Temporary anti-corrosion protection
Preservation of engines
(Procedural standard)

M 3069-4

Dimensions in mm

This English version is a translation. In case of doubt or conflict the valid German-language original will govern.

Contents

1 Applicability and purpose

The stipulations made in this standard apply to the preservation of complete diesel and gas engines to protect them against corrosion, their packing, storage and removal of such preservation.

All parts of an engine are constantly subject to climatic influences, which are of greatest importance for the serviceability of the products. The purpose of this standard is to prevent corrosion prior to commissioning or during standstill periods.

Selection of the degree of protection and sales group should be made to Table 1.

2 Object and implementation of preservation

2.1 Engine oil circuit

2.1.1 Commissioning is carried out with running-in and anti-corrosion engine oil M 3291 SAE 10W-40. In order to keep the oil circuit protected against corrosion, all oil openings (even if oil is drained off) must be closed up tightly with plastic caps.

See attached sheet for approved products.

2.1.2 Replace engine oil by running-in and anti-corrosion engine oil M 3291 SAE 10W-40. Then run engine for approx. 5 minutes. If running-in and anti-corrosion engine oil to M 3291 is not available, the following anti-corrosion engine oils can be used alternatively:

Lubricating oil for internal combustion engines SAE 15W-40 (Nato code 0-236) TL 9150.0063/4.

Lubricating oil for internal combustion engines SAE 30 (BW code CY 6050) TL 9150.0037.

When recommissioning the engine replace the engine oil by engine oils to MAN 271, M 3275 or M 3277 after 5,000 km or 25 hours of operation at the latest.

In gas engines replace the anti-corrosion engine oil by gas engine oil M 3271.

2.2 Engine coolant circuit

2.2.1 At the time of series final inspection the engine coolant circuits are operated with a mixture of 4.0–4.5 % by volume radiator anti-corrosion agent MAN 248 and low-salt water (condensate, el. conductivity <10 µS/cm.) In order to maintain a thin film of anti-corrosion agent in all parts conducting cooling water when the coolant is drained off, all openings of the coolant circuit must be closed up tightly with plastic caps immediately after engine operation.

See attached sheet for approved products.

Preservation of the coolant circuit with water emulsions on mineral oil base is not permissible

Co-author of the standard: TUC-N

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2.2.2 Fill coolant circuit with a mixture of drinkable mains water and at least 40 % by volume antifreeze agent to MAN 324; close it up tightly.

The quantity filled in should be only about 90–95 % of the maximum capacity so as to allow for temperature-dependent expansion.

2.2.3 After switching off the engine and draining out the coolant spray a hydrous VCI solution into the cooling circuit. Then close up all coolant openings tightly with plastic caps. For recommissioning fill up the cooling system with a mixture of drinkable mains water and at least 40 % by volume antifreeze agent to MAN 324.

2.3 Fuel system:

2.3.1 Connect the fuel system to a tank filled with an anti-corrosion fuel.

See attached sheet for approved products

Run the engine for 5 minutes each under full load (at rated speed) and at idling speed so that the entire fuel system is filled with anti-corrosion fuel. Then turn off the engine.

With the intake opening closed the engine is turned over 2 x for approx. 30 seconds each (interval 30 seconds, charge control lever switched to full-load stop position) with the starter. Combustion is thus prevented and the combustion chambers, cylinder liners, valves and injection equipment are preserved.

Besides the full-load stop position of the charge control lever, on engines with cylinder switchoff the stop lever must be held in the "centre position" in order to provide the bank that has been switched off with anti-corrosion fuel during the preservation procedure.

In the case of injection pumps with manifold-pressure compensator (LDA) it is enough to operate the stop lever once and then release it. The control rod is then or with electronic governor in the suction rate control position which allows injection on all cylinders.

In the case of engines with EDC the control unit must be connected up and under current so that fuel injection will take place in accordance with the engine starting curve.

Then close up all combustion chamber openings as airtightly as possible using plastic caps.

2.3.2 Empty the tank and completely fill it with one of the following anti-corrosion fuels:

Diesel DIN EN 590 + 1 vol. % Autol Desolite K
(MAN item no. 09.11060-0802)
or Diesel DIN EN 590 + 10 vol. % running-in and anti-corrosion oil MAN 3271
(MAN item no. 09.11002-0020) or
Diesel DIN EN 590 + 10 vol. % lube oil CY 6050 TL 9150.0037
(MAN item no. 09.11002-0027)

See attached sheet for approved products.

Run engine at medium speed for about 10 minutes so that fuel still in the system is replaced by anti-corrosion fuel.

With the air intake opening closed turn engine over for approx. 30 seconds (charge control lever to full-load stop position) with the starter.

Then close up all combustion chamber openings (including exhaust) tightly in order to maintain lasting preservation.

2.4 Combustion chambers and cylinder liners in ready-for-use gas engines and diesel engines <u>without test run</u>

Job sequence:

- Remove injection nozzles/spark plugs
- Bring pistons of cylinders 1 and 6 into bottom-dead-centre position
- Use pneumatic spray gun to spray 30-40 ml diesel fuel + 1 % by volume Autol Desolite K through the injection nozzles / spark-plug bores into the cylinders 1 and 6

- Then bring the pistons of cylinders 2 and 5 into bottom-dead-centre position and carry out the preservation procedure
- Repeat procedure in cylinders 3 and 4
- Turn over engine briefly (2 to 3 secs) with the starter or turn over engine by hand by three revolutions
- Refit spark plugs

2.5 Air intake system and exhaust pipe of VE engines (not for vehicles)

To prevent chips and dirt from falling into the system during installation of the engine the air filter must be removed from the engine and wrapped in PE foil (except for engines with firmly mounted HD air filter systems).

50 ml R-VCI anti-corrosion oil M 3249 (MAN item no. 09.11002-0025) must be sprayed into both the air intake pipe and the exhaust pipe. The openings must be closed up with plastic caps.

2.6 Metallic bright surfaces

With the exception of grooves in V-belt pulleys, disc flywheels and clutch discs, metallic bright surfaces must be treated with

2.6.1 multi-purpose grease Li-P 00/000 MAN 283 (MAN item no. 09.15001-0011) or

2.6.2 anti-corrosion wax to M 3082-D2. (MAN item no. 04.10008-0111).

It is particularly important to preserve the perimeter of the flywheels.

See attached sheet for approved products.

2.7 Engine packing

2.7.1 The engines are covered with a hood of PE foil (0.050 mm). This hood must remain open at the bottom to allow air circulation which prevents dewpoint corrosion.

2.7.2 The engines are sealed in shrink-on PE foil (0.2 mm) with VCI powder sachets or VCI tablets (40 g/m³ of space to be protected, VCI chips or VCI foam) acc. to works standard M 3167. Indoor storage is required.

2.7.3 The engines are sealed in shrink-on PE foil (0.2 mm) with VCI powder sachets or VCI tablets (40 g/m³ of space to be protected) VCI chips or VCI foam material acc. to works standard M 3167 and packed in containers or crates.

2.8 Storage

2.8.1 The cost-effective preservation and packing measures stipulated in this standard are based on the assumption that the engines will be stored in heated rooms (halls) which offer protection from the weather.

This applies particularly to unpacked engines intended for installation in vehicles in Munich, Salzgitter and Steyr.

Table 1

Object of protection, (assembly, parts, surfaces)	M 3069-4 Section	Standard preservation for overland transport and/or storage (Works: M, W, Y) Up to 3 months	Preservation for transport for storage periods		Preservation for standstill period of		
			Overland transport (Europe) and/or storage CKD parts, engines stored for up to 24 months *)	Air and sea transport, storage in coastal areas Engines, CKD parts stored for up to 24 months *)	Up to 3 months	Up to 12 months	Up to 24 months
Preservation stage	---	A	B1	B2	C1	C2	C3
Internal protection against corrosion	2.1.1	+	+	+	---	---	---
Engine oil circuit	2.1.2	---	---	---	---	+	+
Engine coolant circuit	2.2.1	+	+	+	---	---	---
	2.2.2	---	---	---	+	+	+ [1]
	2.2.3	---	+	+	+ [2]	+ [2]	---
Fuel system	2.3.1	---	+	+	---	---	---
	2.3.2	---	---	---	---	+	+
Gas engines	2.4	---	+	---	---	+	+
Air intake system Exhaust pipe (VE engines)	2.5	+	+	+	---	---	---
External protection against corrosion Metallic bright surfaces alternatively	2.6.1 2.6.2	---	+	+	+	+	+
Packing	2.7.1	(+) [4]	---	---	+	---	---
	2.7.2	---	+	---	---	+	+
	2.7.3	---	---	+	---	---	---
Storage	2.8.1	+	+	+ [3]	+	+	+ [3]

[1]) Also valid for dismantled engines
[2]) Valid for dismantled engines only
[3]) For storage and transport periods of up to 48 months, a water-vapour-proof aluminium synthetic composite foil (seal welding) is to be used instead of a PE foil
[4]) Deviations owing to operating requirements are permissible
*) Bare engine without head, short blocks

3 Removing the preservation

If required (e.g. for leakage test), the external preservative agents are to be thoroughly removed with a low-aromatic (<0.1%) cold cleaner or with white spirit. If high-pressure cleaning devices are used for removing wax, we recommend white spirit as solvent. Avoid intensive spraying of rubber and plastic parts and using water at temperatures above 80°C as this would cause irreversible damage.

Wipe off any wax residues with an absorbent non-woven cloth moistened with white spirit or paraffin.

Standards quoted

MAN 271	Multigrade diesel engine oil; technical conditions of delivery
MAN 283	Multi-purpose greases
MAN 248	Anti-corrosion agents for cooling systems; minimum requirements
MAN 324	Antifreeze agents with protection against corrosion for engine cooling system; minimum requirements
M 3082	Anti-corrosion waxes
M 3167	Preservation and packing for transport of engine components
M 3249	Anti-corrosion oil with VCI; technical conditions of delivery

M 3275	High-performance diesel engine oil; technical conditions of delivery
M 3277	High-performance engine oil; technical conditions of delivery
M 3291	Running-in engine oil SAE 10W-40
TL 9150-0037	Lube oil, internal combustion engines, CY 6045, CY 6050, CY 6015
TL 9150-0063	Lube oil, internal combustion engines, SAE 15W-40; technical conditions of delivery

Previous issues MG-900-10 Sheet 5 / 04.77

M 3069-4 / 09.78, 05.82, 11.89, 07.1997, 99-11, 01-02

Changes: Compared to issue 1989-11 the following changes have been made:

- The standard has been revised editorially.
- The external corrosion protection for metallic bright surfaces for storage periods of up to 3 months has been defined more precisely.
- In section 2.1.2: 1000 km has been changed to 5000 km
- The attached sheet has been adapted to the products approved

Compared to issue 1997-06 the following changes have been made:

- Section 2.1: Running-in and anti-corrosion oil M 3291 has been adopted into the standard
- Section 2.2.1: Series final inspection for cooling circuit has been changed
- Table 1: Storage and transport periods have been changed, gas engines have been adopted into the standard
- The standard has been revised editorially ad updated.

Compared to issue 1999-11 the following change has been made:

- The standard has been revised editorially.

Compared to issue 2001-02 the following change has been made:

- The external corrosion protection for metallic bright surfaces has been added to the preservation stages B1, B2, C2, and C3 in table 1.

Agents for temporary anti-corrosion protection

M 3069 B

Dimensions in mm

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Contents

The following products may be used as the agents specified in Standards M 3069-2 to -4.

1 Engine oil circuit

Running-in and anti-corrosion engine oil MAN 3291 – SAE 10W-40:
MAN item no.: 09.11060-0802
Lube oil, internal combustion engine 0-236 SAE 15W-40 TL 9150.0063 (no MAN item number)
Lube oil, internal combustion engine CY 6050 SAE 30 TL 9150.0037
MAN item number: 09.11002-0027

2 Engine cooling circuit

Radiator anti-corrosion agent MAN 248:
MAN item no. 09.21010-0121

Antifreeze MAN 324 or TK-BA-16-6850-007 (BW (German Army) code SY 7025):
MAN item no. 09.21001-0002, Type N
09.21001-0010, Type NF
09.21001-0013, Type SNF
09.14010-0127, hydrous VCI solution Fuchs Anticorit FE W-50

3 Fuel system

Anti-corrosion agent Autol Desolite K:
MAN item no. 09.14002-0035
Running-in and anti-corrosion engine oil MAN 3291 – SAE 10W-40:
MAN item no.: 09.11060-0802

Lube oil, internal combustion engine CY 6050 – SAE 30 TL 9150-0037 (previously C-642):
MAN item no. 09.11002-0027

3.1 Air intake system, exhaust pipe

Anti-corrosion oil M 3249-R-VCI:
MAN item no. 09.11002-0025

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Co-author of this standard: TUC-N

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4 Bright metal surfaces

Storage for up to 3 months

Multi-purpose grease MAN 283 Li-P 00/000:
MAN item no. 09.15001-0011

Storage for longer than 3 months

Component protection wax M 3082-D2:
MAN item no. 04.10008-0111

5 Paintwork and chrome-plated parts

Paint protection wax M 3082-A:
MAN item no. 04.10008-0100

6 Underbody protection

Underbody wax M 3082-C:
MAN item no. 04.10008-0140

or

Two-coat wax M 3082-Z consisting of
Penetrating wax M 3082-P:
MAN item no. 04.10008-0120

and

Seal-up wax M 3082-S:
MAN item no. 04.10008-0130

6 Packaging

Packaging material

VCI paper:
MAN item no. 09.81002-0092

VCI tablets:
MAN item no. 09.81002-0093

VCI powder:
MAN item no. 09.81002-0094

Standards quoted

M 3069-2	Temporary anti-corrosion protection; standard for commercial vehicles
M 3069-3	Temporary anti-corrosion protection; temporary decommissioning of commercial vehicles
M 3069-4	Temporary anti-corrosion protection; preservation of engines
M 3082	Anti-corrosion waxes; technical delivery conditions
M 3249	Anti-corrosion oil with VCI; technical delivery conditions
M 3291	Running-in and anti-corrosion engine oil SAE 10W-40
MAN 248	Anti-corrosion agents for engine cooling systems; minimum requirements
MAN 283	Multi-purpose greases Li-P; technical delivery conditions
MAN 324	Antifreeze with anti-corrosion agents for the engine cooling system; minimum requirements
TL 9150-0037	Technical delivery conditions; lube oil, internal combustion engine CY 6045, CY 6050, and CY 6015
TL 9159-0063/4	Technical delivery conditions; lube oil, internal combustion engine SAE 15W-40, NATO code 0-236, BW code OY 11 45

Previous issues

MG.900-10 Appendix 1 / 04.77
M 3069 Appendix / 78-09; 82-05; 86-10; 89-11; 91-07; 94-12; 97-07; 97-11; 99-11

Changes:

Compared to issue 1997-07 the following changes have been made:

- Preservation of the engine cooling circuit and the fuel system extended,
- Air intake system and exhaust pipe added,
- Packaging added.

Compared to issue 1997-11 the following change has been made:

- Running-in and anti-corrosion engine oil to M 3291 and hydrous VCI solution added.

Compared to issue 1999-11 the following change has been made:

- Standard updated and editorially revised.