# 12 Technical specifications

## 12.1 Hydraulic system

### 12.1.1 General specifications

| Unit | Item | Specification |
|---|---|---|
| Hydraulic reservoir 4T1 | Maximum capacity [L] | 55 |
| | Used capacity [L] | 35 |
| | Pressure [bar] (absolute) | 0.6 |
| Hydraulic fluid[1] | Type | MIL-H-5606, NATO-H-515 (OM15)<br>MIL-H-83282, NATO-H-537 (OX19)<br>MIL-H-87257, NATO-H-538 |
| | Contamination class (NAS 1638) | 4 or better |
| | Minimum viscosity [cSt] | 6 |
| | Maximum temperature [°C] | MIL-H-5606, NATO-H-515 (OM15): 70<br>MIL-H-83282, NATO-H-537 (OX19): 70<br>MIL-H-87257, NATO-H-538: 40 |
| | Minimum temperature [°C] | MIL-H-5606, NATO-H-515 (OM15): –32<br>MIL-H-83282, NATO-H-537 (OX19): –20<br>MIL-H-87257, NATO-H-538: –32 |
| High-pressure pump 0P2 | Output [L/min] | 0 to 75[2] |
| | Output pressure [bar] | 25 to 220 |
| | Output pressure at reduced flow [bar] | 25 to 240 |
| | Filter | Replaceable filter element |
| | Filtration [µm] | 2 (high collapse) |
| Boost pump 0P1 | Output [L/min] | 84 |
| | Filter | Replaceable filter element |
| | Filtration [µm] | 3 |
| Vacuum pump 5P1 | Output [L/min] | 20 |
| Flow, per system | [L/min] | 1 to 60 |
| Flow, total maximum | [L/min] | 75 (up to 240 bar) |
| Supply pressure | [bar] | 0 to 240 |
| Return pressure | [bar] | 0 to 12 |

1 The viscosity of fluids changes with their temperature. As the temperature drops, the viscosity increases. This happens especially with hydraulic fluid H-537 (OX19) at very low temperatures. Be careful when you start the unit at low temperatures.

2 When you use hydraulic fluid NATO-H-538, the pump output is maximum 72 L/min. This is caused by the viscosity of the fluid.

### 12.1.2 Static pressure conditions (> 240 bar)

| Unit | Item | Specification |
|---|---|---|
| Maximum test time of the functional test | [s] | 30 |
| Flow control limits | [L/min] | Maximum 15 |
| Functional test type | Only for static tests | |

### 12.1.3 Indicators

| Item | Description | Specification with maximum deviation | Reference tool |
|---|---|---|---|
| BC1 | Inline particle monitor (option) | NAS 1683 class 00 to 12 | OEM manufacturer |
| | | RH 0% to 100% | |
| BL1 | Reservoir level sensor | 12 to 60 liters | |
| BP1 / BP2 | Supply-pressure transducer | 0 to 400 bar ± 5 bar | Tool B. See § *12.15.1.* |
| BP3 / BP4 | Return-pressure transducer | 0 to 16 bar ± 0.26 bar | Tool A. See § *12.15.1.* |
| BT2 | Temperature transducer | –40 to 99 °C ± 2 °C | Tool D. See § *12.15.1.* |
| L1 / L2 | Flow meter | 4 to 60 L/min ± 0.6 L/min | Tool C. See § *12.15.1.* |

## 12.2 Test specifications for hydraulic components

### 12.2.1 Switches

| Item | Description | Switch or open between the limits | Reference tool |
|---|---|---|---|
| SP2 | Differential pressure switch for the supply pressure filter | 5 to 10 bar | Tools A, F and G. See § *12.15.1.* |
| SP3 | Differential pressure switch for the boost pressure filter | 2 to 4 bar | Tools A, E and G. See § *12.15.1.* |

### 12.2.2 Pressure-relief valves

| Item | Description | Switch or open between the limits | Reference tool |
|---|---|---|---|
| 0V1 | Safety-relief valve for the boost-pressure line | 9 to 11 bar | Tool A. See § *12.15.1.* |
| 0V2 | Control valve for the boost pressure | 3 to 3.5 bar | Tool A. See § *12.15.1.* |
| 0V3 | Pressure-relief valve for the pump housing | 0.2 to 0.4 bar | Tool A. See § *12.15.1.* |
| 0V4 | Safety-relief valve of the high-pressure pump | Pump pressure 260 - 265 bar | Pump-pressure gauge 0M1 |
| 0V7 | Maximum pump pressure valve | Supply pressure 240 - 245 bar | Supply-pressure gauge 1M1 or 2M1 |
| 1V5 / 2V5 | Safety-relief valve to the aircraft | Supply pressure 245 - 250 bar | Supply-pressure gauge 1M1 or 2M1 |
| 1V6 / 2V6 | Pressure-relief valve of the return system | 12 - 13 bar | Return-pressure gauge 1M2 / 2M2 |
| 4V4 | Pressure-relief valve of the hydraulic reservoir | 0.4 to 0.6 bar | Tool G. See § *12.15.1.* |
| 5V1 | Vacuum valve | –0.35 to –0.4 bar | Vacuum pump 5P1, ON. |

### 12.2.3 Flow-control valves

| Item | Description | Switch or open between the limits / Specification with maximum deviation | Reference tool |
|---|---|---|---|
| 1V4 / 2V4 | Pilot flow valves | 0.40 ± 0.05 L/min | Graduated beaker |
| 2V10 | Pressure compensated flow control valve for the inline particle monitor (option) | 300 ± 50 mL/min | Graduated beaker |

### 12.2.4 Pump

| Item | Description | Specification with maximum deviation | Reference tool |
|---|---|---|---|
| 0P2 | Maximum pump flow at minimum pressure | 83 - 88 L/min | |
| | Minimum pump pressure | 25 - 30 bar | |

## 12.3 Electrical system

| Unit | Item | Specification |
|---|---|---|
| AC alternator | Brand | Houchin |
| | Output voltage [V (AC)] | 115 / 200 |
| | Power [kVA] | 85 (continuous) |
| | Phase | 3 |
| | Frequency [Hz] | 400 |
| | Powered by | diesel engine |
| Transformer Rectifier Unit (TRU) | Output voltage [V (DC)] | 28 |
| | Output current [A] | 200 (continuous) |
| | | 1000 (for 35 seconds) |
| | | up to 1400 (for 3 seconds) |
| DC to AC inverter | Output voltage [V (AC)] | 230 |
| | Output power [kW] | 4 (at 230 V) |
| | Frequency [Hz] | 50 |
| | Phase | 1 |
| | Number of DC to AC inverters | 2 |
| Batteries | Brand | Optima® |
| | Type | RedTop® |
| | Voltage [V] | 12 |
| | Capacity [Ah] | 70 |
| | Number of batteries | 4 |
| | Classification | Approved for air shipment, will not spill. Classified as non-regulated by IATA special provisions A-48 and A67 for UN2800. |
| Motor for the vacuum pump 5P1 | Voltage [V] | 24 |
| | Maximum capacity [L/min] | 36 |
| | Insulation class | B |
| Motor for the cooling fan of cooler 0C1 | Capacity [kW] | 14 at 40 °C temperature difference |
| | Power consumption [kW] | 0.55 (2800 rpm) |
| | Insulation class | F |
| AC output read-out (analogue and digital on monitor) | Voltage | 3 voltmeters (phase A, B and C) |
| | Current | 3 ampere meters (phase A, B and C) |
| | Frequency | 1 frequency meter |
| DC output read-out (analogue and digital on monitor) | Voltage | 1 voltmeter |
| | Current | 1 ampere meter |

## 12.4 Pneumatic system

| Unit | Item | Specification |
|---|---|---|
| Screw compressor | Capacity [$m^3$/min] | 0.7 at 6 bar |
| | Lubricating oil | STS part no. 140883 |
| Filter-dryer system | Filter - coalescing; coarse | |
| | Filter - coalescing; fine | |
| | Membrane dryer | |
| Air inlet filter | | |
| | Service pack 'Atlas Copco - part no. 2812 451506' | STS part no. 171074 |

# 12.5 Nitrogen system

## 12.5.1 General specifications

| Unit | Item | Specification |
|---|---|---|
| Generator MR1 | System | Membrane nitrogen generation |
| Cylinder S1 | Capacity [L] | 50 |
| | Max pressure [bar, PG3] | 10 - 220 |
| Nitrogen | Type | I, gaseous |
| | Grade | B, 99.50% pure nitrogen |
| | Class | 2, oil tolerant |
| Control | Manually operated pressure reducing valves | At each output (HP and LP) |
| | Shutoff valves | At each output (HP and LP) |
| Read-out | Digital information | BP6: S1 output pressure, read-out on control panel monitor |
| | Analogue manometer | PG3: S1 output pressure |
| | | PG4: low pressure output |
| | | PG5: high pressure output |
| | | PG6: input pressure for the Nitrogen control panel |

## 12.5.2 Test specifications - Safety-relief valves

| Item | Description | Switch or open at limit value | Reference tool |
|---|---|---|---|
| RV1 | Safety-relief valve for the fill line to the $N_2$ cylinder | 230 bar | |
| RV2 | Safety-relief valve for the low-pressure outlet to the aircraft | 30 bar | |

## 12.6 Diesel engine

| Unit | Item | Specification |
|---|---|---|
| Diesel engine | Type | Cummins QSB4.5-C |
| | Number of cylinders | 4 |
| | Power rating [kW] | 119 (at 2400 rpm) |
| | Temperature control | Liquid cooled |
| | Operation speed [rpm] | 2400 (electronically controlled) |
| | Injection | Direct injection |
| | Max. operating temp [°C] | 55 |
| Fuel tank | Capacity [L] | 100 |
| | Average running time on full tank [h] | 4 (at average power consumption) |
| | Level control | Level sensor, with read-out to fuel gauge and monitor |
| | | Minimum level switch in tank |
| Fuel | Down to 0 °C | Summer diesel (NATO F-54) |
| | 0 °C to -15 °C | Summer diesel with 60% kerosine, or winter diesel |
| | –15 °C to –32 °C | Kerosine (NATO F-34 / JP8) |
| Lubricating oil | Down to -20 °C | OMD-90 (NATO O-1176) |
| | Below -20 °C | OMD-55 (NATO O-1178)[1] |
| Coolant | Standard | ASTM 4985 or ASTM D6210, for operating temperature of -32 °C |
| | Recommendation | Premix coolant (STS P/N 140851). This contains 50% ethylene glycol antifreeze and 50% water for ambient temperatures down to -32 °C. |

1 When you use the unit again at temperatures above -20 °C, you do not need to replace OMD-55 until the next scheduled oil change is necessary.

## 12.7 Tower light system

| Unit | Item | Specification |
|---|---|---|
| Lighting | Range [m] | 15 |
| | Plane [°] | 360 |
| Mast | Maximum extended length [m] | 6 Above Ground Level |
| HPS lamp | Type | High Pressure Sodium |
| | Input | From 230 V / 50 Hz inverters |
| | Power output [W] | 400 |
| | Intensity [Lumen] | 55000 |
| | Time to full intensity [minute] | After 1 |
| | Cool down time [minute] | 1 |
| | Average life cycle [hrs.] | 10000 |
| | Light colour | Yellow, for contrast rendering |
| MH lamp | Type | Metal Halide |
| | Input | From 230 V / 50 Hz inverters |
| | Power output [W] | 400 |
| | Intensity [Lumen] | 25000 |
| | Time to full intensity [minute] | After 5 |
| | Cool down time [minute] | 10 |
| | Average life cycle [hrs.] | 6000 |
| | Light colour | White, for colour rendering |
| | Range of lighting [m] | 15 |

## 12.8 Control system

| Unit | Item | Specification |
|---|---|---|
| Control panel | Supply voltage [V (DC)] | 24 |
| | Ingress protection | IP54 |
| | Monitor | 10.5 inch colour TFT monitor |
| Codes (pass words) | -> MENU<br>-> CALIBRATION MENU<br>-> SENSORS | 0104 |
| | -> MENU<br>-> SELECT INTERLOCK BYPASS | Refer to Sun Test Systems B.V. |
| | -> MENU<br>-> MAINTENANCE MENU<br>-> IGNORE ALARMS | Refer to Sun Test Systems B.V. |
| | -> MENU<br>-> MAINTENANCE MENU<br>-> IGNORE VALVE ALARMS | Refer to Sun Test Systems B.V. |
| | -> MENU<br>-> MAINTENANCE MENU<br>-> RAW INPUTS PAGE | Refer to Sun Test Systems B.V. |

## 12.9 Front and rear axle

| Unit | Item | Specification |
|---|---|---|
| Maximum towing speed on paved road | [km/h] | 20 |
| Tyre | Size | 195/75 R14C8 |
| | Pressure [bar] | 4.5 |
| | Version | Tubeless |
| Rim | Size | 6J x 14H2 |
| Track width (front and rear) | [mm] | 1855 |
| Wheel base | [mm] | 2390 |
| Ground clearance | [mm] | 300 |
| Maximum ramp angle | [°] | 15 (during operation) |

## 12.10 Dimensions and mass

| Item | Specification |
|---|---|
| Width [mm] | 2100 |
| Length [mm] | 3650 |
| Height [mm] | 2150 |
| Total mass of unit [kg] | 3880 |
| Lifting eyes on top of chassis, maximum weight [kg] | 4 x 4500 |

## 12.11 Ambient conditions

| Item | Specification |
|---|---|
| Operating and storage temperature [°C] | –32 to +55 |
| Maximum operating altitude [m Above Sea Level] | 3000 |

## 12.12 Noise level

| Item | Specification |
|---|---|
| Maximum average noise level [dB(A)] | 82 (distance: 1 m, height: 1.3 m) |

## 12.13 Electromagnetic specifications

| Item | Specification |
|---|---|
| Electromagnetic compatibility | 'EN 61000-6-2' and 'EN 61000-6-4' and MIL-STD-461, DEF STAN 59-41 |

## 12.14 Cables and hoses

| Unit | Item | Specification |
|---|---|---|
| AC cable | Version | Detachable |
| | Cross section [$mm^2$] | 50 |
| | Sockets | Double-ended NATO |
| | Length [m] | 10 |
| DC cable | Version | Detachable |
| | Cross section [$mm^2$] | 70 |
| | Sockets | Double-ended NATO |
| | Length [m] | 10 |
| Supply-pressure hose | Diameter [inch] | 0.5 |
| | Connection | JIC, female connector |
| | Number of hoses | 2 (one for each system) |
| | Length [m] | 15.5 |
| Return-pressure hose | Diameter [inch] | 0.75 |
| | Type | JIC, female connector |
| | Number of hoses | 2 (one for each system) |
| | Length [m] | 15.5 |
| Nitrogen high-pressure hose | Length [m] | 15 |
| | Number of hoses | 1 |
| Nitrogen low-pressure hose | Length [m] | 15 |
| | Number of hoses | 1 |
| Compressed air hose | Length [m] | 18 |
| | Inner diameter [mm] | 8 |
| | Outer diameter [mm] | 14 |
| | Number of hoses | 1 |

## 12.15 Equipment for maintenance

### 12.15.1 Test set for maintenance

- All tools are included in the Sun Test Set TTS75.
- Contents: tools that are necessary to examine, calibrate and adjust the unit.

| Tool name | Tool description | Quantity |
|---|---|---|
| Tool A | Pressure gauge -1 to 20 bar with Minimess M16x2 "female" connections.<br>Precision: 0.25% of the full-scale value. | 1 |
| Tool B | Pressure gauge 0 to 400 bar with Minimess M16x2 "female" connections.<br>Precision: 0.25% of the full-scale value. | 1 |
| Tool C | Flow meter 4 to 75 L/min.<br>Precision: 0.3 % of the full-scale value. | 1 |
| Tool D | Temperature gauge 0 to 100 °C.<br>Precision: 0.3 °C of the full-scale value. | 1 |
| Tool E | Test manifold for the differential pressure switch SP3 of the low-pressure filter 0F1.<br>Part number: 330112. | 1 |
| Tool F | Test dummy for the differential pressure switch SP2 of the high-pressure filter 0F2.<br>Part number: 330094. | 1 |
| Tool G | Hydraulic hand pump or a pressurised air source with an adjustable pressure from 0 to 10 bar. | 1 |
| Tool H | T-piece adapter with Minimess 1620 connections (2x male, 1x female). | 1 |

### 12.15.2 Other tools - ACT95C - MFAGE-t

The following tools are not included in the STS test set. They are advised to have available to do the preventive and corrective maintenance procedures.

| Name | Short name | Quantity | Part number |
|---|---|---|---|
| | Hydraulic test manifold for the safety-relief valve 0V1 | 1 | 600263 |
| | Hydraulic test manifold for the drain control valve 0V3 | 1 | 600264 |
| | Extension hose | 1 | |
| | Graduated beaker of minimum 0.5 L | 1 | |
| | Pressure gauge 0 - 10 bar, for pressurised air only | 1 | |
| | Pressurized air source with an adjustable pressure from 0 to 7 bar | 1 | |
| | Pressure transmitter 0 - 300 bar, for $N_2$ only | 1 | |
| | T-piece adapter, for pressurised air only | | |
| | AC load bank for checking the 115 V / 400 Hz voltages and currents | 1 | |
| | DC load bank for checking the 28 V (DC) voltages and currents | 1 | |

## 12.16 Torque specifications for bolts and nuts

| Specification of the bolt or the nut | Torque [Nm] |
|---|---|
| M6 | 8 |
| M8 | 20 |
| M10 | 40 |
| M12 | 70 |
| M16 | 180 |
| Wheel nuts | 270 |

## 12.17 Adhesive specification for bolts and nuts

| Bolt and nut type | Part number |
|---|---|
| All | Loctite 243 |

## 12.18 Paint specifications

| Part | Specification |
|---|---|
| Cleaning liquid | 'ENVICLEAN PR' |
| Surface cleanliness class | St3 according to ISO 8501-1 |
| Chassis, canopy and hose reels, E-box | RAL6031 |
| Tow bar, axles | Black (any available paint) |
| Diesel reservoir filler cap | Yellow (any available diesel-fuel resistant paint) |

## 12.19 Lubricant specifications

| Part | Specification |
|---|---|
| Hinges e.g. on the canopy doors | OMD-80X; NSN 9150-17-110-3048 |
| Wheel hub bearings | XG-279 (NATO G-403) |
| Keyway on compressor pulley | STS part number 140523 |

## 12.20 Torque specifications for valves

### 12.20.1 Specification

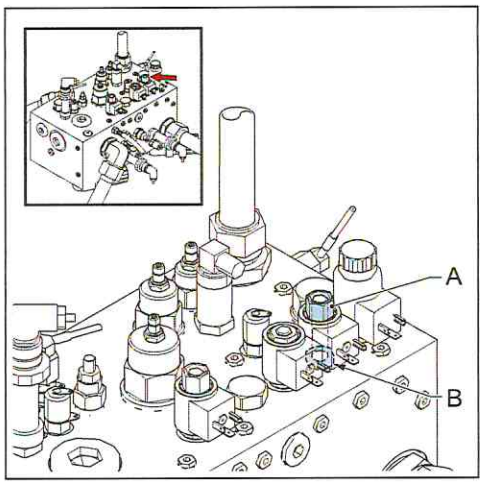
| Valve | Torque [Nm] |
|---|---|
| 0V1 | 60 - 65 |
| 0V2 | 60 - 65 |
| 0V3 | 45 - 50 |
| 0V4 | 45 - 50 |
| 1V1 / 2V1 | 60 - 65 |
| 1V2 / 2V2 | 60 - 65 |
| 1V3 / 2V3 | 60 - 65 |
| 1V4 / 2V4 | 45 - 50 |
| 1V5 / 2V5 | 45 - 50 |
| 1V6 / 2V6 | 60 - 65 |
| 1V7 / 2V7, coil. See § *12.20.2.* | maximum 6.8 |
| 1V7 / 2V7, valve. See § *12.20.2.* | maximum 27.1 |
| 1V8 / 2V8, coil. See § *12.20.2.* | maximum 6.8 |
| 1V8 / 2V8, valve. See § *12.20.2.* | maximum 27.1 |
| 1V9 / 2V9, coil. See § *12.20.2.* | maximum 6.8 |
| 1V9 / 2V9, valve. See § *12.20.2.* | maximum 27.1 |
| 4V1 | 60 - 65 |
| 4V2, coil. See § *12.20.2.* | maximum 6.8 |
| 4V2, valve. See § *12.20.2.* | maximum 27.1 |

## 12.20.2 2/2 Pilot valve fasteners

The illustration shows a typical example. The procedure applies to the items as specified in § *12.20.1*.

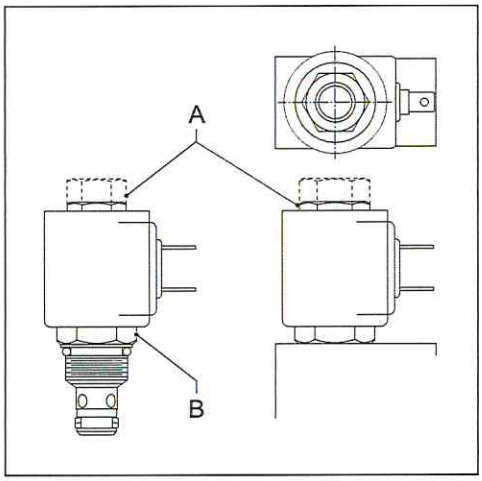
A Nut (top)
B Valve (bottom)

1. Install the valve coil with the letters facing upward.




2. Tighten the nut (A) of the coil carefully.

**CAUTION**
Do not overtighten the nut. You will damage the valve.




## 12.21 Torque specifications for pipe fittings

| Specification of the bolt or the nut | Torque [Nm] |
|---|---|
| 1/4 inch | 15 |
| 3/8 inch | 30 |
| 1/2 inch | 60 |
| 3/4 inch | 110 |
| 1 inch | 175 |
| 1 1/4 inch | 260 |
| 1 1/2 inch | 340 |