Purging Routine
New routine for distribution and filing

- Purge the pump’s cofferdam regularly.
- Log and evaluate the purging result.
- A clean and open cofferdam gives trouble free cargo pumping.
- The ship’s staff on board have the primary responsibility for purging and necessary action to be taken, knowing the actual operation and running conditions.
- If in doubt please contact FMS AS for advise, and a quick answer will be returned.
- Send the purging form to Shipowner and Framo for control and filing. According to new routines from 1995, they will normally not be answered by Framo if not especially requested.

<table>
<thead>
<tr>
<th>Tank No.</th>
<th>Cargo Date</th>
<th>Result</th>
<th>Open cofferdam Date</th>
<th>Result</th>
<th>Open cofferdam Date</th>
<th>Average result</th>
<th>Date</th>
<th>Result</th>
<th>Open cofferdam Date</th>
<th>Result</th>
<th>Open cofferdam Date</th>
<th>State action taken, new parts installed, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

For long voyages with “no leakage at A” purge at least every fortnight.
**General**

Purging of the cofferdam is one of the most important operations to be done when operating a submerged Framo Cargo Pump. This is because the only way to check the pump’s seals, and thus the conditions of the pumps, is by purging possible leakages in the cofferdam. If this is done and necessary action in case of large leakages is taken, trouble-free operation of the cargopump is obtained.

**Purging routine on board**

The pump’s cofferdam must be purged regularly according to Framo instruction highlighted in service manual 1000.010 GB00. (Rev. 1995).

The primary responsibility for purging has to be with the ship’s staff on board.

The reasons for this are that correct operation and correct preventative maintenance can only be carried out on board, in the daily life of the ship.

If the purging result indicates that action must be taken - the necessary step must be done on board by the ship’s staff without any delay. If requested, Framo can of course assist in any way necessary.

**From 1995 - New routine for distribution and filing**

To get a quicker response in case the ship’s staff need information/advise from Framo, they shall according to the new routine from 1995 contact us by telefax or e-mail. Use telefax no. +47 55 99 93 82, or e-mail service@framo.no, and the ship will receive a quick answer from Frank Mohn Services AS.

Alternatively call +47 55 99 92 00 or after office hours +47 90 99 00 06.

The standard purging routine form will normally not be answered by Framo anymore but will be controlled and filed by Framo as a part of our service record for the ship.

So finally - good luck with your Framo Cargo Pumps. Do the purging regularly and send copies of the purging form to both Shipowner and to Framo.
# PURGING ROUTINE FOR FRAMO SUBMERGED CARGO PUMPS

**Ship Name:**

**Voyage No.:**

## PURGING INTERVALS

<table>
<thead>
<tr>
<th>Tank No.</th>
<th>Cargo</th>
<th>Date</th>
<th>Result</th>
<th>Open</th>
<th>Date</th>
<th>Result</th>
<th>Open</th>
<th>Average</th>
<th>Date</th>
<th>Result</th>
<th>Open</th>
<th>Date</th>
<th>Result</th>
<th>Open</th>
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<tbody>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

- **In "Result" column:**
  - H = hydr. oil
  - C = cargo
  - W = water condensate

- **In "Open cofferdam" column:**
  - Yes = air or liquid coming through
  - No = Blocked cofferdam

For long voyages with 'no leakage at A' purge at least every fortnight.

**Remember:**

- Clean and open cofferdam.
- Make sure that the drain hole from the pump's cofferdam never is blocked.
- Purge the pump's cofferdam regularly.
CONTENTS

1  How to purge the cofferdam
2  Purging intervals – logging of purging result
3  Evaluation of the purging result
4  Trouble shooting
5  Precautions to be taken when handling special types of cargoes
6  Example of purging form
This procedure describes purging of submerged cargo pumps with «dry» cofferdam. (For submerged cargo pumps with liquid filled cofferdam, refer to instruction 1000-0102-4.)

The cargo pump cofferdam is essential for segregation of the pump hydraulic section from the cargo – and for seal monitoring. Purging to be carried out at regular intervals for the purpose of:
- Leakage rate detection
- Condition monitoring of the shaft seal system
- Avoid that leakages are blocking the cofferdam

1 HOW TO PURGE THE COFFERDAM

CAUTION:
Exhaust gas and liquid may be hazardous. Wear safety gear and avoid contact with drain from exhaust trap and venting line.

Preparation:
1) Place a suitable container underneath the exhaust trap to collect the leakage.
2) Check that drain valve at bottom of exhaust trap is not blocked.
3) Drain the purging medium supply line for condensed water.
4) Connect purging hose (max. supply pressure 7 bar).

Purging:
5) Start the purging by opening the valve at purging medium supply line.

Note!
A relief valve is fitted at cofferdam purging connection. This is set at 3-3,5 bar to limit the purging pressure for protection of the pump seals. A small leakage from the relief valve is normal when liquid is purged from cofferdam. The valve will also open if the cofferdam is blocked.
6) Check that exhaust gas is coming out of the exhaust trap vent line (to verify that cofferdam is open).

CAUTION! Exhaust gas and liquid – watch out!

7) Purge cofferdam in several sequences if required. Drain exhaust trap between each sequence.
8) Disconnect purging hose.
9) Close exhaust trap drain valve.
10) Log the amount of leakage, -evaluate the result.

Note! For handling special cargoes, ref. chapter 5.
2 PURGING INTERVALS, - LOGGING OF PURGING RESULT

<table>
<thead>
<tr>
<th>LOADING</th>
<th>VOYAGE</th>
<th>DISCHARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Shortly before loading.</td>
<td>1. 1-2 days after loading.</td>
<td>1. Shortly before discharging.</td>
</tr>
<tr>
<td>2. If no leakage at step 1, purge every fortnight.</td>
<td>2. If leakage is detected at step 1, or at a later stage during the voyage, purge this pump every day.</td>
<td>2. Shortly after discharging.</td>
</tr>
<tr>
<td>3. If pumps are used for cargo circulation during the voyage, the cofferdam must be purged before start and after stop.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note!** Neglecting of purging can result in a blocked cofferdam and lack of leakage control.

The purging form should be filled in with the results from every purging operation. Each horizontal line in the form represents one cargo in one tank from loading till discharging. If a ship loads and discharges some tanks more frequently than others, an extra form should be filled in for those tanks.

Example of FRAMO purging form

Filled in purging form to be sent to Shipowner and to Framo(purging@framo.no). (Green copy for the ship, red copy for the Shipowner and white copy for Framo.)

Ship’s crew to evaluate the purging results and to take necessary action – however in case the ship’s crew needs advice, contact a Framo Service Station.
3 EVALUATION OF THE PURGING RESULT

3.1 Cargo leakage
A small leakage rate of up to about 0.5 l/day (and higher with light cargoes) during pump operation is normal.

Acceptable leakage rate depends on the type of cargo and possible consequences in case of leakage.

- Risk for clogging of pump cofferdam

Cargoes like naphtha, condensate etc. penetrates the shaft seals more easily than lubricating oils, vegetable oils and other viscous cargoes.

It is therefore recommended to carefully monitor the leakage rate over a period of time, preferable with different type of cargoes.

For critical cargoes, when the leakage rate is about 2 litres/day or higher, the pump must be purged a couple of times daily and service (pressure test-repair) carried out at first opportunity.

Intensify the purging if the leakage rate is exceeding acceptable limits. If this is not sufficient to keep the leakage under control it must, depending on the nature of the cargo, be considered to discharge the tank using the portable pump.

Cargo leakage to cofferdam normally indicates shaft seal leakage. But the leakage might come from flange connections or damage (cracks/pin holes) in pump/pipe stack (ref. chapter 4, Trouble shooting).

The development of a cargo leakage can be monitored if purging is done according to instructions. Thereby maintenance work can be planned, and unexpected shut down due to leakage can be avoided.

Note! Always remember to pressure test the cofferdam with 3 bar to locate the leakage prior to any dismantling of the cargo pump.

3.2 Hydraulic oil leakage
Hydraulic oil in the cofferdam normally indicates shaft seal leakage, but might come from flange face seals in pipe stack/pump head or damage in the pipe stack/pump head.

A small leakage rate into the cofferdam up to about 10 ml/h (0.25 l/day) from the mechanical oil seal or lip seal during pump operation is normal. For short periods of time, higher leakage peaks can occur.

If the leakage rate is increasing above acceptable level, the pump must be purged a couple of times daily, and inspected as soon as possible to find the reason for the leakage. Intensify the purging if the leakage rate is increasing above the acceptable level. If this is not keeping the leakage under control, close the hydraulic service valve. Depending of the nature of the cargo consider to use the portable pump to discharge the cargo.

3.3 Blocked cofferdam
In general we do not recommend to operate the cargo pump with blocked cofferdam.

For advice, depending of type of cargo etc., contact a Framo Service Station.
### 4 TROUBLE SHOOTING

**Warning:** To prevent damage from hazardous cargoes, take necessary precautions, wear safety gear and avoid contact with spray/gases.

<table>
<thead>
<tr>
<th>Symptom:</th>
<th>POSSIBLE REASON:</th>
<th>Remedy: *)</th>
</tr>
</thead>
</table>
| Not possible to purge the cofferdam (no air, inert gas or liquid coming out of the check pipe when purging) | a) No or insufficient purging medium supply  
b) Blocked cofferdam system  
*Note!*  
In case steam is used in attempt to clear a blockage in pump cofferdam system pay special attention not to over pressurize the pump/pipe stack | a) Check valves, hose connections and purging medium relief valve (open at approx. 3 bar).  
b) Check the exhaust trap and the piping on deck for blockage. Open if possible.  
b1) Disconnect check pipe from pump unit (lower seal house) – watch out for possible pressurized liquid in cofferdam!!  
By carefully purging check if the blockage is located in the check pipe or in the pump/pipe stack cofferdam. Depending on the nature of the medium blocking the cofferdam system use steam or solvent to dissolve the blockage. Dismantling of pump might be required.  
*Note!* Pressure test pump after assembly. |
| Cargo leakage to pump cofferdam. | General  
*Note!*  
Always pressure test pump prior to and after dismantling. This is required to locate possible leakage and to confirm no leakage upon completion of repair. | Pressure test pump cofferdam system at approx. 3 bar.  
Check for leakage – if required spray with soapy water to locate the leakage.  
a) Replace cargo seal set.  
Also, carefully check ceramic sleeve for possible damage-wear.  
b) Check for loose bolts and for pitting corrosion in seal faces – in case of corrosion repair is required.  
When assemble, renew damaged seal element.  
c) Contact a Framo Service Station. |

*) Ref. instruction for maintenance and repair for actual pump.
<table>
<thead>
<tr>
<th>Symptom:</th>
<th>Possible reason:</th>
<th>Remedy: *)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic oil leakage to pump cofferdam. (See also chapter 1)</td>
<td>General</td>
<td>Drain the pump return side prior to dismantling. Disconnect pump head/unit from pipe stack/casing. Pressurize pump unit return side at approx 4 bar and check for leakage to cofferdam side. Pressure test pump pipe stack / casing at max 7 bar on cofferdam side and check for leakage to return side.</td>
</tr>
<tr>
<td></td>
<td>a) Leaking shaft seal</td>
<td>a) Replace shaft seal (replaced seal to be reconditioned if feasible)</td>
</tr>
<tr>
<td></td>
<td>b) Leaking seal element in flange connection.</td>
<td>b) Check sealing surface for possible damage – repair if damaged. When assemble, renew damaged seal element.</td>
</tr>
<tr>
<td></td>
<td>c) Crack/pinhole in piping</td>
<td>c) Contact a Framo Service Station.</td>
</tr>
</tbody>
</table>

*) Ref. instruction for maintenance and repair for actual pump.

**Note!**

*Evaluate if changed parts as sleeves, mechanical seals etc. are possible to recondition. Send these parts to a Framo Service Station and ask for an evaluation.*
5 PRECAUTIONS TO BE TAKEN WHEN HANDLING SPECIAL TYPES OF CARGOES

The main rule is to have the cofferdam clean, dry and vented to atmosphere through the exhaust trap vent line, in order to detect leakages easily. However, when handling certain groups of cargoes it may be an advantage to fill the cofferdam with liquid to improve the seal lifetime and to avoid solidifying cargo blocking the cofferdam. Recommended type of liquid to be filled into the cofferdam for some groups of cargoes is given below.

This is a general advice, only experience can define which liquid gives the best result for the great number of different types of cargoes. In addition to this advice charters instruction, Material Safety Data sheet and any ATC instructions shall be taken into consideration during cargo operation and handling.

**Acid and basic cargoes**
After discharging and purging is finished, it may be an advantage to flush fresh water through the cofferdam to remove all residues after a leakage.

**Note!** Remember that some of these types of cargoes are very hazardous

**Polymerising cargoes. (TDI, MDI)**
Fill cofferdam with dioctyl phthalate (DOP) to limit the risk of blocking the cofferdam.

**Solidifying cargoes (molasses, etc.)**
Fill cofferdam with fresh water. Flushing the cofferdam with a low flow of water should also be considered.

**Heated oil products (fuel oil, crude oil)**
Fill cofferdam with diesel oil or a light lubricated oil (VG10) to keep any leakage into cofferdam in liquid form. (This is especially important after stripping and during tank cleaning.)

**Filling**
To fill liquid in the cofferdam, disconnect the exhaust trap piping from the pump top plate. Using a suitable adapter, fill the liquid through the cofferdam check pipe. Open the purging connection to ventilate the cofferdam during filling. (Connect an open female coupling or similar).

**Flushing**
Flushing of liquid through the cofferdam can be arranged in the following way:
- Connect liquid supply to the purging connection. The supply line must be equipped with a valve to regulate the liquid flow.
- Open drain valve on the exhaust trap, and collect the return liquid (fig. 3).

**Note!**
When filling liquid in the cofferdam or flushing, it is important that the hydraulic oil return pressure always is higher than the pressure in the cofferdam.

**Solidifying cargoes (in cargo tanks with heating coils)**
To prevent the cargo to get solid (freeze) inside the suction well, circulate the cargo at intervals by starting the cargo pump.
# PURGING ROUTINE FOR FRAMO SUBMERGED CARGO PUMPS

## PURGING INTERVALS

<table>
<thead>
<tr>
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<th>Cargo</th>
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<th>Result</th>
<th>Open cofferdam</th>
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<th>Result</th>
<th>Open cofferdam</th>
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<th>Result</th>
<th>Open cofferdam</th>
<th>Date</th>
<th>Result</th>
<th>Open cofferdam</th>
<th>State action taken, new sarts installed, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Example no. 1</td>
<td>1/1</td>
<td>OK</td>
<td>Yes</td>
<td>3/1</td>
<td>1C</td>
<td>Yes</td>
<td>7/1</td>
<td>2C</td>
<td>Yes</td>
<td>9/1</td>
<td>OK</td>
<td>Yes</td>
<td>Cargo with low spgr, low viscoses</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Example no. 2</td>
<td>1/1</td>
<td>OK</td>
<td>Yes</td>
<td>3/1</td>
<td>OK</td>
<td>Yes</td>
<td>7/1</td>
<td>1/2C</td>
<td>Yes</td>
<td>9/1</td>
<td>OK</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Example no. 3</td>
<td>1/1</td>
<td>OK</td>
<td>Yes</td>
<td>3/1</td>
<td>30C</td>
<td>Yes</td>
<td>4/1</td>
<td>30C</td>
<td>Yes</td>
<td>30C</td>
<td>30C</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Example no. 4</td>
<td>1/1</td>
<td>0H</td>
<td>Yes</td>
<td>3/1</td>
<td>6H</td>
<td>Yes</td>
<td>4/1</td>
<td>6H</td>
<td>Yes</td>
<td>6H</td>
<td>8H</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Example no. 5</td>
<td>1/1</td>
<td>OK</td>
<td>Yes</td>
<td>3/1</td>
<td>1/2H</td>
<td>Yes</td>
<td>7/1</td>
<td>1H</td>
<td>Yes</td>
<td>9/1</td>
<td>1/2H</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Example no. 6</td>
<td>1/1</td>
<td>-</td>
<td>No</td>
<td>3/1</td>
<td>-</td>
<td>No</td>
<td>7/1</td>
<td>-</td>
<td>No</td>
<td>9/1</td>
<td>-</td>
<td>No</td>
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<td></td>
</tr>
</tbody>
</table>

Evaluatethe purging results

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Signed by:  
Chief Officer: [Signature]  
Chief Engineer: [Signature]  
Pumpman: [Signature]