

YANMAR SERVICE NEWS

Title	Control of Cooling Water Temperature for HFO Spec. Generator Engines (Prevention of Low Temperature Corrosion)	No. : 01-2-G-1-005-0-Rev. 3 Date: June 2006
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Engine Models	N330, N280, N260, Z280, T260, T240, M220 M200, S185, 6N18, 6/8N21	Use	Marine Aux. Engines
		Engine Nos.	_____

In some of the HFO spec. engines, lube oil consumption increased, which derived from engine CW temperature being too low. In this relation, we would like to advise you of the appropriate control of CW temperature as follows:

When fuel containing sulfur content is burnt, nitrous acid gas, SO₂, is produced, which turns to nitrous anhydride, SO₃, in the expansion stroke when the temperature is lowered. Then, SO₃ further reacts with water vapor in the combustion gas and nitric acid vapor, H₂SO₄ is produced. The metallic faces of normal temperature under the gaseous nitric acid will not be corroded, but when the metallic faces of which temperature are under the dew-point temperature of nitric acid vapor contact nitric acid, liquid nitric acid, H₂SO₄, is produced and the metallic faces are corroded.

When the production of liquid nitric acid exceeds the acid neutralizing potency of lube oil, rings, liner and piston cause sulfuric corrosion, which largely shortens the service life of these parts. In addition, this causes the lube oil in the piston ring grooves to degenerate quickly and the detergent dispersion capacity of lube oil is lost, and as a result, the deposit of carbon sludge increases abnormally in the ring groove. The satisfactory functioning of the ring groove is lost and lube oil consumption increases consequently.


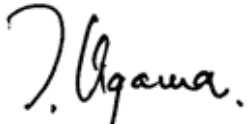

The higher the density of sulfur content, the higher dew-point temperature of nitric acid vapor. Accordingly, when using HFO, of which sulfur content density is higher than that in MDO, it is necessary to control the engine CW temperature most rigidly for maintaining the temperature of the combustion face at the upper part of the cylinder liner higher than the dew-point temperature of nitric acid vapor.

In the cases of past failures of the generator engines, operated on HFO, most troubles have occurred when the engine CW temperature at cylinder head outlet, at service load, was below 72~73deg. We, accordingly, recommend that the engine CW temperature be controlled as follows for preventing the service life shortening of cylinder liner, piston and rings due to sulfuric corrosion and LOC increase:

Maintain the engine CW temperature at cylinder head outlet over 75deg even during operation at low load.

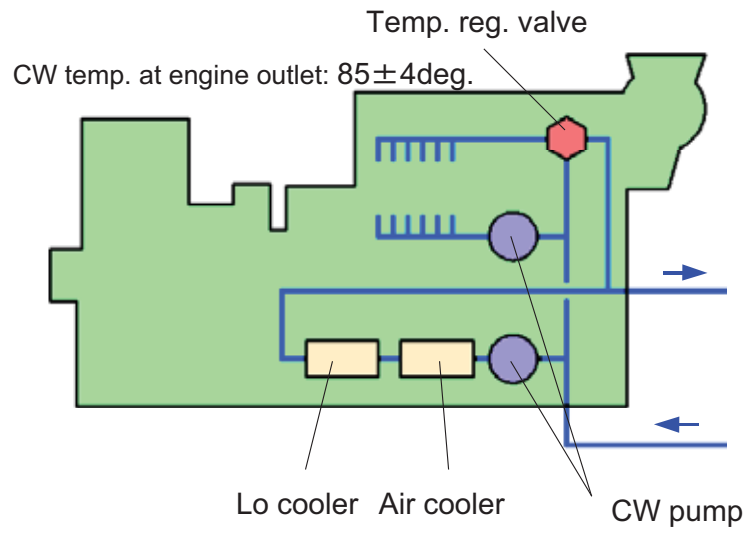
1. Mixing System Engines (Models 6N18, 6/8N21 Refer to Fig.1)
 In the mixing system engines, CW temp. control is conducted by the engine-mount temp. regulating valve (wax type) at engine outlet. The setting of the temp. regulating valve is 85±4deg. When the engine is operated at low load or when heat discharge is large, the CW temperature naturally drops, but there is no problem of sulfuric corrosion as far as the CW temperature at engine outlet is maintained over 75deg.

2. Engines with Freshwater/Freshwater Dual Cooling System (Engines other than those above. Fig.2)
 In most generator engines, CW temperature is controlled at engine inlet. The CW temp. setting at the engine inlet in this case is 70deg(or 75deg)based on the estimation of the CW temp. at engine outlet and including some allowance for operation at 100% output. With this setting, however, it is difficult to maintain the CW temperature at engine outlet over75deg during low load operation. We, accordingly, recommend that the CW temp. setting for the service load range from max. to min. load of your vessel be adjusted as follows:
Adjust the temp. setting of CW temp. regulating valve to 75~85deg at engine outlet for actual service load range.

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Engines w/Mixing System
(Models 6N18,6/8N21)

Fig. 1



Freshwater/Freshwater Dual Cooling System
(Engines other than w/Mixing System)

Fig. 2

