

- 10304B - PROTECTION METHODS**
- 1 GENERAL
- 1.1 This compressor unit will be used in a food process. Therefore requires that the gas contact and seal areas be exceptionally clean. There will be no preservatives permitted in the gas contact areas. The time interval begins when the unit leaves the plant and ends when the unit is put in operation.
- 1.2 This instruction is a thorough preparation for shipment & storage for a time interval of 1 year. However, this procedure can be used for longer periods of time provided the following conditions are met:
- 1.2.1 Periodic inspections are continued and data logged. (see 2.1.4)
- 1.2.2 At the end of the first period and once a year thereafter, suction & discharge shipping covers & bearing caps removed & a thorough investigation of the internals to be made. If any signs of corrosion are found, corrective measures are to be taken and inspections varied accordingly. (see 2.1.6 for sealing compressor after inspection).
- 1.2.3 Yearly, internal inspections are to be performed in all shipped loose items in accordance with (1.2.2) above, except for items sealed in plastic bags, if no visual corrosion is apparent.
- 1.3 During the transportation interval this instruction requires that a waterproof cover be placed over all equipment and crates. During the storage interval, Delaval-Stork recommends that all equipment be stored in heated buildings. If this is not possible and the main unit is stored outside, waterproof covers are required. Since so many variables exist, which are not controlled by the company, Delaval-Stork will accept no responsibility for corrosion damage.
- 1.4 For outdoor storage the above requirement shall be followed and the preservatives as described in para 2 shall be left in place.

DELAVAL-STORK V.O.F.

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- ☐ APPROVAL PRIOR TO MANUFACTURE OR PURCHASE OF MATERIAL.
(REQUIRED BY _____ TO ASSURE MAINTAINING PRESENT SCHEDULE.)
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DATE

17/11/82**CJB (PROJECTS) LTD****FOR GREEK PETROCHEMICAL S.A.****PETROCHEMICAL COMPLEX****ACHELOOS ESTUARY - GREECE****ITEM NR. C 430****DLS ORDER NR, LC 0261****CJB PROJECT NR. 4110****CJB PURCHASE ORDER NR. 4110/A/4/30/01****CJB DWG NR. 4110/C - 430 / 51B**

TITLE:

Preservation for shipment of compressor unit and long term storage.

**DELAVAL
STORK**HENGELO (O)
HOLLANDSHT. No. 1 OF 6

NoC0261.04 G 001

A	Changed as indicated	1/10/82	J.W.		
CHG.	ALTERATIONS	DATE	BY	CHK.	MADE

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23/7/82

2 COMPRESSOR UNIT

2.1 Protection level

The level of preservation, will be designed for storage in heated buildings. During the transportation interval it is required to place a waterproof cover overall equipment and crates. In general the following criteria are required:

- 2.1.1 Careful handling during transportation and intransit storage from manufacture to ultimate user.
- 2.1.2 Handling shall be done only by the marked lifting and points and in the marpostition.
- 2.1.3 Static loads imposed by stacking during transit and storage are not acceptable.
- 2.1.4 Periodic inspections shall be performed. The first inspection shall be immediately after the transportation is complete. This shall include, but not limited to inspection for visible external damage to equipment or crates, indication of pressure gauge, indication of moistures and or oxidation and degradation of applied preservative compounds. The prevence of any such signs require a thorough inspection of all equipment. The second inspection shall be made two weeks after the first. Each month thereafter, all humidity indicators shall be inspected.
- 2.1.5 The interval for subsequent inspections shall be determined by the findings of the first and second inspections, however, the interval shall not exceed six months.

Note.

Inspector to keep a log in the following data as a minimum: S.O., date, indicator readings, replacement of desiccant bags, any general comments of condition of equipment and signature of inspector.

- 2.1.6 We recommend a Delaval-Stork service engineer or his representative to be present during all inspections and any additional preservation requested by him shall be done.

2.2 Oil used during test

The lubricant used during test will be (RVC), a 10% solution of Rust Veto Concentrate and mineral white oil (Ondina 32).

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2.3

Preservatives and materials.

Symbols used in text are included.

Symbols	Mil or commercial Specification	Trade Name	Description
(P-1)	MIL-C-16173D Grade 4	Rust-Ban 397	Corrosive preventative compound transparent, non-tacky film. art. no. 0.7800.808
(RVH)	MIL-C-11796 CL3	Rust Veto Heavy	Corrosion preventative compound hot or cold application, soft film
(RVC)		Rust Veto Concentrate	A solution of one part corrosion preventative base, mixed with 9 parts white oil.
(BM-4)	JAN-B-121 Grade C	Grade C (Marvel Pak22)	Grease proofed, waterproofed, non-corrosive, medium duty, stretchable.
(PCC)	MIL-P-149		Plastic coating compound strip-pable, hot dip application art. no. 0.7800.809
(T)	Federal PPP-T-60	Tape	Pres. sensitive adhesive water-proof for packing and sealing.
(DS)	MIL-D-3464 Type 1	Desiccant Bag	Activated bagged for Packaging use & static dehumidification.
(CCM)	PPP-C-843 A	Cellulose	Cushioning material
(S-1)		Sponge Rubber	0.02" thick to cover full width of flange mating surf.

2.4 Console oil system.

- 2.4.1 (RVC) shall be used as lube and seal oil during the testing of the console.
- 2.4.2 Drain oil from unit after satisfactory completion and approval of all testing requirements.
- 2.4.3 Remove tank-top mounted pump-driver assemblies.
- 2.4.4 Inspect and clean suction screens.
- 2.4.5 Coat all exposed unpainted surfaces and flexible couplings with (RVC).
- 2.4.6 Spray internals of all piping which is part of the pump-driver assembly with (RVC).
- 2.4.7 Remove tank access covers and wash out tank internal with solvent.
- 2.4.8 Remove and discard filter cartridges and wash inside or filter housing with solvent, the apply (RVC).
- 2.4.9 If required, customer witness to inspect entire unit for cleanliness.
- 2.4.10 Spray entire internal tank surfaces with (RVC), including inspection covers and any internal pipe.
- 2.4.11 Re-install tank-top mounted pump-driver assemblies and inspection/access covers.

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- 2.4.12 Install new filter cartridges in all filter housings.
- 2.4.13 Blank all flanges with a steel plate 3 mm or 1/8" thick. (S-1) shall be used between plate and flange as a minimum bolts will be used on $\frac{1}{2}$ the holes on all flanges (minimum to be 4 bolts per flange). Use plastic caps on npt holes. The edges of all flange covers shall be taped (T) to the flange.
- 2.4.14 Apply (P-1) to all exterior unpainted surfaces, valve stems, etc.
- 2.4.15 Paint unit in accordance with applicable specification.
- 2.5 Unit oil system.
- 2.5.1 (RVC) shall be used as lube and seal oil during the testing of this unit. All oil piping used during test which is completely filled with (RVC) requires no further preservation.
- 2.5.2 After completion of the mechanical test, all of the inside of the seal oil and lube oil piping shall be coated with (RVC). All pipe, piping assemblies etc. not used during test shall be completely filled with (RVC) and drained before mounting on the unit or packaged for shipment.
- 2.5.3 Blank all flanges with a steel plate 3 mm or 1/8" thick. (S-1) shall be used between plate and flange. Bolts shall be used in half the holes of all flanges. (Minimum to be 4 bolts per flanges). Use plastic caps on npt. The edges of all flange covers shall be taped (T) to the flange.
- 2.5.4 Apply (P-1) to all external machined surfaces, valve stems, etc.
- 2.6 Compressor.
- 2.6.1 The rotor shall be shipped in the casing properly blocked to prevent axial motion. Use multiple strips of (T) placed over top of journals to take up all bearing clearance when cover is bolted down. Tag outside of unit with tag stating:
"Remove plastic shims at journals before operating unit".
- 2.6.2 The exposed parts of the rotor such as shaft ends and coupling hub (when mounted on shaft) shall be brushed with (P-1). The coupling end of the shaft shall be trapped with (BM-4) and taped (T). All bearing vents are to taken off and plugged.
 Further, all openings of the bearing housing shall be made gas tight.
- 2.6.3 Sealing the casing.
 The intent is to completely seal the unit and prevent pockets of water, such as at bolt holes. All openings shall be covered with metal covers. Use metal covers for flanged openings: 12 mm for main- and 3 mm for oil connect. (S-1) Shall be used between metal cover and flanges. The edges of all flange covers shall be taped (T) to the flange.
 As a minimum, bolts will be used in $\frac{1}{2}$ the holes on all flanges. (Minimum to be 4 bolts per flange).
- 2.6.4 The bearing housing at the coupling side shall be closed with metal cap covering shaft end and/or coupling hub. (S-1) Shall be used between metal cap and flange.
 Desiccant bags (DS) will be provided on the inside of the metal cap. Be sure that seal of bearing inner/outer housing is sufficient.
- 2.6.5 Suction and discharge nozzle openings shall be blanked as described above. Attach dehumidifier and operate until drain stops dripping. Each section shall be dehumidified on re-entry type units. Desiccant bags (DS) will be provided on the inside of the covers. Re-entry type units shall have desiccants (DS) provided for each section. The desiccant bags (DS) should be heated in accordance with instructions on the bags just prior to installation, immediately placed in the unit and unit sealed. The amount of desiccant (DS) re-

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quired is 1.0 units per cubic foot of internal volume to be protected and may be estimated as follows:

Number of units desiccant material (DS) required = $D \times D \times L$

Example: For a compressor with a casing length ("L") of 4 ft and a casing diameter ("D") of 3.5 ft.

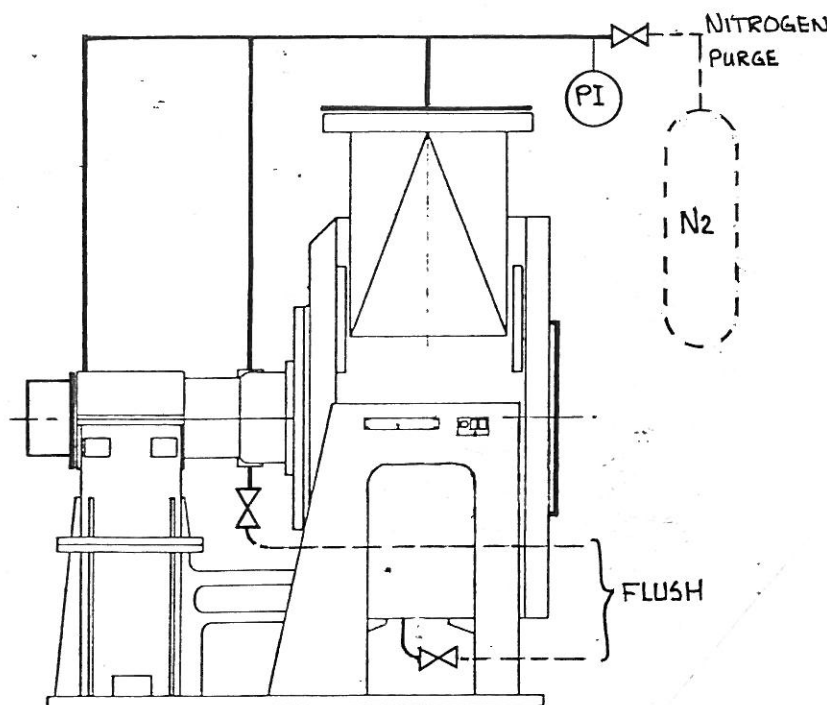
The number of units of desiccant (DS) required is $3.5 \times 3.5 \times 4 = 49$

A humidity indicator shall be fitted so that the internal humidity condition may be determined by external inspection. When high humidity is indicated, the covers shall be removed and the desiccant bags (DS) reactivated by heating in accordance with the instructions printed on the bags. The reactivated bags and covers should be replaced for protection during continued storage. Stamp the number of desiccant bags and date installed on metal cover.

IMPORTANT: Desiccant (DS) bags must be removed before placing the unit in operation. TAG outside of unit at each desiccant (DS) location with tag stating: "Remove all desiccant material before operating unit."

2.6.6 Prepare and preserve unit oil piping in accordance with paragraph 2.5.

2.6.7 Nitrogen purge and Flushing piping shall be connected as per sketch below



Valves and pressure gauge shall be installed.

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- 2.6.8 If the compressor and bearing housing is completely sealed the casing shall be flushed with nitrogen until the casing contains pure nitrogen.

Purge pressure: max. 10000 N/m² (0.1 bar)
min. 1000 N/m² (0.01 bar)

Before dispatch this pressure should be checked.

2.7 Couplings.

- 2.7.1 All loose main coupling parts to be coated, preferably by dipping with (RVH), wrapped in (BM-4) and packaged separately.

2.8 Miscellaneous parts.

(such as spares or other items which are shipped separately).

- 2.8.1 Separately shipped gauges shall be capped, cleaned and carefully wrapped and packed in cellulose cushioning material (CCM).

- 2.8.2 Vibration pickup and other vendor devices shall be cleaned and carefully wrapped and packed in cellulose cushioning material (CCM).

- 2.8.3 Electrical devices shall be cleaned, carefully wrapped and packaged in (CCM).

- 2.8.4 Spare bearing (journal or thrust) - Coat as indicated below (*)

- 2.8.5 Labyrinths - Coat as indicated below (*)

- 2.8.6 Tools: Coat unpainted surfaces indicated below (*)

- 2.8.7 For all other miscellaneous item, coat unpainted surfaces as indicated below (*).

- 2.8.8 Spare Rotor - Coat rotor completely with (P-1) preservation. When (P-1) is dry, wrap both journals and thrust bearing collar with (BM-4). Place rotor on wooden rotor skid with sheet lead under the journal areas. The rotor shall be completely enclosed with (BM-4) and tape (T). The skid shall be completely enclosed with a wood crate.

* = Where practical, dip in (PCC) as the preferred method.

Otherwise, dip or brush coat with (RVH), wrap with (BM-4) and tape (T).

NOTE: Before unit comes in operation at site the oil system shall be flushed with white mineral oil.

Cleanliness requirements of the oil shall be determined by the user.

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