified: Groove and Fillet Welds
Base metal(s) welded: SA-106, Grade B to SA-106, Grade B

Welder Variables (QW-350)	Actual Values Used		Range Qualified	
P- or S-Number to P- or S-Number	P-No. 1 to P-No. 1		P-1 thru P-15F,P-34 & P-4X	
Base metal thickness (in.)	0.718		WPS Limits	
Pipe diameter (in.)	6.625		2.875" minimum	
	GMAW / Semiauto	FCAW / Semiauto	GMAW / Semiauto	FCAW / Semiauto
Backing **	No backing used	Backing used	With or without backing	With backing only
AWS classification	ER70S-6	E71T-12M		
Filler metal specification (SFA)	5.18	5.20	5.xx	5.xx
Filler metal F-No.	6	6	F-No. 6	F-No. 6
Filler metal product form	N/A	N/A	N/A	N/A
Consumable insert	N/A	N/A	N/A	N/A
Deposit thickness (in.) [>= 3 layers]	0.125 [N/A]	0.593 [No]	0.1375" maximum	1.1860" maximum
Welding position	1GR - Rotated	1GR - Rotated	Flat only	Flat only
Weld progression	N/A	N/A	N/A	N/A
Backing gas	No backing gas used	No backing gas used	W/WO backing gas	W/WO backing gas
GMAW / FCAW transfer mode	Short-circuiting arc	Globular arc	Short-circuiting arc	Spray, Pulsed, or Globular

Machine Welding Variables (QW-360)	Actual Values Used		Range Qualified	
Direct / remote visual control	N/A	N/A	N/A	N/A
Automatic voltage control	N/A	N/A	N/A	N/A
Automatic joint tracking	N/A	N/A	N/A	N/A
Welding position	N/A	N/A	N/A	N/A
Consumable insert	N/A	N/A	N/A	N/A
Backing **	N/A	N/A	N/A	N/A
Single / multiple pass per side	N/A	N/A	N/A	N/A

Fillet Welds: Qualified to make fillet welds of any size on all base material thicknesses and pipe diameters of any size.
** Welds with backing include fillets and double-welded groove welds.
Notes:

Guided Bend Test (QW-160)

Figure Number and Type	Result	Figure Number and Type	Result
QW-462.2 Side bend	Passed	QW-462.2 Side bend	Passed
None		None	
None		None	

Visual examination results: Visual exam satisfactory per QW-302.4 and QW-194
Volumetric test results: None
Welding test conducted by: ISTI Plant Services
Mechanical/Radiographic tests conducted by: American Piping Inspection Lab test no.: M171153

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Approved By: _____ Organization: ISTI Plant Services
8/2/17
Date

TULSA GAMMA RAY INC.

1127 South Lewis Ave. Tulsa OK 74104
PH 918.585.3228 FX 918.584.5598

QW-484A SUGGESTED FORMAT A FOR WELDER PERFORMANCE QUALIFICATIONS (WPQ)

(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

Welder's Name: Antonio Flores — Identification No.: Q8

TEST DESCRIPTION

Identification of WPS followed: WPS 1001 — ☒ Test Coupon ☐ Production Weld

Specification of base metal(s): SA106B — Thickness: 0.218"

TESTING CONDITIONS & QUALIFICATIONS

Welding Variables (QW-350)	Actual values	Range Qualified
Welding Process(es)	GTAW	GTAW
Type (i.e.: manual, semi-auto) used	MANUAL	MANUAL
Backing (metal, weld metal, double-welded, etc.)	WITHOUT	WITH/WITHOUT
☐ Plate ☒ Pipe (enter diameter if pipe or tube)	2"	1" & GREATER
Base metal P or S-Number to P- or S Number	P1 to P1	P1 thru P15E,P34, P4X
Filler metal or electrode specification(s) (SFA) (info only)	5.18/5.20	
Filler metal or electrode classification(s) (info only)	ER70S-6	
Filler metal F-Numbers	F6	ALL F6
Consumable Insert (GTAW or PAW)	NONE	NONE
Filler type (solid/metal or flux cored/powdered) (GTAW or PAW)	SOLID	SOLID
Deposit thickness for each process	------	------
Process 1: GTAW 3 layers minimum ☐ yes ☒ no	0.218"	0.436" MAX
Process 2: N/A 3 layers minimum ☐ yes ☐ no	N/A	N/A
Position qualified (2G, 6G, 3F, etc.)	1GR	1GR, 1F
Vertical progression (uphill or downhill)	UPHILL	UPHILL
Type of fuel gas (OFW)	N/A	N/A
Inert gas backing (GTAW, PAW, GMAW)	N/A	N/A
Transfer mode (spray/globular or pulse to short circuit-GMAW)	N/A	N/A
GTAW current type/polarity (AC, DCEP, DCEN)	DCEN	DCEN

RESULTS

Visual Examination of Completed Weld (QW-302.4): ACCEPTABLE

☒ Bend Test ☐ Transverse Root and Face [QW-462.2(a)] ☐ Longitudinal Root and Face [QW-462.3(b)] ☒ Side (QW-462.2)

☐ Pipe bend specimen, corrosion-resistant overlay[QW-462.5(e)] ☐ Plate bend specimen, corrosion resistant overlay[QW-462.5(d)]

☐ Macro test fusion [QW-462.5 (b)] ☐ Macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result
FACE #1	ACCEPTABLE	ROOT #2	ACCEPTABLE	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A

Alternative radiographic examination results (QW-191): N/A

Fillet weld – fracture test (QW-180): N/A — Length and percent of defects: N/A

Macro examination (QW-184): N/A — Fillet size (in.): ____ x ____ — Concavity/convexity (in.): N/A

Other Tests: N/A

Film or Specimens evaluated by: John Phillips — Company: Tulsa Gamma Ray, Inc.

Mechanical tests conducted by: TULSA GAMMA RAY, Inc. — Laboratory Tests: 102135525

Welding supervised by: ISTI Plant Services

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the latest requirements of Section IX of the ASME Code.

Organization: ISTI Plant Services

Date: 09-29-2014

By: Rod Wold

American Piping Inspection

18501 E Admiral Pl. Catoosa, OK 74015
PH 918.266.4130

QW-484A SUGGESTED FORMAT A FOR WELDER PERFORMANCE QUALIFICATIONS (WPQ)

(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

Welder's Name: Antonio Flores — Identification No.: Q8

TEST DESCRIPTION

Identification of WPS followed: 1004
Specification of base metal(s): SA106B
☒ Test Coupon ☐ Production Weld
Thickness: 0.562"

TESTING CONDITIONS & QUALIFICATIONS

Welding Variables (QW-350)	Actual values	Range Qualified
Welding Process(es)	(1)GMAW/(2)FCAW	(1)GMAW/(2)FCAW
Type (i.e.: manual, semi-auto) used	(1)SEMI/(2)SEMI	(1)SEMI/(2)SEMI
Backing (metal, weld metal, double-welded, etc.)	(1)WITHOUT/(2) WITH	(1)WITH OR WITHOUT/(2) WITH
☐ Plate ☒ Pipe (enter diameter if pipe or tube)	6.625"	2 7/8" to UNLIMITED
Base metal P or S-Number to P- or S Number	P1 to P1	P1- P15F, P34 & P4X
Filler metal or electrode specification(s) (SFA) (info only)	(1)5.18/(2)5.20	(1)5.18/(2)5.20
Filler metal or electrode classification(s) (info only)	(1)ER70S-2/(2)E71T-12M	(1)ER70S-6/(2)E71T-12M
Filler metal F-Numbers	F6	ALL F6
Consumable Insert (GTAW or PAW)	NONE	NONE
Filler type (solid/metal or flux cored/powdered) (GTAW or PAW)	(1)SOLID/(2)TUBULAR	(1)SOLID/(2)TUBULAR
Deposit thickness for each process	------	------
Process 1: (1)GMAW 3 layers min. ☐ yes ☒ no	(1) 0.125"	(1) 0.1375" MAX
Process 2: (2)FCAW 3 layers min. ☒ yes ☐ no	(2) 0.437"	(2) 0.874"
Position qualified (2G, 6G, 3F, etc.)	1GR	1G, 1F
Vertical progression (uphill or downhill)	N/A	N/A
Type of fuel gas (OFW)	N/A	N/A
Inert gas backing (GTAW, PAW, GMAW)	NONE	NONE
Transfer mode (spray/globular or pulse to short circuit-GMAW)	(1)SHORT CIRCUIT/(2)GLOBULAR	(1)SHORT CIRCUIT/(2)GLOBULAR
GTAW current type/polarity (AC, DCEP, DCEN)	(1)DCEP/(2)DCEP	(1)DCEP/(2)DCEP

RESULTS

Visual Examination of Completed Weld (QW-302.4): ACCEPTABLE

☒ Bend Test ☐ Transverse Root and Face [QW-462.3(a)] ☐ Longitudinal Root and Face [QW-462.3(b)] ☒ Side (QW-462.2)
☐ Pipe bend specimen, corrosion-resistant overlay[QW-462.5(e)] ☐ Plate bend specimen, corrosion resistant overlay[QW-462.5(d)]
☐ Macro test fusion [QW-462.5 (b)] ☐ Macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result
SIDE BEND #1	ACCEPTABLE	SIDE BEND #2	ACCEPTABLE	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A

Alternative radiographic examination results (QW-191): N/A
Fillet weld – fracture test (QW-180): N/A
Macro examination (QW-184): N/A — Fillet size (in.) ____ x ____ — Length and percent of defects: N/A — Concavity/convexity (in.): N/A
Other Tests: N/A
Film or Specimens evaluated by: Maxwell D. Stocker — Company: American Piping Inspection
Mechanical tests conducted by: American Piping Inspection — Laboratory Tests: M150327-1D
Welding supervised by: ISTI Plant Services

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Date: 3-27-15 — Organization: ISTI Plant Services

By: Rodolfo

TULSA GAMMA RAY INC
1127 South Lewis Ave Tulsa OK 74104
PH 918.585.3228 FX 918.584.5598

QW-484A SUGGESTED FORMAT A FOR WELDER PERFORMANCE QUALIFICATIONS (WPQ)

(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

Welder's Name HUGO MEZA Identification No W

TEST DESCRIPTION

Identification of WPS followed 1001
Specification of base metal(s) SA106B
☒ Test Coupon ☐ Production Weld
Thickness .218"

TESTING CONDITIONS & QUALIFICATIONS

Welding Variables (QW-350)	Actual values	Range Qualified
Welding Process(es)	GTAW	GTAW
Type (i.e., manual, semi-auto) used	MANUAL	MANUAL
Backing (metal, weld metal, double-welded, etc.)	NONE	WITH OR WITHOUT
☐ Plate ☒ Pipe (enter diameter if pipe or tube)	2"	1" to UNLIMITED
Base metal P or S-Number to P- or S-Number	P1 to P1	P1- P1
Filler metal or electrode specification(s) (SFA) (info only)	5.18	
Filler metal or electrode classification(s) (info only)	ER70S-6	
Filler metal F-Numbers	6	6
Consumable Insert (GTAW or PAW)	NONE	NONE
Filler type (solid/metal or flux cored powdered) (GTAW or PAW)	SOLID	SOLID
Deposit thickness for each process	.218"	.436"
Process 1 GTAW 3 layers minimum ☒ yes ☐ no		
Process 2 ____ 3 layers minimum ☐ yes ☐ no	N.A.	N.A.
Position qualified (2G, 6G, 3F, etc.)	6G	ALL
Vertical progression (uphill or downhill)	UPHILL	UPHILL
Type of fuel gas (OFW)	N.A.	N.A.
Inert gas backing (GTAW, PAW, GMAW)	NONE	NONE
Transfer mode (spray, globular or pulse to short circuit-GMAW)	N.A.	N.A.
GTAW current type polarity (AC, DCEP, DCEN)	DCEN	DCEN

RESULTS

Visual Examination of Completed Weld (QW-302.4) ACCEPTABLE

☒ Bend Test ☒ Transverse Root and face (QW-462.3(a)) ☐ Longitudinal root and face (QW-462.3(b)) ☐ Side (QW-462.2)
☐ Pipe bend specimen, corrosion-resistant overlay (QW-462.5(d)) ☐ Plate bend specimen, corrosion resistant overlay (QW-462.5(d))
☐ Macro test fusion (QW-462.5(e)) ☐ Macro test for fusion (QW-462.5(e))

Type	Result	Type	Result	Type	Result
Face	Acceptable	Face	Acceptable		
Root	Acceptable	Root	Acceptable		

Alternative radiographic examination results (QW-191) N.A.
Fillet weld - fracture test (QW-180) N.A.
Macro examination (QW-184) N.A. Fillet size (in.) N.A. Length and percent of defects N.A.
Other Tests N.A. Concavity/convexity (in.) N.A.

Film or Specimens evaluated by RICK PRICE
Mechanical tests conducted by RICK PRICE Company Tulsa Gamma Ray, Inc.
Welding supervised by ISTI Plant Services Laboratory Tests 102132039
We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code. Radiography Ticket # N.A.

Date 4-12-11 Organization ISTI Plant Services
By

TULSA GAMMA RAY INC
1127 South Lewis Ave Tulsa OK 74104
PH 918.585.3228 FX 918.584.5598

QW-484A SUGGESTED FORMAT A FOR WELDER PERFORMANCE QUALIFICATIONS (WPQ)

(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

Welder's Name: HUGO MEZA Identification No.: W

TEST DESCRIPTION

Identification of WPS followed: 1004
Specification of base metal(s): SA106-B
☒ Test Coupon ☐ Production Weld
Thickness: 0.562"

TESTING VARIBLES & QUALIFICATION LIMITS

Welding Variables (QW-350)	Actual values	Range Qualified
Welding Process(es)	(1)GMAW/(2)FCAW	(1)GMAW/(2)FCAW
Type (i.e., manual, semi-auto) used	(1)SEMI/(2)SEMI	(1)SEMI/(2)SEMI
Backing (metal, weld metal, double-welded, etc.)	(1)Without/(2)With	(1)With or Without/(2) With
☐ Plate ☒ Pipe (enter diameter if pipe or tube)	6"	2 7/8" to UNLIMITED
Base metal P or S-Number to P- or S Number	P1-P1	P1thru P15E, P34 & P4X
Filler metal or electrode specification(s) (SFA) (info only)	5.18/5.20	
Filler metal or electrode classification(s) (info only)	ER70S-6/E71T-12M	
Filler metal F-Numbers	6/6	6/6
Consumable Insert (GTAW or PAW)	NONE	NONE
Filler type (solid/metal or flux cored/powdered) (GTAW or PAW)	(1)SOLID/(2)TUBULAR	(1)SOLID/(2)TUBULAR
Deposit thickness for each process	------	-------
Process 1: GMAW 3 layers min. ☐ yes ☒ no	0.125"	0.1375" MAX
Process 2: FCAW 3 layers min. ☒ yes ☐ no	0.307"	0.614"
Position qualified (2G, 6G, 3F, etc.)	1G	1G, 1F
Vertical progression (uphill or downhill)	N.A.	N.A.
Type of fuel gas (OFW)	N.A.	N.A.
Inert gas backing (GTAW, PAW, GMAW)	NONE	NONE
Transfer mode (spray/globular or pulse to short circuit-GMAW)	SHORT CIRCUIT	SHORT CIRCUIT
GTAW current type/polarity (AC, DCEP, DCEN)	DCEP	DCEP

RESULTS

Visual Examination of Completed Weld (QW-302.4): ACCEPTABLE

☒ Bend Test ☐ Transverse Root and Face [QW-462.3(a)] ☐ Longitudinal Root and Face [QW-462.3(b)] ☒ Side [QW-462.2]
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)] ☐ Plate bend specimen, corrosion resistant overlay [QW-462.5(d)]
☐ Macro test fusion [QW-462.5(b)] ☐ Macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result
SIDE BEND #1	PASS				
SIDE BEND #2	PASS				

Alternative radiographic examination results (QW-191): N/A
Fillet weld - fracture test (QW-180): N/A
Macro examination (QW-184): N/A Fillet size (in.): ___ x ___ Length and percent of defects: N/A
Other Tests: N/A Concavity/convexity (in.): N/A
Film or Specimens evaluated by: ROBERT BAKER
Mechanical tests conducted by: ROBERT BAKER Company: TULSA GAMMA RAY, Inc.
Welding supervised by: ISTI PLANT SERVICES Laboratory Tests: 102132585

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer or Contractor: ISTI PLANT SERVICES

Date: 12-7-12

Certified by:

TULSA GAMMA RAY INC.
1127 South Lewis Ave. Tulsa OK 74104
PH 918.585.3228 FX 918.584.5598

QW-484A SUGGESTED FORMAT A FOR WELDER PERFORMANCE QUALIFICATIONS (WPQ)

(See QW-301, Section IX, ASME Boiler and Pressure Vessel Code)

Welder's Name: Hugo Meza Identification No.: W

TEST DESCRIPTION

Identification of WPS followed: 1002 ☒ Test Coupon ☐ Production Weld
Specification of base metal(s): SA106B Thickness: 0.562"

TESTING CONDITIONS & QUALIFICATIONS

Welding Variables (QW-350)	Actual values	Range Qualified
Welding Process(es)	GTAW / SMAW	GTAW / SMAW
Type (i.e.: manual, semi-auto) used	MANUAL	MANUAL
Backing (metal, weld metal, double-welded, etc.)	WITHOUT / WITH	WITH or WITHOUT / WITH
☐ Plate ☒ Pipe (enter diameter if pipe or tube)	6.625"	2.875" & ABOVE
Base metal P or S-Number to P- or S Number	P1 TO P1	P1-P15F, P34 & P4X
Filler metal or electrode specification(s) (SFA) (info only)	5.18/5.1	
Filler metal or electrode classification(s) (info only)	(1)ER70S-6/(2)E7018	
Filler metal F-Numbers	F6/F3	ALL CLASSIFICATIONS
Consumable Insert (GTAW or PAW)	N/A	N/A
Filler type (solid/metal or flux cored/powdered) (GTAW or PAW)	COATED	COATED
Deposit thickness for each process	--------	--------
Process 1: GTAW 3 layers minimum ☐ yes ☒ no	0.125"	0.250" MAX.
Process 2: SMAW 3 layers minimum ☒ yes ☐ no	0.437"	0.874" MAX
Position qualified (2G, 6G, 3F, etc.)	6G	ALL
Vertical progression (uphill or downhill)	UPHILL	UPHILL
Type of fuel gas (OFW)	N/A	N/A
Inert gas backing (GTAW, PAW, GMAW)	N/A	N/A
Transfer mode (spray/globular or pulse to short circuit-GMAW)	N/A	N/A
GTAW current type/polarity (AC, DCEP, DCEN)	DCEN/DCEP	DCEN/DCEP

RESULTS

Visual Examination of Completed Weld (QW-302.4): ACCEPTABLE

☒ Bend Test ☐ Transverse Root and face [QW-462.3(a)] ☐ Longitudinal root and face [QW-462.3(b)] ☒ Side (QW-462.2)
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)] ☐ Plate bend specimen, corrosion resistant overlay [QW-462.5(d)]
☐ Macro test fusion [QW-462.5(b)] ☐ Macro test for fusion [QW-462.5(e)]

TYPE	RESULT	TYPE	RESULT	TYPE	RESULT
SIDE BEND #1	ACCEPTABLE	SIDE BEND#3	ACCEPTABLE	N/A	N/A
SIDE BEND #2	ACCEPTABLE	SIDE BEND#4	ACCEPTABLE	N/A	N/A

Alternative radiographic examination results (QW-191): N/A
Fillet weld – fracture test (QW-180): N/A Length and percent of defects: N/A
Macro examination (QW-184): N/A Fillet size (in.): ___ x ___ Concavity/convexity (in.): N/A
Other Tests: N/A
Film or Specimens evaluated by: Maxwell D. Stocker MDS. Company: Tulsa Gamma Ray, Inc.
Mechanical tests conducted by: TULSA GAMMA RAY, INC. Laboratory Tests: 102136018
Welding supervised by: ISTI Plant Services

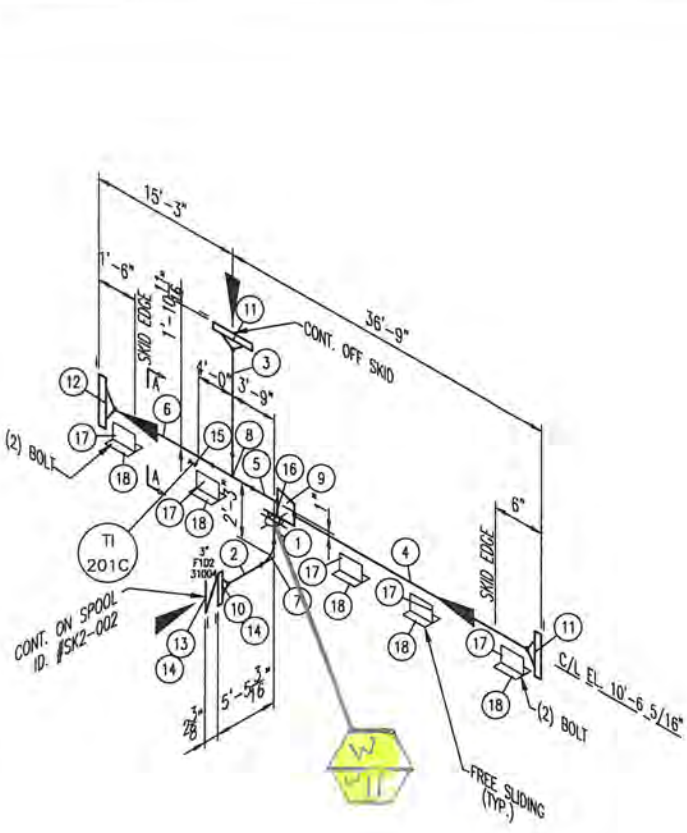
We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of ASME Section IX Boiler & Pressure Vessel Code.

Date: 12-2-2014 Organization: ISTI Plant Services
By: Rod Lodle

J-447

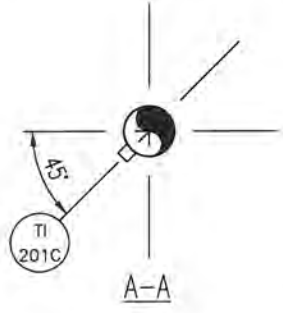
SK2 Assy
Spools

ISTI
Weld Maps



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	3"	PIPE, XH SMLS, A-333-6	1'-4 7/16"
2	1	3"	PIPE, XH SMLS, A-333-6	4'-9 3/16"
3	1	6"	PIPE, XH SMLS, A-333-6	11 3/16"
4	1	6"	PIPE, XH SMLS, A-333-6	31'-7 7/8"
5	1	8"	PIPE, XH SMLS, A-333-6	3'-7 1/4"
6	1	8"	PIPE, XH SMLS, A-333-6	14'-2 1/2"
7	1	3"	ELL, 90 LR XH, A-420-WPL6	
8	1	8"x6"	TEE, REDUCING XH, A-420-WPL6	
9	1	8"x6"	REDUCER, ECC XH, A-420-WPL6	
10	1	3"	FLG, RFWN 600LB XH, A-350-LF2	
11	2	6"	FLG, RFWN 600LB XH, A-350-LF2	
12	1	8"	FLG, RFWN 600LB XH, A-350-LF2	
13	1	3/4"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	7 1/2"
14	2	3"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
15	1	3/4"	CPLG, THRD, 3000LB FS, A-350-LF2	
16	1	8"x3"	WOL, XH, A-350-LF2	
17	5		PLATE, 1/4" THK. x 2 3/4" x 6" (SA-516-70 MATERIAL)	
18	5		PLATE, 1/4" THK. x 6" x 6" (SA-516-70 MATERIAL)	



J-447
12/19/16
IFC

SEP 29 2017

J6733

SHOP WELD

*** = JOB #

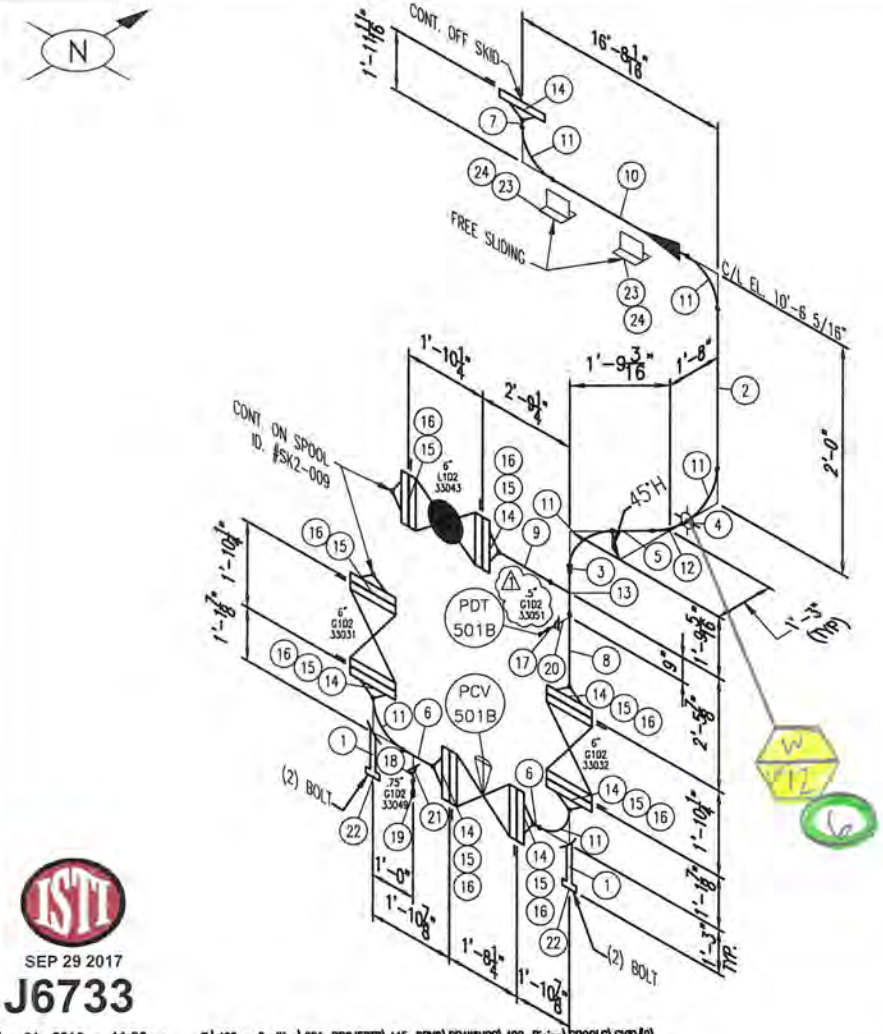
Oct 04, 2013 – 11:26am Z:\100 – Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	870 Psia							
OPER. TEMP.	37 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	155-D1-LT-6" 1.5"C
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-231
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	~~SC6~~
SPOOL LI. No.	SK2-005
REV.	0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	2	3"	PIPE, STD SMLS, A-333-6	1'-11 1/2"
2	1	6"	PIPE, XH SMLS, A-333-6	6"
3	1	6"	PIPE, XH SMLS, A-333-6	6 11/16"
4	1	6"	PIPE, XH SMLS, A-333-6	7 1/4"
5	1	6"	PIPE, XH SMLS, A-333-6	8 7/16"
6	2	6"	PIPE, XH SMLS, A-333-6	9"
7	1	6"	PIPE, XH SMLS, A-333-6	9 13/16"
8	1	6"	PIPE, XH SMLS, A-333-6	1'-7 3/8"
9	1	6"	PIPE, XH SMLS, A-333-6	1'-10 3/4"
10	1	6"	PIPE, XH SMLS, A-333-6	15'-2 1/16"
11	6	6"	ELL, 90 LR XH, A-420-WPL6	
12	1	6"	ELL, 45 LR XH, A-420-WPL6	
13	1	6"	TEE, STR. XH, A-420-WPL6	
14	7	6"	FLG, RFWN 600LB XH, A-350-LF2	
15	8	1"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	7"
16	8	6"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
17	1	1/2"	NIPPLE, S/160 SMLS, A-333-6 POE-TOE	3"
18	1	3/4"	NIPPLE, S/160 SMLS, A-333-6 POE-TOE	3"
19	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, THR'D, A-350-LF2	
20	1	6"x1/2"	SOL, 3000LB FS, A-350-LF2	
21	1	6"x3/4"	SOL, 3000LB FS, A-350-LF2	
22	2		BASE PLATE, 1/2" THK. x 6" x 6" (SA-36 MATERIAL)	
23	2		PLATE, 1/4" THK. x 2 3/4" x 6" (SA-516-70 MATERIAL)	
24	2		PLATE, 1/4" THK. x 6" x 6" (SA-516-70 MATERIAL)	

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*** = JOB #

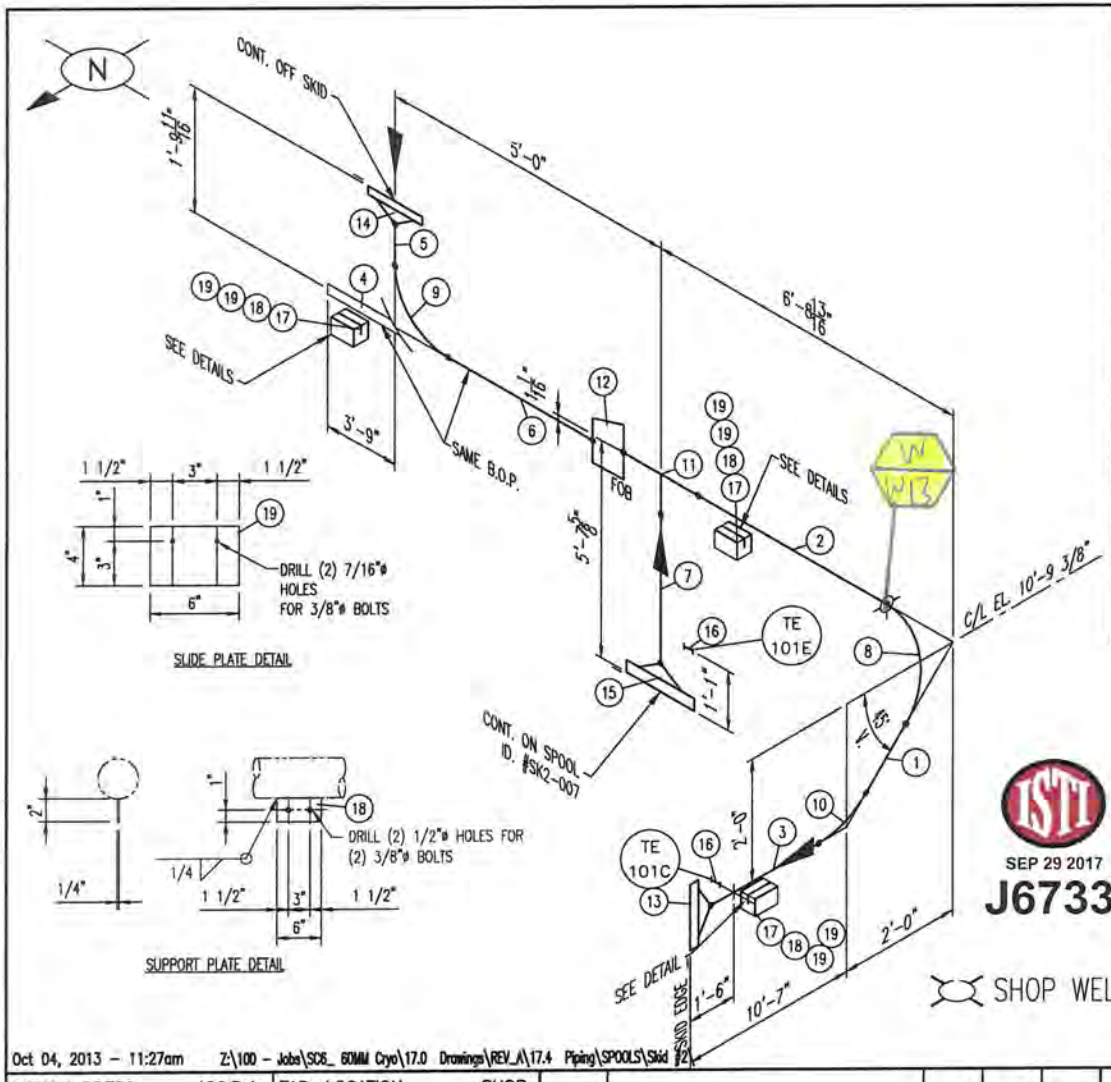
Nov 01, 2016 - 11:26am Z:\400 - Drafting\001-PROJECTS\445-CRYO\DRAWINGS\400-Piping\SPOOLS\SKID#2\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	865 Psia							
OPER. TEMP.	0°F	CORR. ALLOW.	.0625"	1	REV. ITEM #19, AND VALVE TAG	10/31/16	T.HAGAR	R.CARTER
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS. SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	159-D1-LT-6" 1.5"C
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	~~SC6~~
SPOOL I.D. No.	SK2-010
REV.	1



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	10"	PIPE, S/40S EFW, A-312-TP304/304L	1'-0 11/16"
2	1	10"	PIPE, S/40S EFW, A-312-TP304/304L	4'-9 5/16"
3	1	10"	PIPE, S/40S EFW, A-312-TP304/304L	9'-8 1/8"
4	1	4"	PIPE, S/10S EFW, A-312-TP304/304L	4'-9"
5	1	8"	PIPE, S/40S EFW, A-312-TP304/304L	5 5/16"
6	1	8"	PIPE, S/40S EFW, A-312-TP304/304L	2'-8 1/2"
7	1	8"	PIPE, S/40S EFW, A-312-TP304/304L	4'-6 1/8"
8	1	10"	ELL, 90 LR S/40S, A-403-WP304/304L	
9	1	8"	ELL, 90 LR S/40S, A-403-WP304/304L	
10	1	10"	ELL, 45 LR S/40S, A-403-WP304/304L	
11	1	10"x8"	TEE, RED S/40S, A-403-WP304/304L	
12	1	10"x8"	REDUCER, ECC S/40S, A-403-WP304/304L	
13	1	10"	FLG, RFWN 300LB S/40S, A-182-F304/304L	
14	1	8"	FLG, RFWN 300LB S/40S, A-182-F304/304L	
15	1	8"	FLG, RFWN 600LB S/40S, A-182-F304/304L	
16	2	3/4"	CPLG, TOE x 3" LG, 3000LB FS, A-182-F304/304L	
17	3		NYLON BLOCK, 4" x 4" x 6" LG	
18	3		PLATE, 1/4" THK x 2" x 6" LG A-240-304SS (PER DETAIL)	
19	6		PLATE, 1/4" THK x 4" x 6" LG A-240-304SS (PER DETAIL)	

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*** = JOB #

Oct 04, 2013 – 11:27am Z:\100 – Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	220 Psia							
OPER. TEMP.	–83 °F	CORR. ALLOW.	0"					
STRESS RELIEVE	NO	INSULATION	2.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	NONE	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
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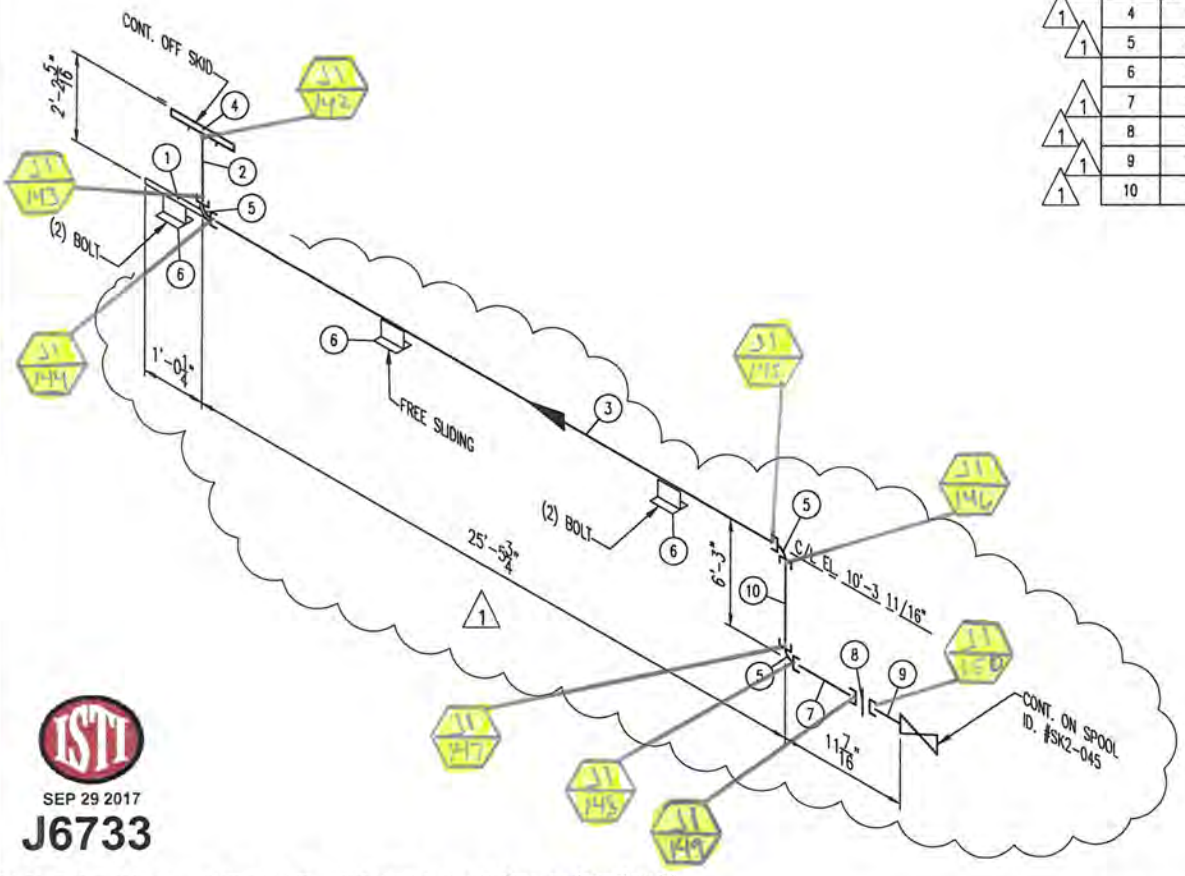
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No. 166-B0-304SS-10" 2.5"C
ASSEMBLY DRAWING SC6-402
PAID DRAWING ***-233
DRAWN BY DV | DATE DRAWN 03/21/11
JOB No. ~~SC6~~ | SPOOL I.D. No. SK2-015 | REV. 0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	1"	PIPE, XH SMLS, A-106-B	1'-1 1/8"
2	1	1"	PIPE, XH SMLS, A-106-B PBE	2'-0 7/8"
3	1	1"	PIPE, XH SMLS, A-106-B PBE	25'-4"
4	1	1"	FLG, RFSW 300LB XH, A-105	
5	3	1"	ELL, 90 SW, 3000LB FS, A-105	
6	3		PIPE SHOE, 6" LG x 3" HI FROM W6x15	
7	1	1"	PIPE, XH SMLS, A-106-B PBE	5 1/16"
8	1	1"	UNION, SW, 3000LB FS, A-105	
9	1	1"	NIPPLE, XH SMLS, A-106-B POE-TOE	4"
10	1	1"	PIPE, XH SMLS, A-106-B PBE	6'-1 1/4"

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*** = JOB #

Oct 04, 2013 - 11:27am Z:\100 - Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	175 Psia						
OPER. TEMP.	73°F	CORR. ALLOW.	.0625"	1	REVISED AS NOTED	02/06/12	DV	LH
STRESS RELIEVE	NO	INSULATION	1"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	NONE	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
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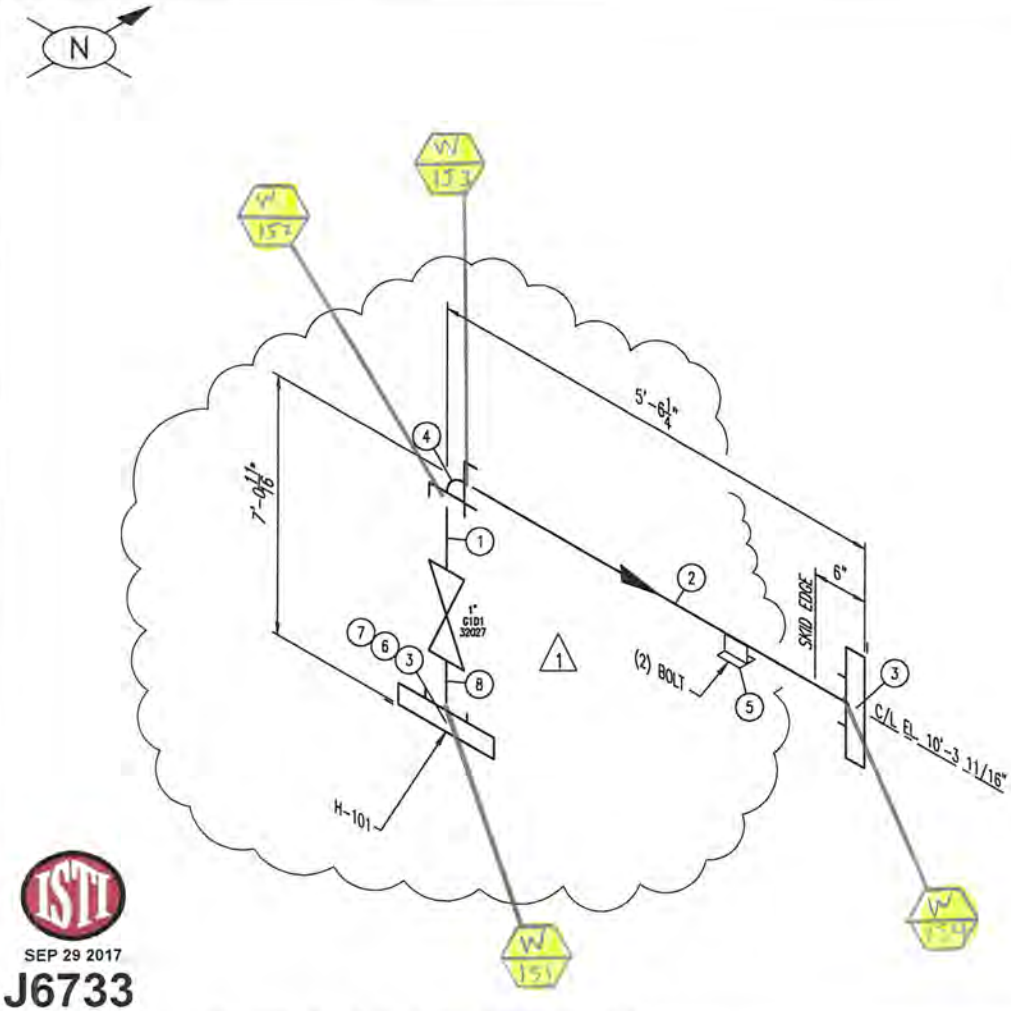
ALL COUPLING TO BE SWAGED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	198-B1-CS-1" 1"H
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	03/23/11
JOB No.	SC6
SPOOL I.D. No.	SK2-020
REV.	1



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	1"	PIPE, S/160 SMLS, A-106-B POE-TOE	6'-4 1/4"
2	1	1"	PIPE, S/160 SMLS, A-106-B PBE	5'-4 9/16"
3	2	1"	FLG, RFSW 600LB S/160, A-105	
4	1	1"	ELL, 90 SW, 3000LB FS, A-105	
5	1		PIPE SHOE, 6" LG x 3" HI FROM W6x15	
6	1	1"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
7	1	5/8"	(4) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	3 3/4"
8	1	1"	PIPE, S/160 SMLS, A-106-B POE-TOE	4"

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*** = JOB #

Oct 04, 2013 - 11:28am Z:\100 - Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	350°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	515 Psia							
OPER. TEMP.	120°F	CORR. ALLOW.	.0625"	1	REVISED AS SHOWN	2/7/12	DV	LH
STRESS RELIEVE	NO	INSULATION	1"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	NONE	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:

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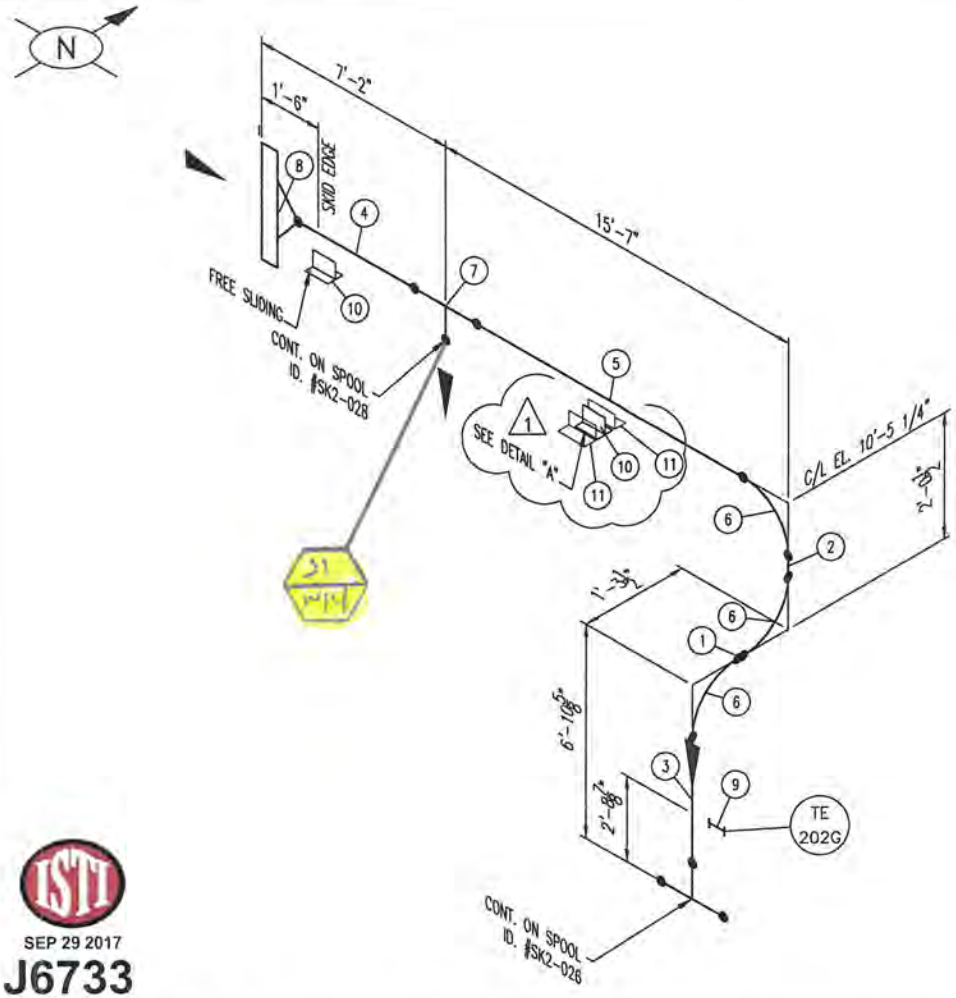
Thomas Russell Co.

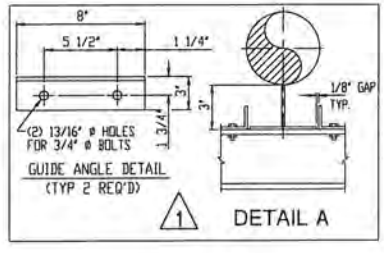
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	199-D1-CS-1" 1"H
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	~~SC6~~
SPOOL I.D. No.	SK2-023
REV.	1



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	4"	PIPE, XH SMLS, A-106-B	3 1/2"
2	1	4"	PIPE, XH SMLS, A-106-B	1'-0 1/2"
3	1	4"	PIPE, XH SMLS, A-106-B	6'-0 1/2"
4	1	4"	PIPE, XH SMLS, A-106-B	6'-5 1/16"
5	1	4"	PIPE, XH SMLS, A-106-B	14'-8 7/8"
6	3	4"	ELL, 90 LR XH, A-234-WPB	
7	1	4"x3"	TEE, RED XH, A-234-WPB	
8	1	4"	FLG, RTJWN 900LB XH, A-105	
9	1	3/4"	CPLG, THRD, 3000LB FS, A-105	
10	2		PIPE SHOE, 8" LG x 3" HI FROM W6x15	
1	11	2		ANGLE, 2" x 3" x 1/4" x 8" LG. A-36 PER DETAIL



J-447
12/19/16
IFC

SEP 29 2017

J6733

*** = JOB #

Jun 09, 2016 - 1:20pm Z:\400 - Drafting\001-PROJECTS\419 BRAZOS SC6 MAFI\DRAWINGS\400-Piping\SPOOLS\CRYO REVS\

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	740 Psia							
OPER. TEMP.	27 °F	CORR. ALLOW.	.0625"	1	ADDED GUIDE & ITEM #11 W/ DETAIL	05/26/16	LG	LH
STRESS RELIEVE	NO	INSULATION	1"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:

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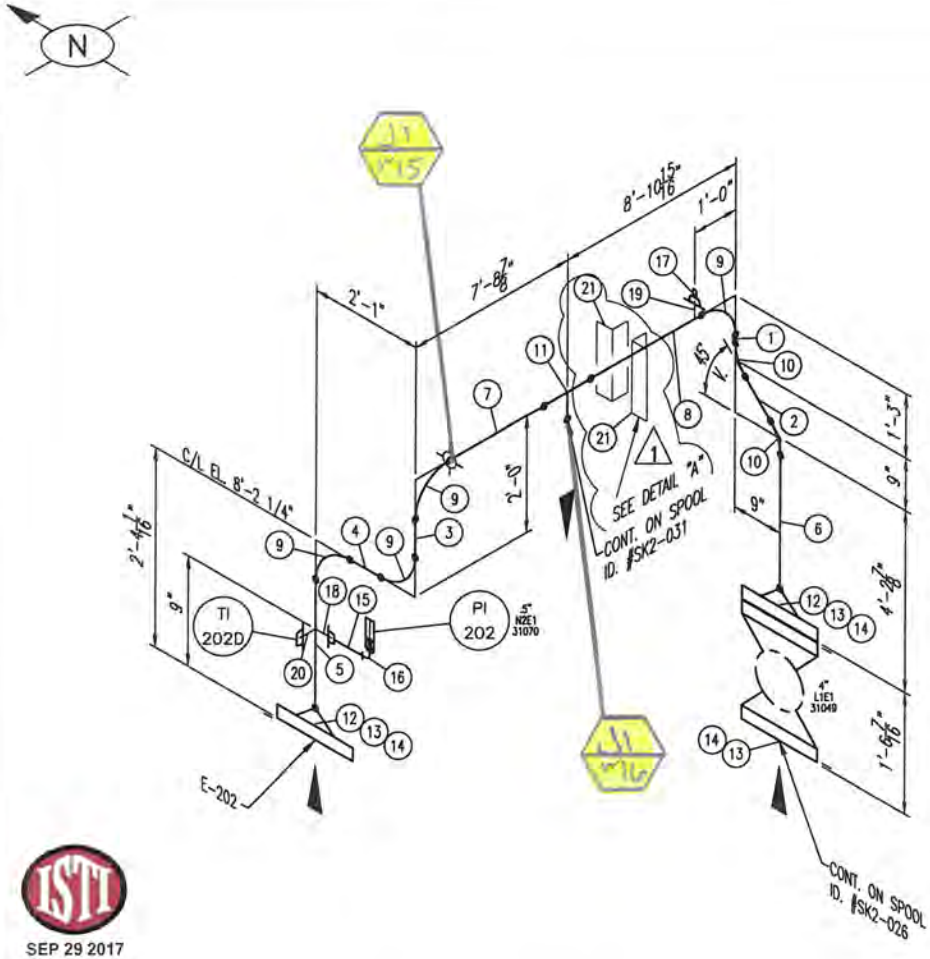
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

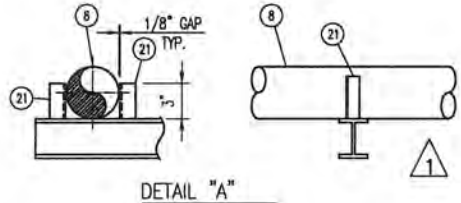
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	215-E1-CS-4" 1"C
ASSEMBLY DRAWING	SC6-402
PIPED DRAWING	***-231/236
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	~~SC6~~
SPOOL I.D. No.	SK2-027
REV.	1



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	4"	PIPE, XH SMLS, A-106-B	6 1/2"
2	1	4"	PIPE, XH SMLS, A-106-B	7 11/16"
3	1	4"	PIPE, XH SMLS, A-106-B	1'-0"
4	1	4"	PIPE, XH SMLS, A-106-B	1'-1"
5	1	4"	PIPE, XH SMLS, A-106-B	1'-5 1/4"
6	1	4"	PIPE, XH SMLS, A-106-B	3'-7 9/16"
7	1	4"	PIPE, XH SMLS, A-106-B	6'-10 3/4"
8	1	4"	PIPE, XH SMLS, A-106-B	8'-0 13/16"
9	4	4"	ELL, 90 LR XH, A-234-WPB	
10	2	4"	ELL, 45 LR XH, A-234-WPB	
11	1	4"	TEE, STR. XH, A-234-WPB	
12	2	4"	FLG, RTJWN 900LB XH, A-105	
13	3	1 1/8"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	7"
14	3	4"	GASKET, RTJ, 900LB R37	
15	1	1/2"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	6"
16	1	1/2"	ELL, 90 THRD. 3000LB FS, A-105	
17	1	1/2"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
18	1	4"x1/2"	SOL, 3000LB FS, A-105	
19	1	4"x1/2"	TOL, 3000LB FS, A-105	
20	1	4"x3/4"	TOL, 3000LB FS, A-105	
1	21	2		ANGLE, 2" x 2" x 1/4" x 3" LG. A-36	



DETAIL "A"
SCALE N.T.S.

J-447
12/19/16
IFC

SEP 29 2017

J6733

*** = JOB #

SHOP WELD

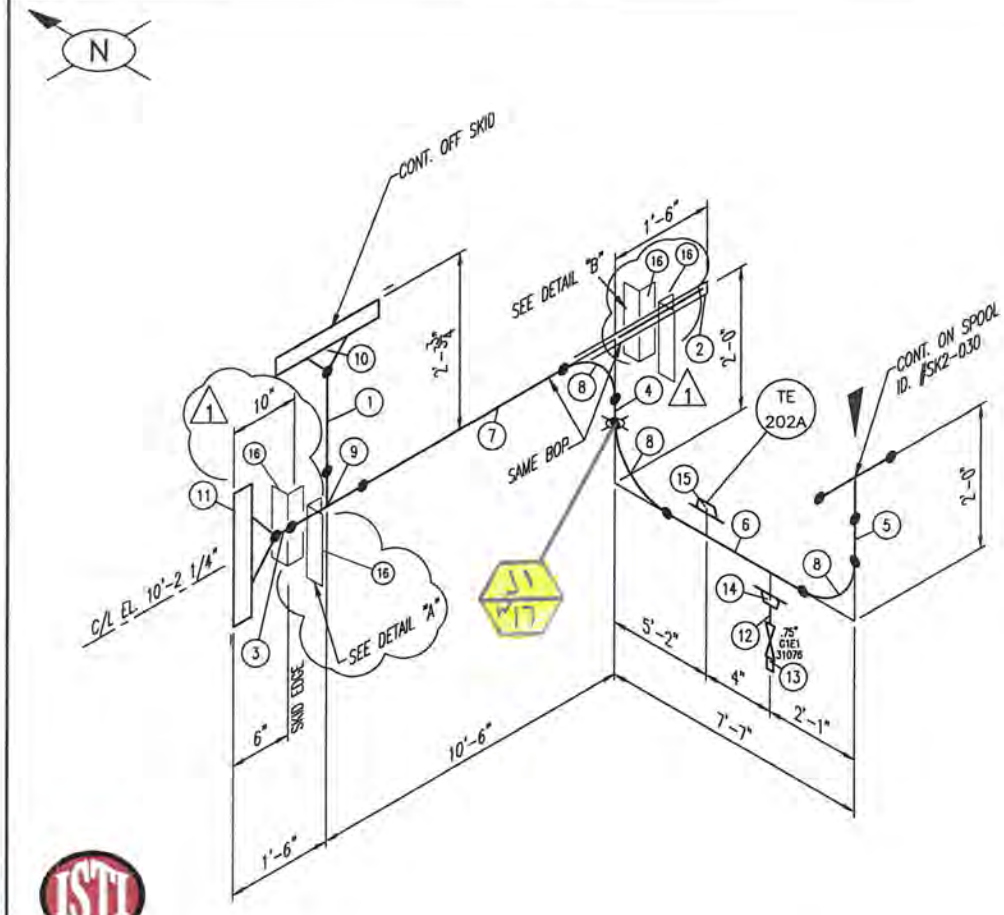
Jun 09, 2016 - 1:20pm Z:\400 - Drafting\001-PROJECTS\419 BRAZOS SC6 MAFI\DRAWINGS\400-Piping\SPOOLS\CRYO REVS\

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	735 Psia							
OPER. TEMP.	56°F	CORR. ALLOW.	.0625"	1	ADDED ITEM #21 W/ DETAIL	5/31/16	LG	LH
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

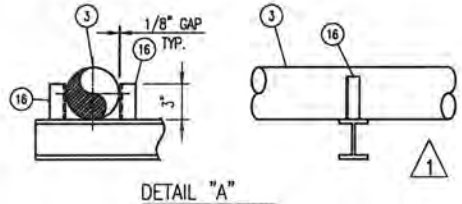
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	216-E1-CS-4"
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-231
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	-SC6-
SPOOL I.D. No.	SK2-030
REV.	1

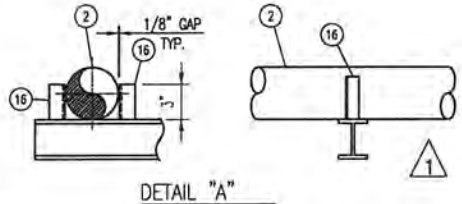


BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	2"	PIPE, XH SMLS, A-106-B	1'-7 15/16"
2	1	3"	PIPE, STD SMLS, A-106-B	2'-0"
3	1	4"	PIPE, XH SMLS, A-106-B	9 1/16"
4	1	4"	PIPE, XH SMLS, A-106-B	1'-0"
5	1	4"	PIPE, XH SMLS, A-106-B	1'-1 7/8"
6	1	4"	PIPE, XH SMLS, A-106-B	6'-7"
7	1	4"	PIPE, XH SMLS, A-106-B	9'-7 7/8"
8	3	4"	ELL, 90 LR XH, A-234-WPB	
9	1	4"x2"	TEE, RED XH, A-234-WPB	
10	1	2"	FLG, RTJWN 900LB XH, A-105	
11	1	4"	FLG, RTJWN 900LB XH, A-105	
12	1	3/4"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	3"
13	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
14	1	4"x3/4"	SOL, 3000LB FS, A-105	
15	1	4"x3/4"	TOL, 3000LB FS, A-105	
1	16	4		ANGLE, 2" x 2" x 1/4" x 3" LG. A-36



DETAIL "A"
SCALE N.T.S.



DETAIL "A"
SCALE N.T.S.

J-447
12/19/16
IFC

SEP 29 2017

J6733

*** = JOB #

SHOP WELD

Jun 09, 2016 - 1:20pm Z:\400 - Drafting\001-PROJECTS\419 BRAZOS SC6 MAFT\DRAWINGS\400-Piping\SPOOLS\CRYO REVS\

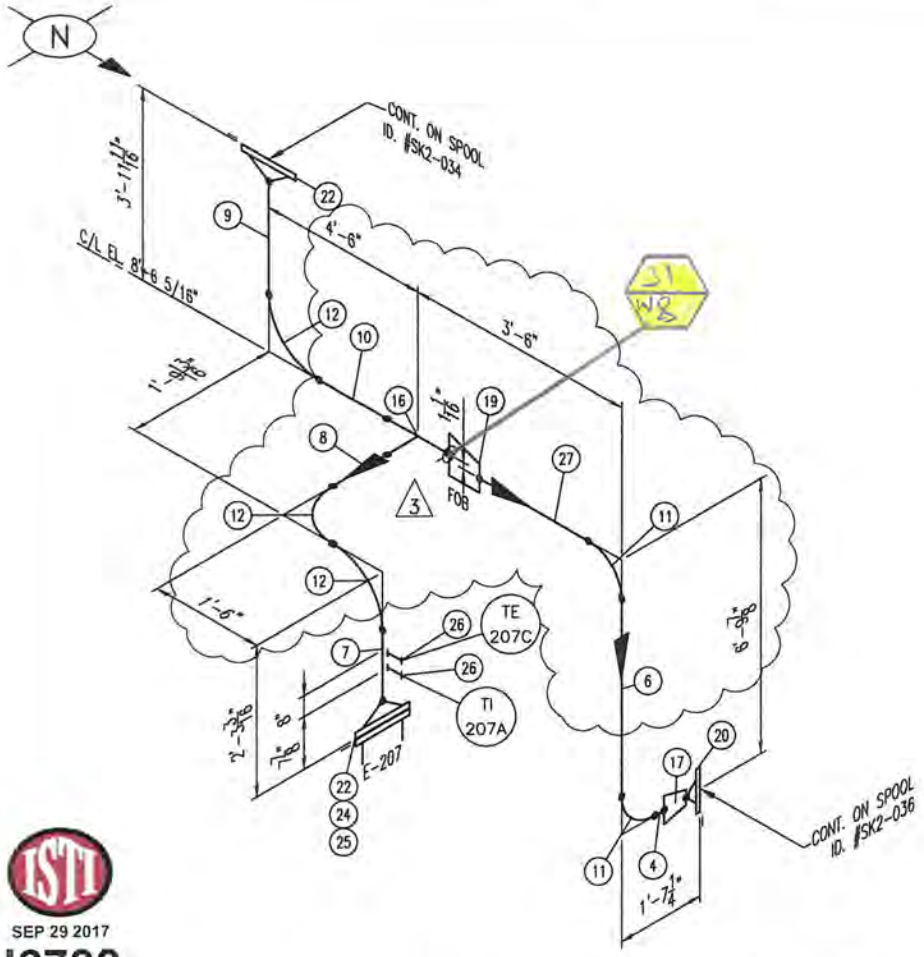
DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	735 Psia							
OPER. TEMP.	56 °F	CORR. ALLOW.	.0625"	1	ADDED ITEM #16 W/ DETAIL	5/31/16	LG	LH
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SWAGED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	216-E1-CS-4"
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-231
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	-SC6-
SPOOL I.D. No.	SK2-031
REV.	1



BILL OF MATERIAL				
MARK	QTY	SIZE	DESCRIPTION	LENGTH
1				
2				
3				
4	1	4"	PIPE, STD SMLS, A-106-B	6 3/4"
5	1	4"	PIPE, STD SMLS, A-106-B	8 3/4"
6	1	4"	PIPE, STD SMLS, A-106-B	5'-9 7/8"
7	1	6"	PIPE, STD SMLS, A-106-B	1'-2 11/16"
8	1	6"	PIPE, STD SMLS, A-106-B	7 3/16"
9	1	6"	PIPE, STD SMLS, A-106-B	2'-11 3/16"
10	1	6"	PIPE, STD SMLS, A-106-B	3'-3 3/8"
11	2	4"	ELL, 90 LR STD, A-234-WPB	
12	3	6"	ELL, 90 LR STD, A-234-WPB	
13				
14				
15				
16	1	6"	TEE, STR. STD, A-234-WPB	
17	1	4"x2"	REDUCER, CONC STD - XH , A-234-WPB	
18				
19	1	6"x4"	REDUCER, ECC STD, A-234-WPB	
20	1	2"	FLG, RFWN 150LB XH, A-105	
21				
22	2	6"	FLG, RFWN 150LB STD, A-105	
23				
24	1	3/4"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	4 3/4"
25	1	6"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
26	2	3/4"	CPLG, TOE x 2 1/2" LG, 3000LB FS, A-105	
27	1	4"	PIPE, STD SMLS, A-106-B	2'-0 7/8"

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J6733

J-447
12/19/16
IFC

*** = JOB #

SHOP WELD

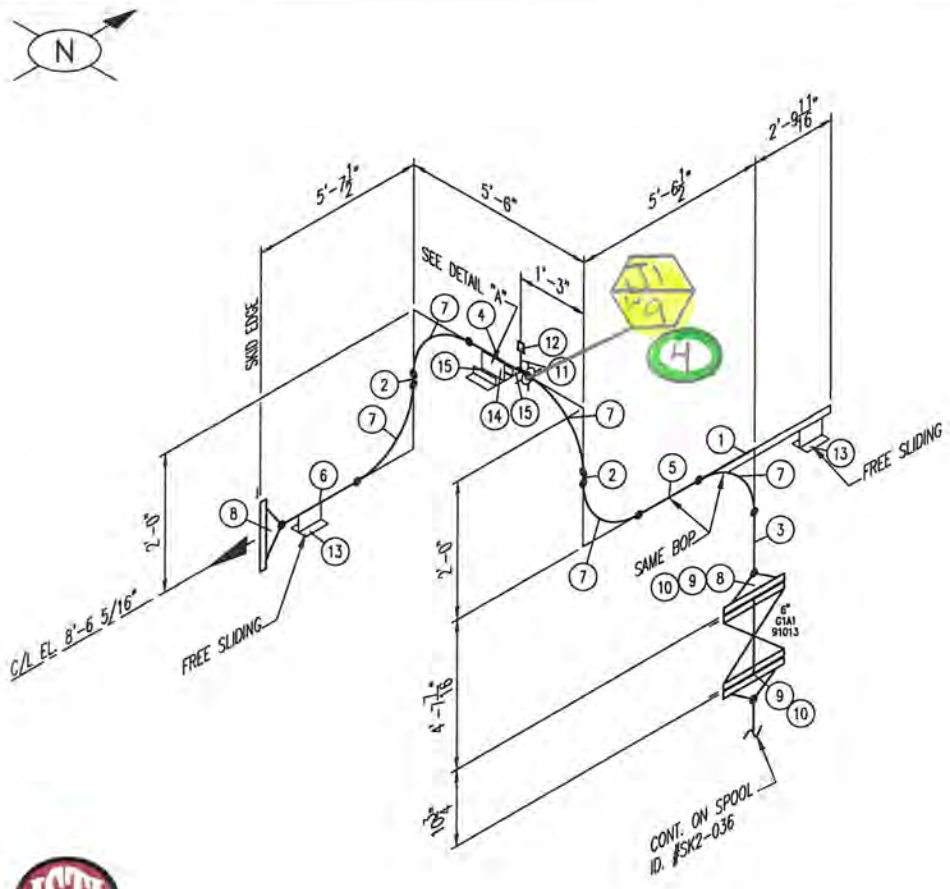
Oct 04, 2013 - 11:29am Z:\100 - Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID #2	3	REVISED & REMOVED PIPING	10/03/13	MSD	KK
OPER. PRESS.	50 Psia			2	REVISED AS NOTED	2/9/12	DV	LH
OPER. TEMP.	300 °F	CORR. ALLOW.	.0625"	1	REVISED AS NOTED	12/27/11	DV	LH
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

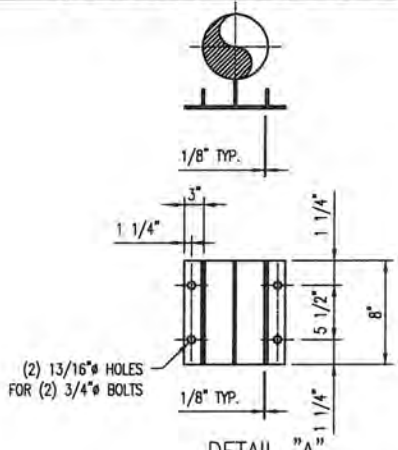
LINE No.	611-A1-CS-6" 2"H
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-291
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	~~SC6~~
SPOOL I.D. No.	SK2-033
REV.	3



SHOP WELD

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	3"	PIPE, STD SMLS, A-106-B	3'-6 11/16"
2	2	6"	PIPE, STD SMLS, A-106-B	6"
3	1	6"	PIPE, STD SMLS, A-106-B	3'-6 15/16"
4	1	6"	PIPE, STD SMLS, A-106-B	4'-0"
5	1	6"	PIPE, STD SMLS, A-106-B	4'-0 1/2"
6	1	6"	PIPE, STD SMLS, A-106-B	4'-7"
7	5	6"	ELL, 90 LR STD, A-234-WPB	
8	2	6"	FLG, RFWN 150LB STD, A-105	
9	2	3/4"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	4 1/4"
10	2	6"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
11	1	1/2"	CPLG, TOE x 2 1/2" LG, 3000LB FS, A-105	
12	1	1/2"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
13	2		PIPE SHOE, 6" LG x 3" HI FROM W6x15	
14	1		PIPE SHOE, 8" LG x 3" HI FROM W6x15	
15	2		ANGLE, 3" x 2" x 1/4" x 8" LG. (DRILL PER DETAIL)	



DETAIL "A"
SCALE N.T.S.

J-447
12/19/16
IFC

*** = JOB #

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SEP 29 2017

J6733

Oct 04, 2013 - 11:29am Z:\100 - Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP				
DESIGN TEMP.	400°F	SPOOL LOCATION	SKID #2				
OPER. PRESS.	40 Psia						
OPER. TEMP.	200°F	CORR. ALLOW.	.0625"				
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #2	NO.	REVISION	DATE	BY	APR

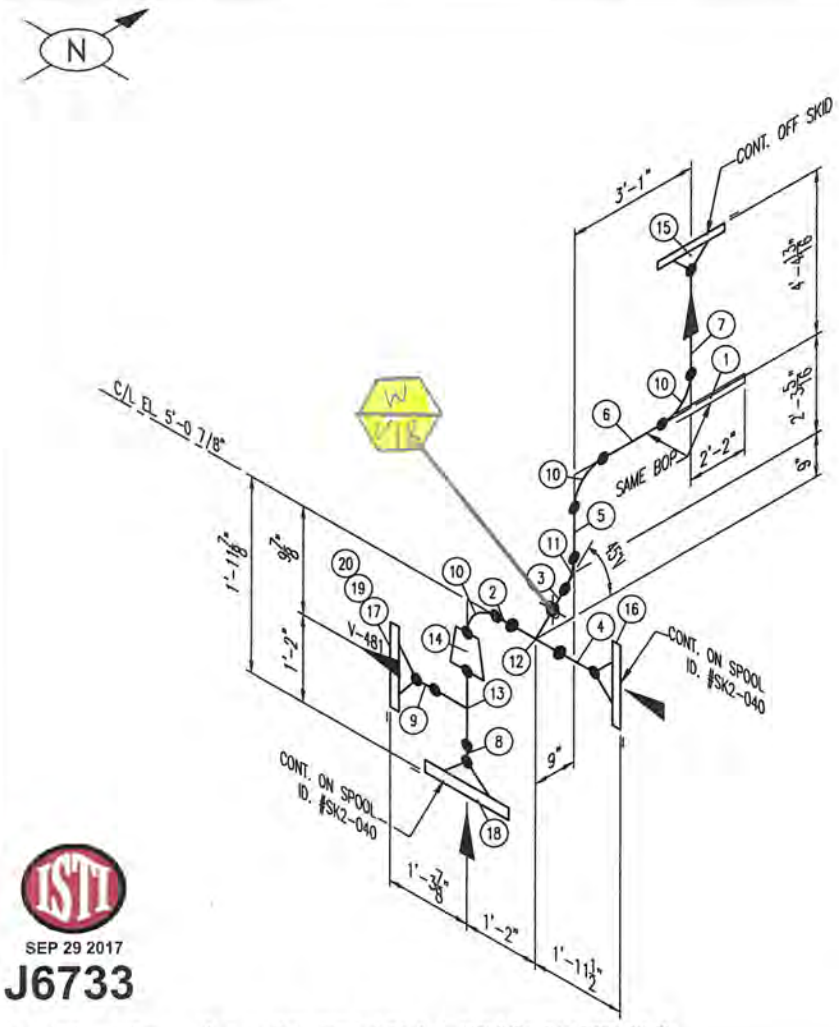
FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.

7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	614-A1-CS-6" 2"H
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-291
DRAWN BY: DV	DUE DRAWN 03/22/11
JOB No. ~~SC6~~	SPOOL I.D. No. SK2-037 REV. 0



BILL OF MATERIAL				
MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	1 1/2"	PIPE, XH SMLS, A-106-B	2'-5"
2	1	2"	PIPE, XH SMLS, A-106-B	8 1/2"
3	1	2"	PIPE, XH SMLS, A-106-B	8 7/8"
4	1	2"	PIPE, XH SMLS, A-106-B	1'-6 1/4"
5	1	2"	PIPE, XH SMLS, A-106-B	1'-10 15/16"
6	1	2"	PIPE, XH SMLS, A-106-B	2'-7"
7	1	2"	PIPE, XH SMLS, A-106-B	3'-11 5/16"
8	1	3"	PIPE, STD SMLS, A-106-B	7 1/2"
9	1	3"	PIPE, STD SMLS, A-106-B	9 3/4"
10	3	2"	ELL, 90 LR XH, A-234-WPB	
11	1	2"	ELL, 45 LR XH, A-234-WPB	
12	1	2"	TEE, STR. XH, A-234-WPB	
13	1	3"	TEE, STR. STD, A-234-WPB	
14	1	3"x2"	REDUCER, CONC STD - XH, A-234-WPB	
15	1	2"	FLG, RFWN 150LB XH, A-105	
16	1	2"	FLG, RFWN 300LB XH, A-105	
17	1	3"	FLG, RFWN 150LB STD, A-105	
18	1	3"	FLG, RFWN 300LB STD, A-105	
19	1	5/8"	(4) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	3 3/4"
20	1	3"	GASKET, 1/8" THK, 150LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	

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SEP 29 2017

J6733

SHOP WELD

J-447
12/19/16
IFC

*** = JOB #

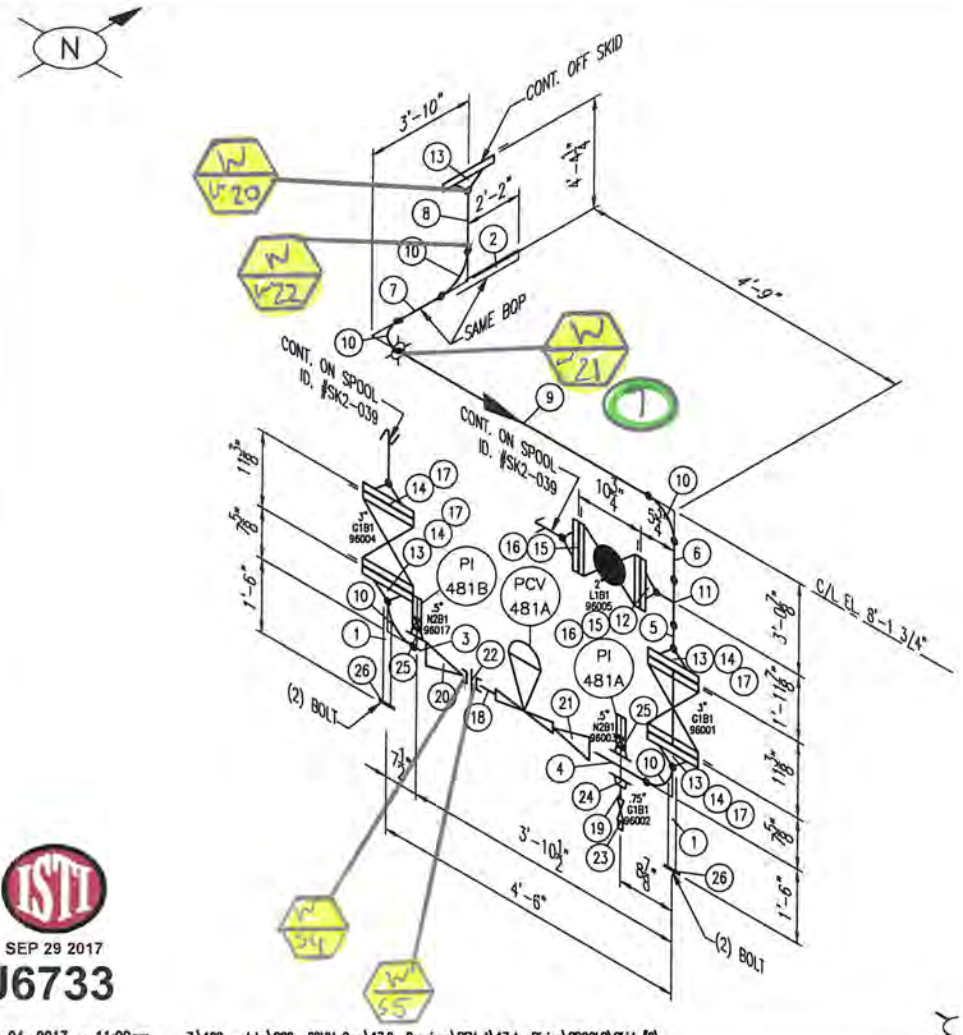
Oct 04, 2013 - 11:29am Z:\100 - Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	100 Psia							
OPER. TEMP.	69 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	04/25/11	PLD	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS. SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	702-A1-CS-3"
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-296
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	~~SC6~~
SPOOL I.D. No.	SK2-039
REV.	0



SEP 29 2017

J6733

Oct 04, 2013 - 11:29am Z:\100 - Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	2	2"	PIPE, XH SMLS, A-106-B	1'-10"
2	1	2"	PIPE, XH SMLS, A-106-B	2'-6 1/2"
3	1	3"	PIPE, STD SMLS, A-106-B	6"
4	1	3"	PIPE, STD SMLS, A-106-B	8 13/16"
5	1	3"	PIPE, STD SMLS, A-106-B	1'-5 3/8"
6	1	3"	PIPE, STD SMLS, A-106-B	2'-5"
7	1	3"	PIPE, STD SMLS, A-106-B	3'-1"
8	1	3"	PIPE, STD SMLS, A-106-B	3'-8 5/8"
9	1	3"	PIPE, STD SMLS, A-106-B	4'-0"
10	5	3"	ELL, 90 LR STD, A-234-WPB	
11	1	3"x2"	TEE, REDUCING STD - XH, A-234-WPB	
12	1	2"	FLG, RFWN 300LB XH, A-105	
13	4	3"	FLG, RFWN 300LB STD, A-105	
14	4	3/4"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	4 1/2"
15	2	5/8"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	3 3/4"
16	2	2"	GASKET, 1/8" THK, 300LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
17	4	3"	GASKET, 1/8" THK, 300LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
18	1	1 1/2"	NIPPLE, XH SMLS, A-106-B POE-TOE	4"
19	1	3/4"	NIPPLE, XH SMLS, A-106-B POE-TOE	3"
20	1	3"x1 1/2"	SWAGE, CONC, STD - XH, A-106-B BLE-PSE	
21	1	3"x1 1/2"	SWAGE, CONC, STD - XH, A-106-B BLE-TSE	
22	1	1 1/2"	UNION, SW, 3000LB FS, A-105	
23	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
24	1	3"x3/4"	SOL, 3000LB FS, A-105	
25	2	3"x1/2"	TOL, 3000LB FS, A-105	
26	2		BASE PLATE, 1/2" THK. x 5" x 5" (SA-36 MATERIAL)	

J-447
12/19/16
IFC

SHOP WELD

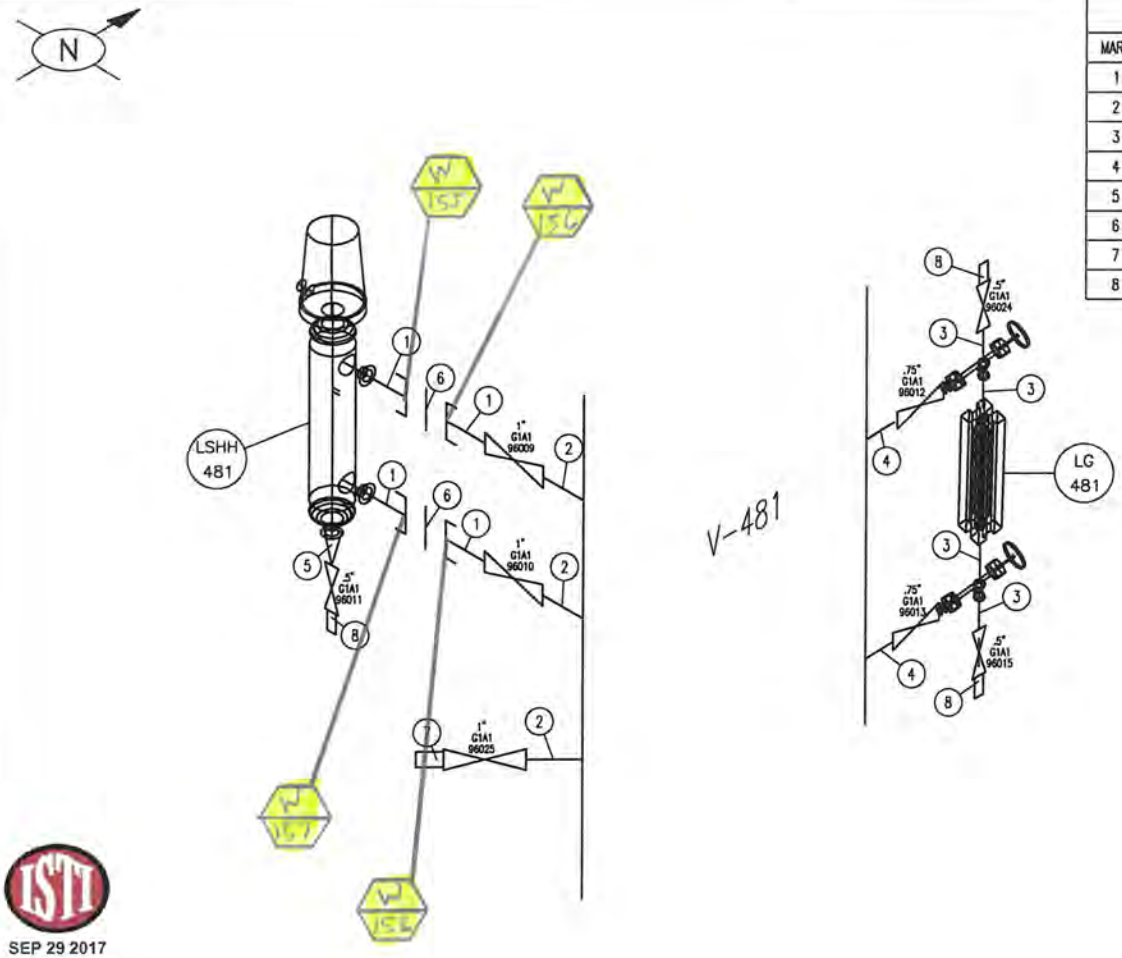
*** = JOB #

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	175 Psia							
OPER. TEMP.	73°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	700-B1-CS-3"
ASSEMBLY DRAWING	SC6-402
PIPE DRAWING	***-296
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	~~SC6~~
SPOOL ID. No.	SK2-040
REV.	0



BILL OF MATERIAL				
MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	4	1"	NIPPLE, XH SMLS, A-106-B POE-TOE	4"
2	3	1"	NIPPLE, XH SMLS, A-106-B TBE	4"
3	4	1/2"	NIPPLE, S/160 SMLS, A-106-B TBE	3"
4	2	3/4"	NIPPLE, XH SMLS, A-106-B TBE	3"
5	1	1"x1/2"	SWAGE, CONC, S/160, A-106-B TLE-TSE	
6	2	1"	UNION, SW, 3000LB FS, A-105	
7	1	1"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
8	3	1/2"	PLUG, SOLID STEEL, ROUND HEAD, A-105	

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J6733

J-447
12/19/16
IFC

*** = JOB #

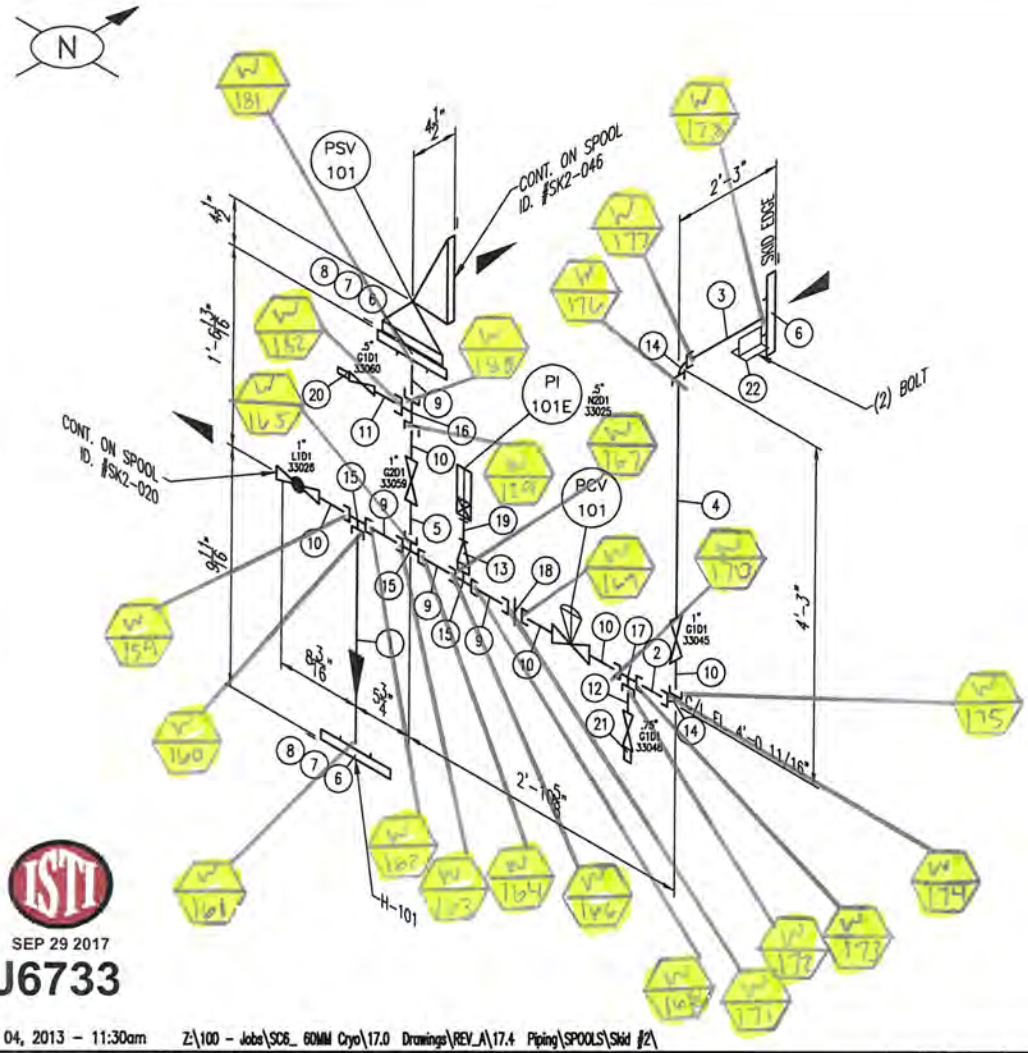
Oct 04, 2013 - 11:29am Z:\100 - Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	100 Psia							
OPER. TEMP.	105 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1"H W/ET	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	NONE	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR SW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	V-481 TRIM (A1-CS)
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-296
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	-SC6-
SPOOL I.D. No.	SK2-044
REV.	0



ISTI

SEP 29 2017

J6733

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	1"	PIPE, S/160 SMLS, A-106-B PBE	8"
2	1	1"	PIPE, S/160 SMLS, A-106-B PBE	9 1/8"
3	1	1"	PIPE, S/160 SMLS, A-106-B PBE	2'-1 5/16"
4	1	1"	PIPE, S/160 SMLS, A-106-B POE-TOE	3'-6 9/16"
5	1	1"	PIPE, S/160 SMLS, A-106-B POE-TOE	4 7/8"
6	3	1"	FLG, RFSW 600LB S/160, A-105	
7	2	5/8"	(4) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	3 3/4"
8	2	1"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
9	4	1"	NIPPLE, S/160 SMLS, A-106-B PBE	4"
10	5	1"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	4"
11	1	1/2"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	3"
12	1	3/4"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	3"
13	1	1"x1/2"	SWAGE, CONC, S/160, A-106-B PLE-TSE	
14	2	1"	ELL, 90 SW, 3000LB FS, A-105	
15	3	1"	TEE, SW, 3000LB FS, A-105	
16	1	1" x 1/2"	TEE, RED SW, 3000LB FS, A-105	
17	1	1" x 3/4"	TEE, RED, SW, 3000LB FS, A-105	
18	1	1"	UNION, SW, 3000LB FS, A-105	
19	1	1/2"	CPLG, THRD, 3000LB FS, A-105	
20	1	1/2"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
21	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
22	1		PIPE SHOE, 6" LG x 3" HI FROM W6x15	

J-447
12/19/16
IFC

*** = JOB #

Oct 04, 2013 - 11:30am Z:\100 - Jobs\SC6_ 60MM Cryo\17.0 Drawings\REV_A\17.4 Piping\SPOOLS\Skid #2\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	515 Psia							
OPER. TEMP.	100°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1"H	0	ISSUE FOR CONSTRUCTION	2/7/12	DV	LH
RADIOGRAPHY	NONE	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.

7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	197-D1-CS-1" 1"H
ASSEMBLY DRAWING	SC6-402
FIELD DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	02/07/12
JOB No.	~~SC6~~
SPOOL I.D. No.	SK2-045
REV.	0

J-447

SK2 Assy
Spools

ISTI
NDE Test Reports

Advanced Inspection Technologies

Radiographic Inspection Report

CUSTOMER IST LOC. Catawba DATE 10-20-17 PAGE 1 OF 1

JOB# 6733 PART# S-474 SR#2 P.O. _____

MAT'L CS CODE B31.3 NR PROC.# RT-1 ORIG. FILM ✓ REPAIR FILM _____

TRAVEL MILES _____ TRAVEL HRS. _____ WORK HRS. _____ STANDBY HRS. _____ TOTAL HRS. _____

RADIOGRAPHER Byron Edmondson LEVEL II ASSISTANT S Sides LEVEL I

INTERPRETED BY Byron Edmondson

TESTING VARIABLES

☑ IR192 ☐ CO60 ☐ X-RAY Ci 74 Kv _____ Ma _____ Focal Spot .135

PROCESSING: ☐ MANUAL ☑ AUTOMATIC FILM/CASSETTE _____ ☐ SINGLE FILM ☐ Comp Film

EXPOSURE: ☑ DWE/SWV ☐ DWE/DWV ☐ SWE/SWV

FILM: TYPE F-29, 80 CLASS I SENSITIVITY 2-2T

FILM USAGE: 3-1/2 x 8-1/2 6 | 3-1/2 x 10 _____ | 3-1/2 x 17 _____ | 4-1/2 x 10 _____
4-1/2 x 17 _____ | 7 x 8-1/2 _____ | 7 x 17 _____ | 8 x 10 _____
14 x 17 _____ | 70 MM _____ | OTHER _____

	FILM ID	INTERVAL	I.Q.I	SHIM	MAT. THK.	WELD THK.	REINF.	OFD	SOD	DIA.	DEN.	DISCONTINUITIES	ACCEPT	REJECT
1	W XR-6	12 o'clock	8F	—	.482	.557	.125	557	6.43	6"	2-4		✓	
2	W XR-7	V	15F	.094	.300	.425	V	.425	3.45	3"	L		✓	
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28														
29														
30														
31														
32												Jonathan Cook II		
33														
34														
35														

Sheet #1

Date: 10/20/2017

ISTI Plant Services
Radiography Sheet

Use XR numbers listed
on reader sheets
AIT

Job #	SK#/Desc	Spool #	Weld#	XR #	Welder	Size	Schd.	Comments
6733	SK2	SK2-010	W-12	XR-6	W	6"	XH	Good
6733	SK2	SK2-040	W-21	XR-7	W	3"	XH	Good

Advanced Inspection Technologies

Radiographic Inspection Report

CUSTOMER JSJI LOC. Catoosa DATE 10-10-17 PAGE 1 OF 1

JOB# 6733 PART# J-474 SR#2 P.O. _____

MAT'L CS CODE B31.3 NS PROC.# RTI ORIG. FILM ✓ REPAIR FILM _____

TRAVEL MILES _____ TRAVEL HRS. _____ WORK HRS. _____ STANDBY HRS. _____ TOTAL HRS. _____

RADIOGRAPHER Byron Edwards LEVEL II ASSISTANT S Burks LEVEL I

INTERPRETED BY Byron Edwards

TESTING VARIABLES

☑ IR192 ☐ CO60 ☐ X-RAY Ci 80 Kv _____ Ma _____ Focal Spot .140

PROCESSING: ☐ MANUAL ☑ AUTOMATIC FILM/CASSETTE _____ ☐ SINGLE FILM ☐ Comp Film

EXPOSURE: ☑ DWE/SWV ☐ DWE/DWV ☐ SWE/SWV

FILM: TYPE F-80 CLASS I SENSITIVITY 2-2T

FILM USAGE: 3-1/2 x 8-1/2 3 | 3-1/2 x 10 _____ | 3-1/2 x 17 _____ | 4-1/2 x 10 _____

4-1/2 x 17 _____ | 7 x 8-1/2 _____ | 7 x 17 _____ | 8 x 10 _____

14 x 17 _____ | 70 MM _____ | OTHER _____

	FILM ID	INTERVAL	I.Q.I	SHIM	MAT. THK.	WELD THK.	REINF.	OFD	SOD	DIA.	DEN.	DISCONTINUITIES	ACCEPT	REJECT
1	JI XR-4	10010	BF	—	.280	.405	.125	.405	6.545	6"	2-4		✓	
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28														
29														
30														
31												Jonathan Cash 10-16		
32														
33														
34														
35														

Sheet #1

ISTI Plant Services
Radiography Sheet

Date: 10/10/2017

Use XR numbers listed

on reader sheets

AIT

Job #	SK#/Desc	Spool #	Weld#	XR #	Welder	Size	Schd.	Comments
6733	SK2	SK2-037	W-9	XR-4	J1	6"	STD	Good

J-447

SK2 Assy
Spools

ISTI
Pressure Test Reports

PLANT SERVICES

PNEUMATIC TEST FORM

TEST PACKAGE # 06

ISTI Client **UOP Russell LLC.**

ISTI Job# **J-6733**

TEST PRESSURE **440 psi** TEST MEDIA **Nitrogen**

PRE-PNEUMATIC

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

PNEUMATIC TEST START Date: **10/31/2017** Time: **3:05 PM**

Test Gauge # **Digital** **576360**

PNEUMATIC TEST COMPLETE Date: **10/31/2017** Time: **4:15 PM**

Chart Recorder# **0-1000 psi** **08176**

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

POST -PNEUMATIC

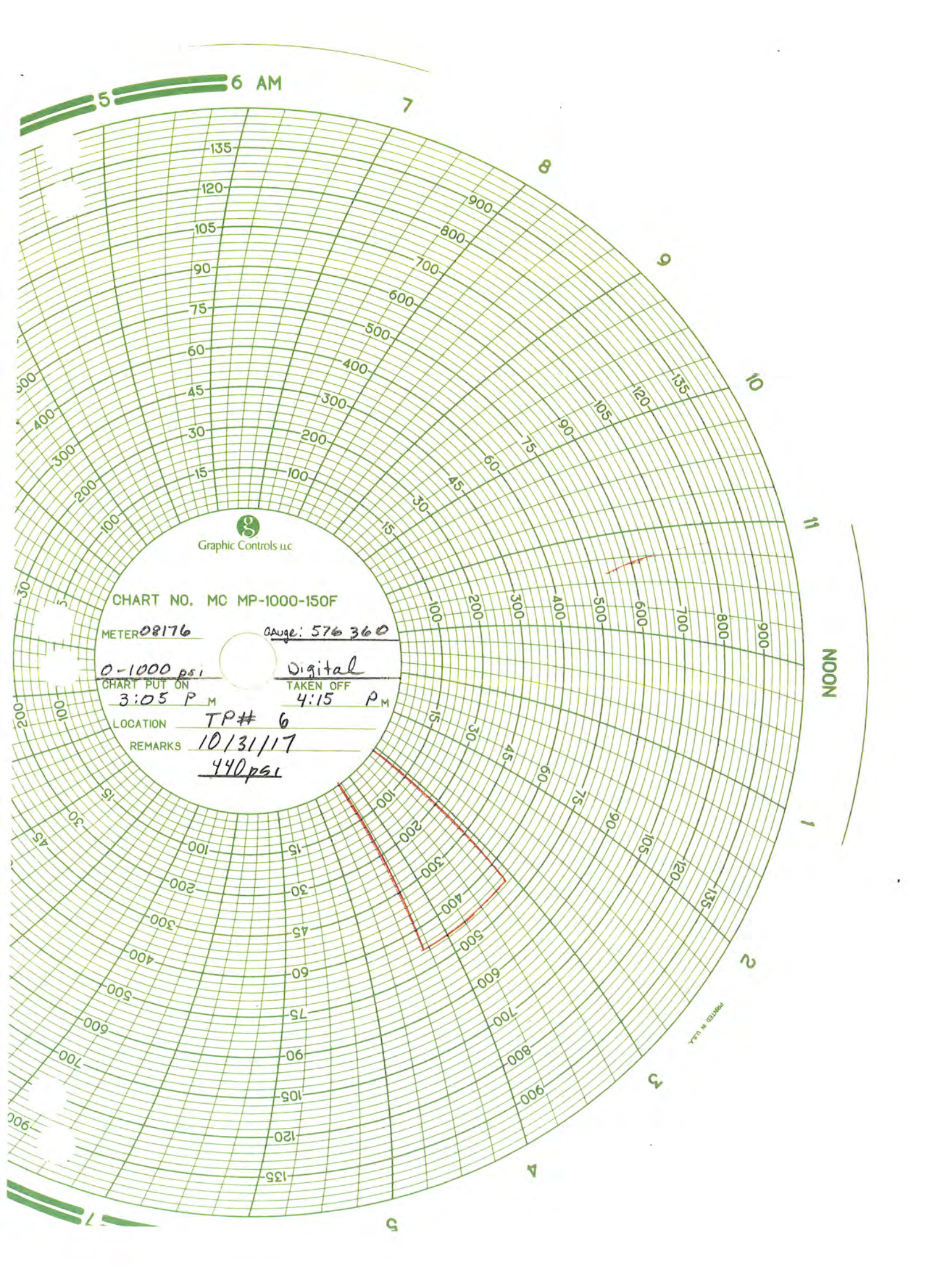
System Piping Dried Date: **10/31/2017**

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

ISTI Plant Services J-6733
Client: UOP Russell

Spool ID	TEST #	Test Date	Test Pressure
SK2-012	TP#6	10/31/2017	440
SK2-014	TP#6	10/31/2017	440
SK2-015	TP#6	10/31/2017	440
SK2-018	TP#6	10/31/2017	440
SK2-020	TP#6	10/31/2017	440
SK2-021-PC2	TP#6	10/31/2017	440
SK2-024	TP#6	10/31/2017	440
SK2-025	TP#6	10/31/2017	440
SK2-029	TP#6	10/31/2017	440
SK2-040	TP#6	10/31/2017	440
SK3-001	TP#6	10/31/2017	440
SK3-002	TP#6	10/31/2017	440


6 AM
NOON
Graphic Controls LLC
CHART NO. MC MP-1000-150F
METER 08176
Gauge: 576 360
0-1000 psi
Digital
CHART PUT ON
3:05 PM
TAKEN OFF
4:15 PM
LOCATION TP# 6
REMARKS 10/31/17
440psi

PLANT SERVICES

PNEUMATIC TEST FORM

TEST PACKAGE # 07

ISTI Client UOP Russell LLC.

ISTI Job# J-6733

TEST PRESSURE 550 psi TEST MEDIA Nitrogen

PRE-PNEUMATIC

Test Supervisor Jerry Allen Date: 10/31/2017

ISTI Quality Rep. Rod Holden Date: 10/31/2017

PNEUMATIC TEST START Date: 10/31/2017 Time: 3:15 PM

Test Gauge # Digital 567628

PNEUMATIC TEST COMPLETE Date: 10/31/2017 Time: 4:30 PM

Chart Recorder# 0-1000 psi 08176

Test Supervisor Jerry Allen Date: 10/31/2017

ISTI Quality Rep. Rod Holden Date: 10/31/2017

POST -PNEUMATIC

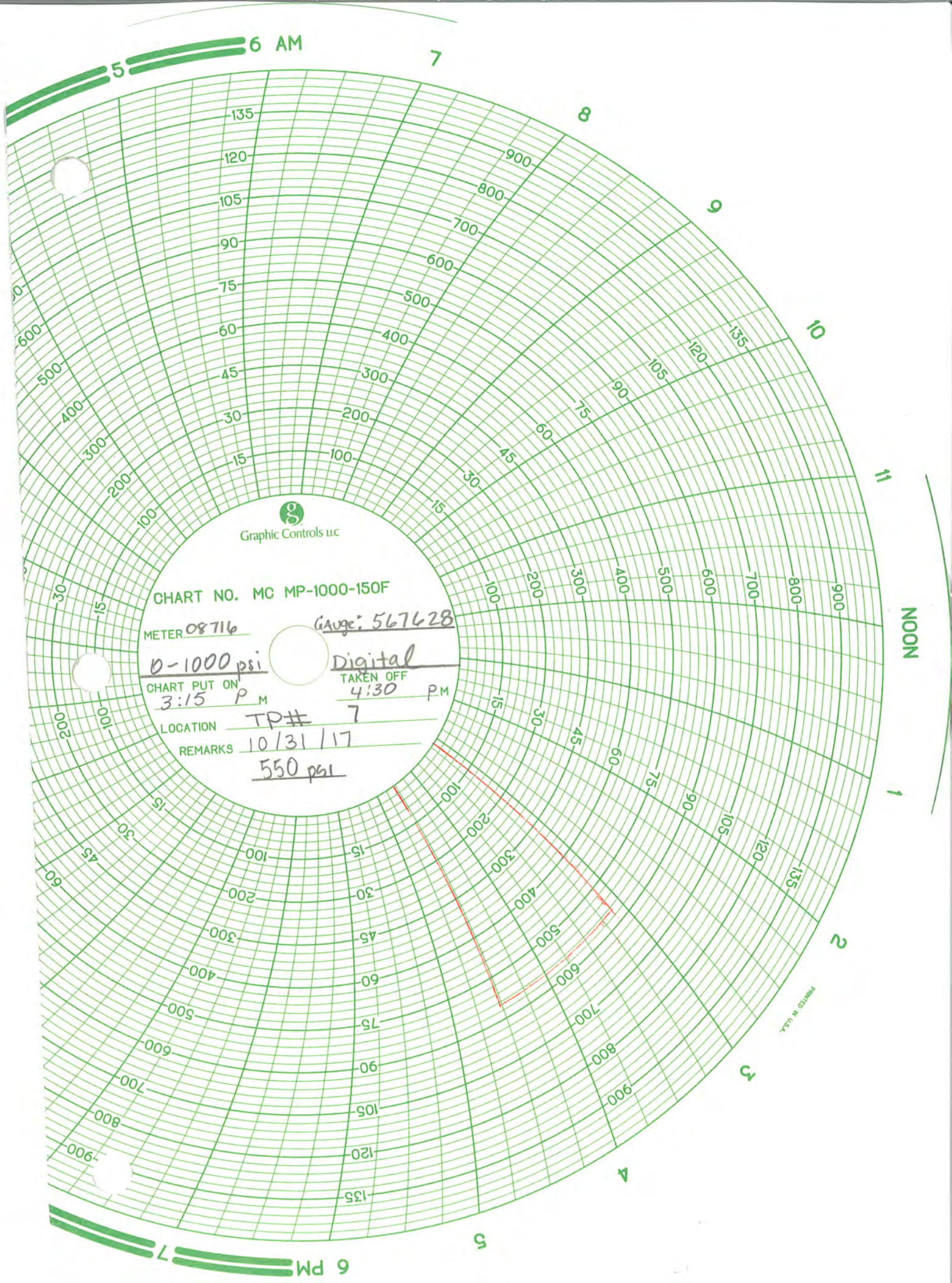
System Piping Dried Date: 10/31/2017

Test Supervisor Jerry Allen Date: 10/31/2017

ISTI Quality Rep. Rod Holden Date: 10/31/2017

ISTI Plant Services J-6733
Client: UOP Russell

Spool ID	TEST #	Test Date	Test Pressure
SK2-019	TP#7	10/31/2017	550


6 AM
7
8
9
10
11
NOON
1
2
3
4
5
6 PM
7
5
Graphic Controls LLC
CHART NO. MC MP-1000-150F
METER 08716
Gauge: 567628
0-1000 psi
Digital
CHART PUT ON 3:15 PM
TAKEN OFF 4:30 PM
LOCATION TP# 7
REMARKS 10/31/17
550 psi
PRINTED IN U.S.A.

PLANT SERVICES

PNEUMATIC TEST FORM

TEST PACKAGE # 08

ISTI Client **UOP Russell LLC.**

ISTI Job# **J-6733**

TEST PRESSURE **1584 psi** TEST MEDIA **Nitrogen**

PRE-PNEUMATIC

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

PNEUMATIC TEST START Date: **10/31/2017** Time: **4:15 PM**

Test Gauge # **Digital 576360**

PNEUMATIC TEST COMPLETE Date: **10/31/2017** Time: **5:15 PM**

Chart Recorder# **0-3000 psi 202A-156510**

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

POST -PNEUMATIC

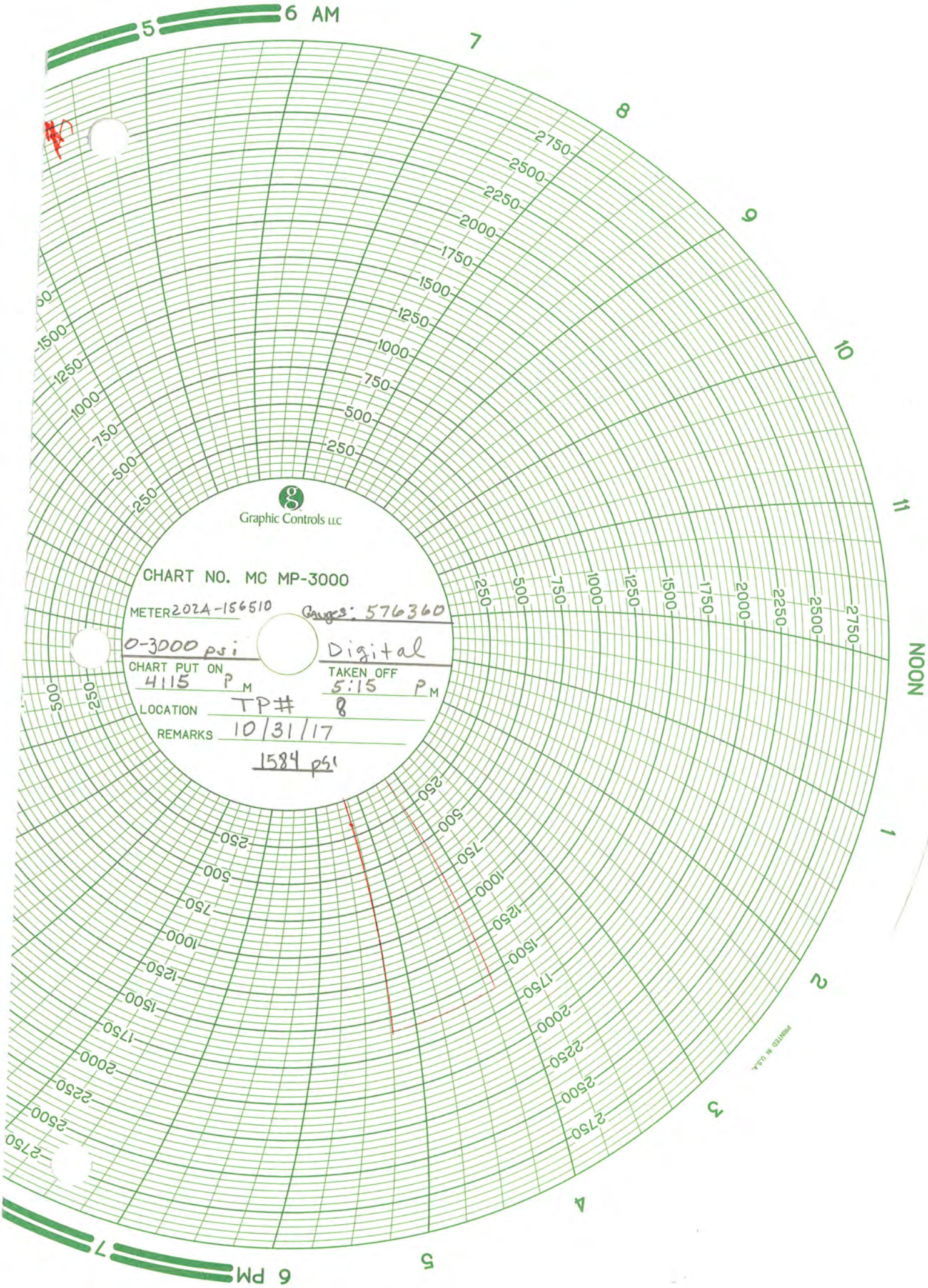
System Piping Dried Date: **10/31/2017**

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

ISTI Plant Services J-6733
Client: UOP Russell

Spool ID	TEST #	Test Date	Test Pressure
SK2-026	TP#8	10/31/2017	1584
SK2-027	TP#8	10/31/2017	1584
SK2-028	TP#8	10/31/2017	1584
SK2-030	TP#8	10/31/2017	1584
SK2-031	TP#8	10/31/2017	1584
SK2-042	TP#8	10/31/2017	1540
SK2-043	TP#8	10/31/2017	1540


6 AM
NOON
6 PM
Graphic Controls LLC
CHART NO. MC MP-3000
METER 2024-156510
Gauges: 576360
0-3000 psi
Digital
CHART PUT ON 4115 PM
TAKEN OFF 5:15 PM
LOCATION TP# 8
REMARKS 10/31/17
1584 psi
PRINTED IN U.S.A.

PLANT SERVICES

PNEUMATIC TEST FORM

TEST PACKAGE # 09

ISTI Client **UOP Russell LLC.**

ISTI Job# **J-6733**

TEST PRESSURE **165psi** TEST MEDIA **Nitrogen**

PRE-PNEUMATIC

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

PNEUMATIC TEST START Date: **10/31/2017** Time: **4:45 PM**

Test Gauge # **Digital** / **794666**

PNEUMATIC TEST COMPLETE Date: **10/31/2017** Time: **6:00 PM**

Chart Recorder# **0-1000 psi** / **265-42857**

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

POST -PNEUMATIC

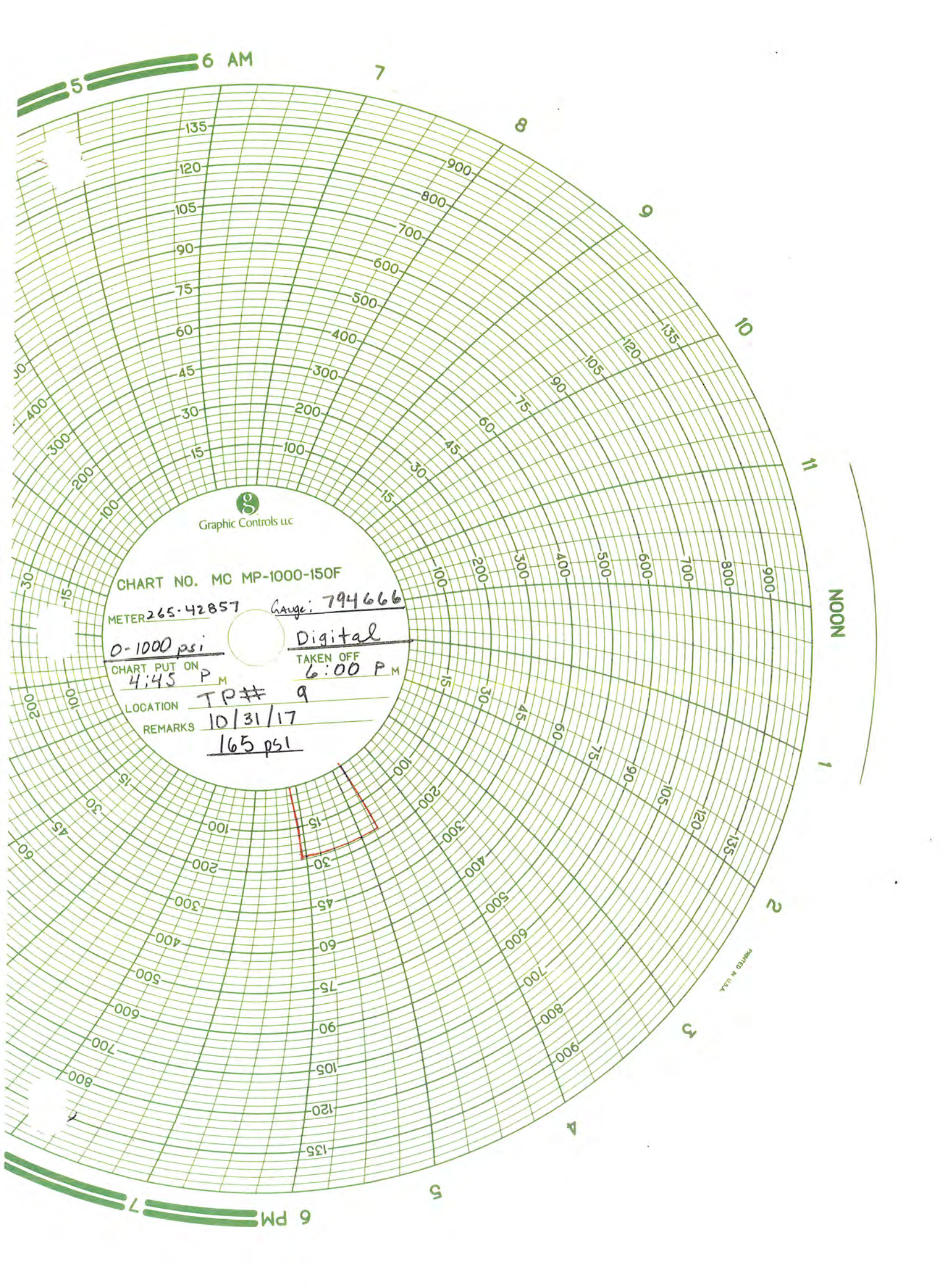
System Piping Dried Date: **10/31/2017**

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

ISTI Plant Services J-6733
Client: UOP Russell

Spool ID	TEST #	Test Date	Test Pressure
SK2-032	TP#9	10/31/2017	165
SK2-033	TP#9	10/31/2017	165
SK2-034	TP#9	10/31/2017	165
SK2-035	TP#9	10/31/2017	165
SK2-036	TP#9	10/31/2017	165
SK2-037	TP#9	10/31/2017	165
SK2-038	TP#9	10/31/2017	165
SK2-039	TP#9	10/31/2017	165
SK2-041	TP#9	10/31/2017	165
SK2-044	TP#9	10/31/2017	165
SK2-046	TP#9	10/31/2017	165
SK2-047	TP#9	10/31/2017	165
SK2-048	TP#9	10/31/2017	165
SK3-003	TP#9	10/31/2017	165
SK3-004	TP#9	10/31/2017	165


6 AM
NOON
6 PM
Graphic Controls LLC
CHART NO. MC MP-1000-150F
METER 265-42857
Gauge: 794666
0-1000 psi
Digital
CHART PUT ON 4:45 PM
TAKEN OFF 6:00 PM
LOCATION TP# 9
REMARKS 10/31/17
165 psi

PLANT SERVICES

PNEUMATIC TEST FORM

TEST PACKAGE # 10

ISTI Client **UOP Russell LLC.**

ISTI Job# **J-6733**

TEST PRESSURE **1210 psi** TEST MEDIA **Nitrogen**

PRE-PNEUMATIC

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

PNEUMATIC TEST START Date: **10/31/2017** Time: **6:15 PM**

Test Gauge # **Digital** **567628**

PNEUMATIC TEST COMPLETE Date: **10/31/2017** Time: **7:20 PM**

Chart Recorder# **0-2000 psi** **202A-4998**

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

POST -PNEUMATIC

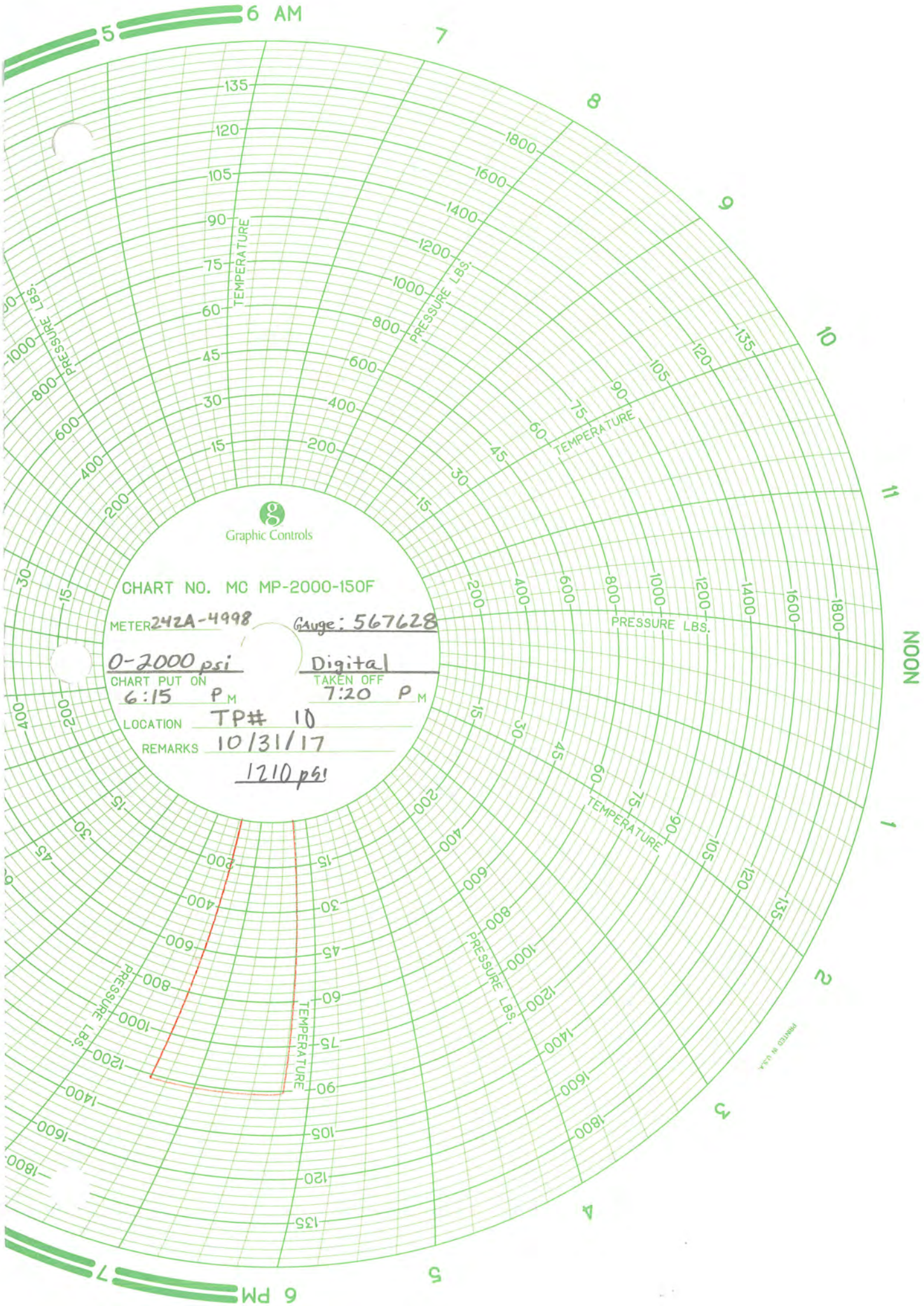
System Piping Dried Date: **10/31/2017**

Test Supervisor **Jerry Allen** Date: **10/31/2017**

ISTI Quality Rep. **Rod Holden** Date: **10/31/2017**

ISTI Plant Services J-6733
Client: UOP Russell

Spool ID	TEST #	Test Date	Test Pressure
SK2-001	TP#10	10/31/2017	1210
SK2-002	TP#10	10/31/2017	1210
SK2-003	TP#10	10/31/2017	1210
SK2-004	TP#10	10/31/2017	1210
SK2-005	TP#10	10/31/2017	1210
SK2-006	TP#10	10/31/2017	1210
SK2-007	TP#10	10/31/2017	1210
SK2-008	TP#10	10/31/2017	1210
SK2-009	TP#10	10/31/2017	1210
SK2-010	TP#10	10/31/2017	1210
SK2-011	TP#10	10/31/2017	1210
SK2-013A	TP#10	10/31/2017	1210
SK2-016	TP#10	10/31/2017	1210
SK2-017	TP#10	10/31/2017	1210
SK2-021-PC1	TP#10	10/31/2017	1210
SK2-022	TP#10	10/31/2017	1210
SK2-023	TP#10	10/31/2017	1210
SK2-045	TP#10	10/31/2017	1210


6 AM
7
8
9
10
11
NOON
1
2
3
4
5
6 PM
7
5
TEMPERATURE
PRESSURE LBS.
Graphic Controls
CHART NO. MC MP-2000-150F
METER 242A-4998
Gauge: 567628
0-2000 psi
Digital
CHART PUT ON
6:15 PM
TAKEN OFF
7:20 PM
LOCATION TP# 10
REMARKS 10/31/17
1210 psi
PRINTED IN U.S.A.

PLANT SERVICES

PNEUMATIC TEST FORM

TEST PACKAGE # 11

ISTI Client **UOP Russell LLC.**

ISTI Job# **J-6733**

TEST PRESSURE **1210 psi** TEST MEDIA **Nitrogen**

PRE-PNEUMATIC

Test Supervisor **Jerry Allen** Date: **11/10/2017**

ISTI Quality Rep. **Rod Holden** Date: **11/10/2017**

PNEUMATIC TEST START Date: **11/10/2017** Time: **8:15 AM**

Test Gauge # **Digital** **794845**

PNEUMATIC TEST COMPLETE Date: **11/10/2017** Time: **9:30 AM**

Chart Recorder# **0-2000 psi** **202-21048**

Test Supervisor **Jerry Allen** Date: **11/10/2017**

ISTI Quality Rep. **Rod Holden** Date: **11/10/2017**

POST -PNEUMATIC

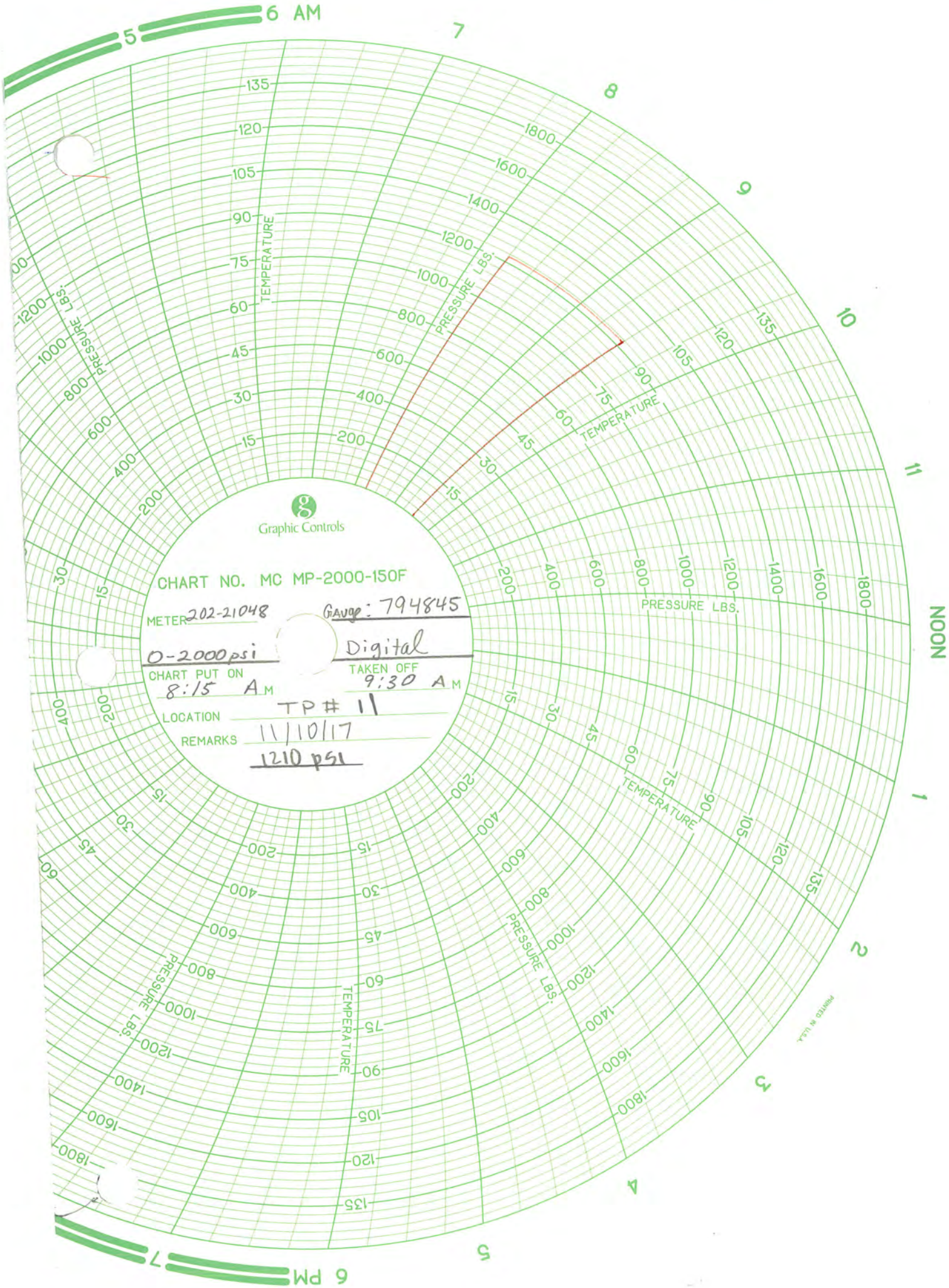
System Piping Dried Date: **11/10/2017**

Test Supervisor **Jerry Allen** Date: **11/10/2017**

ISTI Quality Rep. **Rod Holden** Date: **11/10/2017**

ISTI Plant Services J-6733
Client: UOP Russell

Spool ID	TEST #	Test Date	Test Pressure
SK2-013B	TP#11	11/10/2017	1210


6 AM
7
8
9
10
11
NOON
1
2
3
4
5
6 PM
7
5
TEMPERATURE
PRESSURE LBS.
Graphic Controls
CHART NO. MC MP-2000-150F
METER 202-21048
Gauge: 794845
0-2000psi
Digital
CHART PUT ON 8:15 AM
TAKEN OFF 9:30 AM
LOCATION TP# 11
REMARKS 11/10/17
1210 psi
PRINTED IN U.S.A.

J-447

SK2 Assy
Spools

ISTI
Calibration Certificates

HYDRO-CHART

Calibration → Certification → Repair → Rental

www.hydro-chart.com 7709 E. 42nd Place, Suite 128 Tulsa, OK 74145 918-834-3210

CERTIFICATE OF CALIBRATION

Customer Name:	ISTI
Model:	Barton Pressure/Temperature Recorder
Serial Number:	202-21048
Range:	0 - 2,000 psi / 0 - 150 Deg. F.
Accuracy +/- :	1%
Condition as Left:	Within Tolerance
Date Calibrated:	September 26, 2017
Action Performed:	Calibrated/Certified

Tech: Mark M. Harrison

Authorized Signature: Mark M. Harrison

This certificate applies solely for the equipment listed above.
The primary test and measuring equipment used is calibrated and traceable to the National Institute of Standards and Technology (NIST) United States.

Additel SN: 211H13610038 Asset # 1123679 Due Date: 09/05/2018
Crystal SN: 261773 Asset # 1126050 Due Date: 09/05/2018
Fluke SN: 20000054 Asset # 1141857 Due Date: 10/17/2017

Based on Standard Gravity @72 Deg. F. and 39% Relative Humidity.

CERTIFICATION OF CALIBRATION

THE INSTRUMENTS LISTED BELOW MEET-OR EXCEED PUBLISHED SPECIFICATION AND HAS BEEN CALIBRATED UNDER CONTROLLED CONDITIONS TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (FORMERLY N.B.S.). M & M INSTRUMENTS CONFORMS TO ANSI Z540-1.

CERTIFICATION#: 39190

INSTRUMENT MAKE: CRYSTAL DIGITAL TEST GAUGE
MODEL: XP2i
ID#: NONE
S/N: 356841
DATE: 09-21-17
DUE: 09-21-18
HUMIDITY: 63.2% TEMPERATURE: 74.18 DEG F

SOURCE 1: PRESSUREMENTS W2000/3HP — CERT#: 2103511
SOURCE 2: — CERT#:
SOURCE 3: — CERT#:

INSTRUMENT RECEIVED: IN TOL.

MANUFACTURER ACCURACY: +/-0.1% RDG. 20-100%F.S., +/-0.02%F.S. 0-20%F.S.

COMMENTS:

CERTIFIED BY EP

M & M INSTRUMENTS

5022 SYCAMORE AVE.

PASADENA, TX 77503

PHONE (281) 991-5036
FAX (281) 991-5077

TechCal
Established 1984

Tech Cal Recorder™
Certificate of Calibration

This is to certify that this pressure and/or temperature recorder has been manufactured and calibrated in accordance with Technology & Calibrations, Inc.'s quality assurance program, current revision. All measurements are traceable to the National Institute of Standards and Technology (NIST) and certified in accordance with ANSI/NCSL, Z540-1 and ISO 10012-1. All calibrations performed at 72 degrees Fahrenheit, plus or minus 4 degrees and less than 65% relative humidity. The collective uncertainty of the measurement standard does not exceed 25% of the acceptable tolerance for each characteristic of the measuring and test equipment being certified.

Model Number: 2B1T0 Serial Number: 08176

Pen 1 Range: 1,000 PSI Pen 2 Range: 0-150 Deg. F Pen 3 Range: N/A

The Accuracy of this Recorder is +/- 0.5% of Indicated Range

Date of Calibration: Sep 8, 2017

Customer "In Service Date": _____

Calibration Due Date: _____

Technician: M. Rosales QA Approval: _____

WARRANTY

Tech Cal Recorders are warranted against defective materials or workmanship for 12 months following the date of shipment. Technology & Calibration, Inc.'s liability is limited to repair or replacement at the factory. No obligation can be assumed for recorders subjected to misuse or unauthorized repairs.

HYDRO-CHART
Calibration → Certification → Repair → Rental

www.hydro-chart.com 7709 E. 42nd Place, Suite 128 Tulsa, OK 74145 918-834-3210

CERTIFICATE OF CALIBRATION

Customer Name:	ISTI
Model:	Barton Pressure/Temperature Recorder
Serial Number:	202A-40940
Range:	0 - 1,000 psi / 0 - 150 Deg. F.
Accuracy +/- :	1%
Condition as Left:	Within Tolerance
Date Calibrated:	September 5, 2017
Action Performed:	Calibrated/Certified

Tech: Mark M. Harrison

Authorized Signature: Mark M. Harrison

This certificate applies solely for the equipment listed above.
The primary test and measuring equipment used is calibrated and traceable to the National Institute of Standards and Technology (NIST) United States.
Crystal Engineering SN: 070569 Asset# 1121166 Due Date: 11/10/2017
Fluke SN: 20000054 Asset # 1141857 Due Date: 10/17/2017
Based on Standard Gravity @72 Deg. F. and 39% Relative Humidity.

HYDRO CHART
Calibration → Certification → Repair → Rental

www.hydro-chart.com 7709 E. 42nd Place, Suite 128 Tulsa, OK 74145 918-834-3210

CERTIFICATE OF CALIBRATION

Customer Name:	ISTI
Model:	Barton Pressure/Temperature Recorder
Serial Number:	242A-4998
Range:	0 - 2,000 psi / 0 - 150 Deg. F.
Accuracy +/- :	1%
Condition as Left:	Within Tolerance
Date Calibrated:	September 5, 2017
Action Performed:	Calibrated/Certified

Tech: Mark M. Harrison

Authorized Signature: Mark M. Harrison

This certificate applies solely for the equipment listed above.
The primary test and measuring equipment used is calibrated and traceable to the National Institute of Standards and Technology (NIST) United States.
Crystal Engineering SN: 070569 Asset# 1121166 Due Date: 11/10/2017
Fluke SN: 20000054 Asset # 1141857 Due Date: 10/17/2017
Based on Standard Gravity @72 Deg. F. and 39% Relative Humidity.

CERTIFICATION OF CALIBRATION

THE INSTRUMENTS LISTED BELOW MEET-OR EXCEED PUBLISHED SPECIFICATION AND HAS BEEN CALIBRATED UNDER CONTROLLED CONDITIONS TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (FORMERLY N.B.S.). M & M INSTRUMENTS CONFORMS TO ANSI Z540-1.

CERTIFICATION#: 38889

INSTRUMENT MAKE: CRYSTAL DIGITAL TEST GAUGE
MODEL: XP2i
ID#: NONE
S/N: 567628
DATE: 07-27-17
DUE: 07-27-18
HUMIDITY: 55.6% TEMPERATURE: 78.00 DEG F

SOURCE 1: PRESSUREMENTS W2000/3HP — CERT#: 2103511
SOURCE 2: — CERT#:
SOURCE 3: — CERT#:

INSTRUMENT RECEIVED: IN TOL.

MANUFACTURER ACCURACY: +/-0.1% RDG. 20-100%F.S., +/-0.02%F.S. 0-20%F.S.

COMMENTS: REPLACED SENSOR AND BATTERIES.

CERTIFIED BY EP

M & M INSTRUMENTS

5022 SYCAMORE AVE.

PASADENA, TX 77503

PHONE (281) 991-5036
FAX (281) 991-5077

Crystal Engineering Corporation
708 Fiero Lane, Suite 9
San Luis Obispo, CA 93401

TEL 805.595.5477 · FAX 805.595.5466
crystalengineering.net

Report Number: 271065

Certificate of Calibration

Calibrations comply with ISO/IEC 17025:2005 and ANSI NCSL Z540-1-1994

ACCREDITED
CALIBRATION CERT #2601.01

Device Information	
Model	5KPSIXP2I
Serial Number	794845
Water Column (@ 1 Atm)	4° C
Calibration Date	11 July 2017
Verification Date	12 July 2017
As Received Condition	New
As Left Condition	In Tolerance

Laboratory Conditions	
Laboratory ambient conditions throughout this calibration	
Temperature	19 to 23° C
Humidity	20 to 60% RH

Definitions

Temperature ..... Measured temperature of Device Under Test (DUT) during data collection.
Reference Reading .... True value according to our reference standards.
Indicated Reading ..... Displayed reading from test unit.
Condition ..... Pass or Fail.
Difference ..... Indicated reading minus reference reading.
Relative Difference ..... (Difference / reference reading) x 100.
Allowable Tolerance .... ± according to manufacturer's specifications.
Pressure Medium ..... Nitrogen.

Traceability Statement

Reference Standards used in this calibration are traceable to the National Institute of Standards and Technology of the United States (NIST) or other NMI.

System Expanded Uncertainty

System expanded uncertainty evaluation includes the calibration reference used and device under test and is calculated in accordance with ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainties reported represent expanded uncertainties using a coverage factor (k) to approximate a percentage (%) confidence level. *In Tolerance* or *Pass* conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. Test methods defined by COI-054.

Coverage Factor (k)	2
Confidence Level (%)	~ 95

Traceable Reference Standards				
Manufacturer	**Calibration Reference Used**	**Serial Number**	**Report No.**	**Reference Cal. Due**
DHI	PPCH-G 618 10KPSI Pressure Controller	618	16028	19 November 2017

Laboratory Representative
Tony Ly

Quality Representative
Bruce Hitt

Crystal Engineering Corporation, is ISO 9001:2008 Quality Management System Certified by Intertek, Certificate No. QMS 1058.

AMETEK®
TEST & CALIBRATION INSTRUMENTS

Crystal pressure

Crystal Engineering Corporation
708 Fiero Lane, Suite 9
San Luis Obispo, CA 93401

TEL 805.595.5477 · FAX 805.595.5466
crystalengineering.net

Report Number: 270667

Certificate of Calibration

Calibrations comply with
ISO/IEC 17025:2005 and
ANSI NCSL Z540-1-1994

ilac-MRA

ACCREDITED
CALIBRATION CERT #2601.01

Device Information	
Model	5KPSIXP2I
Serial Number	794666
Water Column (@ 1 Atm)	4° C
Calibration Date	06 July 2017
Verification Date	06 July 2017
As Received Condition	New
As Left Condition	In Tolerance

Laboratory Conditions	
Laboratory ambient conditions throughout this calibration	
Temperature	19 to 23° C
Humidity	20 to 60% RH

Definitions

Temperature ... Measured temperature of Device Under Test (DUT) during data collection.
Reference Reading .... True value according to our reference standards.
Indicated Reading ..... Displayed reading from test unit.
Condition ..... Pass or Fail.
Difference ..... Indicated reading minus reference reading.
Relative Difference ..... (Difference / reference reading) x 100.
Allowable Tolerance .... ± according to manufacturer's specifications.
Pressure Medium ..... Nitrogen.

Traceability Statement

Reference Standards used in this calibration are traceable to the National Institute of Standards and Technology of the United States (NIST) or other NMI.

System Expanded Uncertainty

System expanded uncertainty evaluation includes the calibration reference used and device under test and is calculated in accordance with ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainties reported represent expanded uncertainties using a coverage factor (k) to approximate a percentage (%) confidence level. *In Tolerance* or *Pass* conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. Test methods defined by COI-054.

Coverage Factor (k)	2
Confidence Level (%)	~95

Traceable Reference Standards				
Manufacturer	**Calibration Reference Used**	**Serial Number**	**Report No.**	**Reference Cal. Due**
DHI	PPCH-G 618 10KPSI Pressure Controller	618	16028	19 November 2017

Laboratory Representative
Tony Ly

Quality Representative
Bruce Hitt

HYDRO CHART

Calibration → Certification → Repair → Rental

www.hydro-chart.com 7709 E. 42nd Place, Suite 128 Tulsa, OK 74145 918-834-3210

CERTIFICATE OF CALIBRATION

Customer Name:	ISTI
Model:	Barton Pressure/Temperature Recorder
Serial Number:	265-42857
Range:	0 - 1,000 psi and 0 - 150° F.
Accuracy +/- :	1%
Date Calibrated:	June 19, 2017
Condition as received:	Could not test - Clogged Tube
Condition as left:	Within Tolerance
Action Performed:	Calibrated/Certified

Tech: Mark M. Harrison

Authorized Signature: Mark M. Harrison

This certificate applies solely for the equipment listed above. Calibration is performed on-site at 7709 E. 42nd Place #128, Tulsa OK, 74145.

The primary test and measuring equipment used is calibrated and traceable to the National Institute of Standards and Technology (NIST) United States.

Additel SN: 211H136100338 Asset # 1123679 Due Date: 08/23/2017

Fluke SN: 20000054 Asset # 1141857 Due Date: 10/17/2017

Based on Standard Gravity @72 Deg. F. and 39% Relative Humidity.

HYDRO CHART
CALIBRATION SERVICES

7709 EAST 42nd PLACE, SUITE 128 TULSA, OK 74145 918-834-3210

CALIBRATION CERTIFICATION

We certify the instrument identified below has been tested using precision Standards traceable to NIST and the accuracy found is attested to below:

CUSTOMER PIPELINE SUPPLY & SERVICE

MODEL Crystal Engineering XP2i Digital Test Gauge

SERIAL NUMBER 576360

RANGE 0 - 5,000 psi

ACCURACY +/- 0.1 %

CALIBRATED BY Mark M. Harrison Mark M. Harrison

DATE March 27, 2017

The primary test and measuring equipment used is calibrated and traceable to NIST (National Institute of Standards and Technology) United States

Additel SN 211H136100338 Asset # 1123679 Due Date: 08/23/2017

Fluke SN: 20000054 Asset # 1141857 Due Date: 10/17/2017

Based on Standard Gravity @72 Deg. F and 39% Relative Humidity

HYDRO-CHART
CALIBRATION SERVICES

7709 EAST 42nd PLACE, SUITE 128 TULSA, OK 74145 918-834-3210

CALIBRATION CERTIFICATION

We certify the instrument identified below has been tested using precision Standards traceable to NIST and the accuracy found is attested to below:

CUSTOMER ISTI

MODEL Barton Pressure / Temperature Recorder

SERIAL NUMBER 202A - 156510

RANGE 0 - 3,000 psi and 0 - 150° F.

ACCURACY + / - 1 %

CALIBRATED BY Mark M. Harrison Mark M. Harrison

DATE February 6, 2017

The primary test and measuring equipment used is calibrated and traceable to NIST (National Institute of Standards and Technology) United States

Additel SN 211H136100338 Asset # 1123679 Due Date: 08/23/2017

Fluke SN: 20000054 Asset # 1141857 Due Date: 10/17/2017

Based on Standard Gravity @72 Deg. F and 39% Relative Humidity

Honeywell | UOP Russell

PRESSURE TEST RECORD

JOB: 488 SKID: 2 (SC6-1)

SPOOL#	METHOD USED	DESIGN PRESSURE (PSIG)	DESIGN TEMP	TEMPERATURE CORRECTION FACTOR (HYDRO ONLY)	TEST PRESSURE USED (PSIG)	GAUGE USED	CALIBRATION DATE	DATE TESTED	REMARKS
2	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
6	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
7	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
8	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
9	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
10	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
11	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
12	Nitrogen	400	150'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
15	Nitrogen	400	150'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
17	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
21(D1-CS)	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
21(D1-LT)	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
21(B1-LT)	Nitrogen	400	200'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
23	Nitrogen	1100	350'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
29	Nitrogen	400	200'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
38	Nitrogen	150	150'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
41	SHOP AIR	150	150'F	NA	90 PSIG	DG-3	1/23/2018	11/21/2018	INSTRUMENT AIR
42	Nitrogen	1400	150'F	NA	1540 PSIG	DG-3	1/23/2018	11/20/2018	
43	Nitrogen	1400	150'F	NA	1540 PSIG	DG-3	1/23/2018	11/20/2018	
44	Nitrogen	150	150'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
100	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
101	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
102	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
103	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
104	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
105	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
106	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
107	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
108	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
109	Nitrogen	150	400'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	

Hold all pressure tests for a minimum of 10 minutes

Witnessed by: *David Osborn*

UOPR

Honeywell | UOP Russell

PRESSURE TEST RECORD

JOB: 488 SKID: 2 (SC6-2)

SPOOL#	METHOD USED	DESIGN PRESSURE (PSIG)	DESIGN TEMP	TEMPERATURE CORRECTION FACTOR (HYDRO ONLY)	TEST PRESSURE USED (PSIG)	GAUGE USED	CALIBRATION DATE	DATE TESTED	REMARKS
110	Nitrogen	400	150'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
111	Nitrogen	150	150'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
112	Nitrogen	500	250'F	NA	550 PSIG	DG-3	1/23/2018	11/21/2018	
113	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
114	Nitrogen	400	200'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
115	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
116	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
117	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
118	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
119	Nitrogen	500	350'F	NA	550 PSIG	DG-3	1/23/2018	11/21/2018	
120	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
121	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
122	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
123	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
124	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
125	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
126	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
127	Nitrogen	1100	150'F	NA	1210 PSIG	DG-3	1/23/2018	11/20/2018	
128	Nitrogen	400	150'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
129	Nitrogen	400	200'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
130	Nitrogen	400	200'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
131	Nitrogen	400	150'F	NA	440 PSIG	DG-3	1/23/2018	11/21/2018	
132	Nitrogen	1440	200'F	NA	1584 PSIG	DG-3	1/23/2018	11/20/2018	
133	Nitrogen	1440	200'F	NA	1584 PSIG	DG-3	1/23/2018	11/20/2018	
134	Nitrogen	1440	200'F	NA	1584 PSIG	DG-3	1/23/2018	11/20/2018	
135	Nitrogen	1440	200'F	NA	1584 PSIG	DG-3	1/23/2018	11/20/2018	
136	Nitrogen	150	150'F	NA	165 PSIG	DG-3	1/23/2018	11/21/2018	
137	Nitrogen	1440	200'F	NA	1584 PSIG	DG-3	1/23/2018	11/20/2018	
138	Nitrogen	650	200'F	NA	710 PSIG	DG-3	1/23/2018	11/21/2018	

Hold all pressure tests for a minimum of 10 minutes

Witnessed by: *David Osborn*

UOPR

Honeywell | UOP Russell

WELD MAP INDEX

JOB: 488 SKID: 2

JOB/SKID/SPOOL#	WELD #	PIPE SIZE/WALL THICKNESS	NEW/REPAIR/TRACER	MATERIEL TYPE	ACCEPT/ REJECT	DATE	READER SHEET #	MAPPED	Remarks
J488-SK2-135	PX-1	3"/.300	NEW	CS	ACCEPT	10/23/2018	11636	MAPPED	
J488-SK2-111	LX-1	4"/.237	NEW	CS	REJECT	10/23/2018	11636	MAPPED	
J488-SK2-111	LX-1	4"/.237	REPAIR	CS	ACCEPT	10/302018	13281	MAPPED	
J488 SK2-100	PX-2	8".322	NEW	CS	ACCEPT	10/302018	13281	MAPPED	
J488 SK2-134	PX-3	6".432	NEW	CS	ACCEPT	10/302018	13281	MAPPED	
J488 SK1-134	PX-4	6".432	NEW	CS	ACCEPT	10/302018	13281	MAPPED	
J488 SK2- 137	PX-5	6"/.432	NEW	CS	ACCEPT	11/2/2018	11684	MAPPED	
J488 SK2- 124	PX-6	3"/.216	NEW	SS	ACCEPT	11/2/2018	11684	MAPPED	
J488 SK2- 124	PX-7	3"/.216	NEW	SS	ACCEPT	11/2/2018	11684	MAPPED	
J488 SK2- 105	PX-8	8"/.332	NEW	CS	ACCEPT	11/15/2018	12112	MAPPED	
J488 SK2- 105	PX-9	8"/.332	NEW	CS	ACCEPT	11/15/2018	12112	MAPPED	
J488 SK2- 102	P-10	8"/.332	N/A	CS	N/A	N/A	N/A	MAPPED	
J488 SK2- 015	P-11	10"/.365	N/A	SS	N/A	N/A	N/A	MAPPED	
J488 SK2- 117	P-12	2"/.218	N/A	CS	N/A	N/A	N/A	MAPPED	
J488 SK2- 010	P-13	6"/.432	N/A	CS	N/A	N/A	N/A	MAPPED	
J488 SK2- 021	P-14	2"/.218	N/A	CS	N/A	N/A	N/A	MAPPED	
J488 SK2- 010	P-15	6"/.432	N/A	CS	N/A	N/A	N/A	MAPPED	
J488 SK2- 121	P-16	8"/.500	N/A	CS	N/A	N/A	N/A	MAPPED	
J488 SK2- 118	P-17	3"/.300	N/A	CS	N/A	N/A	N/A	MAPPED	
J488 SK2- 122	P-18	2"/154	N/A	SS	N/A	N/A	N/A	MAPPED	

PLEASE USE B31.3 NORMAL SERVICE FOR FILM INTERPRETATION

*Add Job number, Welder I.D. and Spool I.D.to film I.D. flag.

*All welds for RT will be flagged with ORANGE tape

*Separate reader sheets by JOB and SKID Number.

UOPR

TGR INDUSTRIAL SERVICES

TX/LA/MS/AL 713 - 636-2288 • OK/KS/MO/AR 1 - 800 - 625-9288
www.tgrind.com

TECHNIQUE/INSPECTION REPORT

CUSTOMER DATA TGR JOB# TC-102318-2
NAME UOP HONEYWELL
ADDRESS
PHONE ATTN:
W.O. # J488 P.O. #
JOB LOCATION
DESCRIPTION MATERIAL TYPE: CLS

DATE 10-23-18 DAY Tue

DEFECT CODE

AB – ARC BURN
AI – ALIGNED INDICATION
BT – BURN THROUGH
CON – CONCAVITY
CRACK – CRACK
HB – HOLLOW BEAD
IF – INADEQUATE FUSION
IP – INCOMPLETE PENETRATION
MA – MISALIGNMENT
POR – POROSITY
SLI – SLAG INCLUSION
SLL – SLAG LINE
SURF – SURFACE INDICATION
UCE – UNDERCUT EXTERNAL
UCI – UNDERCUT INTERNAL

ABBREVIATED TERMS

SOD = SOURCE TO OBJECT DISTANCE
OFD = SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD = OUTER DIAMETER **REP** = REPAIR **RET** = RETAKE
WT = WELD THICKNESS **RES** = RESHOOT **DEN** = DENSITY
WR = WELD REINFORCEMENT **BM** = BASE MATERIAL

	WELD/FILM NUMBER	JOB NUMBER	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE / MFG / TYPE	SOD	OFD	IQI SE	# EXP	DEN	DEFECT LOCATION
1	CX-1	J488 SK2-111	4.5	.237	.125	.362		✓	3	3 ½X10 SOUR	4	.362	10	3		T-2 IP
2	PX-1	J488 SK2-135	3.5	.300	.125	.425	✓		3	3 ½X10 SOUR	3	.425	10	3		
3																
4																
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UOPR

PROCEDURE	EXP. ARRANGEMENT	SOURCE	CURIES/KV	SOURCE SIZE DIA.	DEV. TEMP	DEV. TIME
CR	D	IR-192	90	.104	Auto	Auto

NO. OF WELDS	FT. LONG SEAMS	STANDARDS	NO. OF FILM	FILM/ CASSETTE	EXPOSURE: DBL WALL	S. WALL	VIEWING: DBL WALL	S. WALL	MR/R	SCREENS
2		B31.3 NFS	6	1	X			✓	2	PB

TRUCK NO. / SHOP	REPORT NO.	PAGE NO.	PER DIEM YES / NO	ON SITE HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE
T-129	OF	OF					

FILM INTERPRETER	ASST. NAME	ASNT LEVEL
	Lee, Shannon Weaver	II
COMPANY REPRESENTATIVE	NDT TECHNICIAN	ASNT LEVEL
Jeremy Mc	Jeremy McMurr	II

SIGNATURE CERTIFIES TIME & MATERIALS CORRECT — SIGNATURE

No. 011636

FORM RT-01 Rev.0 9/15

TGR INDUSTRIAL SERVICES ASSUMES NO RESPONSIBILITY FOR LOSSES DUE TO INTERPRETATION

TGR INDUSTRIAL SERVICES

TX/LA/MS/AL 713 - 636-2288 • OK/KS/MO/AR 1 - 800 - 625-9288
www.tgrind.com

TECHNIQUE/INSPECTION REPORT

DATE 10-30-18 DAY TUESDAY

CUSTOMER DATA TGR JOB#
NAME UOP HONEYWELL
ADDRESS
PHONE ATTN:
W.O. # P.O. #
JOB LOCATION Catoosa
DESCRIPTION J488 SKZ MATERIAL TYPE: CS

DEFECT CODE

AB – ARC BURN
AI – ALIGNED INDICATION
BT – BURN THROUGH
CON – CONCAVITY
CRACK – CRACK
HB – HOLLOW BEAD
IF – INADEQUATE FUSION
IP – INCOMPLETE PENETRATION
MA – MISALIGNMENT
POR – POROSITY
SLI – SLAG INCLUSION
SLL – SLAG LINE
SURF – SURFACE INDICATION
UCE – UNDERCUT EXTERNAL
UCI – UNDERCUT INTERNAL

ABBREVIATED TERMS

SOD = SOURCE TO OBJECT DISTANCE
OFD = SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD = OUTER DIAMETER REP = REPAIR RET = RETAKE
WT = WELD THICKNESS RES = RESHOOT DEN = DENSITY
WR = WELD REINFORCEMENT BM = BASE MATERIAL

	WELD/FILM NUMBER	JOB NUMBER	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE / MFG / TYPE	SOD	OFD	IQI S-F	# EXP	DEN	DEFECT LOCATION
1	T-2	SKZ-111 LX1	4.5	237	125	362			1	3½x10 50UM	45	362	10P	1		
2	2-3		↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
3	3-T		↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
4	T-2	SKZ-100 PX2	8⅝	322	↓	447			↓	3½x17 50UM	8⅝	447	12P	↓		
5	2-3		↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
6	3-T		↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
7	T-2	SKZ-134 PX3	6.625	432	↓	557			↓	↓	6⅝	557	13	↓		
8	2-3		↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
9	3-T		↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
10	T-2	SKZ-134 PX4	↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
11	2-3		↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
12	3-T		↓	↓	↓	↓			↓	↓	↓	↓	↓	↓		
13																
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30																

UOPR

PROCEDURE CR	EXP. ARRANGEMENT	SOURCE IR192	CURIES/KV 85	SOURCE SIZE DIA. .106	DEV. TEMP Auto	DEV. TIME Auto	
NO. OF WELDS 4	FT. LONG SEAMS NA	STANDARDS B31.3 NORMAL	NO. OF FILM 12	FILM/ CASSETTE 1	EXPOSURE: DBL WALL X S. WALL VIEWING: DBL WALL S. WALL X	MR/R 3	SCREENS
TRUCK NO. / SHOP 129	REPORT NO. 1 OF 1	PAGE NO. 1 OF 1	PER DIEM ☐ YES ☒ NO	ON SITE HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE

FILM INTERPRETER Jeremy McMaster
ASST. NAME Levi ADAMS ASNT LEVEL II
COMPANY REPRESENTATIVE
NDT TECHNICIAN Jeremy McMaster ASNT LEVEL II

SIGNATURE CERTIFIES TIME & MATERIALS CORRECT SIGNATURE

No. 013281

FORM RT-01
Rev.0 9/15

TGR INDUSTRIAL SERVICES ASSUMES NO RESPONSIBILITY FOR LOSSES DUE TO INTERPRETATION

TGR INDUSTRIAL SERVICES

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TECHNIQUE/INSPECTION REPORT

DATE 11-2-18 DAY FRIDAY

CUSTOMER DATA TGR JOB# TCH0218-4
NAME UOP Honeywell
ADDRESS
PHONE ATTN:
W.O. # P.O. #
JOB LOCATION Catoosa
DESCRIPTION J488 SKZ MATERIAL TYPE: CS/SS

DEFECT CODE:

AB – ARC BURN
AI – ALIGNED INDICATION
BT – BURN THROUGH
CON – CONCAVITY
CRACK – CRACK
HB – HOLLOW BEAD
IF – INADEQUATE FUSION
IP – INCOMPLETE PENETRATION
MA – MISALIGNMENT
POR – POROSITY
SLI – SLAG INCLUSION
SLL – SLAG LINE
SURF – SURFACE INDICATION
UCE – UNDERCUT EXTERNAL
UCI – UNDERCUT INTERNAL

ABBREVIATED TERMS

SOD = SOURCE TO OBJECT DISTANCE
OFD = SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD = OUTER DIAMETER REP = REPAIR RET = RETAKE
WT = WELD THICKNESS RES = RESHOOT DEN = DENSITY
WR = WELD REINFORCEMENT BM = BASE MATERIAL

	WELD/FILM NUMBER	JOB NUMBER	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE / MFG / TYPE	SOD	OFD	IQI S-F	# EXP	DEN	DEFECT LOCATION
1	T-2	SKZ-137 PX5	6.625	.432	.125	.562	✓		1	3½x10 50 m	6.625	.562	1B	1		
2	2-3						✓									
3	3-T						✓									
4	T-2	SKZ-134 PX6	3.375	.216		.341	✓				3.375	.341	10P			
5	2-3						✓									
6	3-T						✓									
7	T-2	SKZ-134 PX7					✓									
8	2-3						✓									
9	3-T						✓									
10																
11																
12																
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UOPR

PROCEDURE CR | EXP. ARRANGEMENT | SOURCE IR192 | CURIES/KV 80 | SOURCE SIZE DIA. .106 | DEV. TEMP AUTO | DEV. TIME AUTO

NO. OF WELDS 3 | FT. LONG SEAMS | STANDARDS B31.3 NORMAL | NO. OF FILM 9 | FILM/ CASSETTE 1 | EXPOSURE: DBL WALL X S. WALL | VIEWING: DBL WALL S. WALL X | MR/R 3 | SCREENS

TRUCK NO. / SHOP 129 | REPORT NO. 1 OF 1 | PAGE NO. 1 OF 1 | PER DIEM ☐ YES ☐ NO | ON SITE HOURS | TRAVEL HOURS | TOTAL HOURS | MILEAGE

FILM INTERPRETER | ASST. NAME Levi ADAMS | ASNT LEVEL II

COMPANY REPRESENTATIVE | NDT TECHNICIAN Jeremy McMaster | ASNT LEVEL II

SIGNATURE CERTIFIES TIME & MATERIALS CORRECT SIGNATURE

No. 011684

FORM RT-01
Rev.0 9/15

TGR INDUSTRIAL SERVICES ASSUMES NO RESPONSIBILITY FOR LOSSES DUE TO INTERPRETATION

TGR INDUSTRIAL SERVICES

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www.tgrind.com

TECHNIQUE/INSPECTION REPORT

DATE 11-15-18 DAY THURSDAY

CUSTOMER DATA TGR JOB#
NAME UOP Honeywell
ADDRESS
PHONE ATTN:
W.O. # P.O. #
JOB LOCATION Catoosa
DESCRIPTION J488 SKZ MATERIAL TYPE: CS

DEFECT CODE

AB – ARC BURN
AI – ALIGNED INDICATION
BT – BURN THROUGH
CON – CONCAVITY
CRACK – CRACK
HB – HOLLOW BEAD
IF – INADEQUATE FUSION
IP – INCOMPLETE PENETRATION
MA – MISALIGNMENT
POR – POROSITY
SLI – SLAG INCLUSION
SLL – SLAG LINE
SURF – SURFACE INDICATION
UCE – UNDERCUT EXTERNAL
UCI – UNDERCUT INTERNAL

ABBREVIATED TERMS

SOD = SOURCE TO OBJECT DISTANCE
OFD = SOURCE SIDE OF OBJECT TO FILM DISTANCE
OD = OUTER DIAMETER REP = REPAIR RET = RETAKE
WT = WELD THICKNESS RES = RESHOOT DEN = DENSITY
WR = WELD REINFORCEMENT BM = BASE MATERIAL

	WELD/FILM NUMBER	JOB NUMBER	OD	BM	WR	WT	WITHIN STD'S YES	WITHIN STD'S NO	# FILM	FILM SIZE / MFG / TYPE	SOD	OFD	IQI S-F	# EXP	DEN	DEFECT LOCATION
1	T-2	SKZ-105 PX8	8.75	322	125	447	✓		1	3½x17 100cm	87.5	447	12P	1		
2	2-3		↓	↓	↓	↓	✓		↓	↓	↓	↓	↓	↓		
3	3-T		↓	↓	↓	↓	✓		↓	↓	↓	↓	↓	↓		
4	T-2	SKZ-105 PX9	↓	↓	↓	↓	✓		↓	↓	↓	↓	↓	↓		
5	2-3		↓	↓	↓	↓	✓		↓	↓	↓	↓	↓	↓		
6	3-T		↓	↓	↓	↓	✓		↓	↓	↓	↓	↓	↓		
7																
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UOPR

PROCEDURE	EXP. ARRANGEMENT	SOURCE	CURIES/KV	SOURCE SIZE DIA.	DEV. TEMP	DEV. TIME
CR		[redacted] Ir192	70	.106	Auto	Auto

NO. OF WELDS	FT. LONG SEAMS	STANDARDS	NO. OF FILM	FILM/ CASSETTE	EXPOSURE: DBL WALL	S. WALL	MR/R	SCREENS
2		B313 NORMAL	6	1	VIEWING: DBL WALL	S. WALL X	3	

TRUCK NO./ SHOP	REPORT NO.	PAGE NO.	PER DIEM	ON SITE HOURS	TRAVEL HOURS	TOTAL HOURS	MILEAGE
129	1 OF 1	1 OF 1	☐ YES ☒ NO				

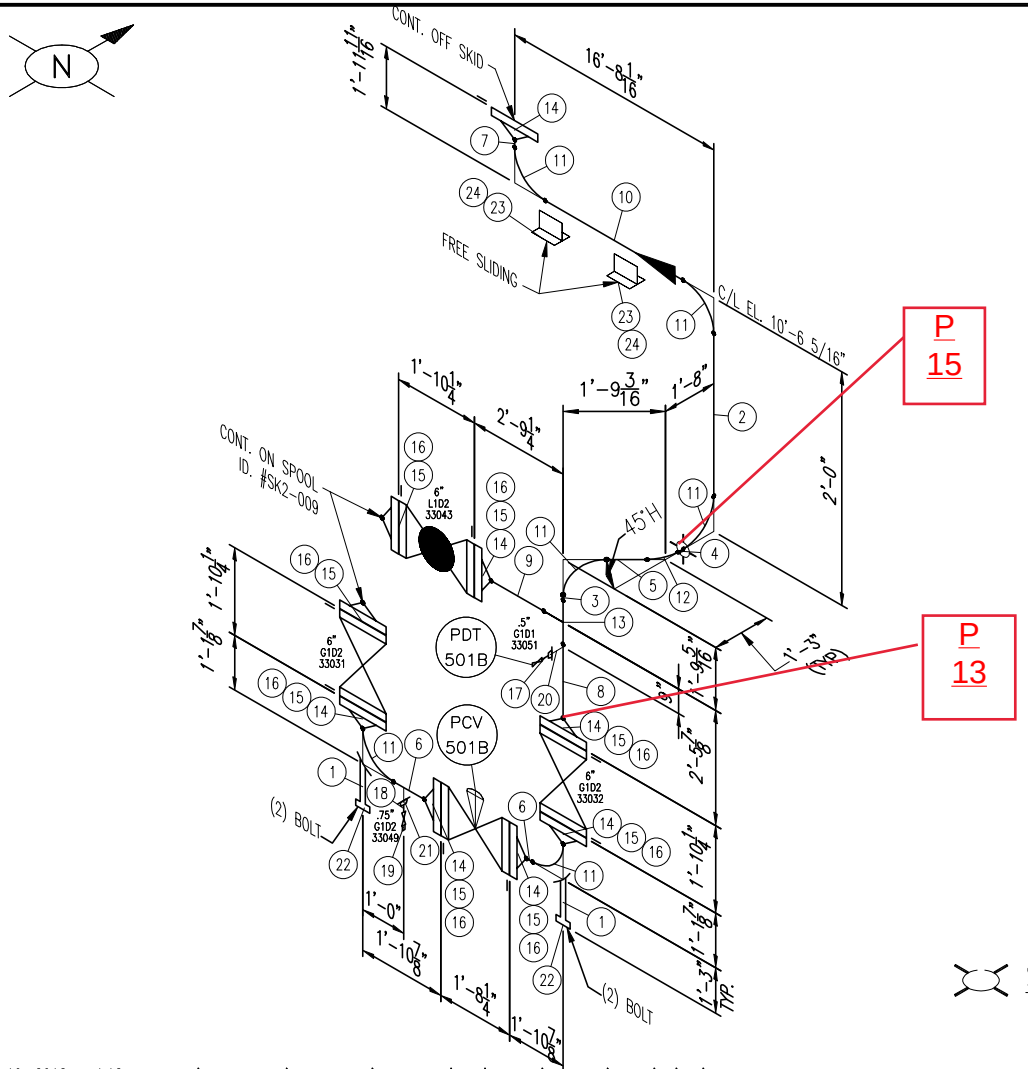
FILM INTERPRETER Jeremy McMaster
COMPANY REPRESENTATIVE
ASST. NAME Levi ADAMS ASNT LEVEL II
NDT TECHNICIAN Jeremy McMaster ASNT LEVEL II

SIGNATURE CERTIFIES TIME & MATERIALS CORRECT SIGNATURE

No. 012112

FORM RT-01
Rev.0 9/15

TGR INDUSTRIAL SERVICES ASSUMES NO RESPONSIBILITY FOR LOSSES DUE TO INTERPRETATION



SHOP WELD

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	2	3"	PIPE, STD SMLS, A-333-6	1'-11 1/2"
2	1	6"	PIPE, XH SMLS, A-333-6	6"
3	1	6"	PIPE, XH SMLS, A-333-6	6 11/16"
4	1	6"	PIPE, XH SMLS, A-333-6	7 1/4"
5	1	6"	PIPE, XH SMLS, A-333-6	8 7/16"
6	2	6"	PIPE, XH SMLS, A-333-6	9"
7	1	6"	PIPE, XH SMLS, A-333-6	9 13/16"
8	1	6"	PIPE, XH SMLS, A-333-6	1'-7 3/8"
9	1	6"	PIPE, XH SMLS, A-333-6	1'-10 3/4"
10	1	6"	PIPE, XH SMLS, A-333-6	15'-2 1/16"
11	6	6"	ELL, 90 LR XH, A-420-WPL6	
12	1	6"	ELL, 45 LR XH, A-420-WPL6	
13	1	6"	TEE, STR. XH, A-420-WPL6	
14	7	6"	FLG, RFWN 600LB XH, A-350-LF2	
15	8	1"	(12) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	7"
16	8	6"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
17	1	1/2"	NIPPLE, S/160 SMLS, A-333-6 POE-TOE	3"
18	1	3/4"	NIPPLE, S/160 SMLS, A-333-6 POE-TOE	3"
19	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-350-LF2	
20	1	6"x1/2"	SOL, 3000LB FS, A-350-LF2	
21	1	6"x3/4"	SOL, 3000LB FS, A-350-LF2	
22	2		BASE PLATE, 1/2" THK. x 6" x 6" (SA-36 MATERIAL)	
23	2		PLATE, 1/4" THK. x 2 3/4" x 6" (SA-516-70 MATERIAL)	
24	2		PLATE, 1/4" THK. x 6" x 6" (SA-516-70 MATERIAL)	

J-488
04/11/18
IFC

*** = JOB #

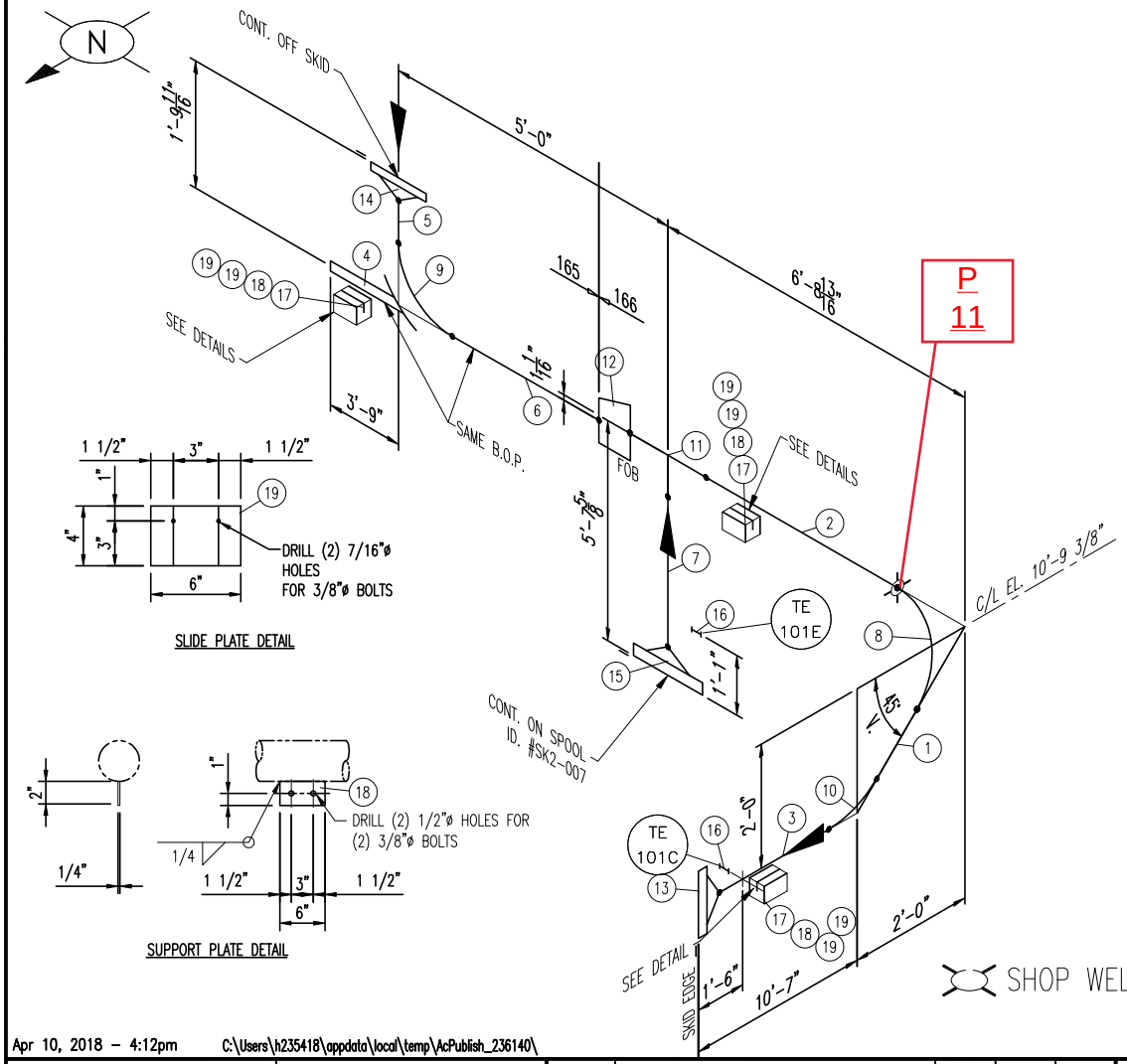
Apr 10, 2018 - 4:12pm Z:\400 - Drafting\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-Piping\SPOOLS\IFC\SK2\

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	865 Psia							
OPER. TEMP.	0°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS. SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

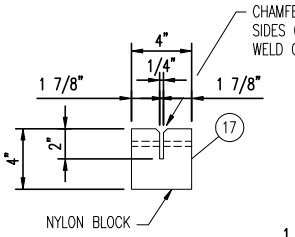
Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

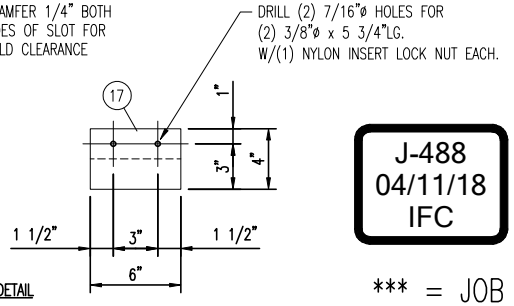
LINE No.	159-D1-LT-6" 1.5"C
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	SC6
SPOOL I.D. No.	SK2-010
REV.	0



SLIDE PLATE DETAIL

SUPPORT PLATE DETAIL





NYLON SHOE DETAIL

J-488
04/11/18
IFC

*** = JOB #

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	10"	PIPE, S/40S EFW, A-312-TP304/304L	1'-0 11/16"
2	1	10"	PIPE, S/40S EFW, A-312-TP304/304L	4'-9 5/16"
3	1	10"	PIPE, S/40S EFW, A-312-TP304/304L	9'-8 1/8"
4	1	4"	PIPE, S/10S EFW, A-312-TP304/304L	4'-9"
5	1	8"	PIPE, S/40S EFW, A-312-TP304/304L	5 5/16"
6	1	8"	PIPE, S/40S EFW, A-312-TP304/304L	2'-8 1/2"
7	1	8"	PIPE, S/40S EFW, A-312-TP304/304L	4'-6 1/8"
8	1	10"	ELL, 90 LR S/40S, A-403-WP304/304L	
9	1	8"	ELL, 90 LR S/40S, A-403-WP304/304L	
10	1	10"	ELL, 45 LR S/40S, A-403-WP304/304L	
11	1	10"x8"	TEE, RED S/40S, A-403-WP304/304L	
12	1	10"x8"	REDUCER, ECC S/40S, A-403-WP304/304L	
13	1	10"	FLG, RFWN 300LB S/40S, A-182-F304/304L	
14	1	8"	FLG, RFWN 300LB S/40S, A-182-F304/304L	
15	1	8"	FLG, RFWN 600LB S/40S, A-182-F304/304L	
16	2	3/4"	CPLG, TOE x 3" LG, 3000LB FS, A-182-F304/304L	
17	3		NYLON BLOCK, 4" x 4" x 6" LG	
18	3		PLATE, 1/4" THK x 2" x 6" LG A-240-304SS (PER DETAIL)	
19	6		PLATE, 1/4" THK x 4" x 6" LG A-240-304SS (PER DETAIL)	

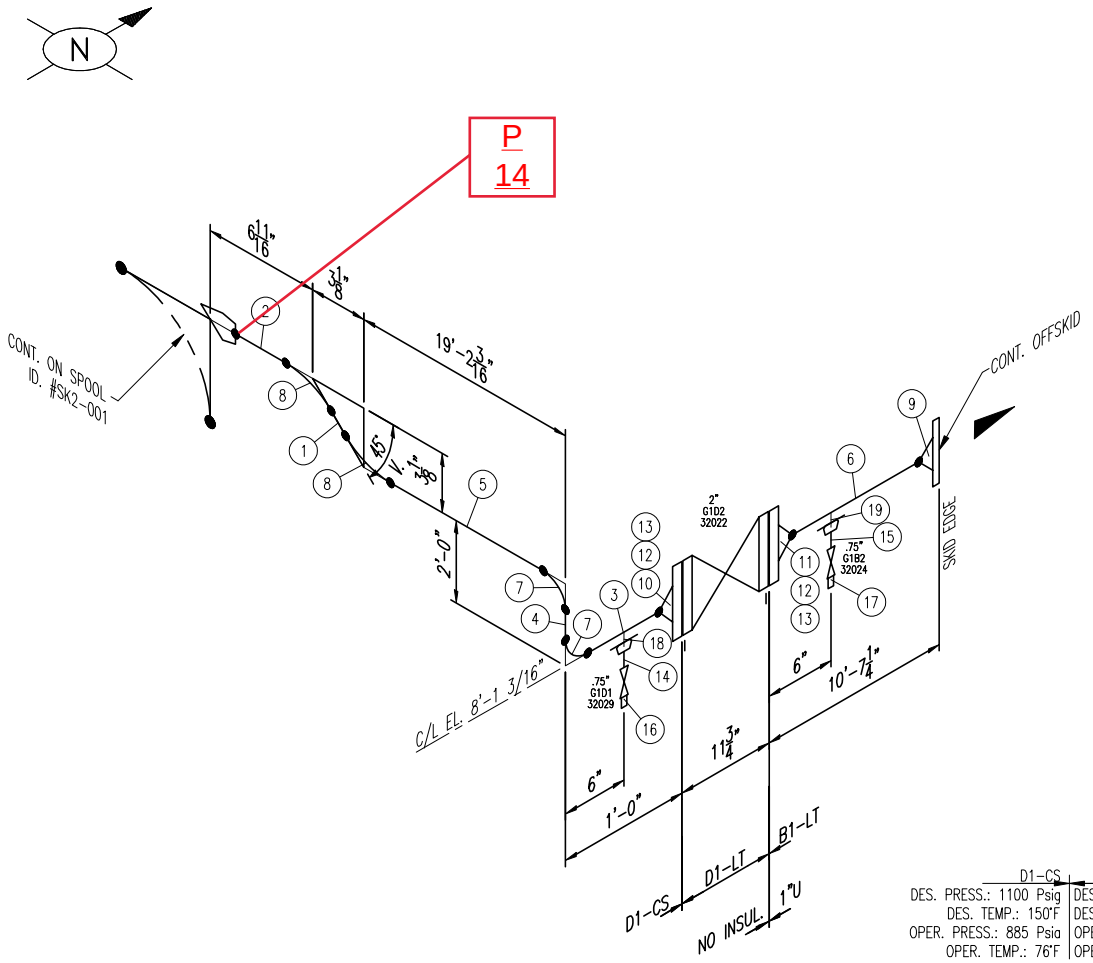
Apr 10, 2018 - 4:12pm C:\Users\h235418\appdata\local\temp\AcPublish_236140\

DESIGN PRESS.	400 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	220 Psia							
OPER. TEMP.	-83°F	CORR. ALLOW.	0"					
STRESS RELIEVE	NO	INSULATION	2.5"C	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	NONE	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	166-B0-304SS-10" 2.5"C
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-233
DRAWN BY	DV
DATE DRAWN	03/21/11
JOB No.	SC6
SPOOL I.D. No.	SK2-015
REV.	0



BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	1	2"	PIPE, XH SMLS, A-106-B	1 11/16"
2	1	2"	PIPE, XH SMLS, A-106-B	3"
3	1	2"	PIPE, XH SMLS, A-106-B	5 7/8"
4	1	2"	PIPE, XH SMLS, A-106-B	1'-6"
5	1	2"	PIPE, XH SMLS, A-106-B	18'-9 13/16"
6	1	2"	PIPE, XH SMLS, A-333-6	10'-1 3/8"
7	2	2"	ELL, 90 LR XH, A-234-WPB	
8	2	2"	ELL, 45 LR XH, A-234-WPB	
9	1	2"	FLG, RFWN 300LB XH, A-350-LF2	
10	1	2"	FLG, RFWN 600LB XH, A-105	
11	1	2"	FLG, RFWN 600LB XH, A-350-LF2	
12	2	5/8"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H	4 1/2"
13	2	2"	GASKET, 1/8" THK, 600LB RF, SPIRALWOUND, 304SS WINDING, FLEXITE SUPER FILLER, CS GUIDE RING	
14	1	3/4"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	3"
15	1	3/4"	NIPPLE, XH SMLS, A-333-6 POE-TOE	3"
16	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
17	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-350-LF2	
18	1	2"x3/4"	SOL, 3000LB FS, A-105	
19	1	2"x3/4"	SOL, 3000LB FS, A-350-LF2	

	D1-CS	D1-LT	B1-LT
DES. PRESS.:	1100 Psig	1100 Psig	400 Psig
DES. TEMP.:	150°F	150°F	200°F
OPER. PRESS.:	885 Psia	885 Psia	220 Psia
OPER. TEMP.:	76°F	60°F	60°F

J-488
04/11/18
IFC

*** = JOB #

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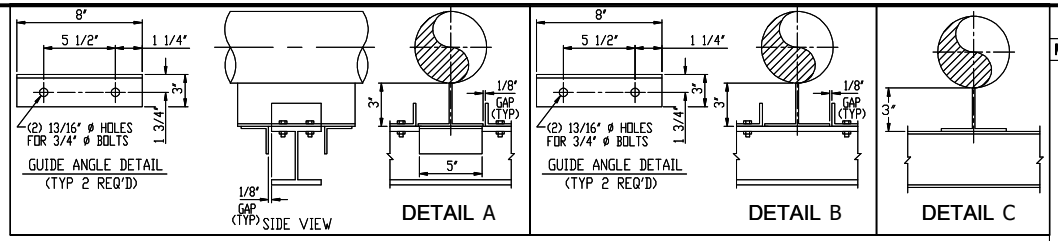
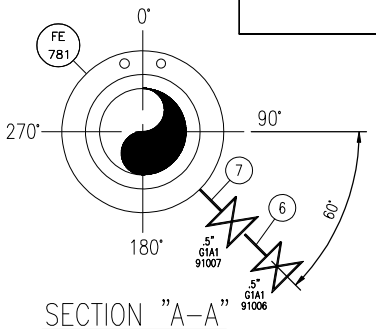
DESIGN PRESS.	NOTED Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	NOTED °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	NOTED Psia							
OPER. TEMP.	NOTED °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NOTED	0	ISSUE FOR CONSTRUCTION	04/25/11	PLO	LH
RADIOGRAPHY	15% NORMAL	PAINT	TRCo SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	110-D1-CS-2"
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-221/232
DRAWN BY	DV
DATE DRAWN	03/22/11
JOB No.	SC6
SPOOL I.D. No.	SK2-021
REV.	0





SECTION "A-A"

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE	18'-2 7/16"
2	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	1
3	8	ELL 45, BW, STD, A-234 Gr. WPB	1
4	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	2
5	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, TBE (6" LG)	1
6	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, TBE (3" LG)	1
7	8	FLG, RFWN, 150#, STD, A-105	2
8	8	FLG, ORIFICE, RFWN, 300#, STD, A-105 w/ 1/2" NPT TAPS	2
9	8	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
10	7/8	(12) STUD BOLTS, 300# x 6" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
		PIPE SHOE (TYPE 10) 3" HI. x 12" LG. FROM W6x15 A-992 (2)	1
11		STOP ANG, 2" x 2" x 1/4" x 5" LG. A-36 (2) GUIDE ANG, 2" x 3" x 1/4" x 8" LG. A-36	
12		PIPE SHOE (TYPE 9) 3" HI. x 12" LG. FROM W6x15 A-992 (2)	1
		GUIDE ANGLE, 2" x 3" x 1/4" x 8" LG. A-36	
13		PIPE SHOE (TYPE 1) 3" HI. x 6" LG. FROM W6x15 A-992	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	
2	8"	BW	
3	8"	BW	
4	8"	BW	
5	8"	BW	
6	8"	BW	
7	8"	BW	
8	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	9'-11 9/16"	BEVEL	BEVEL
B	8"	4'-1 1/16"	BEVEL	BEVEL
C	8"	1'-4 15/16"	BEVEL	BEVEL
D	8"	2'-8 7/8"	BEVEL	BEVEL

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2
OPER. PRESS.	50 Psia		
OPER. TEMP.	300 °F	CORR. ALLOW.	.0625"
STRESS RELIEVE	NO	INSULATION	2"H
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2

NO.	REVISION	DATE	BY	APR
0	ISSUED FOR CONSTRUCTION	11/07/17	CW	WD

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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LINE No.	611-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	CW
DATE DRAWN	11/07/17
JOB No.	488
SPOOL I.D. No.	SK2-100
REV.	0

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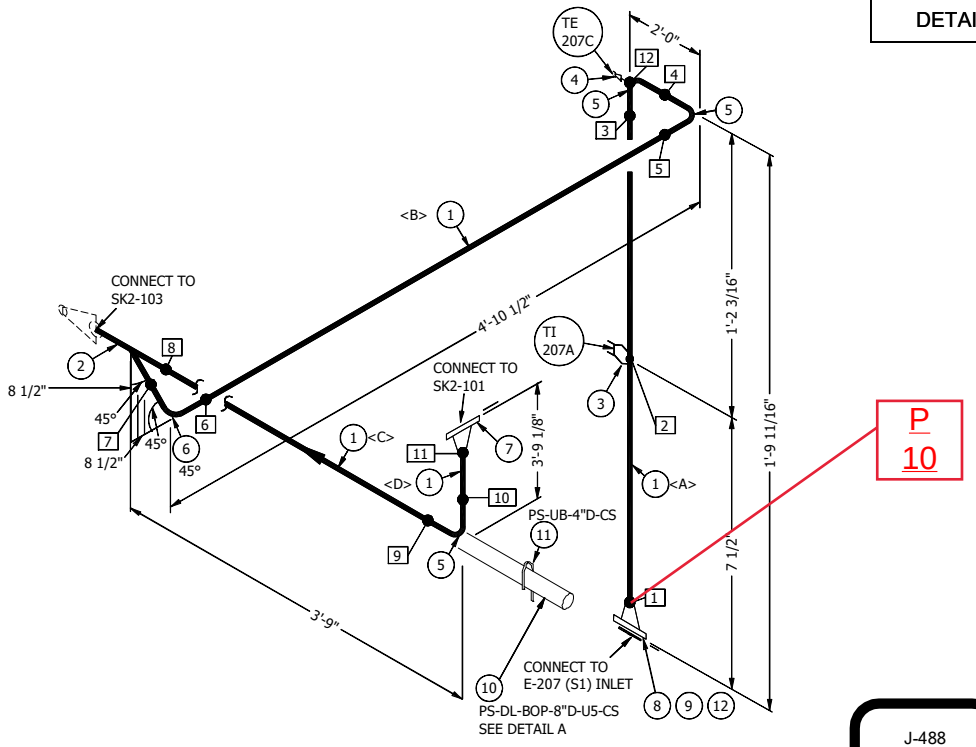

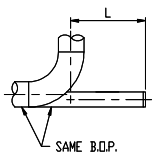

DETAIL A

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE	8'-5 15/16"
2	8X8	TEE, BW, STD, A-234 Gr. WPB	1
3	8X3/4	CPLG, TOE, x 2 1/2" LG, 3000#, A-105	1
4	8X3/4	E-O-L, THRD, 3000#, A-105	1
5	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	3
6	8	ELL 45, BW, STD, A-234 Gr. WPB	1
7	8	FLG, RFWN, 150#, STD, A-105	1
8	8	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
9	7/8	(12) STUD BOLTS, 300#, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (5 3/4" LG)	1
10		(1) PIPE, 4" STD, SMLS, x 4'-5 1/4" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 4 3/8" O.D. A-36 (L=3'-5 1/4")	1
11		U-BOLT FOR 4" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	1
12	8	FLG, RFWN, 300#, STD, A-105	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	
2	3/4"	LET	
3	8"	BW	
4	8"	BW	
5	8"	BW	
6	8"	BW	
7	8"	BW	
8	8"	BW	
9	8"	BW	
10	8"	BW	
11	8"	BW	
12	3/4"	LET	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	5 5/16"	BEVEL	BEVEL
B	8"	3'-5 1/2"	BEVEL	BEVEL
C	8"	2'-2"	BEVEL	BEVEL
D	8"	2'-5 1/8"	BEVEL	BEVEL

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2					
OPER. PRESS.	50 Psia							
OPER. TEMP.	300 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/17/17	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
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LINE No.	611-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	888-291
DRAWN BY	CW
DATE DRAWN	11/13/17
JOB No.	488
SPOOL I.D. No.	SK2-102
REV.	0

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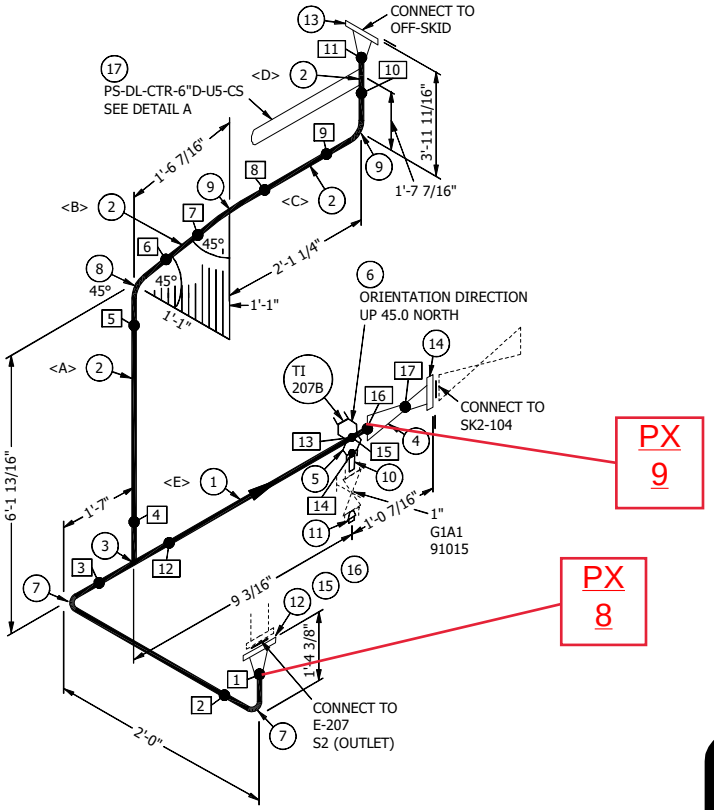

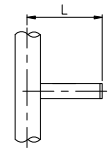

DETAIL B

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, STD, SMLS, A-106 Gr. B, BBE	0'-5 5/8"
2	6	PIPE, STD, SMLS, A-106 Gr. B, BBE	9'-3 1/2"
3	8X6	TEE RED, BW, STD - STD, A-234 Gr. WPB	1
4	8X4	RED CONC, BW, STD - STD, A-234 Gr. WPB	1
5	8X1	S-O-L, SW, 3000#, A-105	1
6	8X3/4	CPLG, TOE, x 2 1/2" LG, 3000#, A-105	1
7	8	ELL 90 LR, BW, STD, A-234 Gr. WPB	2
8	6	ELL 45, BW, STD, A-234 Gr. WPB	1
9	6	ELL 90 LR, BW, STD, A-234 Gr. WPB	2
10	1	NIPPLE, XH, SMLS, A-106 Gr. B, x 3" LG, POE-TOE	1
11	1	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
12	8	FLG, RFWN, 300#, STD, A-105	1
13	6	FLG, RFWN, 150#, STD, A-105	1
14	4	FLG, RFWN, 150#, STD, A-105	1
15	8	GSKT, 1/8" THK, 300#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
16	7/8	(12) STUD BOLTS, 300# x 5 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
17	6	(1) PIPE, 3" STD, SMLS, x 2'-0" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 3 3/8" O.D. A-36 (L=2'-0")	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	
2	8"	BW	
3	8"	BW	
4	6"	BW	
5	6"	BW	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	6"	BW	
11	6"	BW	
12	8"	BW	
13	1"	LET	
14	1"	SW	
15	3/4"	LET	
16	8"	BW	
17	4"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	5'-3 7/16"	BEVEL	BEVEL
B	6"	5 5/8"	BEVEL	BEVEL
C	6"	7 1/4"	BEVEL	BEVEL
D	6"	2'-11 3/16"	BEVEL	BEVEL
E	8"	5 5/8"	BEVEL	BEVEL

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	400 °F	SPOOL LOCATION	SKID#2					
OPER. PRESS.	40 Psia							
OPER. TEMP.	200 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	2"H	0	ISSUED FOR CONSTRUCTION	11/17/17	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #2	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS. SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
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ALL COUPLING TO BE SADDLED ON.

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LINE No.	614-A1-CS-8" 2"H
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-291
DRAWN BY	CW
DATE DRAWN	11/14/17
JOB No.	488
SPOOL I.D. No.	SK2-105
REV.	0

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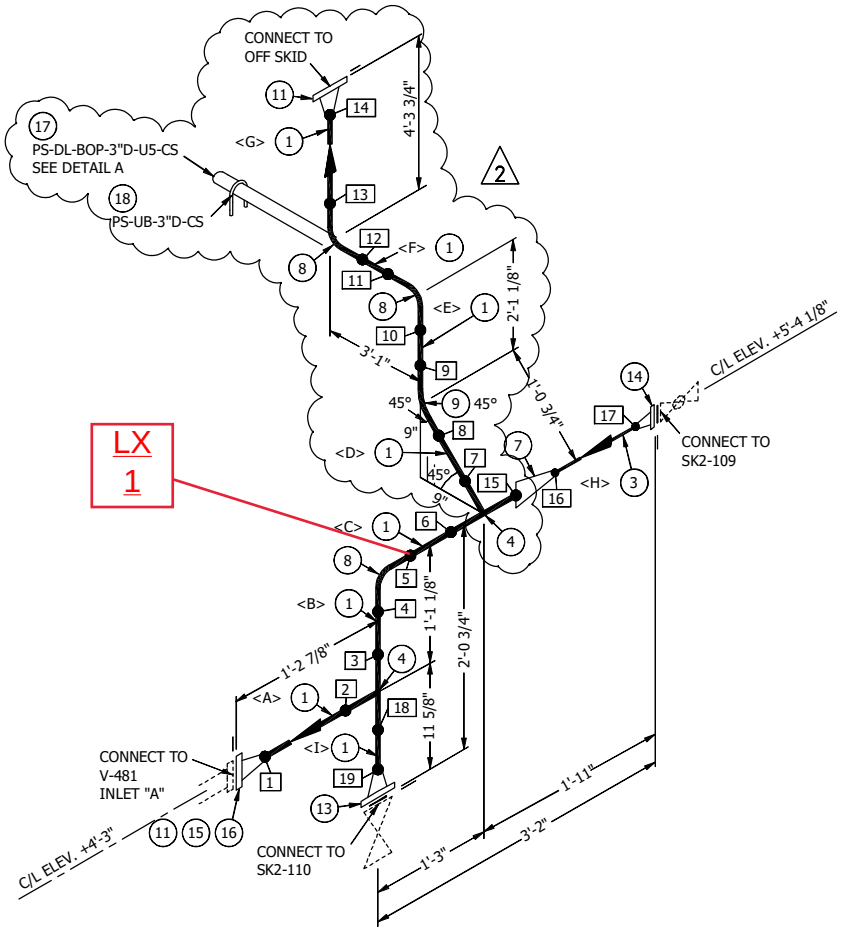

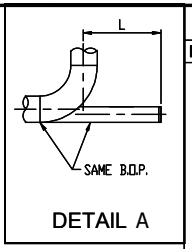

DETAIL A

J-488
06/10/18
REV

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	4	PIPE, STD, SMLS, A-106 Gr. B, BBE 2	9'-2 1/4"
3	2	PIPE, XH, SMLS, A-106 Gr. B, BBE	1'-0 1/8"
4	4X4	TEE, BW, STD, A-234 Gr. WPB 2	2
7	4X2	RED CONC, BW, STD - XH, A-234 Gr. WPB	1
8	4	ELL 90 LR, BW, STD, A-234 Gr. WPB 2	3
9	4	ELL 45, BW, STD, A-234 Gr. WPB 2	1
11	4	FLG, RFWN, 150#, STD, A-105 2	2
13	4	FLG, RFWN, 300#, STD, A-105	1
14	2	FLG, RFWN, 300#, XH, A-105	1
15	4	GSKT, 1/8" THK, 150#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
16	5/8	(8) STUD BOLTS, 150# x 3 3/4" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
17	2	(1) PIPE, 3" STD, SMLS, x 2'-1 7/8" LG. A-106 Gr. B (1) END PL, 1/4" THK. x 3 3/8" O.D. A-36 (L=1'-7 7/8")	1
18	3 2	U-BOLT FOR 3" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	4"	BW	
2	4"	BW	
3	4"	BW	
4	4"	BW	
5	4"	BW	
6	4"	BW	
7	4"	BW	
8	4"	BW	
9	4"	BW	
10	4"	BW	
11	4"	BW	
12	4"	BW	
13	4"	BW	
14	4"	BW	
15	4"	BW	
16	2"	BW	
17	2"	BW	
18	4"	BW	
19	4"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	4"	7 3/4"	BEVEL	BEVEL
B	4"	3"	BEVEL	BEVEL
C	4"	4 7/8"	BEVEL	BEVEL
D	4"	6 1/8"	BEVEL	BEVEL
E	4"	1'-4 5/8"	BEVEL	BEVEL
F	4"	2'-1"	BEVEL	BEVEL
G	4"	3'-6 3/4"	BEVEL	BEVEL
H	2"	1'-0 1/8"	BEVEL	BEVEL
I	4"	4 1/8"	BEVEL	BEVEL

DESIGN PRESS.	150 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	100 Psia			2	REVISED FOR SIZE CHANGE IN PSV-481	6/5/18	COB	WD
OPER. TEMP.	69 °F	CORR. ALLOW.	.0625"	1	REVISED FOR CONTROL VALVE SIZE CHANGE	5/9/18	COB	WD
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUED FOR CONSTRUCTION	5/9/18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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LINE No.	702-A1-CS-4"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	488-296
DRAWN BY	CW
DATE DRAWN	11/20/17
JOB No.	488
SPOOL I.D. No.	SK2-111
REV.	2

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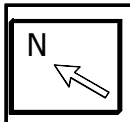
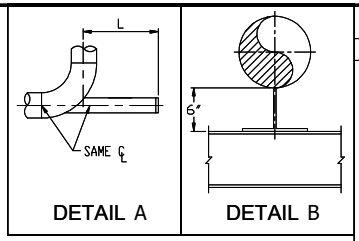
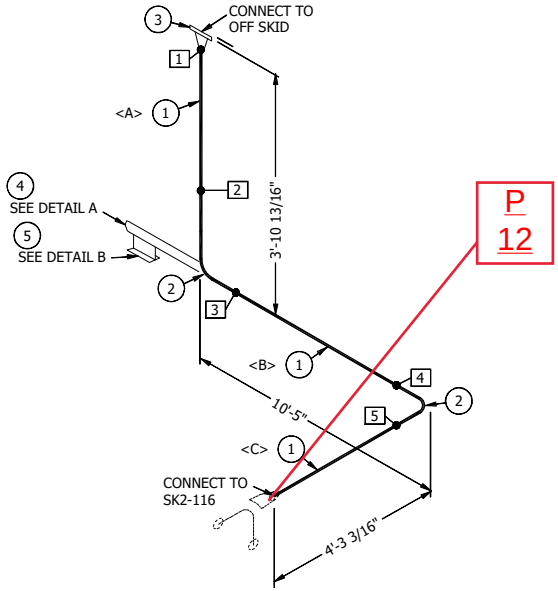




DETAIL A

DETAIL B



J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	2	PIPE, XH, SMLS, A-106 Gr. B, BBE	17'-3 7/8"
2	2	ELL 90 LR, BW, XH, A-234 Gr. WPB	2
3	2	FLG, RFWN, 600#, XH, A-105	1
4		(1) PIPE, 1 1/2" XH SMLS, x 2'-5" LG. A-106-B (1) END PL, 1/4" THK. x 1 3/4" O.D. A-36 (L=2'-2")	1
5		PIPE SHOE (TYPE 1) 6" HI. x 6" LG. FROM W8x24 A-992	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	2"	BW	
2	2"	BW	
3	2"	BW	
4	2"	BW	
5	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	2"	3'-4 11/16"	BEVEL	BEVEL
B	2"	9'-11"	BEVEL	BEVEL
C	2"	4'-0 3/16"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	820 Psia							
OPER. TEMP.	85 °F	CORR. ALLOW.	0.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	12/20/17	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
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LINE No.	151-D1-CS-8"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-231
DRAWN BY	COB
DATE DRAWN	12/13/17
JOB No.	488
SPOOL I.D. No.	SK2-117
REV.	0

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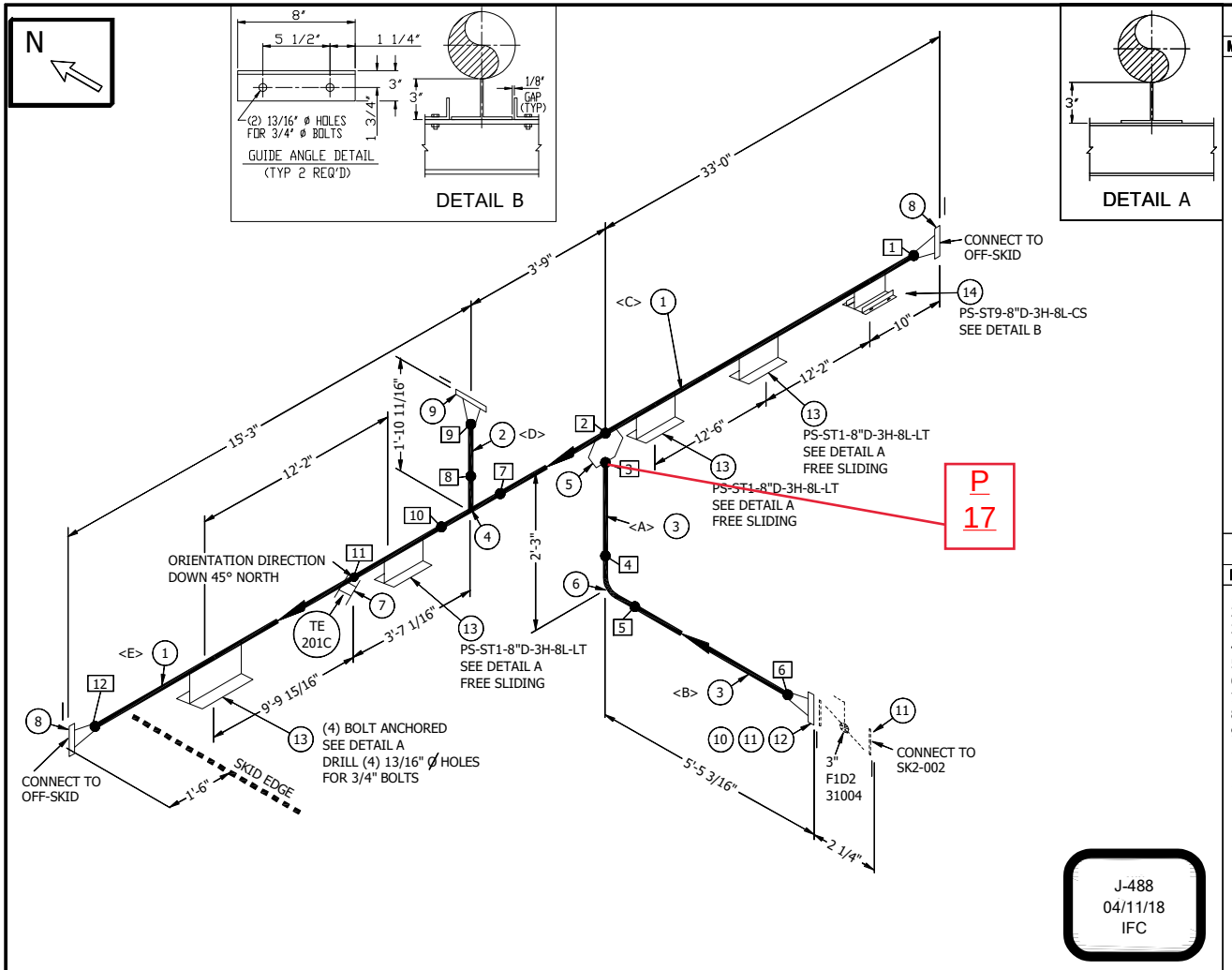

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, XH, SMLS, A-333 Gr. 6, BBE	49'-11"
2	6	PIPE, XH, SMLS, A-333 Gr. 6, BBE	0'-11 3/16"
3	3	PIPE, XH, SMLS, A-333 Gr. 6, BBE	6'-1 5/8"
4	8X6	TEE RED, BW, XH - XH, A-420 Gr. WPL6	1
5	8X3	W-O-L, BW, XH, A-350 Gr. LF2-1	1
6	3	ELL 90 LR, BW, XH, A-420 Gr. WPL6	1
7	3/4	CPLG, THRD X 2" LG., 3000#, A-350 Gr. LF2-1	1
8	8	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	2
9	6	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	1
10	3	FLG, RFWN, 600#, STD, A-350 Gr. LF2-1	1
11	3	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
12	3/4	(8) STUD BOLTS, 600# x 7 1/2" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
13		PIPE SHOE (TYPE 1) 3" HI. x 8" LG. FROM W6x15 A-992	4
14		PIPE SHOE (TYPE 9) 3" HI. x 8" LG. FROM W6x15 A-992 (2) GUIDE ANGLE, 2" x 3" x 1/4" x 8" LG. A-36	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	8"	BW	
2	3"	LET	
3	3"	BW	
4	3"	BW	
5	3"	BW	
6	3"	BW	
7	8"	BW	
8	6"	BW	
9	6"	BW	
10	8"	BW	
11	3/4"	LET	
12	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	3"	1'-4 7/16"	BEVEL	BEVEL
B	3"	4'-9 3/16"	BEVEL	BEVEL
C	8"	35'-8 1/2"	BEVEL	BEVEL
D	6"	11 3/16"	BEVEL	BEVEL
E	8"	14'-2 1/2"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	820 Psia							
OPER. TEMP.	71°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	12-21-17	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS. SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

UOP Russell
Honeywell
UOP
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
Phone: 918-481-5682
Fax.: 918-481-7427

LINE No.	155-D1-LT-8" 1.5"C
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-231
DRAWN BY	COB
DATE DRAWN	3-17-17
JOB No.	488
SPOOL I.D. No.	SK2-118
REV.	0

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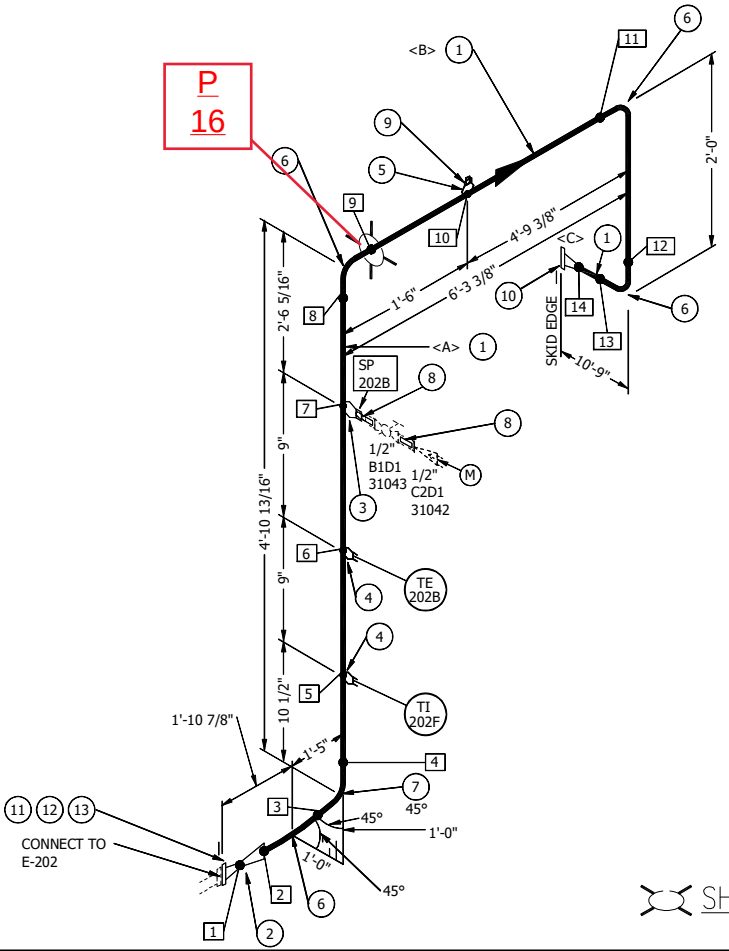

SHOP WELD

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	8	PIPE, XH, SMLS, A-106 Gr. B, BBE	17'-0 3/4"
2	8X6	RED CONC, BW, XH - XH, A-234 Gr. WPB	1
3	8X1 1/2	T-O-L, THRD, 3000#, A-105	1
4	8X3/4	T-O-L, THRD, 3000#, A-105	2
5	8X1/2	T-O-L, THRD, 3000#, A-105	1
6	8	ELL 90 LR, BW, XH, A-234 Gr. WPB	4
7	8	ELL 45, BW, XH, A-234 Gr. WPB	1
8	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, x 3" LG, TBE (3" LG)	2
9	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
10	8	FLG, RFWN, 600#, XH, A-105	1
11	6	FLG, RFWN, 600#, XH, A-105	1
12	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	1
13	1	(12) STUD BOLTS, 600# x 7" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED) (7" LG)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	
2	8"	BW	
3	8"	BW	
4	8"	BW	
5	3/4"	LET	
6	3/4"	LET	
7	1 1/2"	LET	
8	8"	BW	
9	8"	BW	
10	1/2"	LET	
11	8"	BW	
12	8"	BW	
13	8"	BW	
14	8"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	8"	3'-5 13/16"	BEVEL	BEVEL
B	8"	4'-3 3/8"	BEVEL	BEVEL
C	8"	9'-3 9/16"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	830 Psia							
OPER. TEMP.	109 °F	CORR. ALLOW.	0.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	1/12/18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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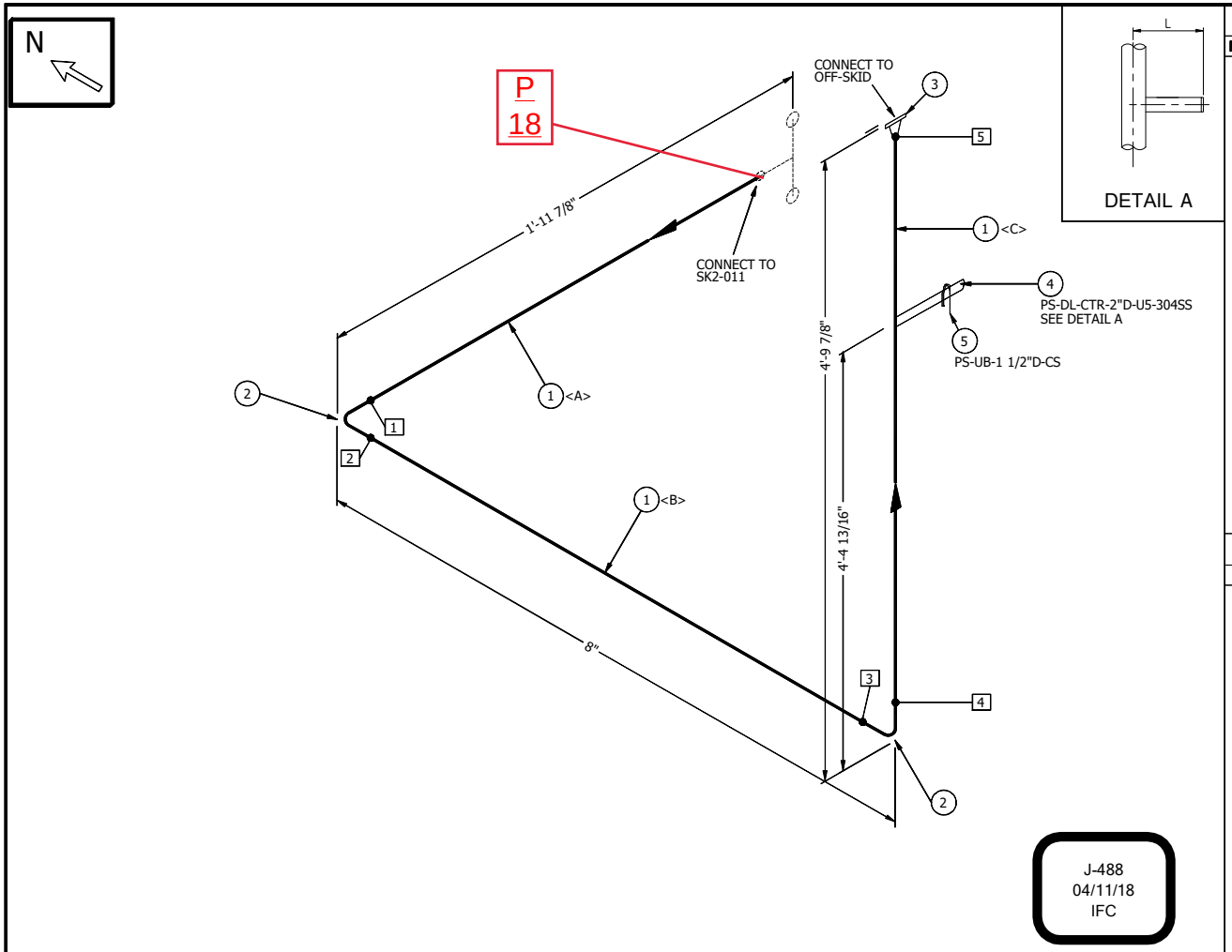
LINE No. 153-D1-CS-8"
ASSEMBLY DRAWING SC6R-402
P&ID DRAWING ***-231
DRAWN BY COB | DATE DRAWN 1/8/18
JOB No. 488 | SPOOL I.D. No. SK2-121 | REV. 0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-121



DETAIL A

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	2	PIPE, S/40S, SMLS, A-312 Gr. TP-304/304L, BBE	5'-11 1/8"
2	2	ELL 90 LR, BW, S/40S, A-403 Gr. WP-304/304L	2
3	2	FLG, RFWN, 600#, S/40S, A-182 Gr. F304/304L	1
4	2	(1) PIPE, 1 1/2" S/80S, SMLS OR WLD, x 1'-7 1/8" LG. A-312 Gr. TP-304/304L (1) END PL, 1/4" THK. x 1 3/4" O.D. A-36 (L=2'-1")	1
5	1 1/2	U-BOLT FOR 1 1/2" DIA PIPE W/ (4) HEX NUTS EA (CS ZINC PL)	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	2"	BW	
2	2"	BW	
3	2"	BW	
4	2"	BW	
5	2"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	2"	1'-5 3/8"	BEVEL	BEVEL
B	2"	2"	BEVEL	BEVEL
C	2"	4'-3 3/4"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	810 Psia							
OPER. TEMP.	−71°F	CORR. ALLOW.	NONE					
STRESS RELIEVE	NO	INSULATION	2.5"C	0	ISSUE FOR CONSTRUCTION	01/09/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	NONE	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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LINE No.	160-D0-304SS-4" 2.5"C
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-231
DRAWN BY	CW
DATE DRAWN	01/09/18
JOB No.	488
SPOOL I.D. No.	SK2-122
REV.	0

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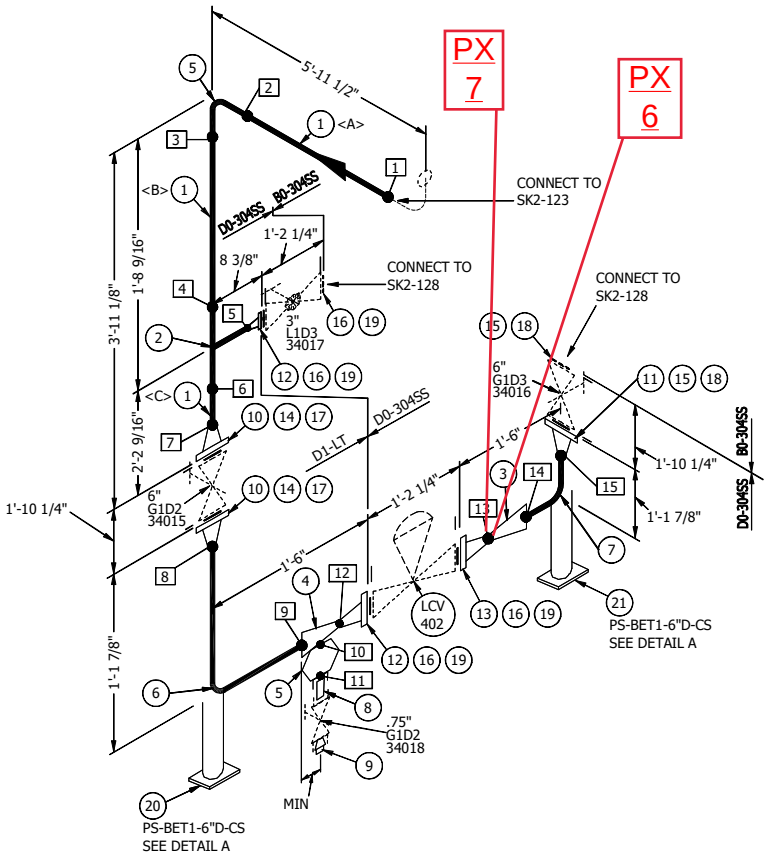

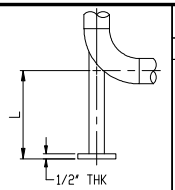

DETAIL A

J-488
04/11/18
IFC

BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-333 Gr. 6, BBE	6'-3 1/2"
2	6X3	TEE RED, BW, XH - XH, A-420 Gr. WPL6	1
3	6X3	RED CONC, BW, XH - XH, A-420 Gr. WPL6	1
4	6X3	RED CONC, BW, S/40S - S/40S, A-403 Gr. WP-304/304L	1
5	6X3/4	S-O-L, SW, 3000#, A-350 Gr. LF2-1	1
6	6	ELL 90 LR, BW, XH, A-420 Gr. WPL6	2
7	6	ELL 90 LR, BW, S/40S, A-403 Gr. WP-304/304L	1
8	3/4	NIPPLE, S/160, SMLS, A-333 Gr. 6, x 3" LG, (3" LG)	1
9	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-350 Gr. LF2-1	1
10	6	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	2
11	6	FLG, RFWN, 600#, S/40S, A-182 Gr. F304/304L	1
12	3	FLG, RFWN, 600#, XH, A-350 Gr. LF2-1	2
13	3	FLG, RFWN, 600#, S/40S, A-182 Gr. F304/304L	1
14	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXITE SUPER FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ PINK STRIPE)	2
15	6	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXIBLE GRAPHITE FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ GREY STRIPE)	2
16	3	GSKT, 1/8" THK, 600#, RF, SPIRAL WOUND, 304SS WINDING, FLEXIBLE GRAPHITE FILLER, C.S. GUIDE RING, ASME B16.20 (YELLOW W/ GREY STRIPE)	4
17	1	(12) STUD BOLTS, 600# x 7" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	2
18	1	(12) STUD BOLTS, 600# x 7" LG, A-193 Gr. B8 Cl. 2, w/ 2 HVY HEX NUTS, A-194 Gr. 8 (ZINC PLATED)	2
19	3/4	(8) STUD BOLTS, 600# x 5 1/4" LG, A-193 Gr. B8 Cl. 2, w/ 2 HVY HEX NUTS, A-194 Gr. 8 (ZINC PLATED)	4
20	6	(1) PIPE, 3" STD, SMLS, x 2'-2 1/2" LG. A-333 Gr. 6 (1) BASE PL, 1/2" THK. x 6" x 6" A-36 (L=1'-6")	1
21	6	(1) PIPE, 3" S/10S, SMLS OR WLD, x 2'-2 1/2" LG. A-312 Gr. TP-304/304L (1) BASE PL, 1/2" THK. x 6" x 6" A-36 (L=1'-6")	1

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	
2	6"	BW	
3	6"	BW	
4	6"	BW	
5	3"	BW	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	3/4"	LET	
11	3/4"	SW	
12	3"	BW	
13	3"	BW	
14	6"	BW	
15	6"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	4'-5 1/2"	BEVEL	BEVEL
B	6"	5 15/16"	BEVEL	BEVEL
C	6"	1'-4 1/16"	BEVEL	BEVEL

DESIGN PRESS.	1100 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	150°F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	800 Psia							
OPER. TEMP.	−30°F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1.5"C	0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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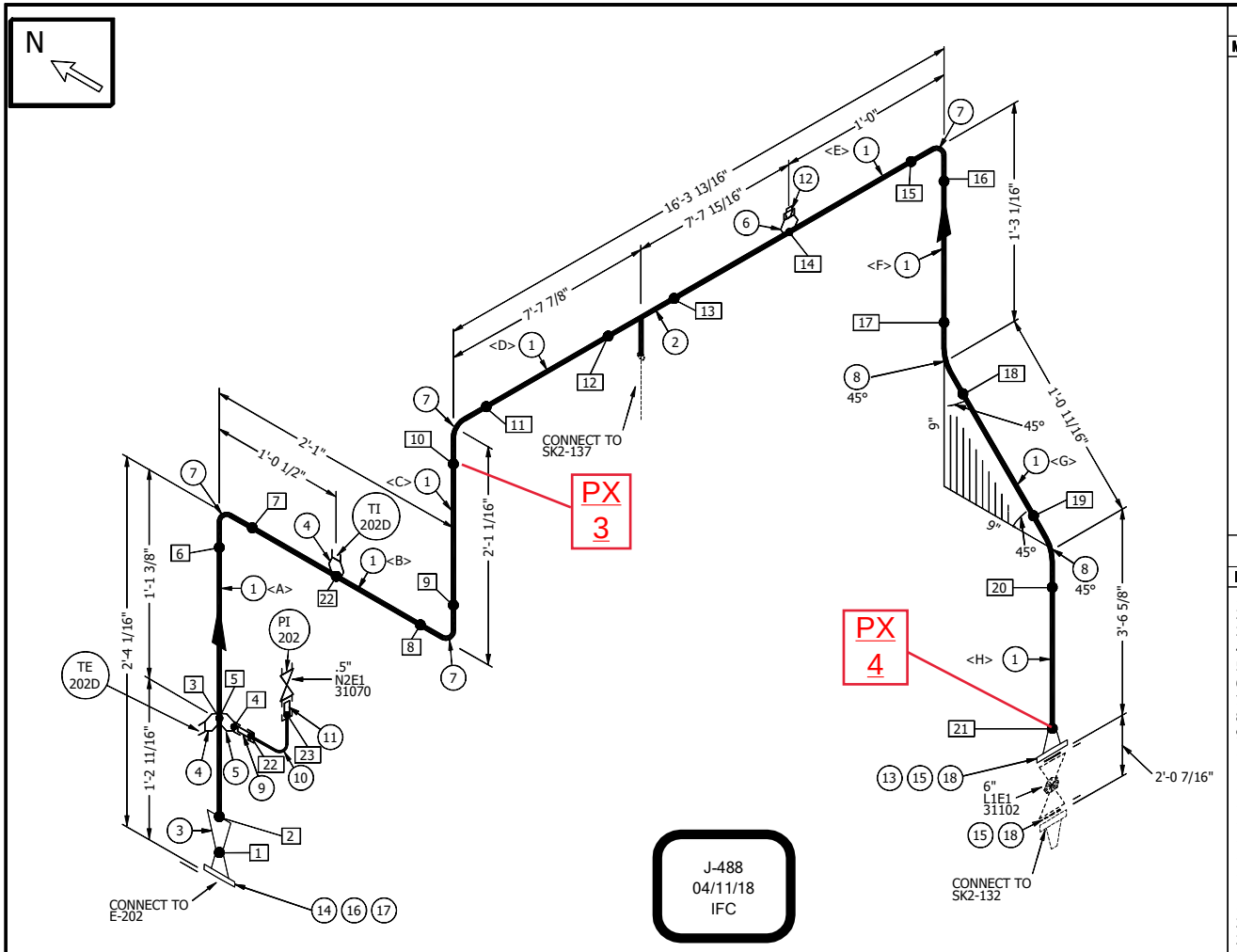
LINE No.	170-D1-LT-6" 1.5"C
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-234
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
SPOOL I.D. No.	SK2-124
REV.	0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-124



BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-106 Gr. B, BBE	19'-1 15/16"
2	6X6	TEE, BW, XH, A-234 Gr. WPB	1
3	6X4	RED CONC, BW, XH - XH, A-234 Gr. WPB	1
4	6X3/4	T-O-L, THRD, 3000#, A-105	2
5	6X1/2	S-O-L, SW, 3000#, A-105	1
6	6X1/2	T-O-L, THRD, 3000#, A-105	1
7	6	ELL 90 LR, BW, XH, A-234 Gr. WPB	4
8	6	ELL 45, BW, XH, A-234 Gr. WPB	2
9	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, x 6" LG, PBE (6" LG.)	1
10	1/2	ELL 90, SW, 3000#, A-105	1
11	1/2	NIPPLE, S/160, SMLS, A-106 Gr. B, x 3" LG, POE-TOE (3" LG.)	1
12	1/2	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
13	6	FLG, RTJWN, 900#, XH, A-105	1
14	4	FLG, RTJWN, 900#, XH, A-105	1
15	6	GSKT, 900# RTJ, SOFT IRON, OVAL RING R37, BRINELL HARDNESS 90 R45	2
16	4	GSKT, 900# RTJ, SOFT IRON, OVAL RING R37, BRINELL HARDNESS 90 R37	1
17	1 1/8	(8) STUD BOLTS, 900# x 7" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	1
18	1 1/8	(12) STUD BOLTS, 900# x 8" LG, A-193 Gr. B7, w/ 2 HVY HEX NUTS, A-194 Gr. 2H (ZINC PLATED)	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	4"	BW	
2	6"	BW	
3	1/2"	LET	
4	1/2"	SW	
5	3/4"	LET	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	6"	BW	
11	6"	BW	
12	6"	BW	
13	6"	BW	
14	1/2"	LET	
15	6"	BW	
16	6"	BW	
17	6"	BW	
18	6"	BW	
19	6"	BW	
20	6"	BW	
21	6"	BW	
22	1/2"	SW	
23	1/2"	SW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	8 3/4"	BEVEL	BEVEL
B	6"	7"	BEVEL	BEVEL
C	6"	7 1/16"	BEVEL	BEVEL
D	6"	6'-5 1/4"	BEVEL	BEVEL
E	6"	7'-5 5/16"	BEVEL	BEVEL
F	6"	2 5/16"	BEVEL	BEVEL
G	6"	5 3/16"	BEVEL	BEVEL
H	6"	2'-9 1/16"	BEVEL	BEVEL

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	1265 Psia							
OPER. TEMP.	72 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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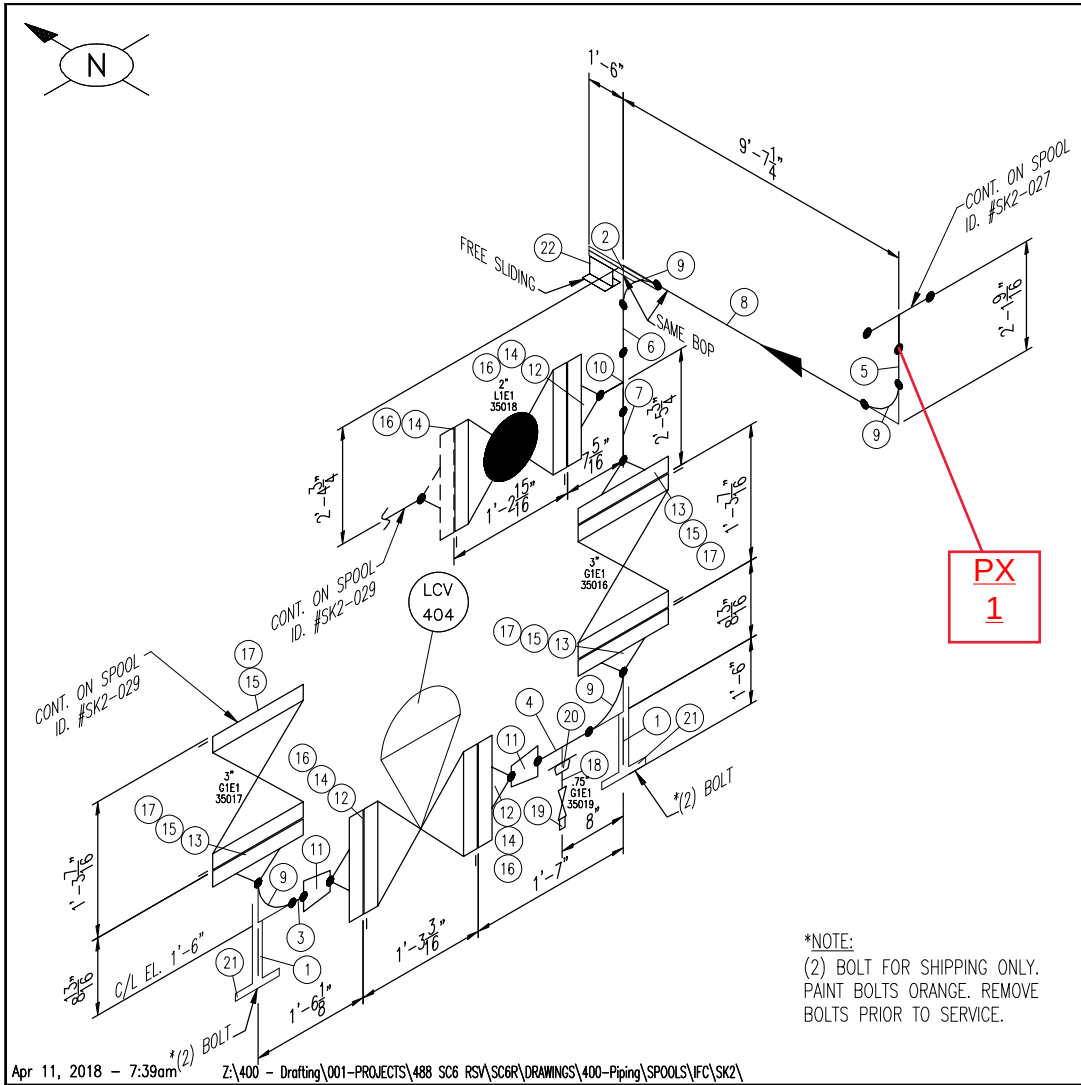
LINE No.	216-E1-CS-6"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-231
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
SPOOL I.D. No.	SK2-134
REV.	0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-134



*NOTE:
(2) BOLT FOR SHIPPING ONLY. PAINT BOLTS ORANGE. REMOVE BOLTS PRIOR TO SERVICE.

BILL OF MATERIAL

MARK	QTY	SIZE	DESCRIPTION	LENGTH
1	2	2"	PIPE, XH SMLS, A-106-B, BBE	1'-10"
2	1	2"	PIPE, XH SMLS, A-106-B, BBE	1'-8 1/2"
3	1	3"	PIPE, XH SMLS, A-106-B, BBE	5 13/16"
4	1	3"	PIPE, XH SMLS, A-106-B, BBE	6 11/16"
5	1	3"	PIPE, XH SMLS, A-106-B, BBE	1'-4 3/16"
6	1	3"	PIPE, XH SMLS, A-106-B, BBE	1'-8 7/8"
7	1	3"	PIPE, XH SMLS, A-106-B, BBE	1'-10 1/16"
8	1	3"	PIPE, XH SMLS, A-106-B, BBE	8'-10 1/4"
9	4	3"	ELL, 90 LR XH, A-234-WPB	
10	1	3"x2"	TEE, RED XH, A-234-WPB	
11	2	3"x2"	REDUCER, CONC XH, A-234-WPB	
12	3	2"	FLG, RTJWN 900LB XH, A-105	
13	3	3"	FLG, RTJWN 900LB XH, A-105	
14	4	7/8"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H (ZINC PLATED)	6"
15	4	7/8"	(8) STUD BOLTS, A-193-B7 w/ TWO HEAVY HEX NUTS, A-194-2H (ZINC PLATED)	6"
16	4	2"	GASKET, RTJ, 900LB R24	
17	4	3"	GASKET, RTJ, 900LB R31	
18	1	3/4"	NIPPLE, S/160 SMLS, A-106-B POE-TOE	3"
19	1	3/4"	PLUG, SOLID STEEL, ROUND HEAD, A-105	
20	1	3"x3/4"	SOL, 3000LB FS, A-105	
21	2		BASE PLATE, 1/2" THK. x 5" x 5" (SA-36 MATERIAL)	
22	1		PIPE SHOE, 6" LG x 3" HI FROM W6x15	

J-488
04/11/18
IFC

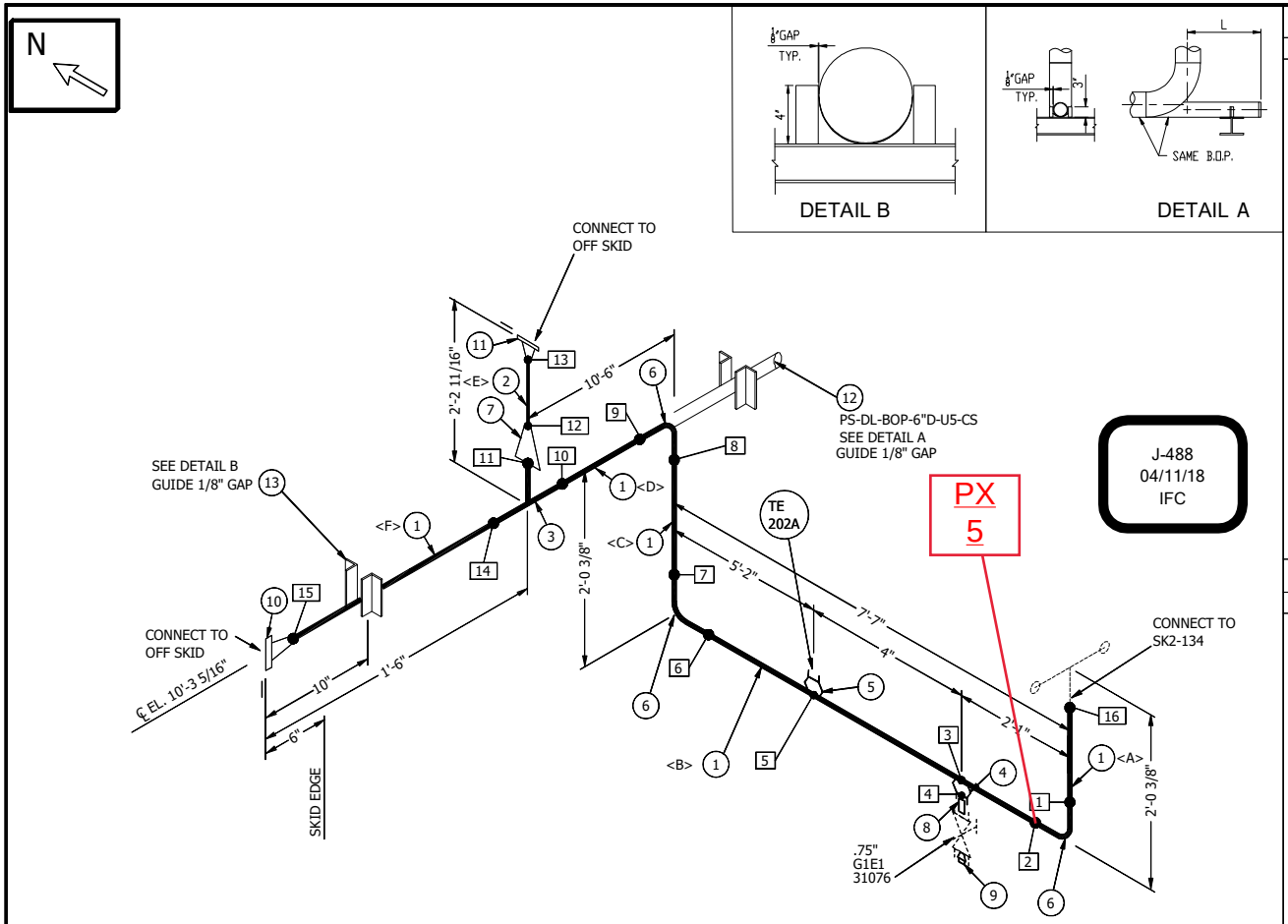
Apr 11, 2018 - 7:39am Z:\400 - Drafting\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-Piping\SPOOLS\IFC\SK2\

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	1270 Psia							
OPER. TEMP.	154 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	1"C	0	ISSUE FOR CONSTRUCTION	01/11/18	COB	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:
ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

Thomas Russell Co.
7050 S. Yale, Suite 210
Tulsa, Oklahoma 74136
PH.: 918-481-5682

LINE No.	235-E1-CS-3" 1"C
ASSEMBLY DRAWING	SC6-402
P&ID DRAWING	***-235/236
DRAWN BY	COB
DATE DRAWN	01/10/18
JOB No.	488
SPOOL I.D. No.	SK2-135
REV.	0



BILL OF MATERIAL

MARK	SIZE	DESCRIPTION	QTY
1	6	PIPE, XH, SMLS, A-106 Gr. B, BBE	17'-3 1/16"
2	2	PIPE, XH, SMLS, A-106 Gr. B, BBE	1'-2"
3	6X3	TEE RED, BW, XH - XH, A-234 Gr. WPB	1
4	6X3/4	S-O-L, SW, 3000#, A-105	1
5	6X3/4	T-O-L, THRD, 3000#, A-105	1
6	6	ELL 90 LR, BW, XH, A-234 Gr. WPB	3
7	3X2	RED CONC, BW, XH - XH, A-234 Gr. WPB	1
8	3/4	NIPPLE, S/160, SMLS, A-106 Gr. B, x 3" LG, POE-TOE (3" LG)	1
9	3/4	PLUG, SOLID STEEL, RND HD, THRD, 3000#, A-105	1
10	6	FLG, RTJWN, 900#, XH, A-105	1
11	2	FLG, RTJWN, 900#/1500#, XH, A-105	1
12	6	(1) PIPE, 3" STD, SMLS, x 30" LG. A-106 Gr. B (1) END PL, 1/4" THK x 3 3/8" O.D. A-36 (L=18"), (2) ANGLE, 2" x 2"x 1/4"x3" LG. A-36	1
13	4	ANGLE, 2" x 2" x 1/4" x 4" LG. A-36	2

WELD MAPPING

MARK	SIZE	TYPE	SCH
1	6"	BW	
2	6"	BW	
3	3/4"	LET	
4	3/4"	SW	
5	3/4"	LET	
6	6"	BW	
7	6"	BW	
8	6"	BW	
9	6"	BW	
10	6"	BW	
11	3"	BW	
12	2"	BW	
13	2"	BW	
14	6"	BW	
15	6"	BW	
16	6"	BW	

PIPE CUT LIST

MARK	SIZE	LENGTH	END 1	END 2
A	6"	9 3/4"	BEVEL	BEVEL
B	6"	6'-1"	BEVEL	BEVEL
C	6"	6 3/8"	BEVEL	BEVEL
D	6"	9'-3 3/8"	BEVEL	BEVEL
E	2"	1'-2"	BEVEL	BEVEL
F	6"	6 9/16"	BEVEL	BEVEL

DESIGN PRESS.	1440 Psig	FAB. LOCATION	SHOP					
DESIGN TEMP.	200 °F	SPOOL LOCATION	SKID #2					
OPER. PRESS.	1265 Psia							
OPER. TEMP.	72 °F	CORR. ALLOW.	.0625"					
STRESS RELIEVE	NO	INSULATION	NONE	0	ISSUE FOR CONSTRUCTION	01/10/18	CW	WD
RADIOGRAPHY	15% NORMAL	PAINT	SYSTEM #3	NO.	REVISION	DATE	BY	APR

FABRICATION NOTES:

ALL VALVES ARE RAISED FACE UNLESS NOTED.
ALL FITTING MAKE-UP & CUT LENGTHS FOR BW PIPE DO NOT INCLUDE WELD GAPS.
SHOP TO MAKE ADJUSTMENTS FOR WELD GAPS.
ALL PIPE SEAMLESS UNLESS NOTED OTHERWISE.
ALL COUPLING TO BE SADDLED ON.

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Fax.: 918-481-7427

LINE No.	216-E1-CS-6"
ASSEMBLY DRAWING	SC6R-402
P&ID DRAWING	***-231
DRAWN BY	CW
DATE DRAWN	01/10/18
JOB No.	488
SPOOL I.D. No.	SK2-137
REV.	0

Z:\400 - DRAFTING\001-PROJECTS\488 SC6 RSV\SC6R\DRAWINGS\400-PIPING\SPOOLS\IFC\SK2\SK2-137