NATO STANDARD

AFLP-2947

TECHNICAL CRITERIA FOR A CLOSE-CIRCUIT REFUELLING SYSTEM

Edition A Version 1

November 2016

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED FUELS AND LUBRICANTS PUBLICATION

Published by the
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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

30 November 2016

1. The enclosed Allied Fuels and Lubricants Publication AFLP-2947, Edition A, Version 1, TECHNICAL CRITERIA FOR a CLOSE-CIRCUIT REFUELLING SYSTEM, which has been approved by the nations in the PETROLEUM COMMITTEE (AC/112), is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 2947.

2. AFLP-2947, Edition A, Version 1, is effective upon receipt.

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

Edvardas MAŽEIKIS
Major General, LTUAF
Director, NATO Standardization Office

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RESERVED FOR NATIONAL LETTER OF PROMULGATION

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
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 Documents Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
GRC	STANAG will be applied only for AH-64A and CH-47D helicopters
ITA	IT will apply STANAG 2947 only for Helicopter AB-412.
NLD	a. AB 412: No reservations b. BO 105: Only gravity refuelling c. AL III: Only gravity refuelling d. Cougar Mk II: Only gravity and pressure refuelling e. Chinook CH47D: Only gravity and pressure refuelling f. Apache A and D: no reservations
SVK	SVK does not possess any helicopter with the closed circuit refuelling system, however SVK can provide refuelling for helicopters with closed refuelling equipment by the additional adaptors for interface
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CHAPTER 1: GENERAL REQUIREMENTS

0101. The closed-circuit refuelling system is intended for use on rotary wing aircraft not requiring the full provisions of STANAG 3105 because of limited fuel capacities. It shall be designed for fueling under pressure with optimum speed, minimum loss of fuel, and a high degree of safety.

0102. The main parts for a closed-circuit refuelling system will be a refuelling nozzle and a receiver mounted in the aircraft fuel system.

0103. The closed-circuit refuelling system must also have the ability for performing conventional open port or gravity fill dispensing of fuel and refuelling with the engines running.

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CHAPTER 2: DETAILS OF AFLP-2947

0201. **Closed-circuit refuelling nozzle.** The nozzle shall have a quick-disconnect on the inlet side and an automatic shut-off coupler for direct connection to a closed-circuit refuelling receiver mounted in the aircraft fuel system on the other side. Furthermore, there must be an internal pressure regulating device, a manually controlled on-off flow valve and a grounding cable assembly (Section 4 – Annex A). The nozzle shall be designed so that one man can easily couple it to an aircraft.

0202. **Coupler.** The nozzle shall include a quick-disconnect, automatic shut-off coupler suitable for connecting the nozzle to any receiver conforming to Section 4 - Annex B. The coupler shall automatically engage the receiver with a mechanical lock that eliminates the need for the operator to maintain any continuous manual holding force. When the nozzle is not coupled to a receiver, a seal that functions automatically shall make it impossible to initiate or maintain flow through the nozzle. Fuel spillage that may occur as the nozzle is uncoupled from the receiver shall not exceed 30 cm^3 (1.83 cubic inches) when the fuel flow control valve is closed or 150 cm^3 (9.15 cubic inches) when flowing at the maximum flow rate. The coupler shall include a dust plug or cap to prevent dust from entering that portion of the nozzle that engages the receiver. The dust plug or cap shall be adequately secured to the nozzle to prevent loss.

0203. **Pressure regulation.** The nozzle shall include an integral means to regulate the pressure at the interface between the nozzle and a closed-circuit receiver. The pressure regulator shall maintain the interface pressure of 104 kPa (15 psi) nominally for nozzle inlet pressures from 138 to 863 kPa (20 to 125 psi). When the nozzle is connected to a closed-circuit receiver discharging through a fixed orifice, the pressure regulator shall function as a means of flow regulation. When the nozzle inlet pressure is less than that required to produce an interface pressure of at least 104 kPa (15 psi), the pressure regulating device shall remain in the full open position. With the nozzle connected to a closed-circuit receiver and the flow control valve in the open position, it shall be possible to visually determine when the regulator has shut off the fuel flow.

0204. **Flow control valve.** The nozzle shall include a flow control valve that allows manual control of the flow rate from no flow to full flow (570 litres per minute or 150 gallons per minute). The flow control valve shall remain in the fully closed or fully open position as selected by the operator without the need of maintaining a continuous manual holding force. Automatic closing of the flow control valve from the fully open to the fully closed position shall cause complete fuel flow termination immediately.

0205. **Nozzle inlet.** The centerline of the nozzle inlet shall be located 120 (+ 10) degrees from the centerline of the nozzle outlet.

0206. **Electrical Bonding.** For single point and closed-circuit refuelling described in STANAG 3682, only bonding is required. Connect the fueling system's bonding cable to the aircraft ensuring contact with an uncoated metal surface. Plug-in jacks should be used where provided to minimize damage to the aircraft.

0207. **Electrical Grounding cable assembly.** For refuelling aircraft with engines running the nozzle shall be equipped with a cable assembly for grounding the nozzle to the aircraft and to the earth stake in addition to bonding. The nozzle-to-aircraft ground connector shall conform to STANAG 3632/AAEP-2. The nozzle-to-earth stake cable shall be approximately 5 m (15 feet) long and the end shall be equipped with a clamp suitable for bonding the cable assembly to a 1.6 cm (5/8 inch) diameter earth stake.

0208. **Receiver.** The receiver is primarily designed for closed-circuit refuelling (Annex B). However it shall also meet the requirements of STANAG 3212 to make conventional open port or gravity fill dispensing of fuel still possible.

0209. **Adapter.** Performing gravity fill with the closed-circuit refuelling nozzle is possible when using an adapter. The adapter shall consist of a quick-disconnect, automatic shut-off inlet fitting, a main body containing a manually operated flow control valve, a control lever with a protective guard, a spout, and dust caps for the inlet fitting and spout (Section 4 - Annex C). The gravity fill adapter shall be compatible with the gravity filling orifice specified in STANAG 3212.

CHAPTER 3: IMPLEMENTATION OF AFLP-2947

0301. This STANAG is implemented when a nation has issued instructions that all future equipment procured for its forces requiring this capability will be manufactured in accordance with the specifications detailed in this agreement.

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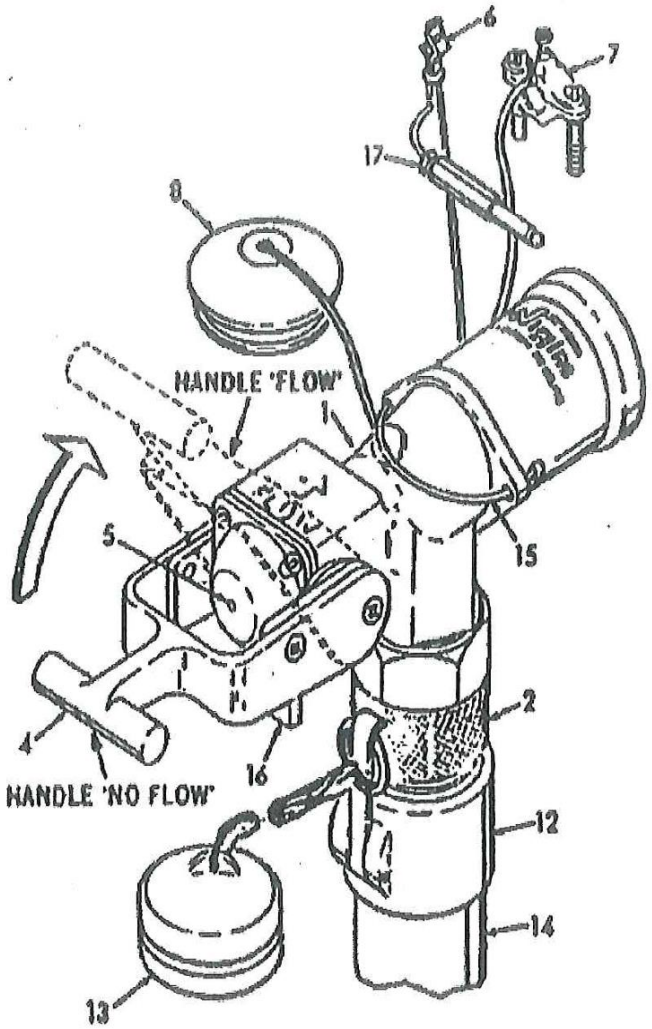
ANNEX A: CLOSED CIRCUIT REFUELLING NOZZLE ASSEMBLY



1. Nozzle Assembly
2. Strainer Assemby
4. Control Handle
5. Red Indicator Pin
6. Alligator Clip
7. Ground Stake Clamp
8. Dust Plug
12. Coupler Quick Disconnect
13. Dust Plug
14. Fuel Hose Assembly
15. Actuating Ring Cable Loop
16. Control Handle Latch
17. Ground Plug

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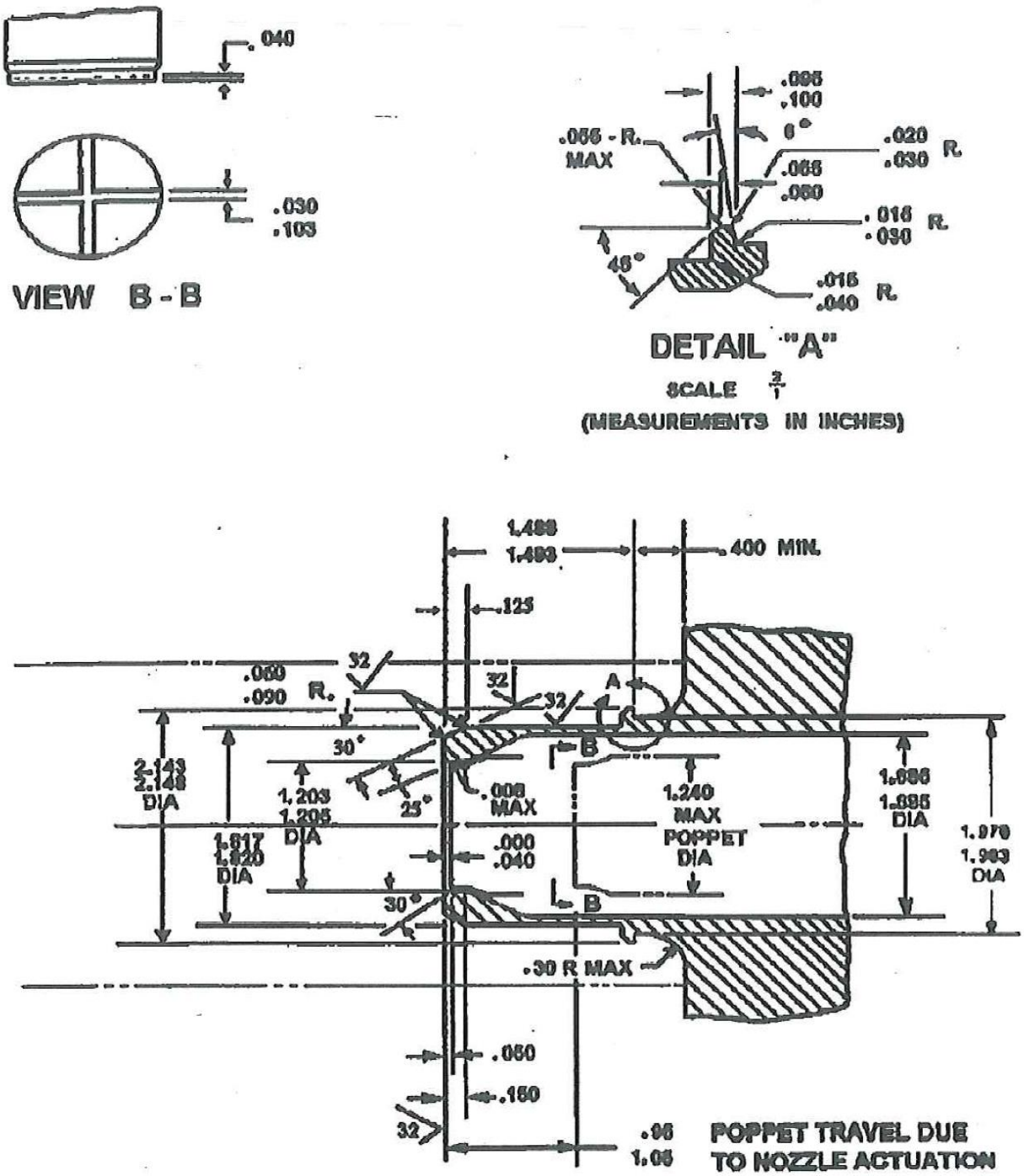
ANNEX B: CLOSED-CIRCUIT REFUELLING RECEIVER DIMENSIONS



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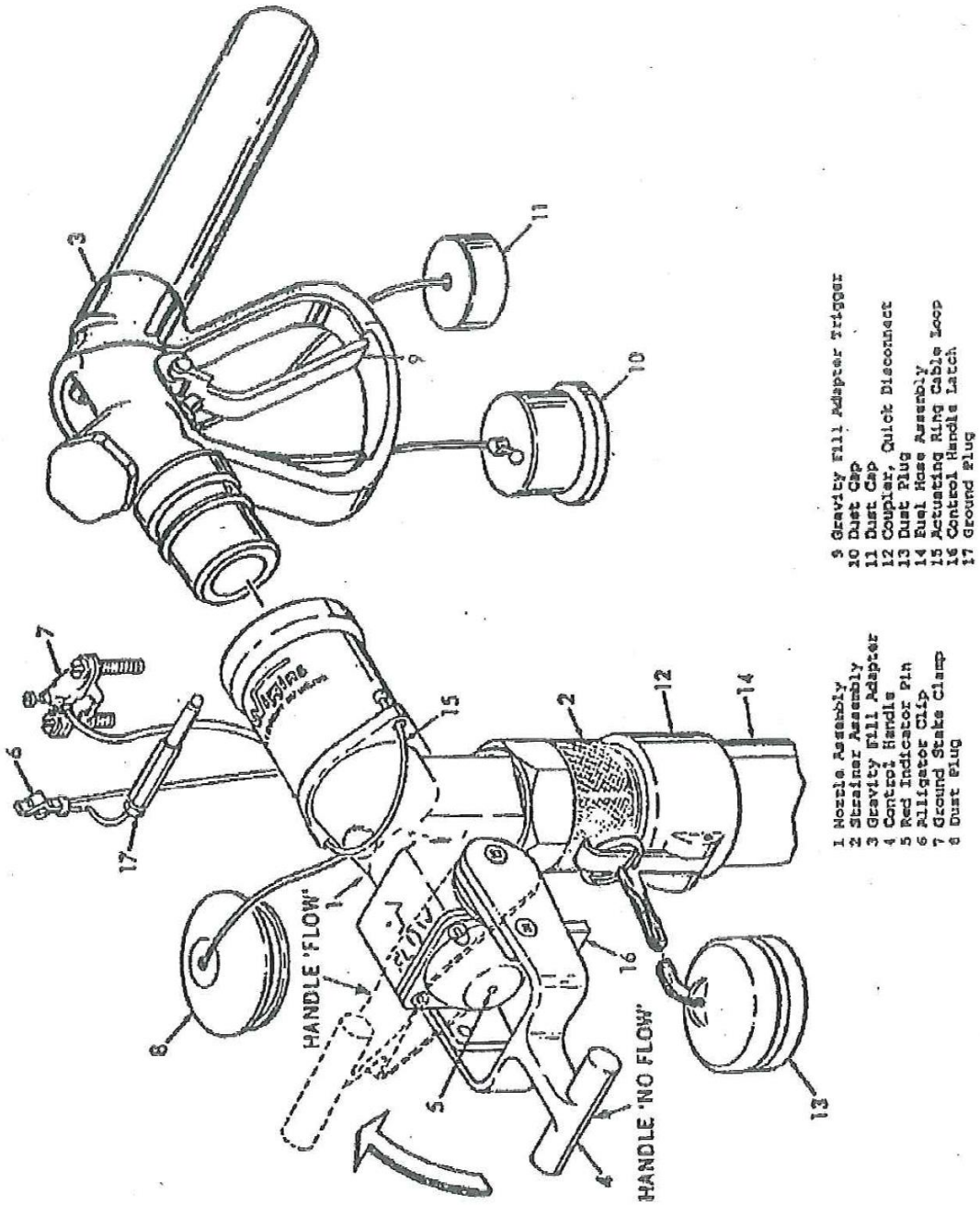
ANNEX C: GRAVITY FILL ADAPTER ASSEMBLY



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