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Critical Item: Compressor

Find Number: A107993 {cabin humidifying & orbiter compartment

Criticality Category: 1S

SAA No: 09GS05-003

System/Area: ECS/SLF/SLS

NASA Part No: N/A

PMN/ Name: S70-0534/ Portable Purge Unit

Mfg/ Part No: Dunham Bush/ DBX250X2013 Motor No. GE5K44SAK150F2

Drawing/ Sheet No: 79KD6061/1

Function: Compresses R-12 gas used for cooling and dehumidifying purge air.

Critical Failure Mode: Fails to operate. FM No. 09GS05-003.005

Failure Cause: Internal valve failure, compressor/motor structural failure, bearing failure.

Failure Effect: Compressor/blower interlock shuts down blower, causing loss of purge to Orbiter compartments. Operation of the blower during the loss of the refrigeration system would allow overtemperature air into the orbiter. Loss of the purge would lead to loss of ability to monitor Orbiter compartments for leaks. Possible loss of life or vehicle during a hazardous condition such as leakage of hazardous fluids or gases.

Acceptance Rationale

Design:

- 125-ton rotary-screw compressor, positive displacement, heliaxial flow.
- Fan-cooled totally enclosed motor.
- Compressor operates with nominal discharge pressure between 120 to 180 psig.
- 250-HP motor is sized so that overload current is no more than 125% of rated load. Normal operating load is 40-90% of rated load, depending on ambient conditions.
- Dryer/filter is provided to prevent contamination.

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Compressor A107993 (Continued)

- Compressor is cooled by R12 refrigerant.
- Lubricated roller bearing - large grease reservoir.

Test:

- The OMRSD, File VI will require that operation of the purge unit is verified prior to each use per OMI S0028 and S0026.
- Electrical checks of the motor windings are performed quarterly per OMI No. V6C72.

Inspection:

- The mechanical elements are inspected monthly per OMI No. V6C72 for:
  - loose or missing hardware
  - corrosion
  - indication of fluid leaks

Failure History:

- PRACA failure history indicates there were six Problem Reports in the critical failure mode. The failures were caused by using an open-drip-proof motor, which was replaced with a totally enclosed fan-cooled motor for units 1, 2 and 4 in 1982. Unit 3 motor was changed out in 1984. After replacement, failures of this type were reduced. One report was written for bearing failure. Compressor motor was replaced.
- No GIDEP failure history identified.

Operational Use:

- There is nothing that can be done immediately to mitigate the effect of the failure.
- The purge unit is monitored for any indication of malfunction. If any anomalies are observed, appropriate steps are taken to repair or replace the item.

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