

# INSTRUCTIONS FOR INSTALLATION AND OPERATION OF

## CROLL-REYNOLDS THREE STAGE EVACTORS WITH SURFACE INTERCOOLERS

See Dwgs.

ATTACHED

### GENERAL

The EVACTOR may be erected at any location for convenient operation. However, if the intercooler is to be drained by barometric leg into a hot well, the bottom of the intercooler should be at least 34 ft. above the water in the hot well. If the condensate from the intercooler is to be drained into a condensate receiver tank, the EVACTOR may be installed immediately over the receiver tank, the entire apparatus being at any elevation desired.

For best results the EVACTOR should be installed so that the 1st stage discharges downward.

### INSTALLATION: STEAM PIPING

Steam lines should be of ample size to give full operating pressure at the EVACTOR nozzles. Valves should be installed to cut off each ejector when desired and piping arranged with unions for easy removal of any ejector nozzle for cleaning. Control valves may be placed in any location for convenient operation.

A steam strainer (not over 1/64 mesh) should be installed in the main steam line as close to the EVACTOR as possible. If steam is wet an effective steam separator should be installed as near the EVACTOR as possible. All steam piping should be covered. Steam lines should be drained to prevent accumulations of condensate.

If the EVACTOR is to operate at lower than line steam pressure, a suitable reducing pressure valve should be installed.

### WATER AND DRAIN PIPING

Cooling water should be piped to the EVACTOR intercooler from any convenient supply line with control valve located for convenient operation. A water pressure of up to 80# gauge is permissible. The drain line from the bottom of the intercooler should be piped to a hot well with the lower end of the open drain sealed under at least 2 ft. of water. The drain should have no horizontal runs and should be direct as possible, sloping downward in any part at not less than 45°. The height from the water level in the hot well to the bottom of the EVACTOR intercooler should not be less than 34 ft. where barometric drain leg is used.

If condensate receiver tank is used, the drain from the intercooler should be connected directly into the top of this tank, using as short a line as possible.



### EXHAUST PIPING

Exhaust from 3rd stage may be discharged to atmosphere; an open or closed heater; an aftercondenser, either jet or surface; or into a hot well below the water level. For any arrangement the back pressure at the EVACTOR exhaust should not be over 1/2# gauge, unless otherwise specified. If exhaust is discharged into hot well or receiver, the exhaust line should be carried to a point not more than 12" below the water level.

### SUCTION LINE

The suction line should be full size and as short as possible to prevent friction loss and should have no low points or loops to accumulate condensation.

A gate valve in the suction line as near the EVACTOR as convenient is recommended, this to be closed when testing the EVACTOR separately to locate possible trouble, or to determine if EVACTOR nozzles are clogged.

### GAUGES

Install steam gauge properly protected with syphon loop in the main steam line as near the EVACTOR as possible. Install vacuum gauge to indicate vacuum at the EVACTOR suction.

### OPERATION

Check over entire installation and piping. Make sure entire apparatus is tight and free from air leaks. This may be determined by careful inspection, or by filling the entire apparatus with water under pressure - ordinarily 10# gauge is sufficient.

Open control valve in cooling water line to intercooler, throttling to give proper quantity. Proper quantity of cooling water depends on temperature and size of unit and should be determined by trial, using quantity which gives the highest vacuum. Ordinarily, a 15 to 20° F. temperature rise from inlet to discharge temperature will give the proper quantity.

Make sure exhaust lines are open. Open steam control valves wide (never throttle steam to EVACTOR nozzle) to give full steam pressure at the EVACTOR nozzles. EVACTOR is then in complete operation.

### NOTES AND PRECAUTIONS

Always turn on cooling water to the intercoolers first and make sure drain lines are sealed under water.

Make sure steam lines are drained and clear and nozzle orifices are not clogged.



If it is desired to drain the condensate receiver tank with the EVACTOR in operation, the gate valve in the drain line should first be closed, then the vent line to atmosphere opened to break the vacuum. The drain connection at the bottom of the tank is then opened. This operation should be done as speedily as possible since if too much condensate accumulates in the bottom of the intercooler, the operation of the EVACTOR will be effected. When the tank drain and vent line are again closed and the intercooler drain valve opened, there will be a temporary drop in vacuum due to the air in the condensate tank. This difficulty may be largely overcome by bleeding steam in place of air thru the vent line into the receiver tank to force out the condensate. This method of operation may also speed up the flow of condensate from the tank and reduce the period of time it is necessary to keep the intercooler drain line closed.

#### CHECKING EVACTOR

To check operation of the EVACTOR, it may be operated independently by blanking off the suction line or closing the gate valve in this line. With blanked suction and water flowing to the intercooler, the stage operating alone should pull up a vacuum within one minute of from 27 to 28" Hg, referred to a 30" barometer. With stages in operation, a vacuum of approximately 29.5" should be obtained.

If the desired vacuum is not obtained, it is probably due to one of the following causes:

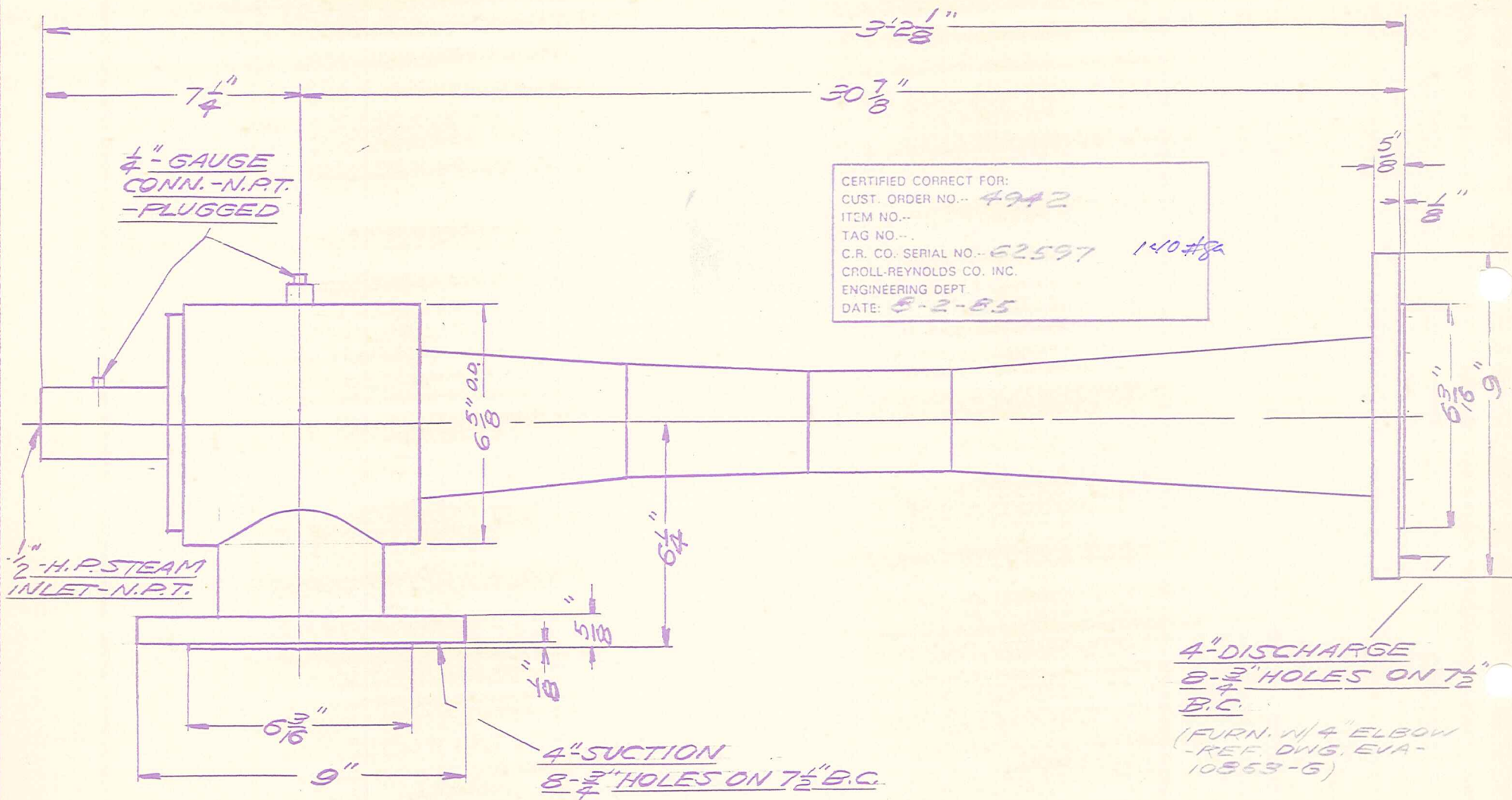
- 1st - Low Steam Pressure - Steam pressure can be higher than specified but not more than a few pounds lower.
- 2nd - Wet Steam - Wet steam will cause a very decided loss in vacuum. By wet steam is meant steam below 97% or 98% quality. Check steam separator. See that it is properly drained and insulated.
- 3rd - High Back Pressure - If the final or 3rd stage of the EVACTOR has a higher back pressure than that for which it was designed, a loss in vacuum will result. Check any obstruction in exhaust lines. See that these lines have no loops or low points for accumulation of condensate and are properly drained.
- 4th - Excessive Air Leakage - Inspect apparatus carefully for openings, split pipes, leaky shutoff



valves, leaky valve stems, etc. Fill apparatus with water to locate leaks.

5th - Steam Nozzles Clogged - With a new installation pipe scale or dirt from the new pipe may clog the EVACTOR nozzles. Even though a steam strainer is used, the scale or dirt between the strainer and the EVACTOR nozzles loosens up and sometimes clogs the nozzle orifices. Remove nozzles from the steam chest and take off attached strainer if any. Clean nozzles thoroughly with emery cloth, particularly the nozzle orifices.





CERTIFIED CORRECT FOR:  
 CUST. ORDER NO.-- 4942  
 ITEM NO.--  
 TAG NO.--  
 C.R. CO. SERIAL NO.-- 62597 140#8  
 CROLL-REYNOLDS CO. INC.  
 ENGINEERING DEPT.  
 DATE: 8-2-85

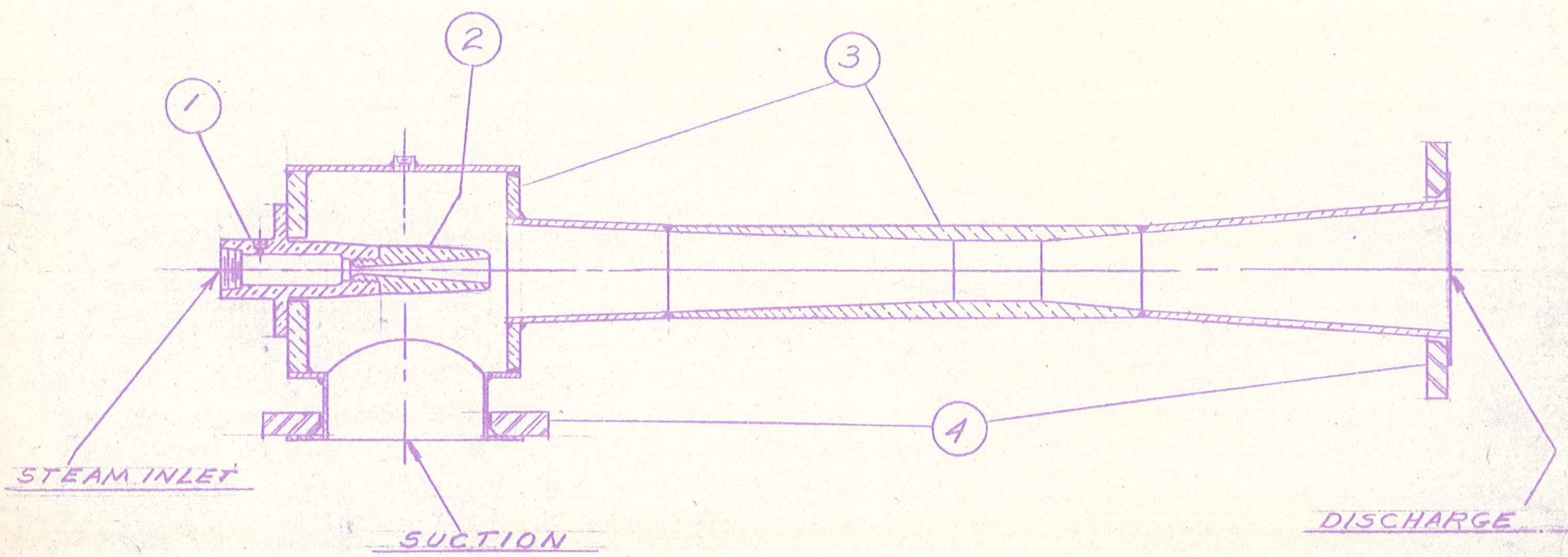
4"-DISCHARGE  
 8-3/4" HOLES ON 7 1/2"  
 B.C.  
 (FURN. W/ 4" ELBOW  
 -REF. DWG. EVA-  
 10519-G)

- NOTES:
- 1) APPROX. WTS. -- EMPTY -- 80 LBS  
 FLOODED - 100 LBS.
  - 2) 1/4" THRU 1/2" H.P. STEAM INLET FURN.  
 WITH "Y" TYPE STRAINER
  - 3) BOLT HOLES IN ALL LOOSE RING FLANGES ARE  
 EQUALLY SPACED & STRADDLE NATURAL 4'S.

CROLL-REYNOLDS COMPANY, INC.  
 WESTFIELD, N.J.  
 No 4-X EVACTOR  
 scale " F.G. 10-9-79 EVA-10519-B



M



BILL OF MATERIAL

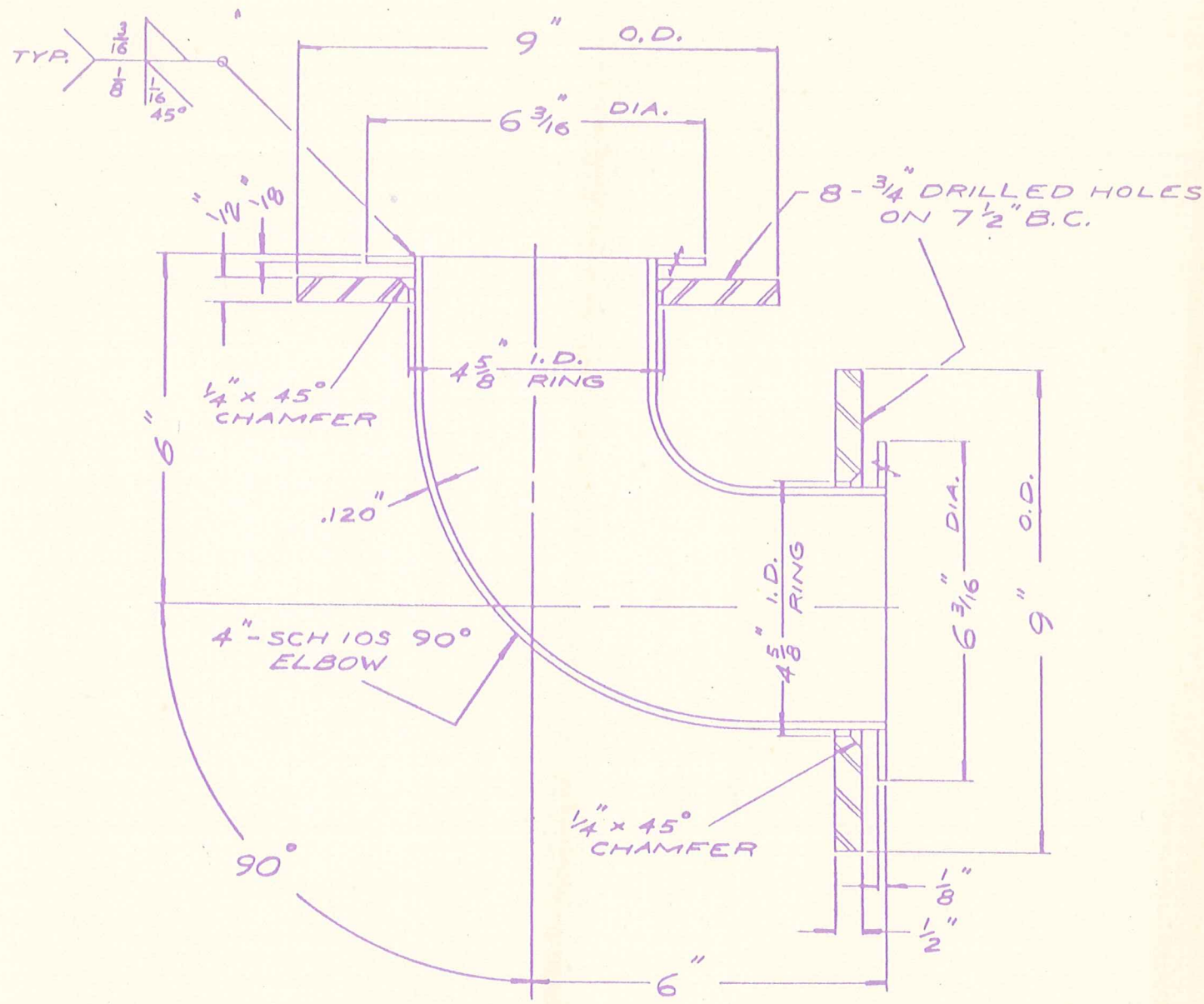
<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>MATERIAL</u>
1	STEAM CHEST	STAIN. STEEL TYPE 304-L
2	STEAM NOZZLE	STAIN. STEEL 304
3	COMBINED HEAD & THROAT	STAIN. STEEL TP 304-L
4	FLANGES	CARBON STEEL

REF: EVA-10519-B

CROLL-REYNOLDS COMPANY, INC.  
WESTFIELD, N.J.

SECTION OF EVACTOR  
SCALE 2"-12"  
LUD 10-10-67 EVA-8879-A

CERTIFIED CORRECT FOR:  
 CUST. ORDER NO... 4942  
 ITEM NO...  
 TAG NO...  
 C.R. CO. SERIAL NO... 62597  
 CROLL-REYNOLDS CO. INC,  
 ENGINEERING DEPT.  
 DATE: 8-2-85



MATERIAL SPECIFICATIONS

ELBOW — STAIN. STEEL TYPE 304-L ASTM-A312

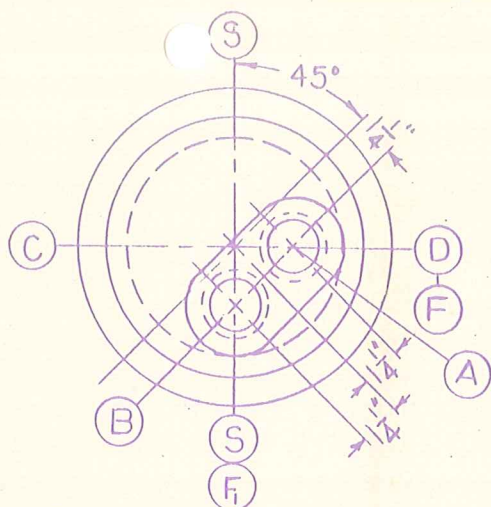
FLANGES — CARBON STEEL RATE ASTM-A285 GR. C FLG. QUAL. W/  
 STAIN. STEEL TYPE 304-L FACINGS ASTM-A240

NOTE:  
 BOLT HOLES IN ALL FLANGED  
 CONNECTIONS MUST BE EQUALLY,  
 SPACED & STRADDLE NATURAL CS.

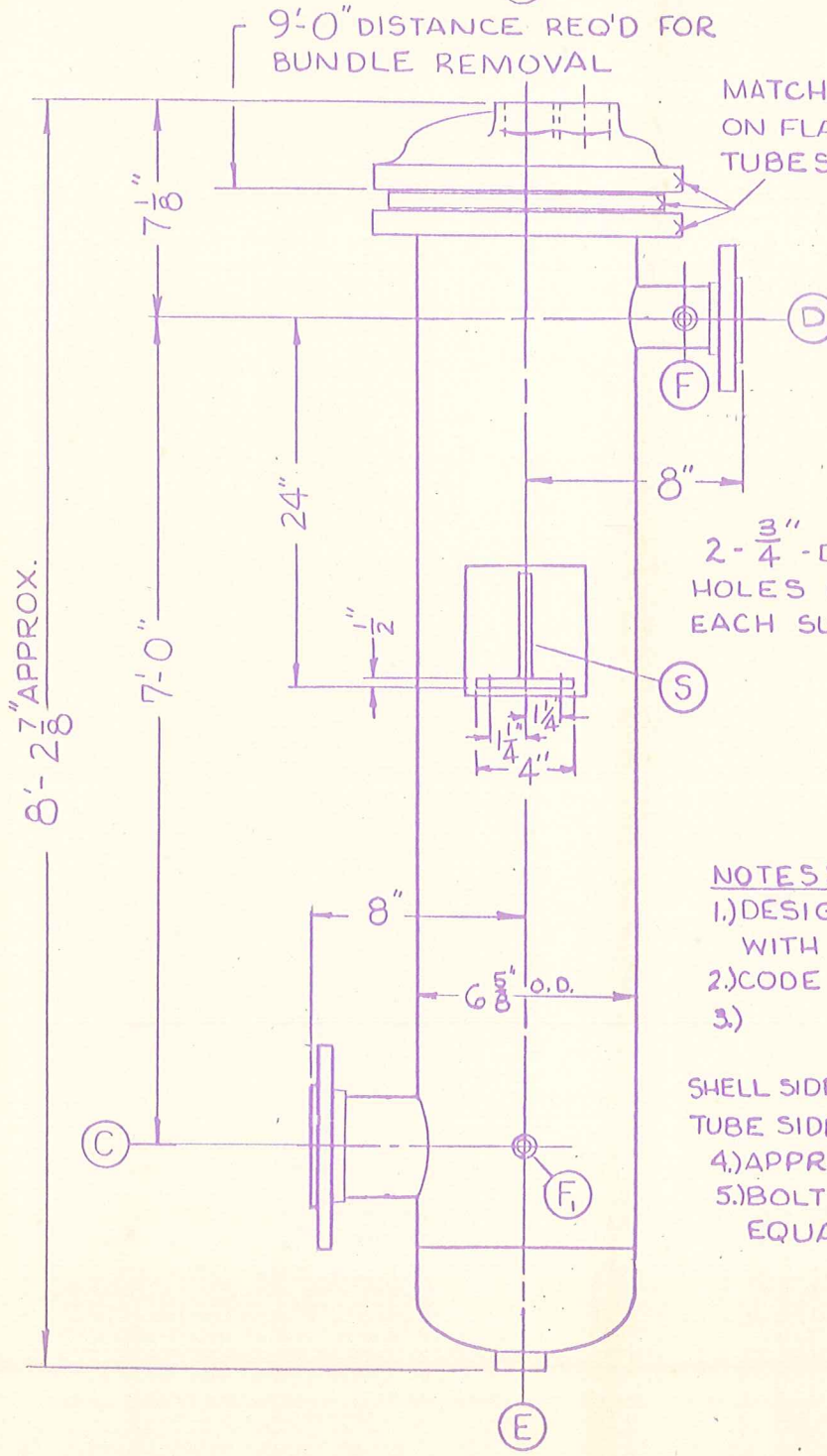
**CROLL-REYNOLDS COMPANY, INC.**  
 WESTFIELD, N.J.  
 SPEC 4"x4" STAIN. STEEL ELBOW  
 SCALE: NONE  
 EAN 11-30-79 EVA-10863-G

BRUNING 44-141 27113





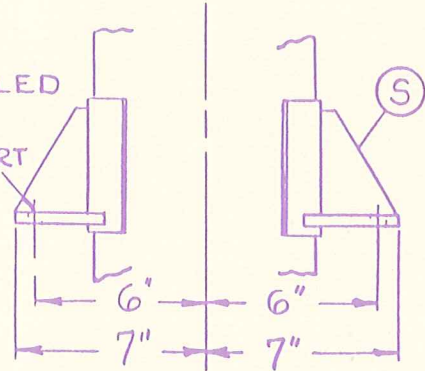
	SIZE	SERVICE	DESCRIPTION
(A)	1/2"	WATER INLET	-N.P.T.-
(B)	1/2"	WATER OUTLET	-N.P.T.-
(C)	4"	VAPOR INLET	150# ANSI, S.S., RF SLIP-ON FLG.
(D)	2"	AIR CONN	150# ANSI, S.S., RF SLIP-ON FLG.
(E)	3/4"	DRAIN	3000# S.S. HALF-COUP. -N.P.T.-
(F)	3/4"	TEST CONN	3000# S.S. HALF-COUP. -NPT- PLUGGED
(F)	3/4"	TEST CONN	3000# S.S. HALF-COUP. -NPT- PLUGGED



MATCH MARKS 'X' ON FLANGES & TUBESHEET

CERTIFIED CORRECT FOR:  
 CUST. ORDER NO... 4942  
 ITEM NO...  
 TAG NO...  
 C.R. CO. SERIAL NO... 62597  
 CROLL-REYNOLDS CO. INC.  
 ENGINEERING DEPT.  
 DATE: 8-2-85

2- 3/4" - DRILLED HOLES IN EACH SUPPORT



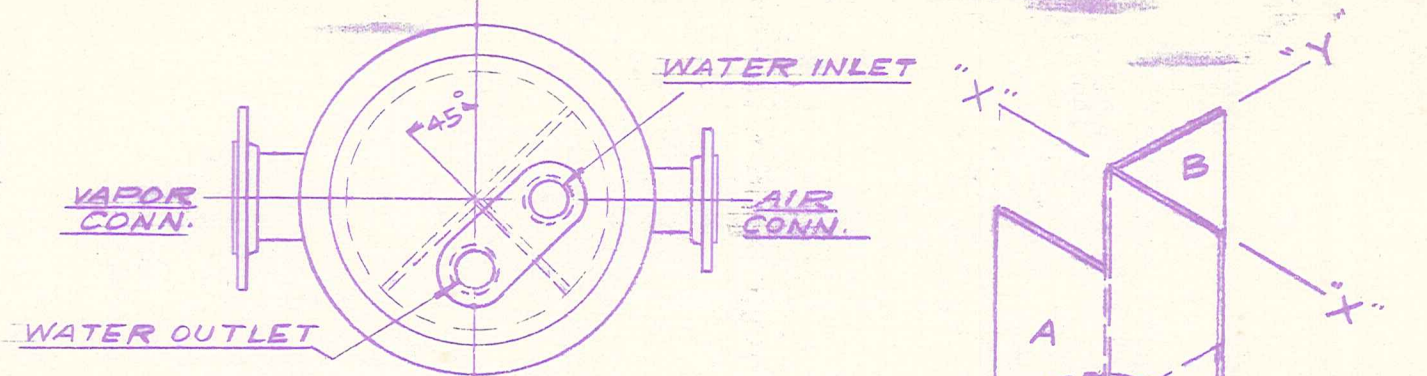
NOTES:

- DESIGN & ~~CONSTRUCTION~~ IN ACCORD WITH ASME CODE, TEMA "C"
- CODE INSPECTION & STAMP REQ'D
- |              | DESIGN PRESS. | DESIGN TEMP. | TEST PRESS. |
|--------------|---------------|--------------|-------------|
| SHELL SIDE-- | 150 PSIG      | 300 °F       | 225 PSIG    |
| TUBE SIDE--  | 150 PSIG      | 300 °F       | 225 PSIG    |
- APPROX. NET. WT. -- 236 LBS.
- BOLT HOLES IN ALL FLANGED CONN'S ARE EQUALLY SPACED & STRADDLE NAT. &'S

**CROLL-REYNOLDS COMPANY, INC.**  
 WESTFIELD, N.J.

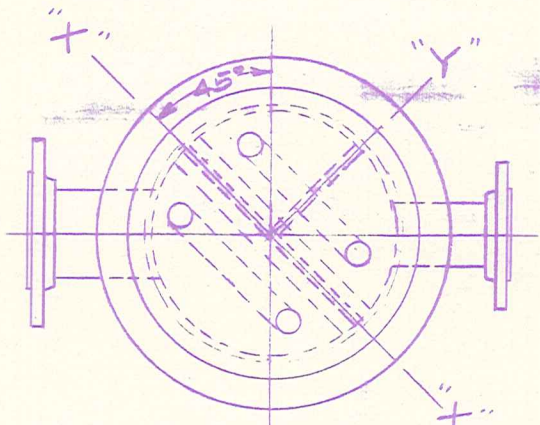
SU-6"-25# STAIN. STEEL SURFACE COND.  
 SCALE: NONE  
 T.S. 7-12-85 SCA-12054-C-1



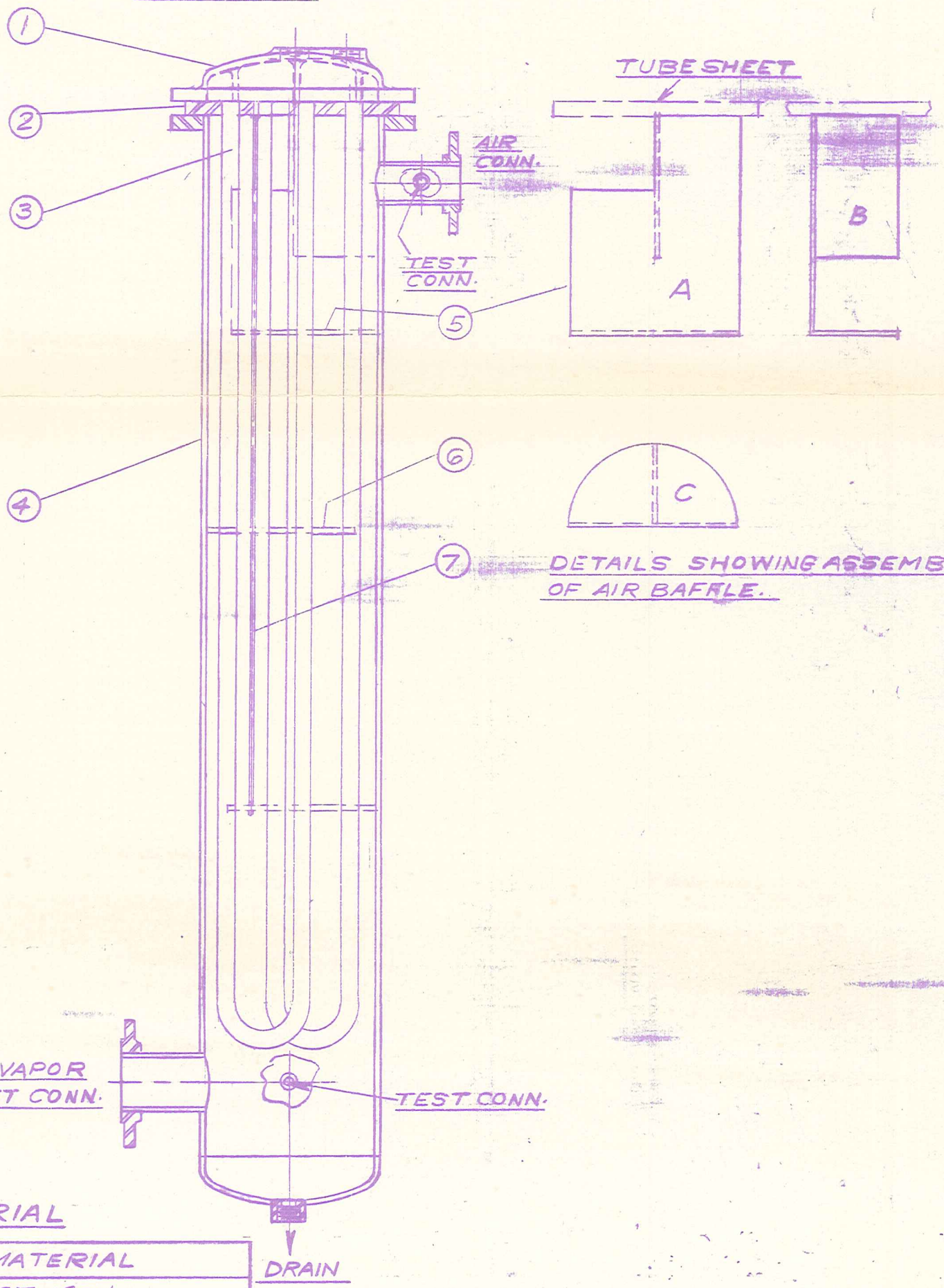


PLAN VIEW SHOWING ORIENT. OF BONNET

ISOMETRIC VIEW OF AIR BAFFLE ASSEMBLY



PLAN VIEW SHOWING ORIENT. OF AIR BAFFLE



DETAILS SHOWING ASSEMBLY OF AIR BAFFLE.

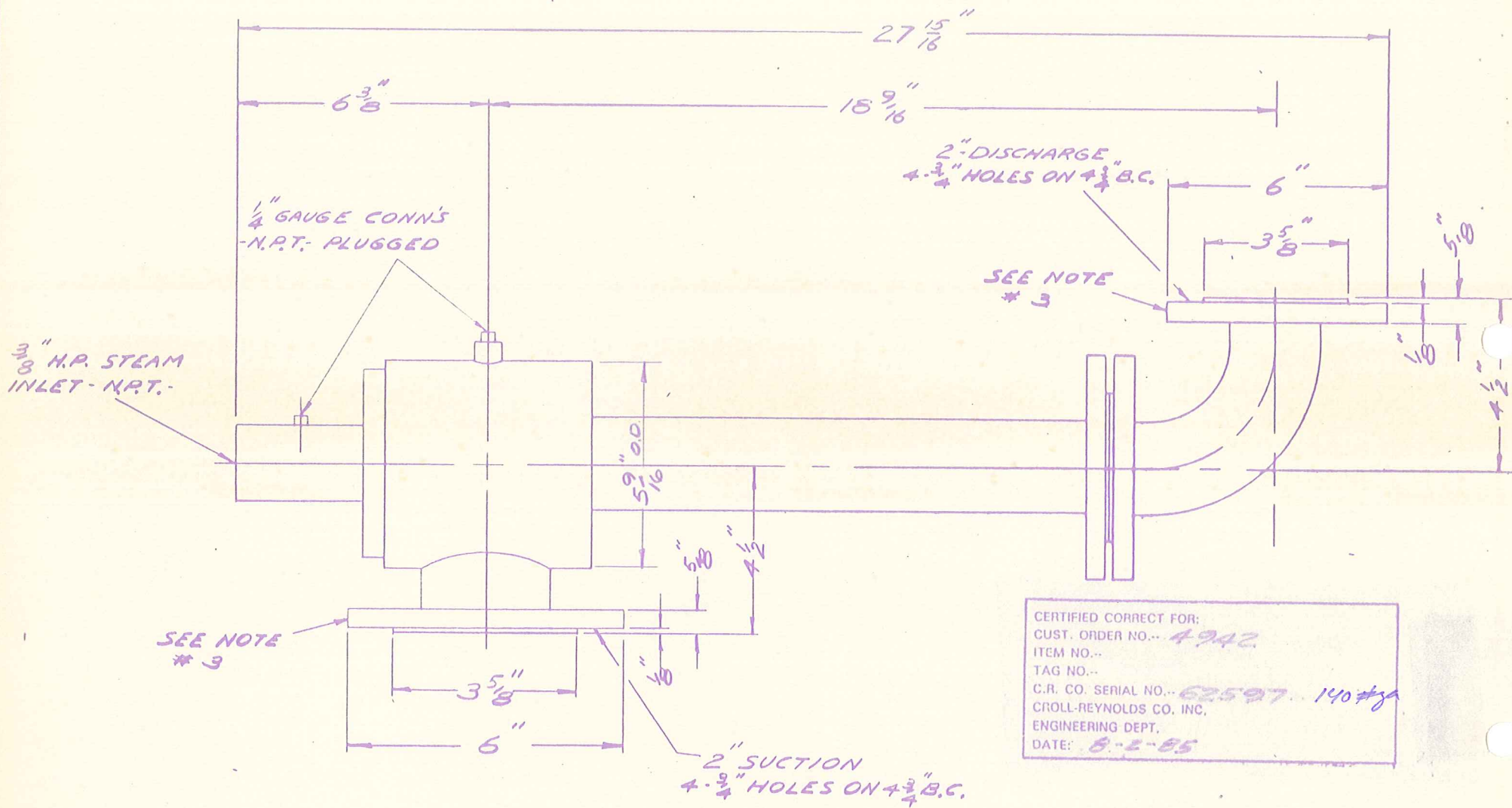
BILL OF MATERIAL

No.	DESCRIPTION	MATERIAL
1	BONNET	CAST IRON
2	TUBE SHEET	STAIN. STEEL TP. 304-L
3	TUBES	STAIN. STEEL TP. 304
4	SHELL	STAIN. STEEL TP. 304-L
5	AIR BAFFLE	STAIN. STEEL TP. 304-L
6	VAPOR BAFFLES	STAIN. STEEL TP. 304-L
7	TIE RODS	STAIN. STEEL TP. 304-L

REF. DWG. - SCA-12054-C-1

**CROLL-REYNOLDS COMPANY, INC.**  
 WESTFIELD, N. J.  
 SECTION OF SQ. FT. SURFACE COND.  
 SCALE: NONE  
 EAN 7-14-81 SCB-10542-M-22





CERTIFIED CORRECT FOR:  
 CUST. ORDER NO... 4942  
 ITEM NO...  
 TAG NO...  
 C.R. CO. SERIAL NO... 62597 140 #3  
 CROLL-REYNOLDS CO. INC.  
 ENGINEERING DEPT.  
 DATE: 8-2-85

APPROX. NET. WT. - 50 LBS.

CROLL-REYNOLDS COMPANY, INC.  
 WESTFIELD, N.J.

No 17 EVAPORATOR

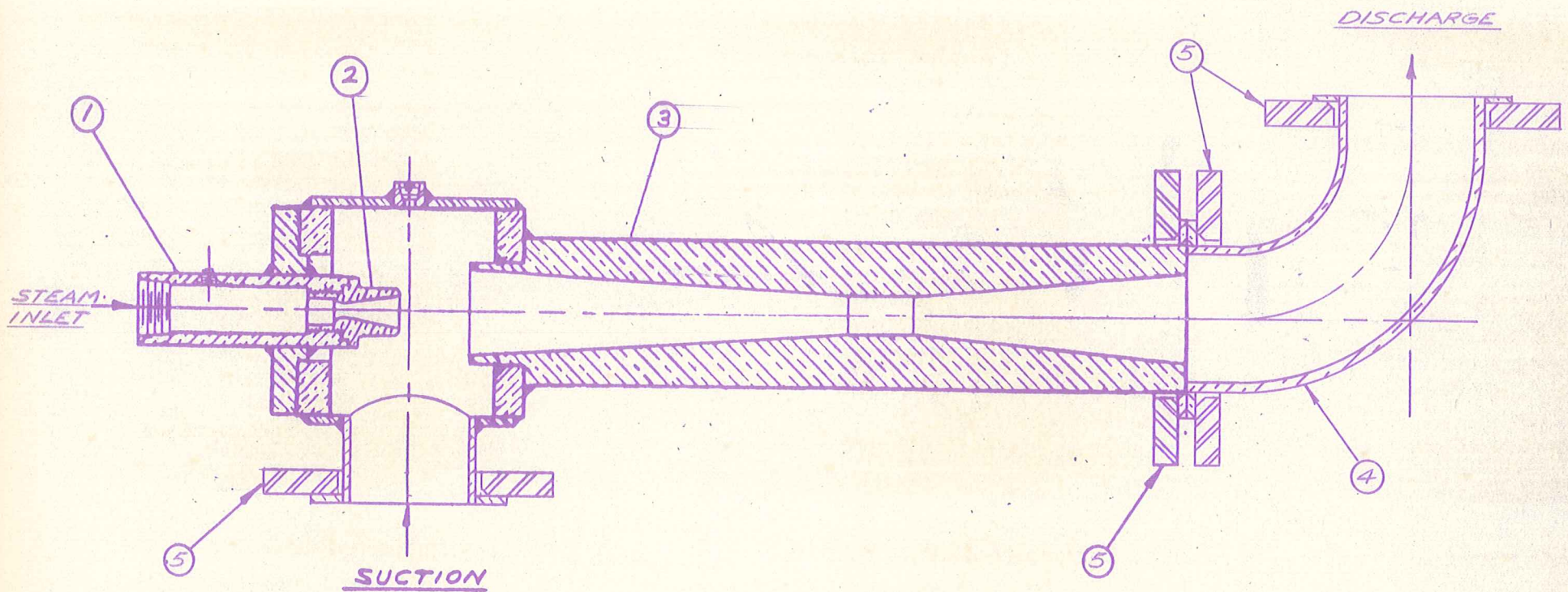
Scale 3/8" = 1"

TS. 4-19-84 EVA-14032-E

NOTES:

- 1) 1/4" THRU 1/2" STEAM INLETS FURNISHED WITH "Y" TYPE STRAINER
- 2) BODY MATERIAL - STAINLESS STEEL
- 3) LOOSE RING TYPE FLANGES - CARBON STEEL





BILL OF MATERIAL

①	STEAM CHEST	STAIN. STEEL 304-L
②	STEAM NOZZLE	STAIN. STEEL 304
③	COMB. HEAD & THROAT	STAIN. STEEL 304-L
④	ELBOW	STAIN. STEEL 304-L
⑤	RING FLANGES	CARBON STEEL

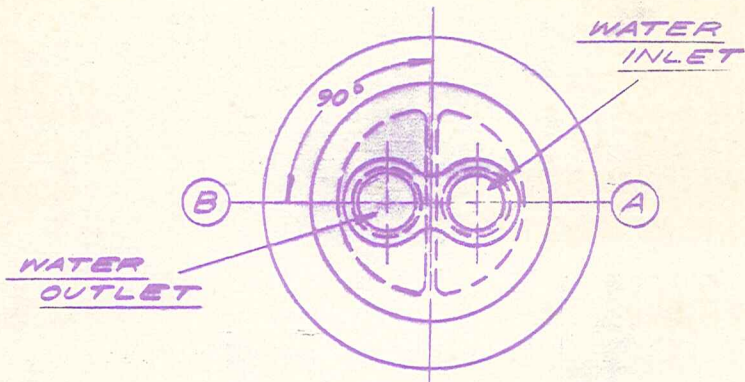
REF.: EVA-14032-E  
"Y-STAGE"

CROLL-REYNOLDS COMPANY, INC.  
WESTFIELD, N.J.

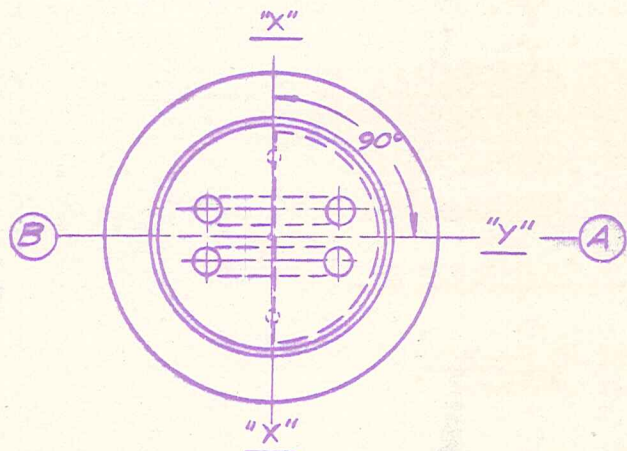
SECTION OF EVAPORATOR  
Scale: NONE  
EAN 1-4-80  
EVA-9508-N



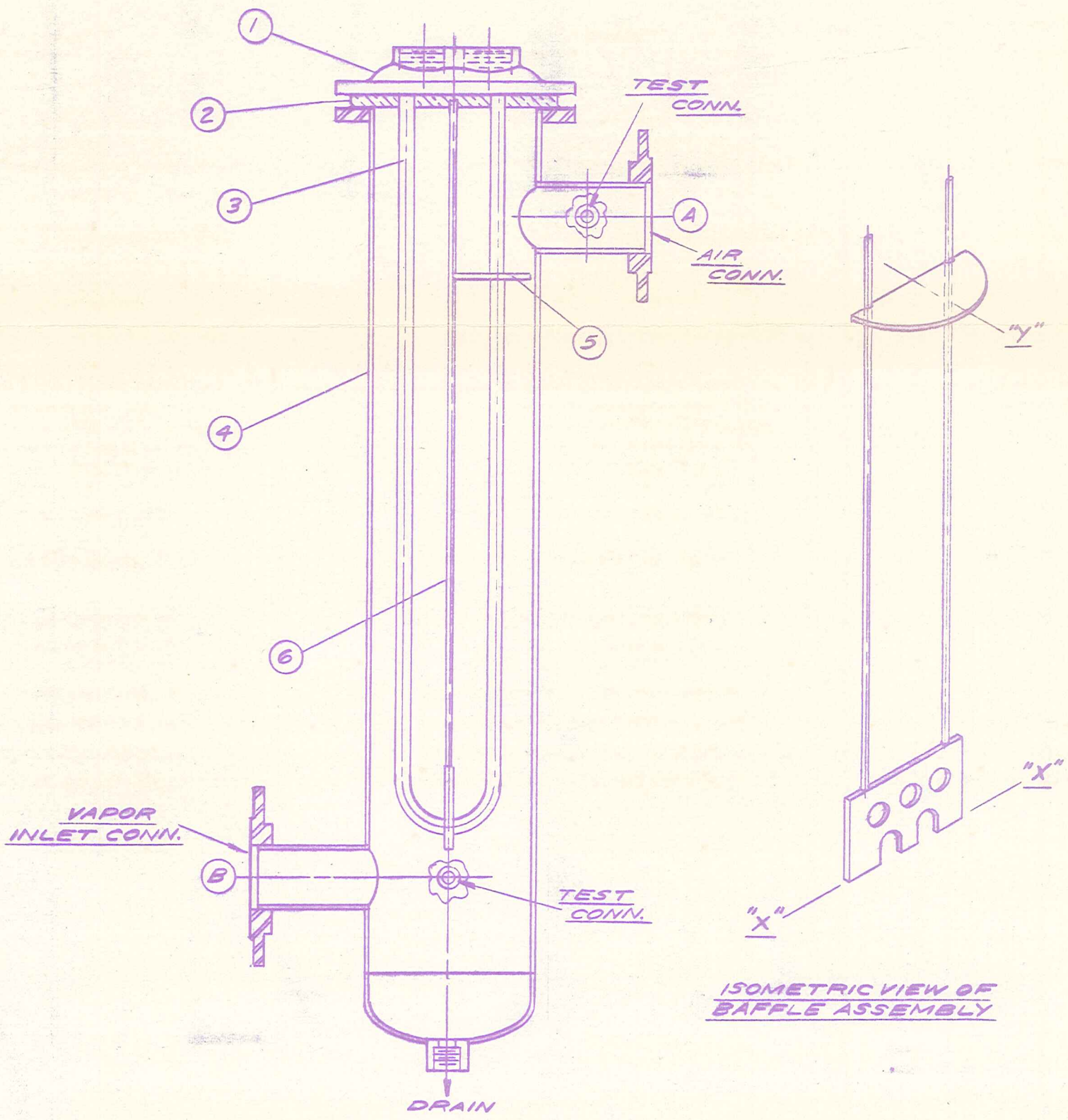
M



PLAN VIEW SHOWING ORIENT. OF BONNET



PLAN VIEW SHOWING ORIENT. OF BAFFLES



ISOMETRIC VIEW OF BAFFLE ASSEMBLY

NO.	DESCRIPTION	MATERIAL
1	BONNET	CAST IRON
2	TUBE SHEET	STAIN. STEEL TP. 304-L
3	TUBES (5)	STAIN. STEEL TYPE 304 5/8" O.D. - 18 BWG
4	SHELL	STAIN. STEEL TP. 304-L
5	BAFFLE	STAIN. STEEL TP. 304-L
6	TIE RODS	STAIN. STEEL TP. 304-L

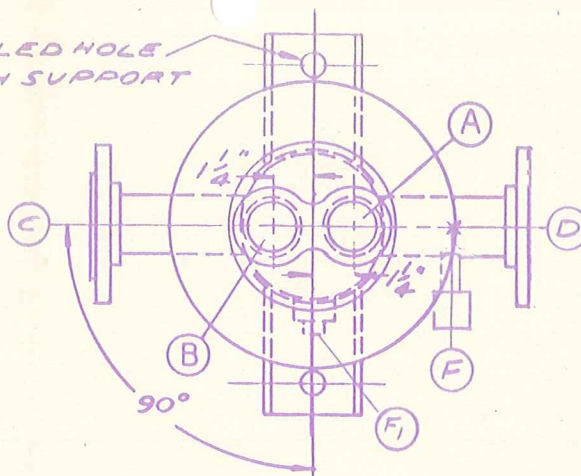
REF. DWGS.: SCA-12620-A-1  
SCA-12620-C-1

**CROLL-REYNOLDS COMPANY, INC.**  
WESTFIELD, N.J.  
SECTION 4" SURFACE CONDENSER  
Scale:  
FIG. 3-2-81 SCB-13006-F

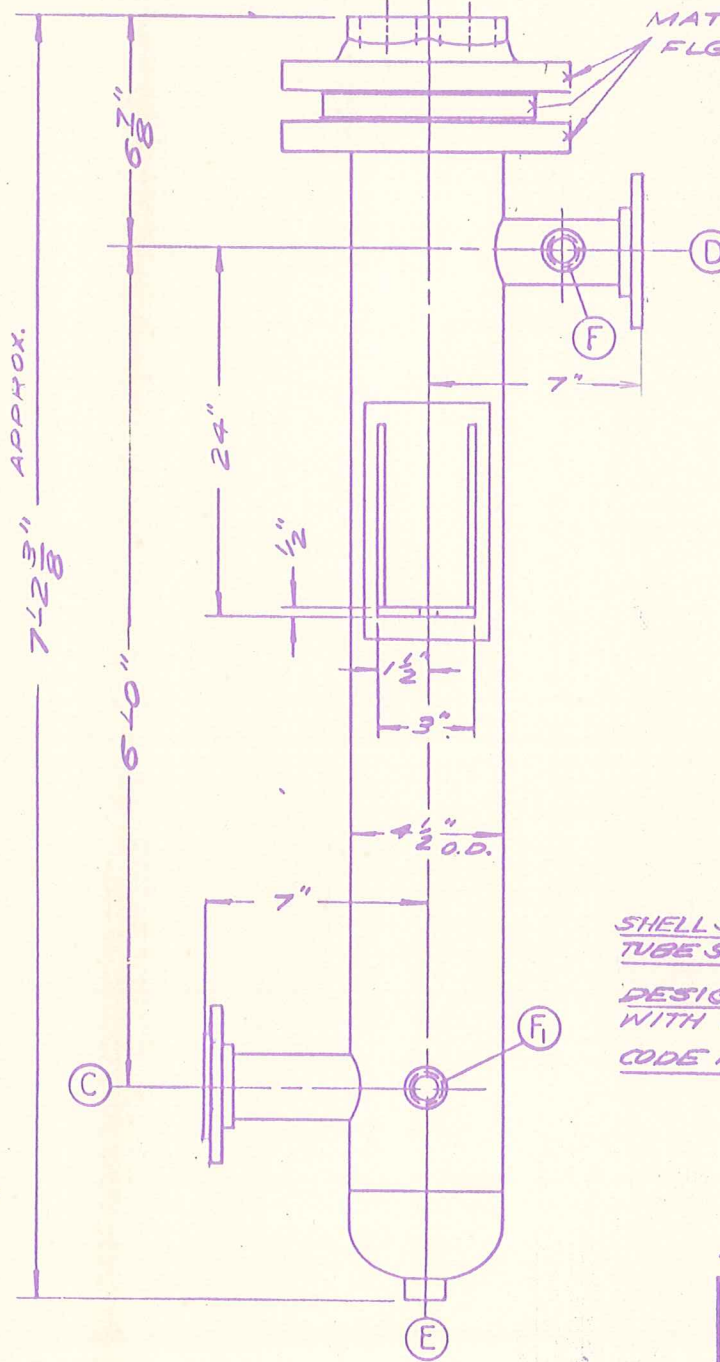
BRUNING 44-141 27113



3/4" DRILLED HOLE  
IN EACH SUPPORT

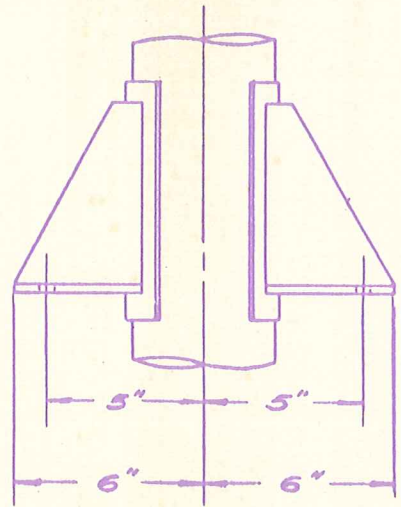


SIZE	SERVICE	DESCRIPTION
(A)	1" WATER INLET	- N.P.T. -
(B)	1" WATER OUTLET	- N.P.T. -
(C)	2" VAPOR INLET	150# ANSI S.S., R.R. SLIP-ON FLG.
(D)	1 1/2" AIR CONN.	150# ANSI, S.S., F.E. SLIP-ON FLG.
(E)	3/4" DRAIN	3000# S.S. HALF-COUP. - NPT -
(F)	3/4" TEST CONN.	3000# S.S. FULL COUP. - NPT - PLUG
(F1)	3/4" TEST CONN.	3000# S.S. HALF-COUP. - NPT - PLUG



MATCH MARKS ON  
FLG'S. & TUBESHEET

CERTIFIED CORRECT FOR:  
CUST. ORDER NO. - 4942  
ITEM NO. -  
TAG NO. -  
C.R. CO. SERIAL NO. - 62597  
CROLL-REYNOLDS CO. INC.  
ENGINEERING DEPT.  
DATE: 8-2-85



	DESIGN PRESS.	DESIGN TEMP.	TEST PRESS.
SHELL SIDE	--150 PSIG	300°F	225 PSIG
TUBE SIDE	--150 PSIG	300°F	225 PSIG

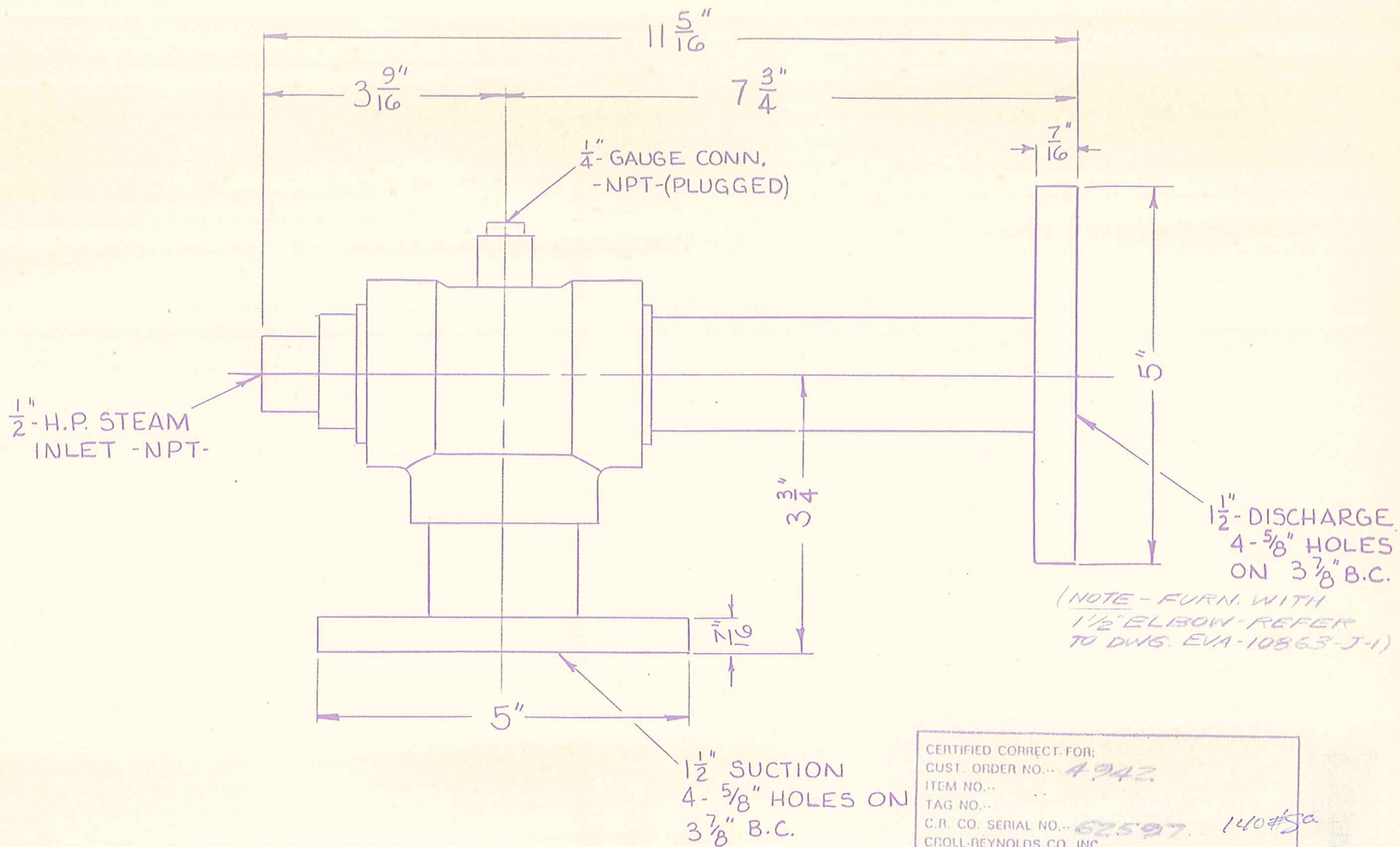
DESIGN & CONSTRUCTION IN ACCORD.  
WITH ASME CODE & TEMA "C"  
CODE INSPECTION & STAMP NOT REQ'D.

APPROX. NET WT. -- 110 LBS.

**CROLL-REYNOLDS COMPANY, INC.**  
WESTFIELD, N.J.  
SU 4"-10φ STAIN. STEEL SURFACE  
CONDENSER  
Scale: None  
T.S. 7-12-85 SCA-12620-C-1

**NOTE:**  
BOLT HOLES IN ALL FLG'D. CONN'S. ARE  
EQUALLY SPACED & STRADDLE NAT. C'S.





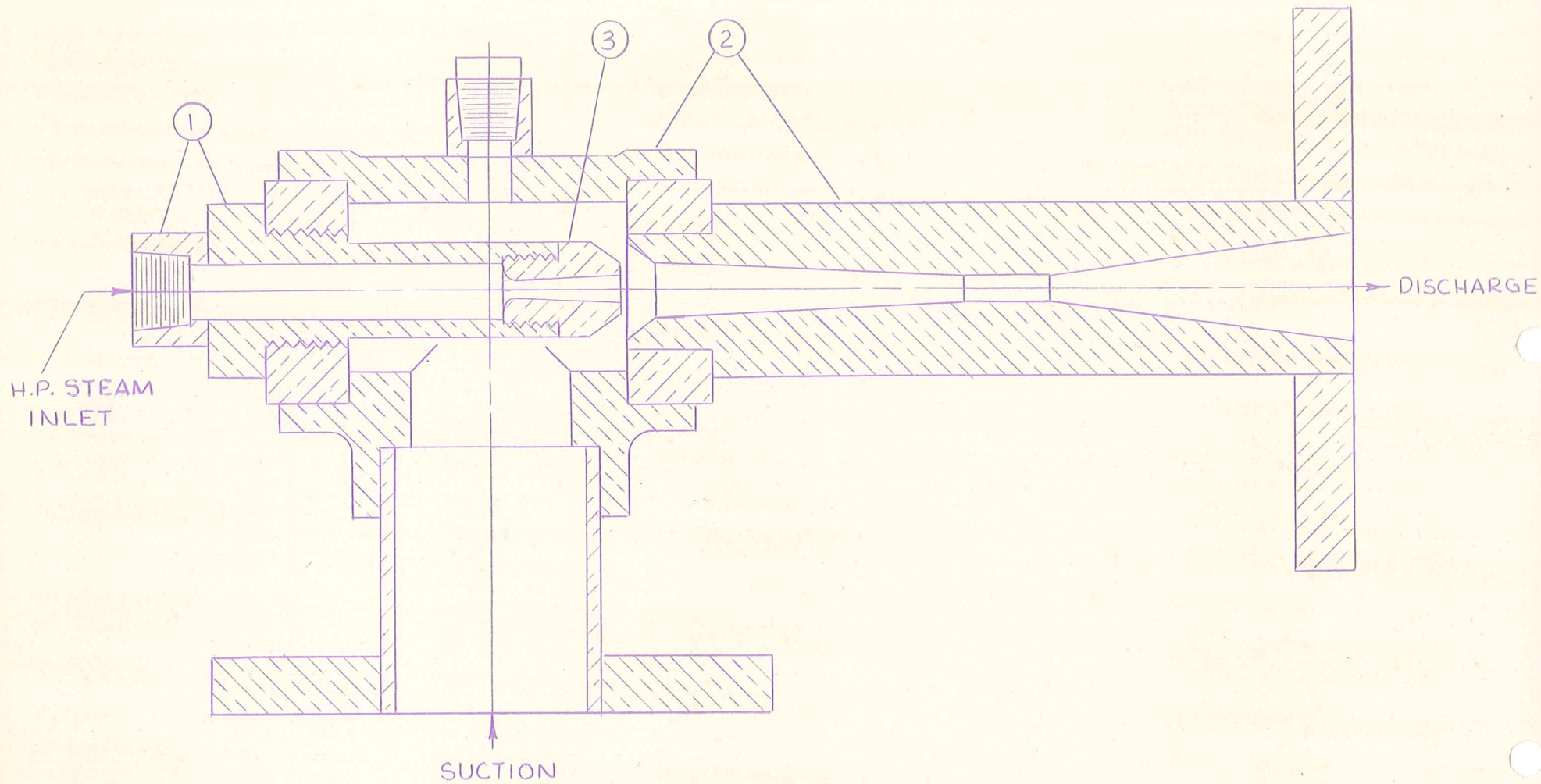
CERTIFIED CORRECT FOR:  
 CUST. ORDER NO... 4942  
 ITEM NO...  
 TAG NO...  
 C.R. CO. SERIAL NO... 62597 140#50  
 CROLL-REYNOLDS CO. INC.  
 ENGINEERING DEPT.  
 DATE: 8-2-85

NOTES:

- 1.)  $\frac{1}{4}$ " THRU  $\frac{1}{2}$ " STEAM INLETS FURN. WITH "Y" TYPE STRAINER
- 2.) APPROX. NET.WT. -- 13 LBS
- 3.) BOLT HOLES IN ALL FLANGED CONN'S ARE EQUALLY SPACED & STRADDLE NATURAL C'S.

①	4-28-83	OVERALL LENGTH WAS $11 \frac{1}{16}$ "
REV. NO.	DATE	DESCRIPTION
<b>CROLL-REYNOLDS COMPANY, INC.</b> WESTFIELD, N.J.		
scale: $\frac{1}{2} = 1$ " J.P.B. 3-11-83 NO 15 EVACTOR EVA-5304-R		





BILL OF MATERIAL

<u>NO</u>	<u>ITEM</u>	<u>MATERIAL</u>
①	COMBINED STEAM CHEST & NOZZLE HOLDER	STAIN. STEEL TYPE 304-L
②	BODY	STAIN. STEEL TYPE 304-L
③	NOZZLE	STAIN. STEEL TYPE 304

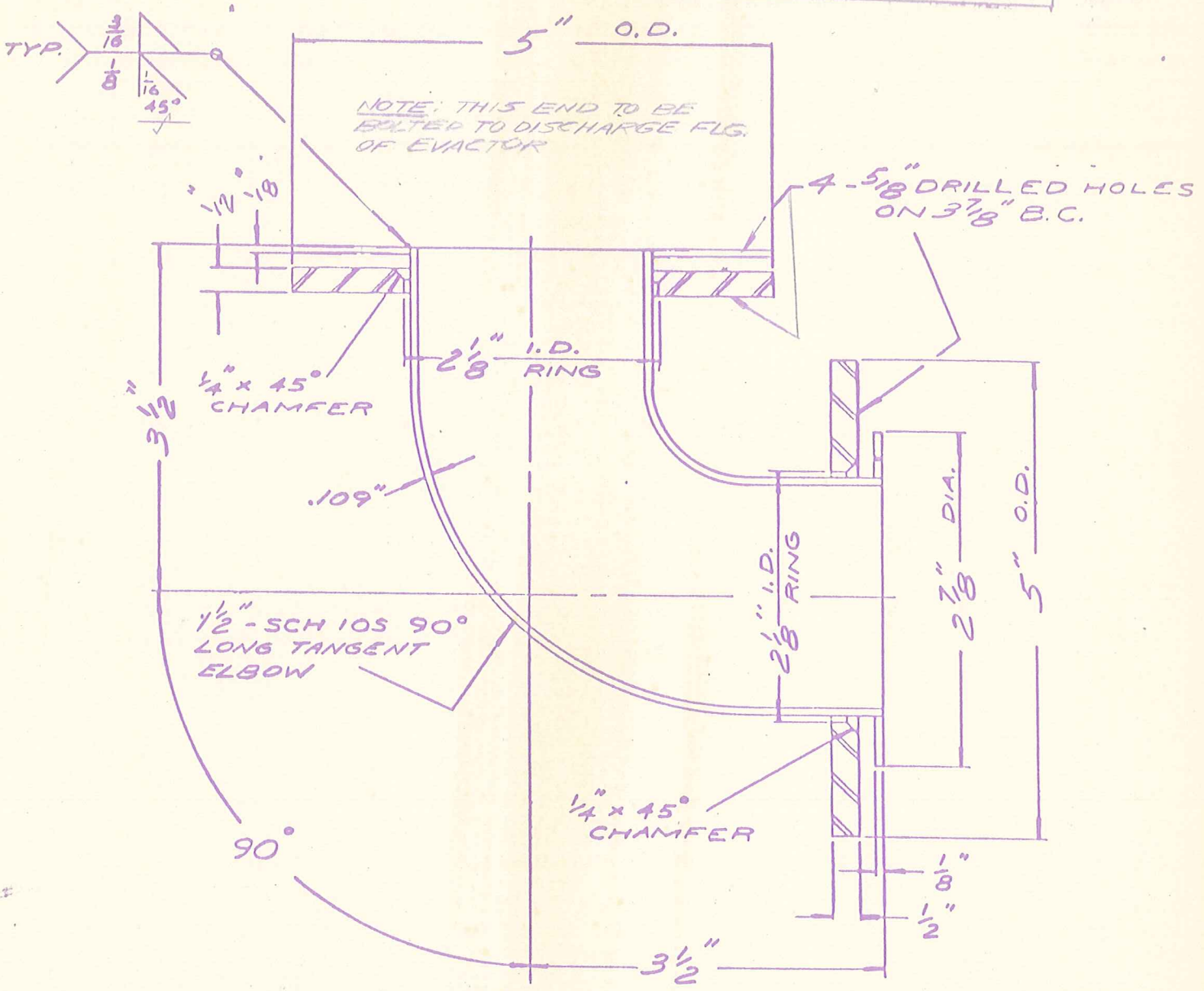
*REF. DWG. EVA-5304-R*

**CROLL-REYNOLDS COMPANY, INC.**  
WESTFIELD, N.J.

SECTION of N<sup>o</sup> 100 EVACTOR  
 scale:  $\frac{3}{4}'' = 1''$   
 H.R. 3-15-83 EVA-5413-K



CERTIFIED CORRECT FOR:  
 CUST. ORDER NO. 4942  
 ITEM NO.  
 TAG NO.  
 C.R. CO. SERIAL NO. 62597  
 CROLL-REYNOLDS CO. INC.  
 ENGINEERING DEPT.  
 DATE: 8-2-85



MATERIAL SPECIFICATIONS

ELBOW — STAIN. STEEL TYPE 304-L ASTM-A 312

FLANGES — CARBON STEEL RATE ASTM-A 285 GR. C FLG. QUAL. W/  
 STAIN. STEEL TYPE 304-L FACINGS ASTM-A 240

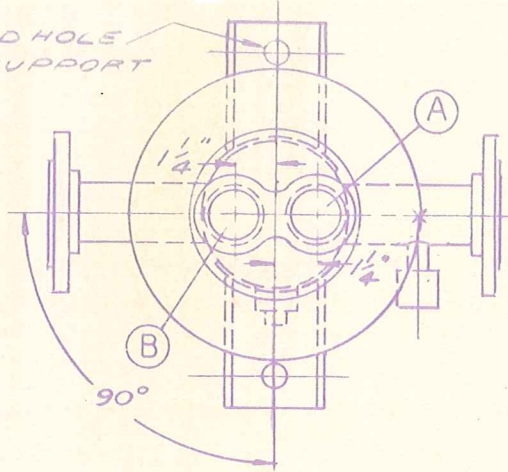
NOTE:  
 BOLT HOLES IN ALL FLANGED  
 CONNECTIONS MUST BE EQUALLY  
 SPACED & STRADDLE NATURAL C.S.

CROLL-REYNOLDS COMPANY, INC.  
 WESTFIELD, N.J.

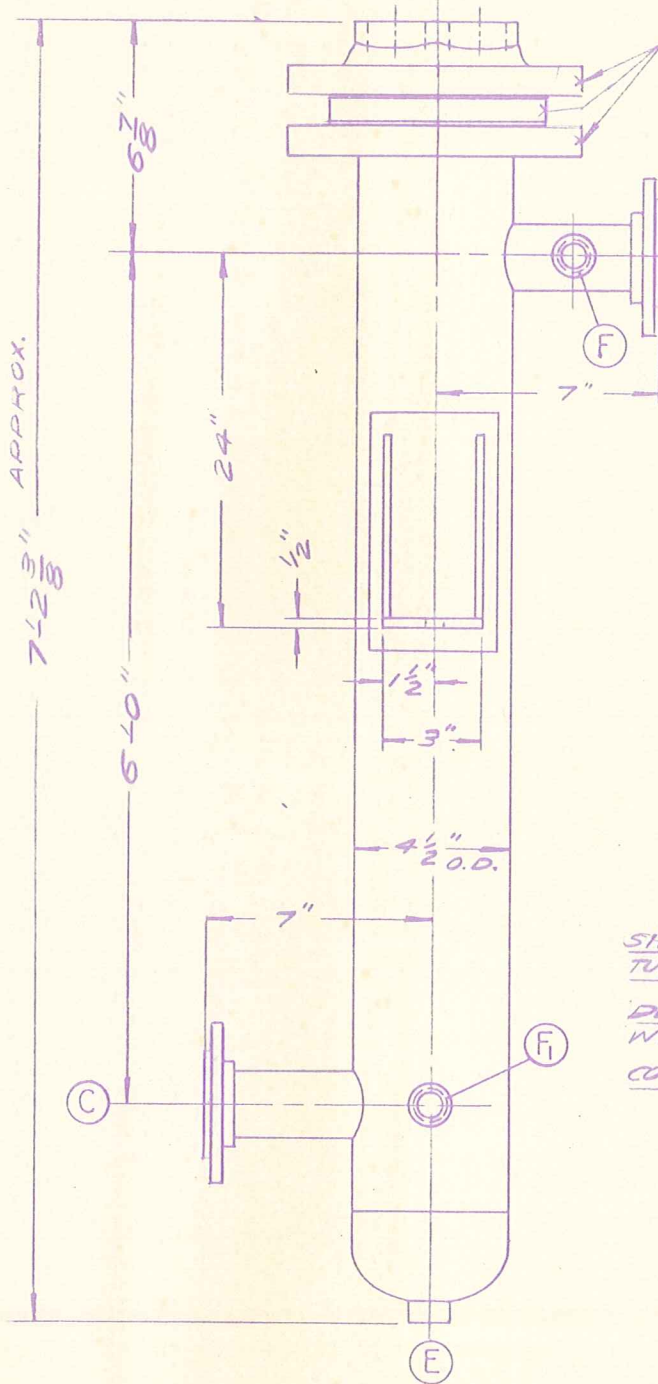
SPEC 1/2" STAIN. STEEL ELBOW  
 SCALE: NONE  
 EAN 4-29-81 EVA-10863-J-1



3/4" DRILLED HOLE  
IN EACH SUPPORT

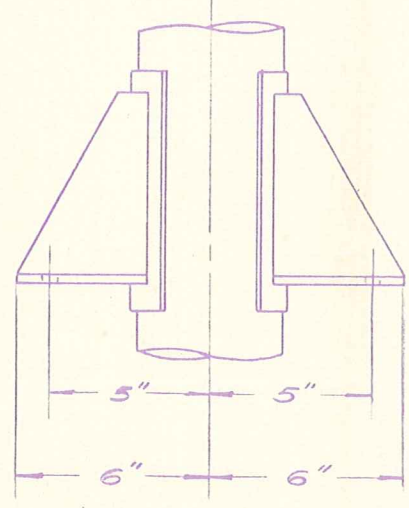


SIZE	SERVICE	DESCRIPTION
(A) 1"	WATER INLET	- N.P.T. -
(B) 1"	WATER OUTLET	- N.P.T. -
(C) 1 1/2"	VAPOR INLET	150# ANSI S.S. R.F. SLIP-ON FLG.
(D) 1 1/2"	AIR CONN.	150# ANSI, S.S., R.F. SLIP-ON FLG.
(E) 3/4"	DRAIN	3000# S.S. HALF-COUP. - NPT -
(F) 3/4"	TEST CONN.	3000# S.S. FULL-COUP. - NPT-PLUG
(Fi) 3/4"	TEST CONN.	3000# S.S. HALF-COUP. - NPT-PLUG



MATCH MARKS ON  
FLG'S. & TUBESHEET

CERTIFIED CORRECT FOR:  
CUST. ORDER NO... 4942  
ITEM NO...  
TAG NO...  
C.R. CO. SERIAL NO... 62597  
CROLL-REYNOLDS CO. INC,  
ENGINEERING DEPT.  
DATE: 8-2-55



	DESIGN PRESS.	DESIGN TEMP.	TEST PRESS.
SHELL SIDE	--150 PSIG	300°F	225 PSIG
TUBE SIDE	--150 PSIG	300°F	225 PSIG

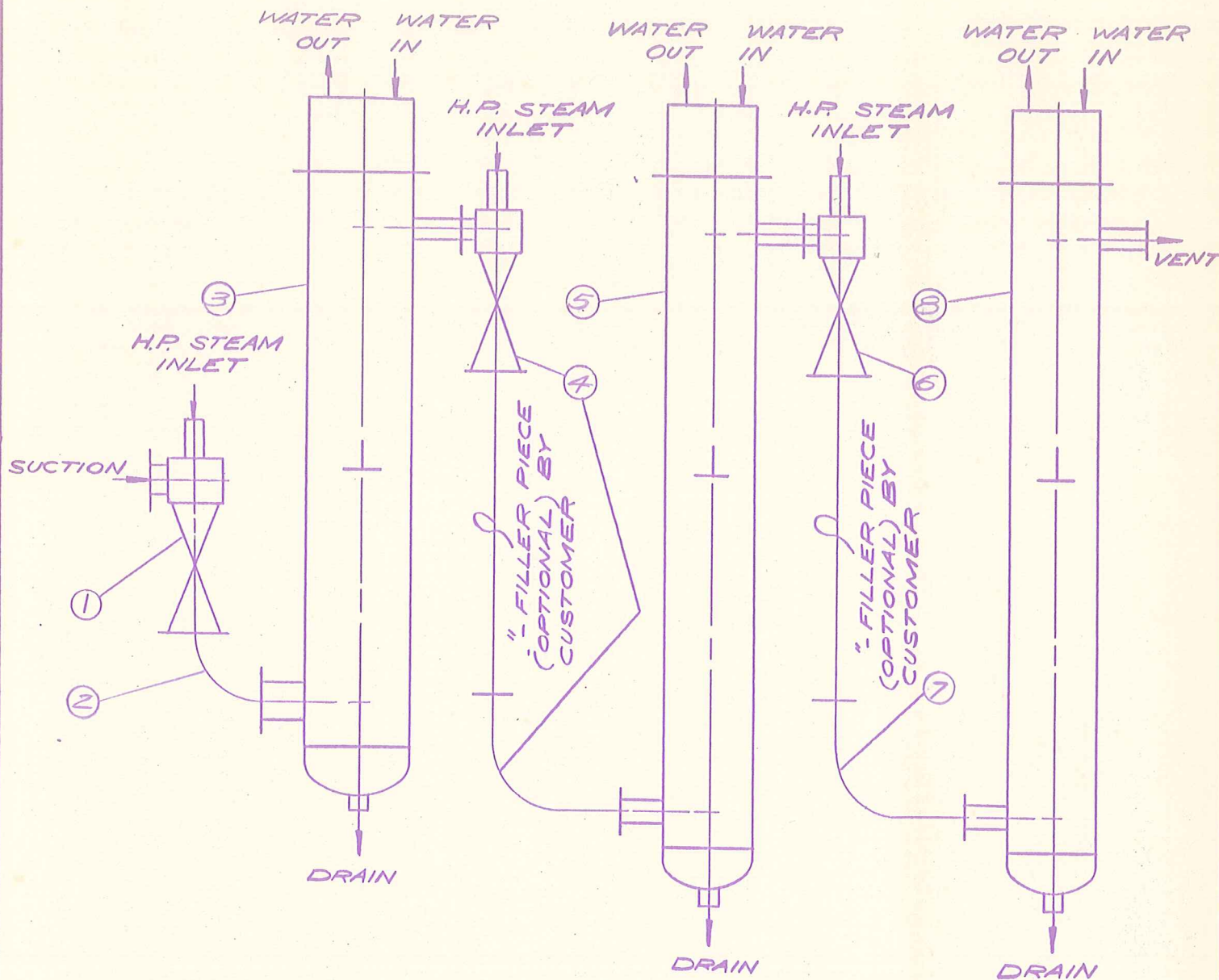
DESIGN & CONSTRUCTION IN ACCORD.  
WITH ASME CODE & TEMA "C"  
CODE INSPECTION & STAMP NOT REQ'D.

APPROX. NET WT. -- 110 LBS.

**CROLL-REYNOLDS COMPANY, INC.**  
WESTFIELD, N.J.  
SU 4"-10φ STAIN. STEEL SURFACE  
Scale: None CONDENSER  
F.G. 2-27-81 SCA-12620-A-1

NOTE:  
SOLT HOLES IN ALL FLG'D. CONN'S. ARE  
EQUALLY SPACED & STRADDLE NAT. C'S.





COMPONENT LIST

PART NO.	DRAWING NO.
①	EVA-10519-B
②	EVA-10863-G
③	SCA-12504-C-1
④	SCA-14032-E
⑤	SCA-12620-C-1
⑥	EVA-5304-R
⑦	EVA-10863-J-1
⑧	SCA-12620-A-1
⑨	
⑩	

MODEL NO. 3410-SUG-SU4-SU4  
EVACTOR

**CROLL-REYNOLDS COMPANY, INC.**  
WESTFIELD, N.J.

SUGGESTED LAYOUT FOR THREE STAGE EVACTOR  
SCALE:  
K.M. 7-17-85 TRA-62597