**Action code: AT FIRST OPPORTUNITY**

# Accumulators – all makes brands and types in the hydraulic system

Safety information

SL2024-754/PRP
April 2024

**Concerns**
Owners and operators of MAN B&W two-stroke marine combustion engines.

**Summary**
MAN Energy Solutions emphasises the importance of checking the nitrogen pressure regularly, to prevent undesirable pressure peaks in the hydraulic oil system.

Replaces SL2019-673/PRP

Dear Sir or Madam

We have recently received reports of malfunctioning accumulators that subsequently led to rupture of the accumulator positioned in the engine hydraulic system.

MAN Energy Solutions is dedicated to providing safe and reliable products. We therefore issue this Service Letter to emphasise the importance of checking the nitrogen pressure in the hydraulic accumulators regularly. This is to prevent undesirable pressure peaks in the hydraulic oil system.

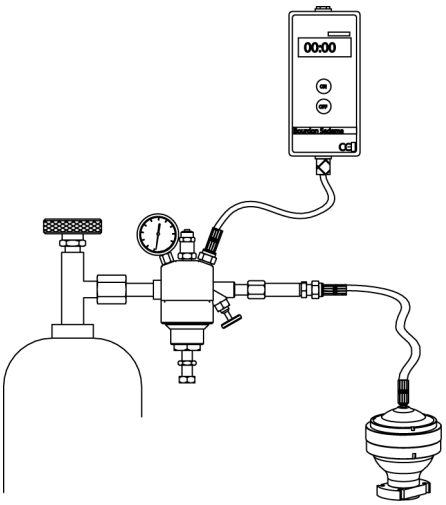
A ruptured hydraulic accumulator poses a serious potential threat to the engine and its surroundings, and may potentially even result in bodily injuries and/or fatal casualties.

MAN Energy Solutions highlights the recommendation for inspection of accumulators, which is as follows:

- Check the nitrogen pressure minimum once a month.
- Replace the accumulator if it has been in operation without nitrogen pressure.

The recommended overhaul and replacement of the diaphragm is still every 5 years.

Yours faithfully

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Enclosures:
Data sheet 4565-0550-0014
Data sheet 4565-0550-0028
Data sheet 0745-0210-0004

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A pressure drop of up to 5 bar per month is regarded as normal. If a significantly higher pressure drop is measured, overhaul of the accumulator should be carried out at the first opportunity. It is important to adjust the measurement for temperature deviation, see the Pressure Adjustment Table in Data Sheet 4565-0550-0028.
For new engines, the hydraulic pressures are shown in Data Sheet 0745-0210.

All details on checking and overhauling of accumulators are described in the instruction manuals. However, the following safety related checks should be given special attention:

- Correct tightening of the screws fastening the accumulator
- Regular check of the nitrogen pressure
- Never open the inlet valve to the hydraulic cylinder unit if the hydraulic system is pressurised.

Please ensure that the checking procedure is carried out only when the engine is in the “Finished with Engine-mode” and the hydraulic system is without pressure. The nitrogen pressure must be kept within the limits specified below:

| | | |
|---|---|---|
| **Nominal hydraulic pressure** | 200 bar | 300 bar |
| **Nitrogen charge pressure at 20°C*** | 95 bar | 136 bar |
| **Minimum nitrogen pressure at 20°C*** | 65 bar | 106 bar |

*) at other temperatures, the correct charge pressure can be found in Data sheets 4565-0550-0014, 4565-0550-0028, and 0745-0210-0004 (for new engine types)

The information in this letter replaces the information given in our Service Letters SL06-469/JOF, SL2017-653/PRP, and SL2019-673/PRP.

For any further questions regarding this Service Letter, write to: Operation2S@man-es.com

# Nitrogen Charging Pressures

## Nitrogen charging of accumulators

When pre-charging hydraulic accumulators or sealing oil accumulators, the pre-charging pressure must be adjusted depending on the hydraulic system pressure and the temperature of the nitrogen gas

Charging must be done as per the table below :

| Gas Temp. | 200 bar hydraulic pressure | 300 bar hydraulic pressure | 330 bar sealing oil pressure | 450 bar hydraulic pressure |
|---|---|---|---|---|
| 0° C | 89 bar | 124 bar | 87 bar | 181 bar |
| 10° C | 92 bar | 130 bar | 91 bar | 190 bar |
| 20° C | 95 bar | 136 bar | 95 bar | 200 bar |
| 30° C | 98 bar | 142 bar | 99 bar | 210 bar |
| 40° C | 101 bar | 148 bar | 103 bar | 219 bar |
| 50° C | 105 bar | 154 bar | 107 bar | 229 bar |
| 60° C | 108 bar | 160 bar | 111 bar | 239 bar |
| 70° C | 111 bar | 166 bar | 115 bar | 248 bar |
| 80° C | 114 bar | 172 bar | 119 bar | 258 bar |
| 90° C | 118 bar | 178 bar | 123 bar | 267 bar |
| 100° C | 121 bar | 185 bar | 127 bar | 277 bar |

After pre-charging, wait approx. 30 minutes for nitrogen temperature in accumulator to adjust to ambient temperature, then carry out final charging. After final charging, pressure should be within ±5 bar.

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## Nitrogen Charging Pressures

### Nitrogen charging of accumulators for LGIM

When pre-charging hydraulic accumulators or sealing oil accumulators, the pre-charging pressure must be adjusted depending on the hydraulic system pressure and the temperature of the nitrogen gas.

Charging must be done as per the table below:

| Gas Temp. | 0.16 / 2.0 litre accumulator | Accumulator at Sealing Oil Unit |
|---|---|---|
| 0° C | 4.6 bar | 36.9 bar |
| 5° C | 4.7 bar | 37.7 bar |
| 10° C | 4.8 bar | 38.5 bar |
| 15° C | 4.9 bar | 39.2 bar |
| 20° C | 5.0 bar | 40.0 bar |
| 25° C | 5.1 bar | 40.8 bar |
| 30° C | 5.2 bar | 41.5 bar |
| 35° C | 5.3 bar | 42.3 bar |
| 40° C | 5.4 bar | 43.1 bar |
| 45° C | 5.5 bar | 43.8 bar |
| 50° C | 5.6 bar | 44.6 bar |
| 55° C | 5.7 bar | 45.4 bar |
| 60° C | 5.8 bar | 46.1 bar |
| 65° C | 5.9 bar | 46.9 bar |
| 70° C | 6.0 bar | 47.7 bar |

After pre-charging, wait approx. 30 minutes for nitrogen temperature in accumulator to adjust to ambient temperature, then carry out final charging. After final charging, pressure should be within ±1 bar.

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## Safety Precautions

*For detailed sketch see 0545-0100*

| | |
|---|---|
| O | Stop the Engine |
| O | Shut off fuel gas supply to the engine (close valve 830 on FGVT) |
| O | Shut off control air supply to fuel gas valve train (FGVT) |
| O | Shut off hydraulic oil supply to control block (close valve 870 on HCU) |
| O | Drain off hydraulic oil from the control block (open valve 871 on HCU) |
| O | Shut off starting air supply - At starting air receiver |
| O | Block the main starting valve |
| O | Shut off control air supply |
| O | Engage turning gear |
| O | Stop lubricating oil supply |
| O | Shut down hydraulic power supply |

## Data

| Ref. | Description | Value | Unit |
|---|---|---|---|
| T45-45 | Pressure Adjustment Table | | |
| - | Accumulator temperature t°C: | | |
| T45-45 | 0° C | 89 | bar |
| T45-45 | 10° C | 92 | bar |
| T45-45 | 20° C | 95 | bar |
| T45-45 | 30° C | 98 | bar |
| T45-45 | 40° C | 101 | bar |
| T45-45 | 50° C | 105 | bar |
| T45-45 | 60° C | 108 | bar |
| T45-45 | 70° C | 111 | bar |
| T45-45 | 80° C | 114 | bar |
| T45-45 | 90° C | 118 | bar |
| T45-45 | 100° C | 121 | bar |
| - | Filling pressure must be as stated above | | |
| - | Check pressure within ± 5 bar. | | |
| T45-48 | Nut, flange to gas block | 50 | Nm |
| T45-63 | Hexagon head screw tightening torque | 20 | Nm |





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## Tools

The task-specific tools used in this procedure are shown on the plates at the end of this chapter or in the chapters indicated by the first two digits in the plate number, e.g. **2570-0010** refers to chapter 25, Bearings.

| Plate | Item No. | Description |
|---|---|---|
| 4570-0540 | - | Test equipment for accumulators |
| 4570-0550 | | Accumulator tools |
| 7670-0200 | - | Torque spanners |



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## Safety Precautions

For detailed sketch see 0545-0100

| | |
|---|---|
| ● | Stop the Engine |
| ● | Shut off starting air supply - At starting air receiver |
| ● | Block the main starting valve |
| ● | Shut off starting air distributor/distributing system supply |
| ● | Shut off control air supply |
| ● | Engage turning gear |
| ● | Stop lubricating oil supply |
| ● | Shut down hydraulic power supply |

## Data

| Ref. | Description | Value | Unit |
|---|---|---|---|
| T45-38 | Flange with accumulators, weight | 200 | kg |
| T45-42 | Accumulator weight, 4 / 10 litre | 30 / 60 | kg |
| T45-43 | N2 Charging pressure | 136 | bar at 20° |
| - | Accumulator temperature | t | °C |
| - | Check pressure within | ± 5 | bar |
| - | Filling pressure must be as stated above | | |
| T45-45 | Pressure Adjustment Table | | |
| - | 0° C | 124 | bar |
| - | 10° C | 130 | bar |
| - | 20° C | 136 | bar |
| - | 30° C | 142 | bar |
| - | 40° C | 148 | bar |
| - | 50° C | 154 | bar |
| - | 60° C | 160 | bar |
| - | 70° C | 166 | bar |
| - | 80° C | 172 | bar |
| - | 90° C | 178 | bar |
| - | 100° C | 185 | bar |
| T45-46 | Assembly off-set 4-litre accumulator | 9 | mm |
| T45-47 | Assembly off-set 10-litre accumulator | 10 | mm |
| T45-48 | Screw, flange to accumulator | 100 | Nm |
| T45-49 | Screw, flange to HCU. 3 step tightening | 130 | Nm |
| T45-53 | Accumulator 0.75 litre, tightening torque | 235 | Nm |
| T45-82 | Screw, flange to hydraulic power supply unit accumulator | 100 | Nm |



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| Ref. | Description | Value | Unit |
|---|---|---|---|
| T45-83 | Screw, flange to hydraulic power supply unit (M10/M12/M14/M16) | 34/56/85/158 | Nm |

The task-specific tools used in this procedure are shown on the plates at the end of this chapter or in the chapters indicated by the first two digits in the plate number, e.g. 2570-0010 refers to chapter 25, Bearings.

## Tools

| Plate No. | Item No. | Description |
|---|---|---|
| 4570-0540 | - | Test equipment for accumulators |
| 4570-0550 | - | Tools for accumulator |
| 7670-0200 | - | Torque spanners |
| 7670-0300 | - | Lifting tools, etc |
| 7670-0410 | 066 | Slide caliper |
| 1470-1400 | 276 | Lifting attachment |



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