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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

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NATO LETTER OF PROMULGATION

4 October 2013

1. The enclosed Allied Fuels and Lubricants Publication AFLP-3583, STANDARDS FOR DIFFERENTIAL PRESSURE GAUGES USED ON AVIATION FUEL FILTERS AND FILTER WATER SEPARATOR VESSELS which has been approved by the nations in the AC/112, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 3583.

2. AFLP-3583 is effective upon receipt.

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4. This publication shall be handled in accordance with C-M(2002)60.

Dr. Cihangir AKSIT, TUR Civ
Director NATO Standardization Agency

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Database for the complete list of existing reservations.

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RECORD OF SPECIFIC RESERVATIONS

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SECTION 1 INTRODUCTION

0101. Differential pressure gauges are installed on filter vessels to display the differential pressure across the filter elements. This information is used to determine when the filter elements are blocked and require changing. If DP readings are taken regularly and displayed graphically a trend can be observed and any deviations can then be fully investigated on the condition of the filter pack.

0102. Filters Water Separators (FWS) are designed to stop the transmission of particulate matter and free water. When they do so they become less permeable and resistance to fuel flow increases with a consequent rise in differential pressure. A rapid rise in differential pressure indicates that:

a. The filter has removed contamination, and
b. The fuel was contaminated.

In this situation the high DP readings will require the filter elements to be changed and an investigation into cause of the contamination. Under no circumstances should the filter elements be operated when the DP of the vessel exceeds the manufacturer's recommendations.

Where the DP readings are abnormally low or zero under fuel flow conditions this may indicate that:

a. The coalescer filter elements are not fitted correctly.
b. The filter elements are ruptured.
c. The DP gauge valves are in the test condition.

With the DP gauge reading below the normal operating range such as that indicated in Section 3, then the FWS is not to be operated in this condition and the fault is to be rectified before returning to service.

0103. It should be noted that the actual DP reading indicated by the gauge is the measured pressure across the vessel at the actual flow rate. This pressure requires correction as the maximum DP allowance is dependant on flow rate. This information is normally supplied by the manufacturer in the form of a graph and should be referred to in order to establish the Corrected Differential Pressure. A typical Filter Water Separator performance graph is illustrated at Section 3 and annotated with two of the following examples in the use of the chart.

a. A flow rate of 1200 liters/min (264 Imp Gal/min) flow rate will give a maximum Differential Flow Pressure of approx 0.75 bar (10.5 psi) before a filter element change is required.

b. Where as a flow rate of 1600 liters/min (352 Imp Gal/min) flow rate will give a maximum Differential Flow Pressure of approx 1 bar (14.5 psi) before filter element change is required.

SECTION 2 AGREEMENT

0201. Participating nations agree that when DP gauges are used they must meet the minimum requirements:

a. Differential pressure gauges of the piston type shall be installed on all new equipment and when modifying or refurbishing existing equipment. Dial and bourdon type gauges can be retained on existing equipment until defective or damaged.

b. The differential pressure gauges shall provide a direct reading of DP in multiple calibrations of psi and kPa across the filter or filter separator elements without manipulation of valves or subtraction of readings from two gauges. They must also be unaffected by positive and negative pressure surges and fitted with built-in gauge protection filter to 10 microns.

c. When DP gauges are employed on shipboard Filter Water Separators and Fuel Filters some nations do not allow use of continuous or direct visual read out pressure gauges at sea, therefore push button to read gauges will be employed in this case.

d. The gauges should be of rugged construction suitable for mounting on mobile and stationary filter vessels and able to operate up to a maximum operating pressure of 20.6 bar (300 psi). Materials of construction for the body shall be limited to Aluminium Alloy or Stainless Steel as non-ferrous materials such as copper and alloys containing 4% and above copper must not be used when in contact with fuel or its vapours. Piston type gauge tubes must be made of high strength glass tested to a minimum of 1,200 psi. The piston material must have similar thermal expansion characteristics to the glass and if not made of corrosion resistant material as mentioned above then it must be nickel plated to protect it.

e. The accuracy of differential pressure gauges used shall be such that any error shall not exceed $\pm$ 2 psi (0.1379 bar or 14 kPa) with scale graduated in 1 psi (0.06 bar or 7 kPa) steps. The accuracy requirements shall be met when the gauge is tested as follows:

(1) **Piston Type Gauge**. Each piston type gauge shall be subjected to a functional check with a test feature included, either as part of the gauge or an accessory such as:

(a) A push button test valve feature which will cause the gauge to move full travel under system pressure, checking for freedom of

the piston in the glass tube This test feature must be spring return to normal so that it cannot be left in the test position.

(b) With no flow through the system, check that the gauge reading is zero. With the system pressurized, close the downstream, or low pressure isolating valve. Slowly open the needle valve in the downstream leg to bleed off the pressure. The gauge piston should travel to full scale deflection. Close the needle valve and open the downstream isolating valve to bring the gauge back into operation.

(c) Alternatively where a 3-way valve is fitted, full scale deflection can be achieved by turning the valve to the exhaust position to depressurize the downstream side of the gauge.

(2) **Dial Gauge**. Each dial gauge shall be subjected to a pressure equal to the maximum scale pressure indicated on its dial, and held at this pressure for a maximum of 30 minutes. Within ten minutes after the pressure is released and without recalibration or adjustment, the gauge shall be calibrated over a cycle of differential pressures ranging from zero to the maximum scale pressure and back to zero. Readings shall be taken at not less than eight equal intervals over the entire scale. The Gauge shall be tapped sharply with the finger approximately the centre of the dial, before readings are taken. The gauge shall be calibrated with any throttling orifice plug or plugs removed.

(3) **Bourdon Tube Gauge**. For Bourdon tube gauges, instead of calibrating the gauge over a cycle of differential pressure ranging from zero to the maximum scale pressure, calibrating at the anticipated initial operating pressure and at the pressure specified as criteria for filter element, change will be acceptable.

(4) A dead weight tester, mercury manometer with air pressure, or calibrated check gauges shall be used in calibrating the gauge.

(5) The temperature of testing shall be with the gauge at a temperature of 20°C ± 5.60°C (68°F ± 10°F).

0202. Calibration check gauges and gauges on equipment shall be calibrated for accuracy against a standard traceable to national standards. The calibration of dial and Bourdon tube gauges shall be carried out at least annually. Calibration of the piston type gauge is not required.

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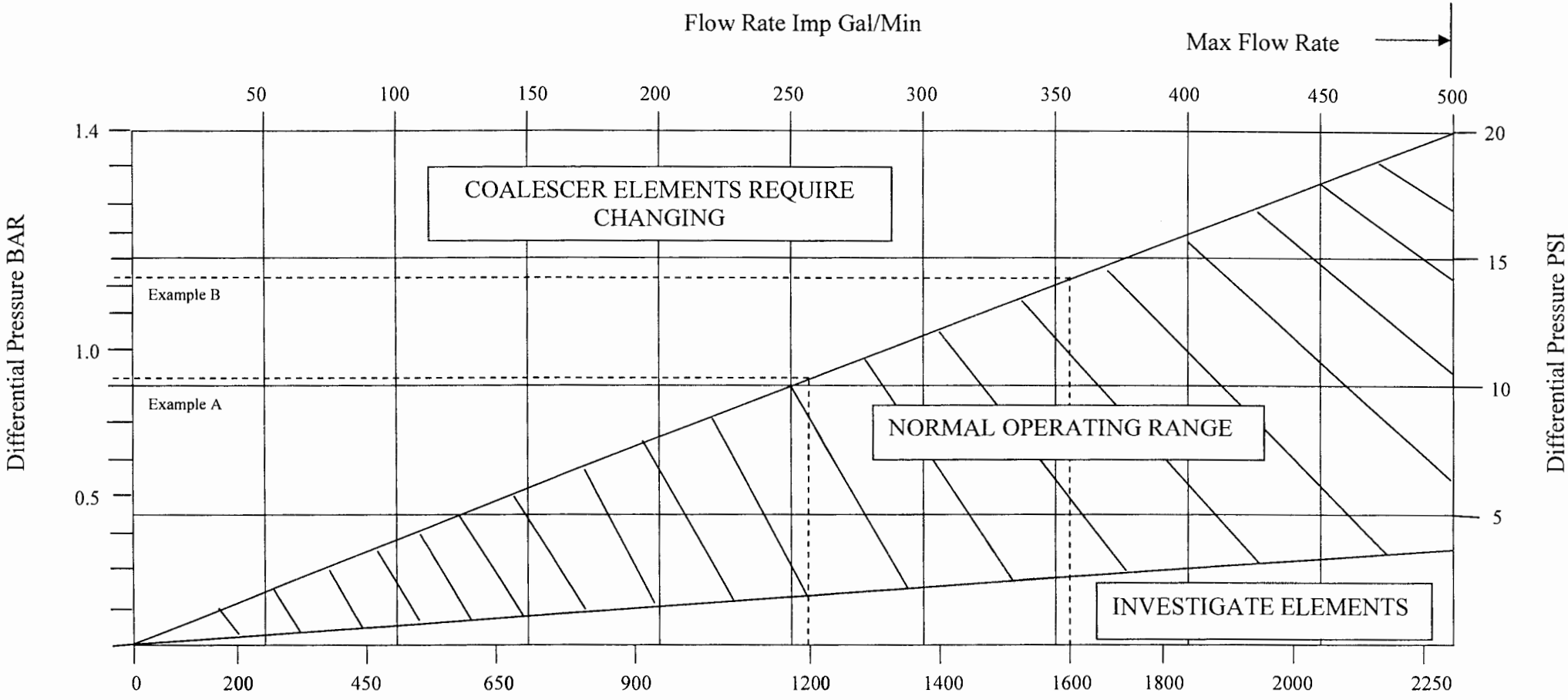
SECTION 3 TYPICAL COALESCER ELEMENT PERFORMANCE TABLE



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