

Preservation of Engines

Taken out of Operation and/or Placed in Storage

Job No.

0-8

All parts of an engine, if not sufficiently protected, are constantly subjected to corrosion. Corrosion can be compared with wear, but wear means a decrease of service life. It is well known that corrosive wear can do several times as much damage as the mechanical wear caused during operation.

During operation the corrosive influences can be kept within the permissible limits or can be eliminated completely through adequate additives in the lubricants, but if the aggregate is taken out of operation there is no protection against the oxygen and the humidity of the air.

Therefore, we urgently recommend that adequate protective measures be taken.

The following preservation instructions are generally sufficient

- a) for a longer period of inoperation,
- b) if the period of inoperation cannot be estimated,
- c) for new aggregates and components which are to be stored for a longer period.

Additional measures can be necessary, e.g. for transportation overseas or inoperation in the tropics. The extent of the necessary operations has to be determined separately in each case. The required data on this subject can be requested from our plants.

A. Preserving Radiator and Cooling System:

Add to the cooling water 1 % corrosion inhibitor oil and operate engine for several minutes.

It is advisable to give older engines a degreasing and defurring treatment before the preservation (see Job No. 0-6).

Naturally, the cooling water has to be drained during the winter months. The filler hole must be well covered. It is advisable to attach a label "cooling water drained".

B. Internal Preservation of Engine

1. Drain the regular H.D. motor oil from the oil pan in warm condition and allow adequate time for thorough draining. Fill up with initial fill-up oil.

- a) For older engines SAE 30.
- b) For brand new engines or engines with a few operating hours only SAE 10 W.

If no initial fill-up oil (see Section E) whatsoever is available, then fill up unused regular H.D. motor oil, thus obtaining at least some protection. H.D. motor oils cannot replace the initial fill-up oils as far as the anti-corrosion properties are concerned. They are not more than a make-shift. [Viscosity as specified under a) and b), see Page 0-8/2]

The initial fill-up oil for engines has to fulfil the following tasks:

- a) As a preservation oil it has to supply adequate anti-corrosion during storage.
 - b) As a "running-in oil" it must guarantee adequate cleaning action similar to HD oils during an operational period of up to approx. 10 hours.
2. 5 to 10% initial fill-up oil has to be added to the motor oil in the cam housing of the injection pump.
 3. For the preservation of the injection assemblies and fuel lines, the engine has to be operated for a short time with a mixture of 95 % diesel fuel and 5 % Autol Desolite (diesel) or initial fill-up oil before the engine is taken out of operation.

Operate engine until it has reached its operating temperature of 75 to 95° C. Then you can be sure that all parts are furnished with a protective oil film.

4. Stop engine, remove glow plugs, and spray approx. 10 cm³ initial fill-up oil into the plug holes. Then crank the engine with the starter for approx. 5 seconds. In order to prevent further fuel injection into the cylinders during cranking, manually bring the control rod of the injection pump to the position "stop"; if there is a pneumatic governor the control cable must also be detached at the adjusting lever of the injection pump.
5. Reinstall the glow plugs, remove cylinder head cover, and spray valve train with initial fill-up oil SAE 30; then remount cylinder head cover.
6. Remove the injection pump cover and spray the spring housing with initial fill-up oil SAE 30. Reinstall pump cover and spray the entire pump with the same oil.
7. **Seal airtight and waterproof the following parts:** exhaust pipe and/or exhaust manifolds, inlet manifolds, and also the hole for the oil dipstick in the crankcase.

C. External Preservation of Engine:

Spray all parts not painted or bonderized with initial fill-up oil SAE 30. To do this remove V-belts, because engine oil induces soaking action of rubber.

D. Preservation of the Battery:

During period of inoperation the battery should be removed and treated as follows:

Charge battery according to instructions (see Job No. 15-41, Section C). Spread acidproof grease over terminals and bridge connectors and store battery in a cool and dry place not exposed to frost. The battery should be discharged and recharged approx. every 4 to 6 weeks. Do not overcharge the battery, charge it only until all cells are gassing uniformly and lively. Check acid level (also see Job No. 15-41, Section A).

Before every 3rd recharging discharge the battery so much that the voltage is 1.75 per cell and then recharge again.

Note: A battery filled with acid should never be stored uncharged, because the sets of plates would become unserviceable in a short time due to oxidation.

E. Anti-Corrosion Agents

- a) Initial fill-up oils for internal and external preservation of the engine and also for external preservation of the injection pump.

Trade Name	Firm
Autol K	Autolwerke Würzburg
Aviaticon Motor preservation oil	Emil Finke, Bremen
BV motor preservation oil	BV-Aral, Bochum
Energol Compound AX	BP-Benzin- und Petroleum AG., Hamburg
Essolub MZ	Esso AG., Hamburg
EXD 70	Mobil Oil AG., Hamburg
Hyperol EK	Montan-Union GmbH., Hamburg
Kompressol fill-up oil	Chr. Arens, Köln
Anti-corrosion motor oil	Optimol-Oelwerke GmbH., München
Motanol KM	Deutsche Gasolin-Nitag AG., Hannover
Norustal	Veedol GmbH., Hamburg
Renolin MR	R. Fuchs, Mineraloelwerk, Mannheim
Rheinpreussen preservation agent	Rheinpreußen GmbH., Homburg/Ndrh.
Shell Ensis Motoroel	Deutsche Shell AG., Hamburg
Valvoline anti-corrosion oil	Valvoline-Oel-GmbH Ritz & Co., Hamburg
Viscobil V 431	DEA-Schliemann, Mineraloelges., Hamburg

- b) Preservation agents for the internal preservation of the injection assembly and the fuel lines to be mixed with 95 % of fuel:

Initial fill-up oil as under a) or

Autol Desolite (diesel) Autolwerke, Würzburg.

- c) Anti-corrosion oils soluble in water for the internal preservation of the cooling water system:

Trade Name	Firm
Anticorit MKR	R. Fuchs, Mineraloelwerk, Mannheim
Anti-corrosion agent for radiator	Franz Voitländer, Kronach/Bay.
Anti-corrosion oil soluble in water	Rheinpreussen GmbH., Homburg/Ndrh.
Kutwell 40	Esso AG., Hamburg
Phosphatol	Houghton-Chemie, Hildesheim
Shell Donax C	Deutsche Shell AG., Hamburg
Valvoline anti-corrosion oil S 2	Valvoline-Oel-GmbH. Ritz & Co., Hamburg
Veedol Anorust 50	Veedol GmbH., Hamburg

F. Putting Preserved Engines into Operation:

Uncover the sealed openings (see Section B, Pos.7), check oil and cooling water levels, and wash off the external preservation before putting engine into operation.

As already mentioned the engine can be operated up to max. 10 hours under light load with the initial fill-up oil. Since the motor oil has left the points of lubrication and there is no longer an oil film after longer periods of inoperation, the engine has to be cranked before starting until pressure is indicated at the oil pressure gauge. To do this proceed as follows:

1. Open shut-off valve of the fuel tank.
2. Completely insert key in junction box, so that the red charging control light is illuminated.
3. Turn starting switch directly – **without preheating** – to position "2" – Starting – and hold it there. The control rod adjusting lever of the injection pump must at the same time be kept in the stop position, so that the engine does not start.
4. Crank engine until oil pressure is indicated.
5. Now start normally with **preheating**.