

Two-stroke

Copenhagen, February 2026

Action code: AT FIRST OPPORTUNITY

Cavitation in hydraulic push rod for exhaust valve

Concerns

Owners and operators of Everllence B&W two-stroke marine combustion engines.
Types: Engines S/G70ME-C10.5 and G80ME-C10.5/6 with the new XV3-type exhaust valve.

Summary

Recently, we have observed an increase in reported cases of cavitation in the hydraulic push rod for the exhaust valve. In few cases, this has led to substantial consequential damage for S/G70ME-C10.5 and G80ME-C10.5/6 engines fitted with the new XV3-type exhaust valve.

Purpose

The purpose of this Service Letter is to increase awareness of the cavitation phenomenon, provide operators with guidance on best practices for early detection of potential issues, and reduce the risk of substantial consequential damage. This Service Letter therefore highlights:

1. Best practice for minimising the risk of cavitation-related damage
2. Recommended actions when cavitation is suspected in the hydraulic system

Action

Everllence is acting to reduce the risk of cavitation in the affected engines.

Contact details

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Reporting observations

A template is available for reporting cavitation-related observations. To obtain the template use SL2026-780@Everllence.com

References

[SL2024-757](#), 6645-0270 Description, 2265-0201 Work Card, 4565-0101 Work Card

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Introduction

Recently, there has been an increase in reported cases of cavitation in the hydraulic system for the exhaust valve for engines fitted with the new XV3-type exhaust valve spindle. Cavitation within the hydraulic system can lead to particle accumulation, clogging throttle valves and orifices in the exhaust valve, and therefore poses a risk for substantial damage. We recommend following the best practice and countermeasures described in this Service Letter.

If in doubt, it is possible to determine the exhaust valve type based on the flowchart in [SL2024-757](#).

Best practice for minimising the risk of damage as a result of cavitation

Particle buildup and clogging of components (throttle valves and orifices) within the exhaust valve assembly due to cavitation, may result in a knocking sound from the exhaust valve and an elevated temperature of the oil in the push rod. The knocking sound is a sign of hard metal contact, either during the opening or closing stroke. Both scenarios pose a risk for damage, so we recommend reading the explanations and following the advised countermeasures in this Service Letter.

The following is divided into two sections:

Section 1: Best practice for minimising the risk of cavitation-related damage, i.e. a checklist for monitoring components and parameters for signs of potential cavitation.

Section 2: Actions/countermeasures when cavitation is suspected in the hydraulic system. Section 2 should be combined with the flowchart in Appendix 1, which gives operational guidance regarding the appropriate action when hydraulic cavitation is suspected based on observations according to Section 1.

1. Checklist for monitoring components and parameters for signs of potential cavitation

Table 1 provides a checklist to be used regularly during engine operation for monitoring changes related to cavitation in the hydraulic system. If cavitation is suspected, perform daily checks.

Item	Check/monitor	Reference
Oil cylinder top	Measure the temperature on the outside of the oil cylinder top using an infrared thermometer. If throttle valve and/or position orifice is blocked, the temperature will be 10–15°C higher than normal	- Fig. 1 - Appendix 2
Main operating panel (MOP)	Check HCU events in the MOP, make manual dumps, and compare these with earlier dumps	- 6645-0270 Description - Appendix 3
Exhaust valve	- Verify opening and closing strokes on MOP/HCU events/CoCos - Check for knocking sounds – the XV3 valve cannot withstand continuous knocking	

Table 1: Monitoring items/parameters for changes related to cavitation

2. Actions/countermeasures when cavitation is suspected in the hydraulic system

This section combined with the flowchart in Appendix 1 gives operational guidance based on observations from Section 1.

Exhaust valve and components, which may show signs of cavitation:

1. Exhaust valve (Table 2)
2. Hydraulic high-pressure pipe for exhaust valve (Table 3)
3. Exhaust valve hydraulic oil cylinder (90-degree bore, throttle valve, position orifice, hydraulic piston, and orifice on damper piston) (Table 4, Figs. 1 and 2)
4. Air cylinder (non-return valve and safety valve) (Table 5, Fig. 3)
5. Exhaust valve actuator (Table 6, Fig. 4)

Checklists for inspecting these components.

1. Exhaust valve

Item	Check	References
Exhaust valve	When a knocking sound is confirmed, inspect throttle valve orifice and actuator damper piston	2265-0201 Work Card

Table 2: Exhaust valve – items to check

2. Hydraulic high-pressure pipe for exhaust valve

Item	Check	References
High-pressure pipe	Dismantle and inspect for cavitation using an endo-scope of good quality	Appendix 4

Table 3: High-pressure pipes – items to check

3. Exhaust valve hydraulic oil cylinder

Item	Check	References
90-degree bore	Check inlet bore for cavitation	Figs. 1 and 2a
Throttle valve (below lifting eye)	<ul style="list-style-type: none"> - Check if oil level is above throttle valve - Inspect for metal particles around orifice and seating - Unscrew throttle valve and check movement - Disassemble throttle valve, verify if orifice hole is blocked by particles 	Figs. 1 and 2b
Position orifice	Verify whether orifice hole is blocked by particles	Figs. 1 and 2c
Hydraulic piston, damper piston, and orifice	<ul style="list-style-type: none"> - Dismantle piston from oil cylinder - Inspect oil cylinder bore for scuffing marks - Inspect the actuator piston for wear, scuffing, etc., including piston rings - Ensure that damper piston moves freely - Verify whether orifice hole in top of damper piston is free from particles 	Figs. 1 and 2d/2e

Table 4: Exhaust valve hydraulic oil cylinder – items to check

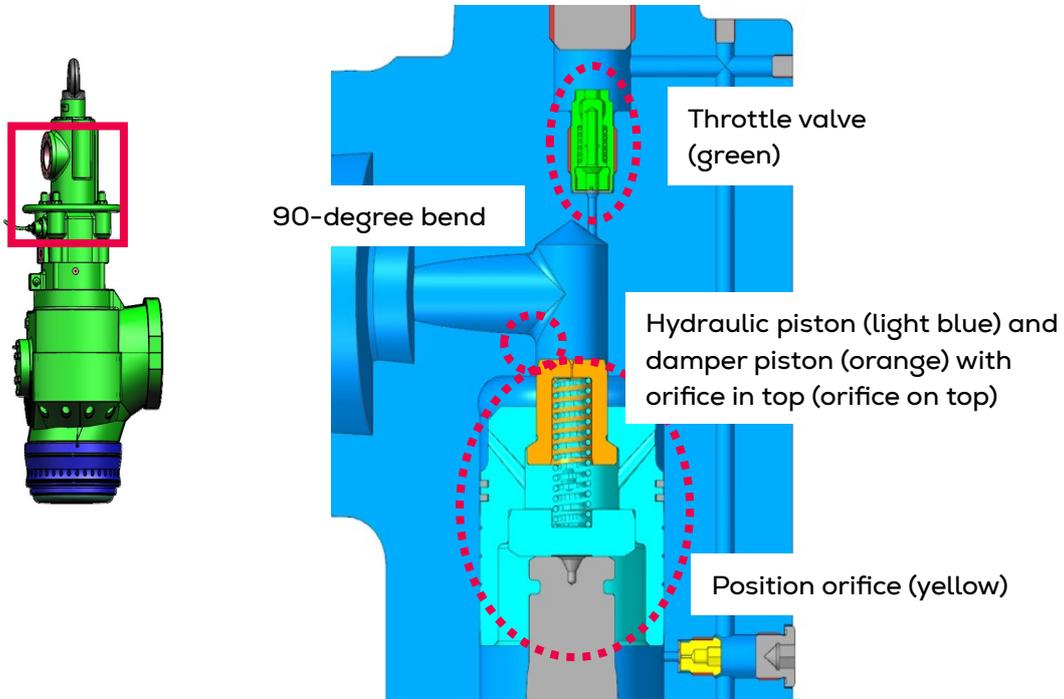


Fig. 1: Critical components to inspect: 90-degree bend, throttle valve, hydraulic piston, orifice on top of damper piston, and position orifice

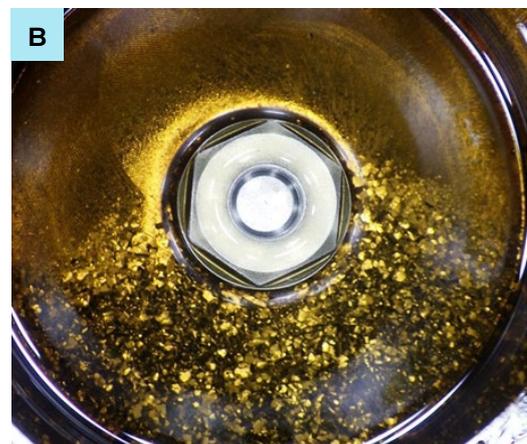
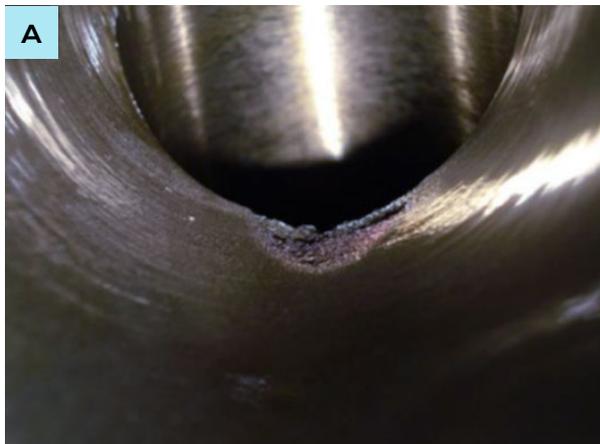


Fig. 2: Examples of a) Cavitation in 90-degree bend, and b) particles in throttle valve, c) clogged position orifice, d) particles in hydraulic piston and damper piston, and e) scratched oil cylinder

4. Air cylinder

Item or function	Check/adjust	References
Dropdown test	Tightness, seals	2265-0201 Work Card Appendix 1
Non-return valve	- Air inlet: 7 bar - Open/close function	Fig. 3a
Safety valve	Check setting according to manual. The XV3 exhaust valve is sensitive to incorrect settings.	Fig. 3a
Lift the oil cylinder	- Inspect for debris from cavitation - Check the condition of cylinder running surface	Fig. 3b (near O-ring) 2265-0201 Work Card

Table 5: Air cylinder – items to check

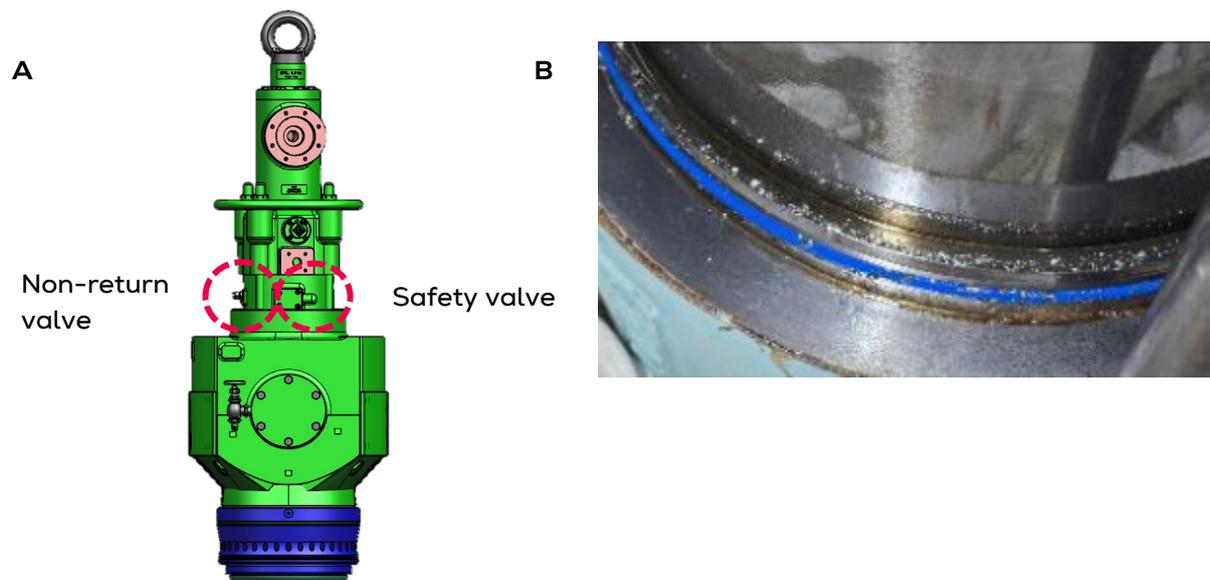


Fig. 3: a) Non-return valve and safety valve and b) Mating area between oil and air cylinders

5. Exhaust actuator

Items	Check	References
Exhaust actuator	- Inspect running surfaces of housing and step 2 piston, debris from cavitation can cause scuffing and scratches - Imprint marks may appear on the top cover; however, even if pronounced, they are considered purely cosmetic - For <u>normal</u> exhaust valve stroke, remove only top cover for actuator inspection. <u>Do not remove pistons, even if scratch marks are found</u> – a well-running actuator will continue to run if scratch marks stay aligned - For <u>reduced</u> exhaust valve stroke, dismantle pistons and recondition running surfaces by slightly grinding the surface	- 4565-0101 Work Card - Fig. 4 - Appendix 1

Table 6: Exhaust actuator – items to check

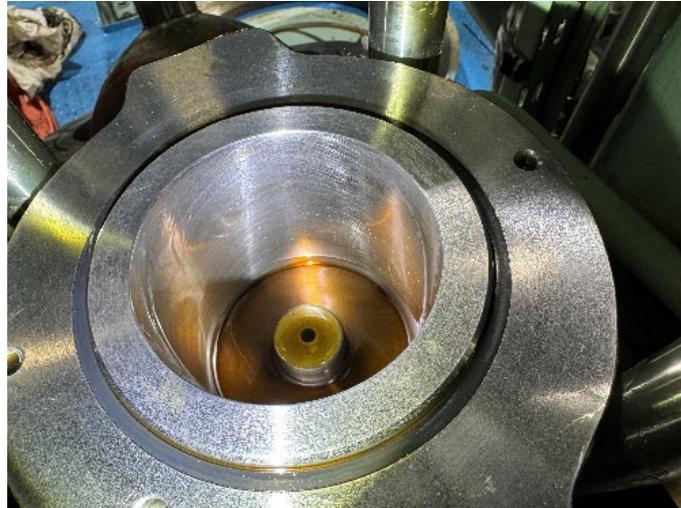


Fig. 4: Exhaust valve actuator housing

If you have further questions to this Service Letter use SL2026-780@Everllence.com

Supporting documents

- Appendix 1: Flowchart with operational guidance when hydraulic cavitation is suspected
- Appendix 2: Exhaust valve oil cylinder – temperature measurement position and measurement sheet example
- Appendix 3: Troubleshooting – hydraulic cylinder unit (HCU) events: Examples of exhaust valve movement in HCU dumps
- Appendix 4: Guide for evaluating exhaust valve high-pressure pipe condition

Yours sincerely,

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Appendix 1

If hydraulic cavitation is suspected, follow the flowchart in Fig. 5 for operational guidance.

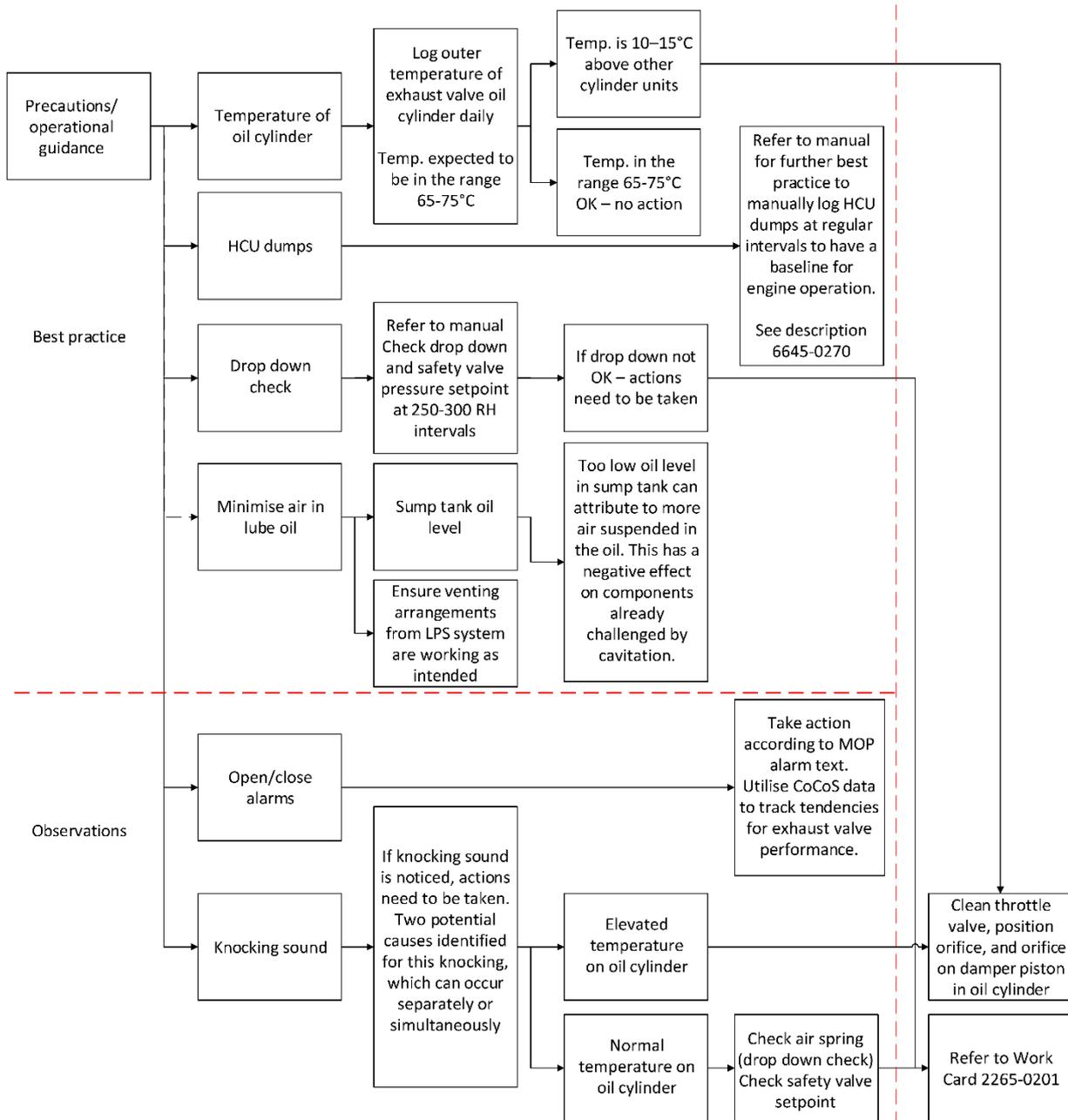


Fig. 5: Flowchart (LPS=low-pressure supply)

Appendix 2

We recommend measuring the oil cylinder temperature daily using a log sheet, see an example in Table 7. Make a mark on each unit to measure the temperature in the same location at each inspection, see Fig. 6 for correct position.

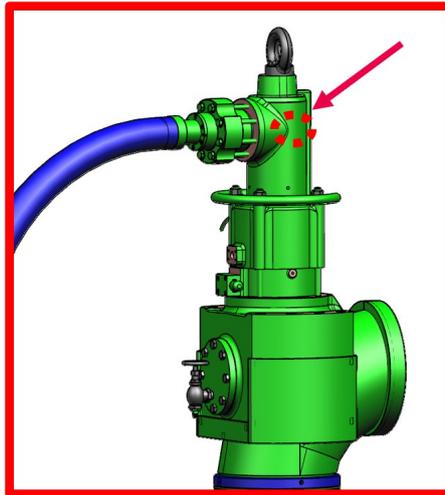


Fig. 6: Position for temperature measurement

Temperature log							
Date	Engine load	Cyl. 1	Cyl. 2	Cyl. 3	Cyl. 4	Cyl. 5	Cyl. 6

Table 7: Temperature measurement sheet – example

Appendix 3

Troubleshooting – HCU events: Examples of exhaust valve movement in HCU dumps.

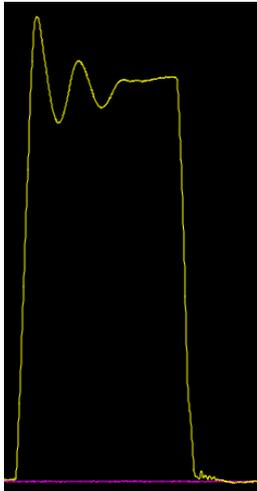


Fig. 7: Air trapped in top of oil cylinder
Throttle valve and position orifice completely blocked by small metal debris, spindle bouncer in open position, reduced opening stroke, closing damper disturbed.



Fig. 8: Air trapped in top of oil cylinder
Throttle valve or position orifice partly blocked by metal debris.

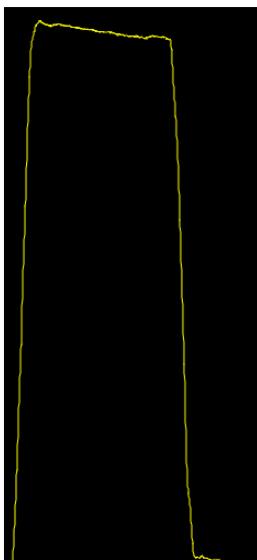


Fig. 9: For comparison – HCU dump showing normal exhaust valve opening/closing

Appendix 4

Guide for evaluating the condition of the exhaust valve high-pressure pipe based on the cavitation severity. Table 8 and Figs. 10–12 illustrate the categorisation of cavitation in four stages.

Stage 1	No cavitation - Accepted for unlimited use
Stage 2	Changes in surface defined as light cavitation or alterations to surface - Depth of cavitation evaluated to less than 1 mm - Reinspect pipe frequently - Can be accepted for unlimited use
Stage 3	Slight to medium cavitation - Depth of cavitation evaluated to between 1 mm and 3 mm - Reinspect pipe frequently - Can be used within a limited period of 2–6 months
Stage 4	Heavy cavitation - Depth of cavitation evaluated to be more than 3 mm - Exchange the pipe

Table 8: Categorisation of high-pressure pipe cavitation in four stages

Stage 2 cavitation

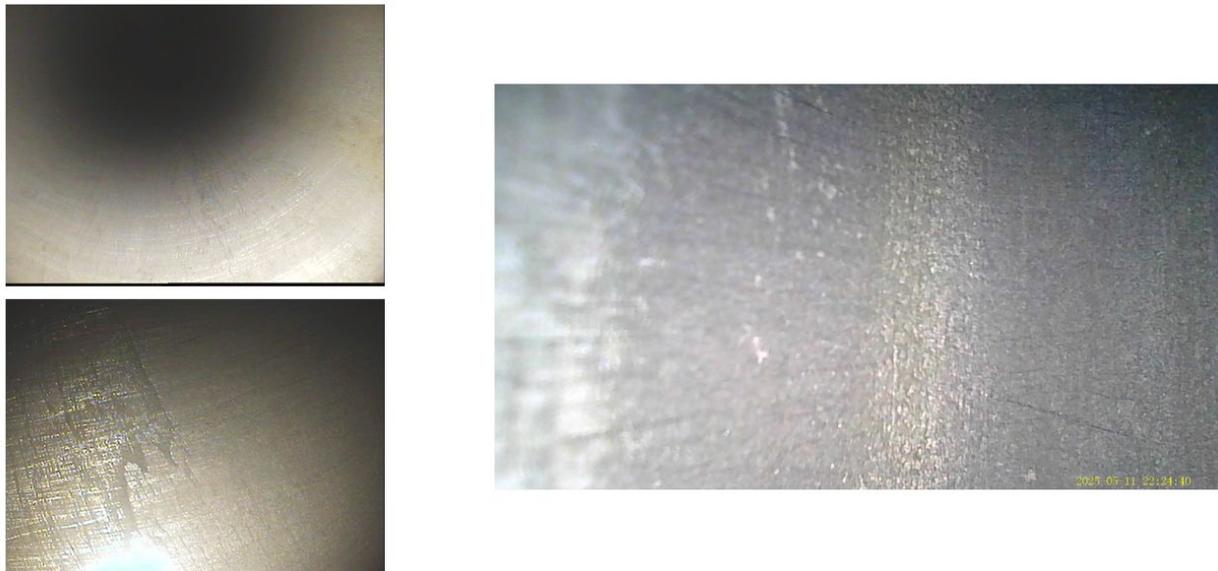


Fig. 10: Changes in the surface that are defined as light cavitation, or alterations to the surface

Stage 3 cavitation

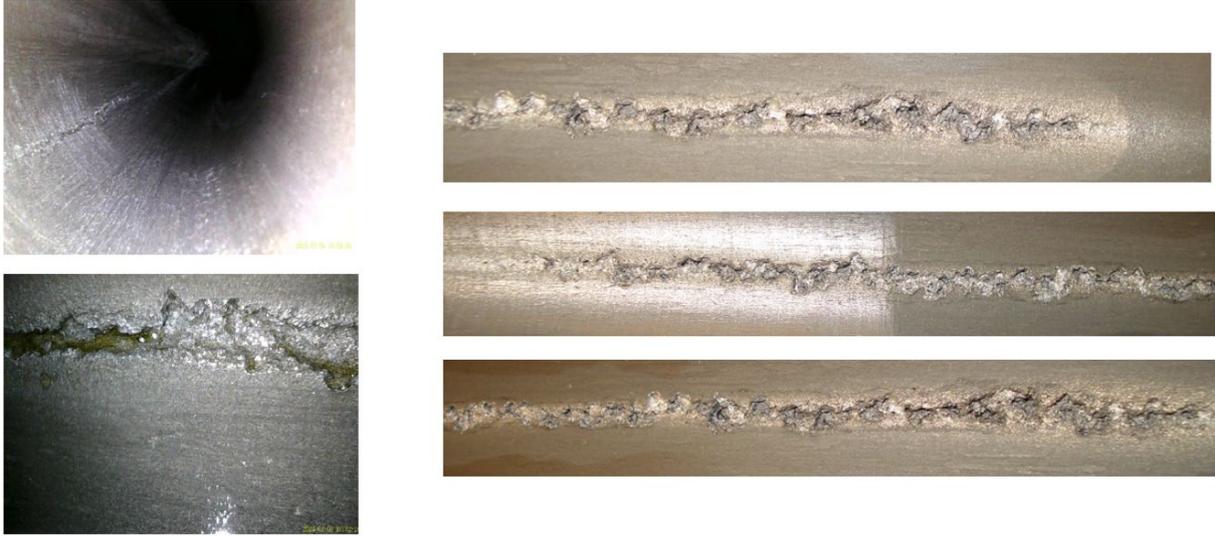


Fig. 11: Slight to medium cavitation

Stage 4 cavitation

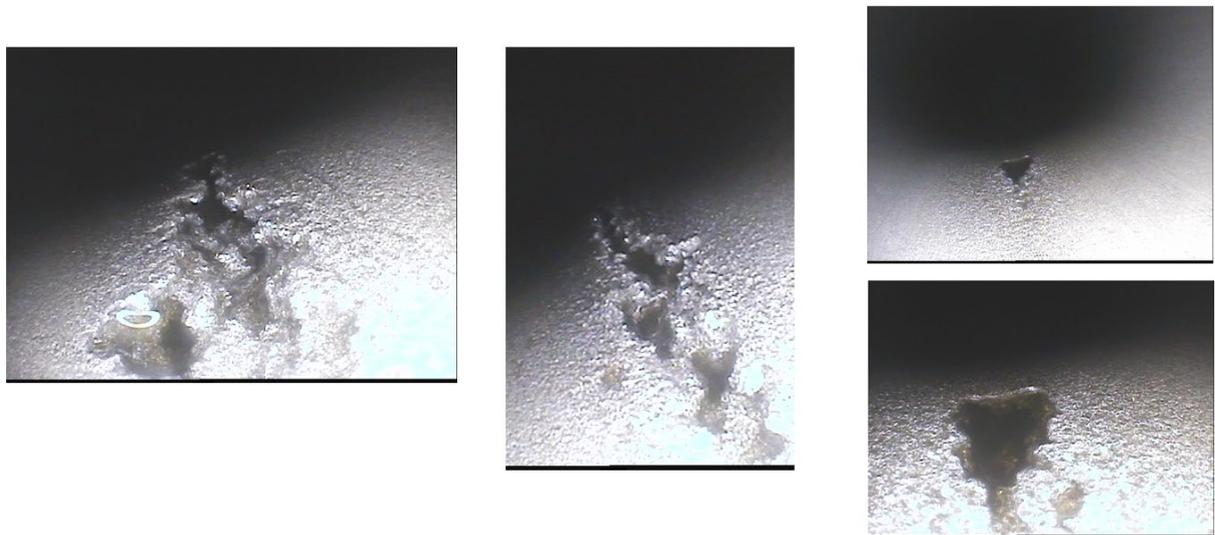


Fig. 12: Heavy cavitation