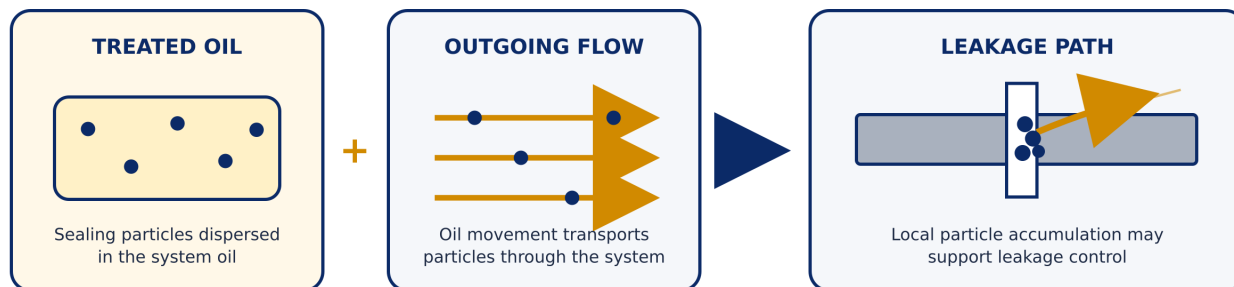


APPLICATION GUIDE

Oil Leakage Treatment



Treated oil + outgoing flow → transport to the leakage path → local accumulation

i **CUSTOMER APPLICATION GUIDE**
The Application Guide explains principles and exceptions. Technical guidance for mineral oil-based stern tube systems

SECTION 1 - Document roles

DOCUMENT	PRIMARY ROLE	USED BY
Customer System Assessment (CSA)	Collects the system information required to assess technical suitability.	Customer and AddVation before treatment
Customer Product Sheet (CPS)	Provides the concise commercial and application overview of ST Seal Core.	Customer decision-makers and technical contacts
Technical Data Sheet (TDS)	Provides controlled product properties, compatibility and technical reference information.	Technical personnel and reviewers
Safety Data Sheet (SDS)	Controls safe handling, storage, exposure response and disposal information.	All personnel handling the product
Treatment Plan	States the recommended quantities, liquid allocation, operating conditions, filter arrangement, triggers and monitoring.	Responsible technical personnel and vessel crew
Quick Guide	Shows the short visual field sequence.	Vessel crew during application
Application Guide	Explains why each step matters, limitations, exceptions and troubleshooting.	Crew and technical personnel

i **DOCUMENT PRIORITY**
Vessel procedures and applicable OEM or seal-maker limits must always be respected. If documents appear to conflict, obtain clarification before proceeding.

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4 Filter assessment	8 Monitoring and decision logic
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SECTION 2

System suitability and lubricant compatibility

System suitability should be confirmed and recorded in the Treatment Plan before application.

Quick suitability check

Outgoing oil leakage where system oil can carry treatment towards the leaking interface.

Relevant treatment volume and system boundary have been identified.

Leakage can be measured using a defined and repeatable method.

Operating pressure, temperature and shaft condition can remain within applicable vessel, OEM and seal-maker limits.

Filter arrangement and nominal ratings are known.

CHECK	WHAT TO CONFIRM
System oil	Mineral oil system. Record the lubricant grade in the Treatment Plan. If the lubricant is EAL, bio-based or unknown, contact AddVation before application.
Previous leak treatment	If another leak-stop, seal-treatment or particle-based product may remain in the system, record the product name and approximate quantity.
Mechanical condition	Severe damage, abnormal vibration/noise or uncontrolled oil loss should be mechanically assessed before treatment.

Assessment information

Application and seal arrangement; seal maker and known seal type.

Relevant system oil volume; header tank arrangement and receiving capacity.

Before-treatment leakage rate and measurement period; current vessel and shaft condition.

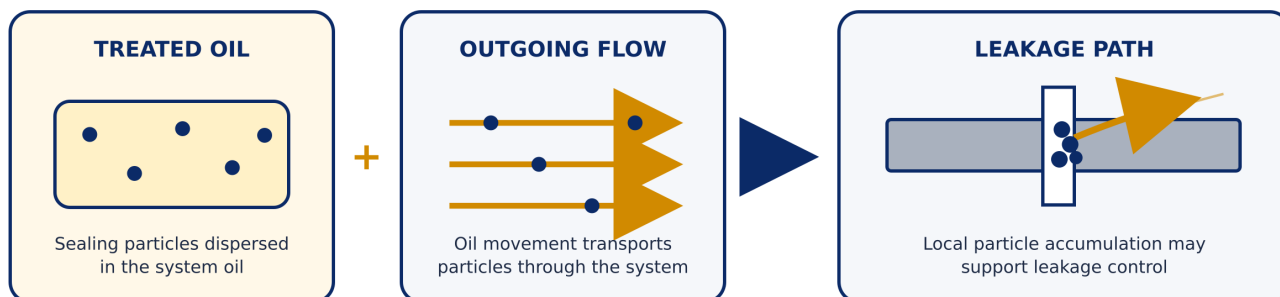
Normal pressure and temperature; filtration arrangement; oil appearance and service history.

i **MECHANICAL LIMITATION**
ST Seal Core is an operational treatment for suitable leakage cases. It does not remove the need for physical inspection or repair where system or seal condition requires mechanical intervention.

SECTION 3

Product function and technical limitations

The treatment relies on outgoing oil flow and controlled circulation - not on an artificial pressure increase.



Treated oil + outgoing flow → transport to the leakage path → local accumulation

Treatment mechanism

ST Seal Core is dispersed into the system oil through the specified premixing process.

Controlled oil circulation carries the dispersed particles through the relevant treatment circuit.

At an outgoing leakage path, oil flow transports particles towards the damaged seal interface.

Under suitable conditions, particles may accumulate at the leakage area and support formation of a sealing barrier.

What influences the response

SYSTEM	CONDITION	OPERATION
Seal arrangement, treatment boundary, circulation path and header-tank configuration.	Damage severity, leakage direction, leakage rate, oil condition and filtration.	Pressure, temperature, shaft state, operating profile, mixing quality and monitoring.
i	PRESSURE CONTROL Do not increase pressure solely to accelerate treatment. Excess outward flow may increase leakage and transport treatment out of the system before a stable response develops. Use only the pressure range stated in the Treatment Plan and remain within applicable vessel, OEM and seal-maker limits.	
i	PERFORMANCE A response cannot be guaranteed. Results depend on the actual system, seal condition, oil, filtration, operation and correct execution.	

SECTION 4

Filter assessment and temporary management

Filter action is system-specific and should be stated in the Treatment Plan. The vessel's responsible technical personnel confirm that the selected arrangement is suitable for the system and vessel procedures.

Filters in the treatment circulation path may retain part of the sealing-particle fraction. However, a filter may also perform a critical contamination-control or safety function. The decision must therefore be system-specific.

ACTION	WHEN IT MAY APPLY	VESSEL CONFIRMATION
KEEP	The filter can remain in service without preventing the stated treatment approach.	Record the selected arrangement in the Treatment Plan.
REMOVE	Temporary removal is technically permitted and consequences of unfiltered operation are understood.	Confirm suitability under vessel procedures and state a reinstatement trigger.
BYPASS	A controlled bypass exists and is permitted for the defined treatment period.	Confirm suitability under vessel procedures and state monitoring and return-to-normal triggers.

Before changing the filter configuration

- Identify every filter in the relevant circulation path and record location and nominal rating.
- Confirm whether it performs a safety-critical or essential contamination-control function.
- Confirm that vessel procedures, system design and relevant OEM guidance permit the planned action.
- Record the responsible person, maximum unfiltered period and exact reinstatement trigger.

During and after a temporary change

- Monitor pressure, temperature, oil condition and system behaviour at the intervals stated in the Treatment Plan.
- Reinstate the filter at the trigger stated in the Treatment Plan - not at an assumed standard time.
- Inspect the filter after reinstatement and record unusual restriction or retained material.



DO NOT REMOVE BLINDLY

If suitability, consequences or reinstatement criteria are unclear, keep the normal filter configuration and obtain technical clarification before treatment.

SECTION 5

Treatment liquids and preparation

Two controlled mixtures keep the initial treatment separate from subsequent level restoration.

MIXTURE	COMPOSITION	PURPOSE	CONTROL RULE
A. Initial Treatment Premix	Initial ST Seal Core quantity (normally 7% of relevant system volume) premixed 1:1 with system oil.	Primary treatment added at the start, as one addition or in stages stated in the Treatment Plan.	Use only the quantity stated in the Treatment Plan.
B. Treatment Top-Up Mix	Actual refill volume containing 3.5% ST Seal Core and 96.5% system oil. The Onboard Top-Up Reserve is the ST Seal Core quantity held for preparing this mix.	Restores the header tank from the actual level to normal operating level when the stated trigger occurs.	Use only the actual refill volume required. Any unused ST Seal Core remains reserve product.

Prepare the treatment premix

Use a clean, suitable mixing container and clean mixing equipment.

Add the ST Seal Core quantity stated for the batch.

Add the volume of system oil stated in the Treatment Plan and mix until homogeneous.

If several batches are required, maintain the stated premix ratio in every batch.

Label A clearly. Keep the ST Seal Core allocated for B separate until a top-up is required.

Container labels

A INITIAL TREATMENT Product: ____ L Premix oil: ____ L (1:1)	B TREATMENT TOP-UP MIX Planned refill: ____ L ST Seal Core reserve: ____ L Mix only the actual refill required: 3.5% product / 96.5% system oil
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SECTION 6

Application sequence and technical reasoning

Use the Quick Guide at the worksite. Use this page to understand why each controlled step exists.

STEP	CONTROLLED ACTION	WHY IT MATTERS
1	Review the Treatment Plan with the vessel's responsible technical personnel. Confirm that quantities, operating conditions, filter arrangement and monitoring points are clearly understood.	Prevents assumptions about quantity, filter action, operation or triggers.
2	Apply the filter action specifically selected in the Treatment Plan.	Balances treatment transport with system protection requirements.
3	Prepare the complete Initial Treatment Premix at the stated 1:1 ratio. Keep the calculated Top-Up Reserve separate.	Prevents reserve product from being confused with the initial treatment quantity.
4	Lower the header tank only to the target stated in the Treatment Plan and confirm receiving capacity.	Confirms that the Initial Treatment Premix can be received without exceeding the normal level or system limits.
5	Add the Initial Treatment Premix as one addition or in the stages stated in the Treatment Plan.	Controls level, capacity and treatment allocation.
6	Begin controlled operation under the exact conditions stated in the Treatment Plan.	Establishes the specified circulation path without changing sailing status or pressure outside vessel procedures.
7	Monitor leakage, tank level, actual refill volume and operating parameters before treatment, after 1, 6 and 24 hours, and daily if treatment continues.	Provides the evidence required for restoration, follow-up or escalation decisions.
8	Restore to normal level with Treatment Top-Up Mix when a stated trigger occurs. Use only the calculated reserve against actual oil loss.	Maintains the specified refill concentration without creating an uncontrolled second dose.
i	TARGET LEVEL - NOT 'EMPTY THE TANK' Do not empty a tank or system section unless the Treatment Plan states that action and the vessel's responsible technical personnel confirm it is suitable. The target level is stated in the Vessel Treatment Plan.	

SECTION 7

Controlled operating conditions

'Operate the system' means the vessel and shaft condition stated in the Treatment Plan and confirmed by the vessel's responsible technical personnel.

CONTROLLED VARIABLE	WHAT THE TREATMENT PLAN SHOULD STATE
Vessel condition	Alongside, anchored, underway or another stated condition.
Sailing permitted	Yes, no or conditional. The treatment documents are not an independent permission to sail.
Shaft condition and speed	Stopped, turning gear, low RPM, service RPM or another stated operating condition.
Controlled operation period	At least 30 minutes to establish circulation, unless the Treatment Plan states a longer period or different operating condition.
Pressure	Normal operating pressure within applicable vessel, OEM and seal-maker limits. For water-ingress cases only, the Treatment Plan may state a controlled outward differential pressure of 0.2-0.4 bar above hydrostatic seawater pressure.
Temperature	Applicable range or limit and the monitoring requirement.
Monitoring and responsibility	Observation interval, responsible person and any operating restrictions.

Circulation - not simply 'normal operation'

The treatment must be carried through the relevant system towards the outgoing leakage path. Depending on vessel and seal arrangement, the stated condition may be alongside, anchored or underway. The required condition cannot be inferred from the phrase 'continue normal operation'.

!	VESSEL OPERATION The Treatment Plan does not determine whether the vessel may sail. Sailing and changes to shaft condition remain the responsibility of the vessel's responsible personnel under vessel procedures.
i	NO PRESSURE ACCELERATION Do not raise pressure solely to force treatment towards the seal. Remain within applicable vessel, OEM and seal-maker limits stated in the Treatment Plan.

Stop and clarify before operation when

- sailing status, shaft condition or pressure range is blank or ambiguous;
- the intended operating condition conflicts with vessel procedures or OEM guidance;
- the system cannot establish the specified circulation path; or
- abnormal system behaviour is present before the treatment begins.

SECTION 8

Monitoring and decision logic

Record actual observations under comparable operating conditions and follow the Vessel Treatment Plan.

Establish a measurable before-treatment reference

i	RECOMMENDED LEAKAGE-RATE BASIS Record the measured oil loss in litres and the measurement period in hours. Calculate the rate as: $L/day = \text{measured loss (L)} \div \text{measurement period (h)} \times 24$. Retain the raw measurement with the calculated rate.
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Record during treatment

Leakage	Measured loss, measurement period and calculated rate.
Header tank	Actual level, normal/percentage/alarm state and time of any restoration.
System	Pressure, oil temperature, oil condition and relevant alarms.
Operation	Vessel condition, shaft speed/state, time and quantity of any Top-Up Mix additions.

Two separate decisions

DECISION	TRIGGER	ACTION
Restore normal tank level	Whichever stated restoration trigger occurs first: leakage stops, the minimum operating level is reached or another stated trigger occurs.	Use Treatment Top-Up Mix at 3.5% of the actual refill volume. Record quantity and time.
Insufficient treatment response	No positive trend at the stated evaluation point, or conditions change unexpectedly.	Stop uncontrolled dosing. Contact AddVation and reassess the plan and mechanical condition.

Escalate immediately when

- leakage rises rapidly or the header-tank level cannot be maintained;
- pressure, temperature, vibration, noise, oil appearance or alarms become abnormal;
- the operating condition changes so measurements are no longer comparable; or
- a required action would fall outside the conditions stated in the Treatment Plan.

SECTION 9

Troubleshooting, completion and handback

Do not correct uncertainty with repeated dosing. Reassess the system and update the Treatment Plan when required.

OBSERVATION	CONTROLLED CHECK	NEXT ACTION
Premix is not homogeneous	Confirm workable temperature, clean equipment, the stated batch ratio and adequate agitation.	Mix smaller batches. Do not add visibly non-homogeneous premix.
Receiving capacity is insufficient	Recheck normal level, stated target level, available receiving capacity and planned Initial Treatment Premix quantity.	Stop. Use only the staged addition specifically defined in an updated plan.
Leakage appears higher	Compare pressure, shaft condition and measurement period with the before-treatment reference.	If the increase is confirmed or abnormal, stop and escalate.
Filter restriction increases	Follow vessel procedures and record filter action, rating and retained material.	Restore the normal configuration and obtain technical review before continuing.
No clear response	Verify system volume, initial 7% quantity, 1:1 premixing, filtration, circulation path, measurement quality and recorded top-up use.	Complete the log. Do not add reserve product as an uncontrolled second dose; reassess the mechanical condition.

Treatment completion

Initial Treatment Premix applied and the stated controlled operation period completed.

Filter decision, restoration trigger and any Treatment Top-Up Mix addition documented.

First, primary and final evaluations completed as required by the Treatment Plan.

Follow-up decision and any required Top-Up Mix addition documented.

Final tank level, operating condition, outcome and deviations recorded.

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COMPLETED TREATMENT PLAN

Send a scan or mobile picture of the completed Treatment Record page (page 2) to info@addvation.com.

Important limitations

For mineral oil-based lubricants only. Do not exceed vessel, OEM or seal-maker limits. Filter changes, vessel operation and pressure changes remain subject to vessel procedures and responsible technical personnel. Do not add uncontrolled product or repeat treatment outside the conditions stated in the Treatment Plan. Severe or uncontrolled leakage may require physical intervention.

This guide is provided in good faith as general technical guidance. The Vessel Treatment Plan is based on customer-supplied information and does not constitute certification of system compatibility. The vessel owner/operator remains responsible for confirming system, seal, lubricant and OEM compatibility and suitability before application, and for safe vessel operation and compliance with applicable requirements.

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DOCUMENT CONTROL
AG-STSC-OL-011
20 August 2026