Condensation water formation in the charge air duct

This Service Information is primarily intended for customers whose ships are equipped with MaK M 43 and M 43 C (in-line engines only) main propulsion plants and frequently operated in tropical climate.

Operating an engine in tropical climate, particularly under high load, may lead to an extreme formation of condensation water in the charge air cooler. This may cause corrosive damage to important engine components such as charge air cooler, engine housing, and inlet valve stems and seat rings which, in turn, will affect their operational safety.

We, therefore, recommend to watch out for the formation of condensation water during engine operation.
In case of an extreme amount of condensation water in the charge air duct, which can be recognized by water leaking out of the two permanently open water detection points on the engine (see figure 1) we recommend to raise the charge air temperature so that no more condensation water will be visibly leaking out.

Figure 1: Water detection points at free and driving end

When doing so, please take into account that an increase in charge air temperature will also subject engine components to higher thermal load and that limits such as charge air temperature at engine inlet and exhaust gas temperature after turbocharger must not be exceeded.

As a basic rule, efforts should be made to operate the engine at the minimum charge air temperature of 45 °C in order to reach optimal operating conditions regarding engine consumption values, emissions, and component life. If an adjustment of charge air temperature should become necessary, the maximum permissible charge air temperature of 55 °C must not be exceeded. If this measure is not sufficient, the engine power output is to be reduced correspondingly.
Please take note of the revised chapter A1.06. (Temperatures of the Operating Media) of the operating instructions and arrange for replacing this chapter in your engine documentations.

Furthermore, the following directions are to be observed.

If the LT cooling water system is equipped with a charge air temperature controller, the charge air temperature is adjusted by changing the setpoint of this controller. When doing so, the maximum charge air temperature of the engine of 55 °C must not be exceeded.

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If the LT cooling water system is equipped with a powered flap valve, the charge air temperature can be adjusted by throttling the LT cooling water flow preferably after charge air cooler (connection point C15) while observing the a.m. limits.
If, depending on local conditions, this measure should not be feasible, the charge air temperature can be adjusted by means of the shut-off valve before charge air cooler inlet (connection point C14) in small steps while observing the a.m. limits. Please note that when applying this throttling method a minimum cooling water pressure alarm may be triggered (shut-off valve nearly fully closed).

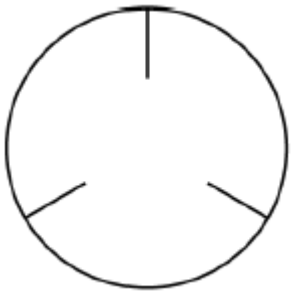

Figure 2

It may be helpful to change over the cooling water system to electronic charge air temperature control. This requires individual adjustments to the pipe system, an adjusting valve (CR1), and an electronic controller (see schemas of fig. 4 and 5).

In order to ensure proper function of the water separator at the charge air cooler, the compressed-air type condensate eliminators are to be regularly checked (see chapter A3.06.06.04). Typically, a charge air/water mixture will leak out at these devices at intervals. If charge air, water or a mixture of both should never or permanently leak out at these devices, please inspect and, if necessary, clean them. Please find in the following an excerpt from the product data sheet of the condensate eliminator that describes the measures that may become necessary (figure 3):

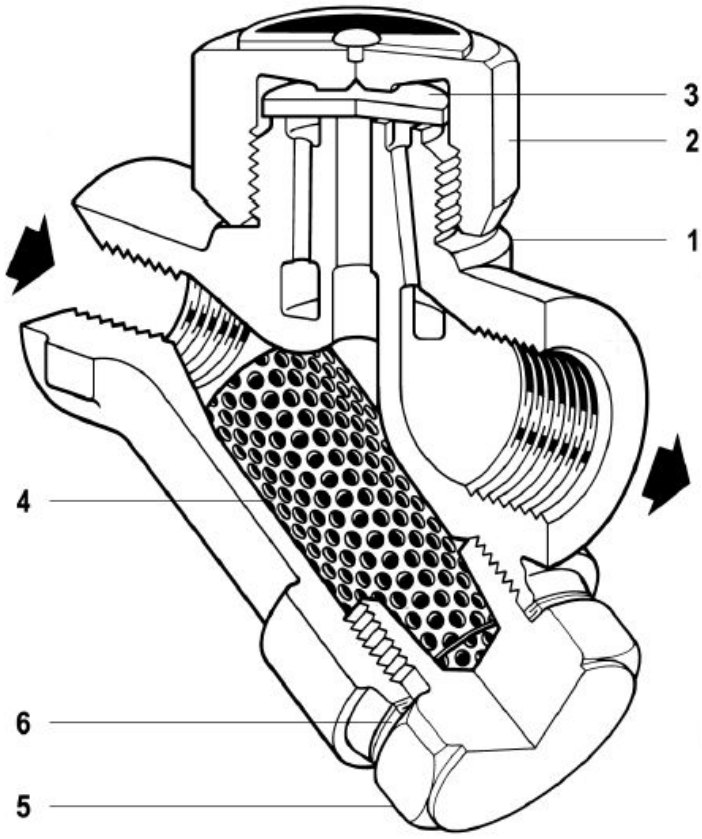

Figure 3

"One side of the valve head (3) is provided with a concentric slot. On the face ground other side of the valve head a small groove has been carved in. Upon delivery, the valve head is inserted in such a way that the concentric slot points towards the valve seat, and this arrangement is intended for operation under clean operating conditions. If during operation the valve head should be found to be "sticking" and the device not be working properly, turn the valve head and reinsert it with the concentric slot pointing

towards the cap. This may become necessary especially when the air is oily or contaminated. In extreme cases it may be required to deepen the groove or to carve in two additional grooves as shown in figure 2. The carved-in grooves should be long enough to extend beyond the two circular valve seat faces."

When fitting the device, please take note of the following torques:

Cap 2 M = 275 Nm using a high-temperature lubricating paste

Plug 5 M = 190 Nm

Schemas

Powered flap valve CR4
with connection point C14

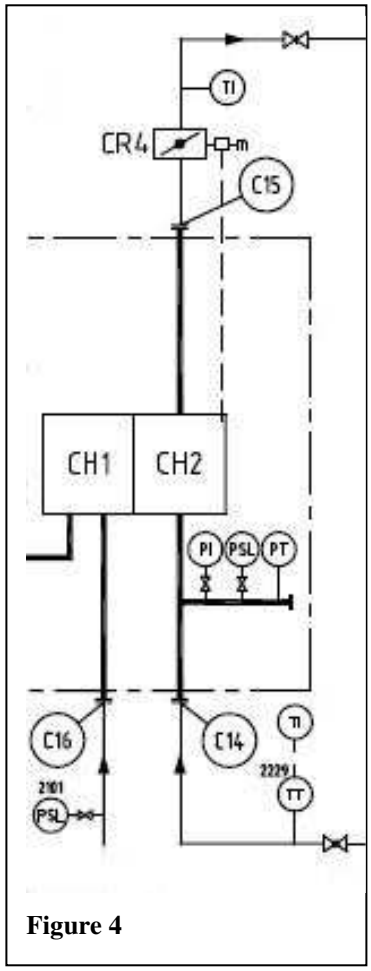

Figure 4

Charge air temperature control
with powered valve CR1

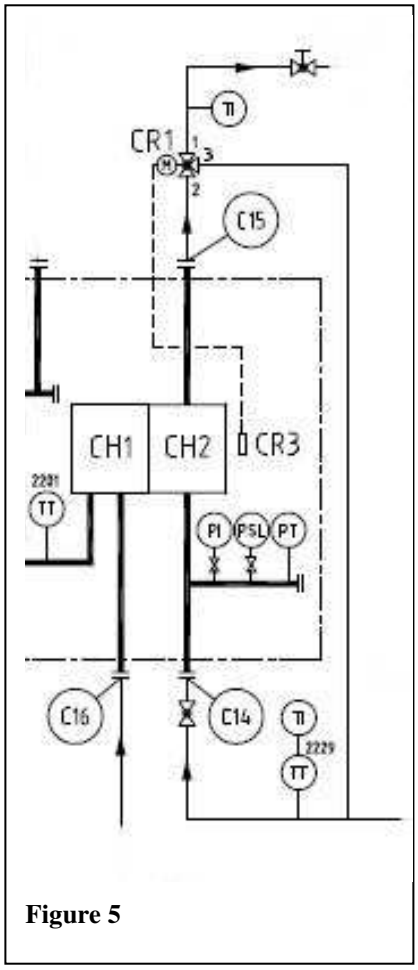

Figure 5