6.3.3 Cooling System—Provide a closed circulating cooling

system with an engine-driven centrifugal water pump or equivalent electric motor driven water pump[11]. System details given in Fig. A4.1 show cooling system modifications;

Fig. A4.2 shows coolant temperature, flow, and pressure

measurement locations; and Fig. A4.3 shows a water pump

bypass arrangement. See 6.3.3.5 regarding system cleaning.

6.3.3.1 Cooling System Modification—Modify the cooling

system as shown in Fig. A4.4.

6.3.3.2 Coolant Flow, Control and Measurement—Modify

the engine coolant lines from the cylinder head to the standpipe

in accordance with Fig. A4.1. As shown, the coolant line

(The note below is to be included as a superscript note. Adjustment of the numbering of superscripts after this section will be needed.)

[11]A suitable electric motor driven water pump from MP Pumps is recommended by Caterpillar. MP Part number: 30885, CF1PMP SS 3-3 56C 6.0 T-2100, stainless steel pump, 3hp e phase; 230/460 VAC motor.

contains (1) a calibrated Barco flowmeter, P/N BR 12705-16-

3111,12, 25.4 mm in diameter to measure the coolant flow and

(2) a P/N 1Y496 orifice, 15.797 mm in diameter before the

flowmeter to develop cooling system pressure and thereby to

eliminate coolant cavitation. Control coolant flow at (65 ±

2.0) L/min at Step 5 (see Table A10.1) by a bypass valve

downstream of the water pump, 19 mm in diameter. Replace

the production hose and the restrictive 90° elbows that connect

the bypass valve to the cylinder block by a Gates 20777

hose13,12 or equivalent (see Fig. A4.3). Measure the coolant

pressure at the block to ensure that proper cooling system

operation has been attained (see Fig. A4.2).

6.3.3.3 Engine Temperature Differential—As an indicator of coolant system performance, maintain the engine temperature differential (ΔT) (coolant temperature out of the cylinder head minus coolant temperature into the block) at (5.0 ± 1.0) °C.

Also control the coolant temperature out at (93 ± 2.5) °C. If original Caterpillar coolant heat exchanger (from 1Y0581 – Lines and Heat Exchanger Group) is replaced, an equivalent replacement heat exchanger must be used to meet all temperature and pressure specifications (coolant outlet temperature: 93°C ± 2.5°C; coolant delta temperature: 5°C ± 1°C; coolant inlet temperature: 88°C; coolant flow: 65 L/min ± 2 L/min; pressure drop across heat exchanger: 1.5 kPa maximum; coolant at jug pressure: 50 kPa)

6.3.3.4 Engine Coolant—The engine coolant is a mixture of 50/50 volume ratio of coolant (Caterpillar brand P/N 8C3684 in a 3.8 L container or P/N 8C3686 in a 200 L drum)14,12 to mineral-free water, the mineral content being ≤34.2 mg/kg of total solids in water. This coolant mixture may be used for up to six tests or three months, whichever comes first. Maintain the mixture at a 50/50 ratio of coolant to water and verify periodically with either a Caterpillar tester P/N 5P3514 or P/N 590957 or equivalent commercial tester. Keep the coolant mixture substantially free from solids contamination (total solids <5000 mg/kg) and at the correct additive level by checking with test kit P/N 8T5296.

[12] The sole source of supply of the Barco flowmeter (Venturi Meter) known to the committee at this time is P/N No. BR12705-16-31 from Aeroquip Co., Maddock Mechanical Industries, 833 N. Orleans, Chicago, IL 60610.
[13] If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.
[14] The sole source of supply of the Gates hose known to the committee at this time is P/N 20777, available from The Gates Rubber Co., 900 S. Broadway, Denver, CO 80217-5887.
[15] The sole source of supply of the antifreeze known to the committee at this time is Caterpillar Brand, P/N 8C3684 (1-gal) or P/N 8C3686 (55-gal drum), from Caterpillar Inc., P.O. Box 610, Mossville, Il 61552-0610.