NATO STANDARD

AFLP- 4712

Edition A Version 1

OCTOBER 2013

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED FUELS AND LUBRICANTS PUBLICATION

Published by the
NATO STANDARDIZATION AGENCY (NSA)

INTENTIONALLY BLANK

NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION AGENCY (NSA)

NATO LETTER OF PROMULGATION

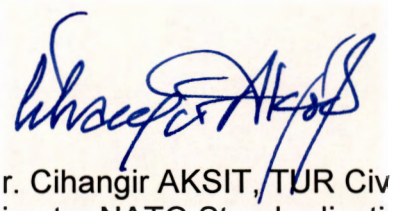
4 October 2013

1. The enclosed Allied Fuels and Lubricants Publication AFLP-4712, STANDARDS FOR MAINTENANCE OF DEPLOYABLE FUEL RECEIPT, STORAGE AND DISPENSING SYSTEMS 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 4712.

2. AFLP-4712 is effective upon receipt.

3.

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



Dr. Cihangir AKSIT, TUR Civ
Director NATO Standardization Agency

INTENTIONALLY BLANK

RESERVED FOR NATIONAL LETTER OF PROMULGATION

INTENTIONALLY BLANK

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.

INTENTIONALLY BLANK

RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
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.	

INTENTIONALLY BLANK

TABLE OF CONTENTS

INTENTIONALLY BLANK

SECTION 1 GENERAL

0101. Each nation shall establish standards for maintenance of DFIs and perform inspections and periodic maintenance based on the guidelines in Sections 2-4.

0102. National regulations shall include the following requirements for maintenance of DFIs to ensure these facilities are in a reliable condition to meet the assigned military mission:

a. Perform scheduled maintenance inspections and prompt remedial action on deficiencies.
b. Maintain written records of inspections.
c. Provide definitive written procedures for preventive and field maintenance.
d. Keep system areas free from fire and explosion hazards.
e. Inspect bulk and operating storage tanks as required to determine the need for cleaning and repair.
f. Perform maintenance functions on filter/separator vessels.
g. Identify systems by the use of NATO markings.
h. Follow environmental protection requirements when system maintenance is performed.

INTENTIONALLY BLANK

SECTION 2 DESCRIPTION, DEFINITIONS AND TERMINOLOGY FOR DFIs

GENERAL

0201. Fuel specifications. Fuel specifications are contained in STANAGs 3747/AFLP-3747, 1135, and 7090. Minimum quality surveillance of fuels is specified in STANAG 3149. Proper maintenance of fuel systems assures a product's specification is maintained throughout a fuel distribution system.

0202. Pressure and Flow Rate - Aircraft and Vehicles. The required operating pressure and flow rate of a fuelling installation is dependent upon the type of system and aircraft/vehicle using the fuel. Consult AFLP-7 for Technical Details regarding Distribution Packages for Tactical Vehicle and Aircraft Fuelling:

a. Standard truck fill facilities' vertical pumps require a minimum amount of pressure at the pump discharge point in order to assure proper functioning of all installed control valves. Flow rate at the dispensing point should normally be 2000 l/min but not less than 1000 l/min.

b. Aircraft hydrant type refuelling systems require higher operating pressures than truck fill stand systems due to the longer pipeline dispensing loops.

c. Maintenance and operating personnel must ensure that the established pressure and flow of the facility is maintained.

(1) Low pressures may cause malfunctioning of control equipment and insufficient fuel flow.

(2) High overpressure may cause damage to equipment and generate increased shock and surges within a system.

0203. Spare Parts. A stock of system spare parts, calculated on a case by case basis, shall be retained on location to guard against possible system shutdown for lack of components.

PERSONNEL

0204. Training. Proper maintenance of fuelling installations requires thorough training of maintenance and operating personnel, to include familiarization with the functioning of the installed equipment and courses on major equipment items. Furthermore, personnel must be made familiar with the hazards of handling fuels. It is essential that installed explosion-proof electrical equipment is not tampered with or repaired by unauthorized personnel, making the operation unsafe.

0205. Health. Maintenance personnel shall receive training to ensure that their health is not jeopardized when working around fuelling systems where spillages could occur and fuel vapours could be inhaled (receipt/issue points, filter/manifold stations, etc). Continual contact with fuel product could generate medical implications.

FACILITIES

0206. Description. The DFIs and components described in this STANAG are in accordance with the technical guidance for design and construction contained in NATO documents AC/4-M(96)001 and AFLP-7. For NATO POL facilities constructed out-of-area, the guidance provided in AC/4-M(96)001 should be followed in principle; noting that the document was not drafted with out-of-area in mind, therefore some parts might not be adapted to out-of-area facilities.[1]

0207. Receiving. Fuel may be received from a variety of sources but delivery by bulk fuel carrying vehicles is common.

0208. Bulk Storage. Bulk storage tanks receive fuel by the various methods and are normally used to transfer fuel into operating tanks.

0209. Transfer. Fuel may be transferred from a variety of sources including pipeline, bulk fuel carrying vehicles, rail tank cars, aerial delivery, etc.

0210. Operational Storage. Operating storage tanks receive fuel from bulk storage areas or pipelines and from trucks. Rigid and flexible tanks are used for dispensing fuel into vehicles, refuellers or directly into aircraft. The DFI must have a filter/manifold station where fuel passes at the receiving point through an inlet filter/separator and at the dispensing side through an issue filter/separator.

0211. Dispensing. NATO locations for tactical aircraft mission support are provided with splinter protected dispensing points for pumping fuel into refueller trucks. Locations for special tactical aircraft and wide body aircraft are provided with hydrant type refuelling systems.

0212. Environmental Protection System. Standardized DFIs are provided with fuel spill protection around dispensing points to prevent spilled fuel entering the soil and ground water. Similarly, berm containment for flexible tanks must be provided.

EQUIPMENT

0213. Tank Accessories. Standard storage tanks may be provided with some or all of the following: level indicators, vents, gauge pipes, high level shut-off valves, low-level control switch and alarms.

[1] EAPC(NPC-PHEWG)DS(2008)0001 ANNEX 13, dated 30 September 2008

0214. Pumps. Centrifugal pumps are commonly utilized for DFIs, however various types of fuelling pumps may be in use. Following is a description of the pump's safety components:

a. Multi-stage, horizontal, self-priming centrifugal pumps and rotary gear pumps are normally provided with an air bleed stage on the pressure-side. For shaft sealing a metal-bellows mechanical seal is commonly used. A flow detector is mounted on the discharge flange

0215. Control Valves. Control valves are used in the truck filling facilities and aircraft fuelling systems and consist of the following types:

a. Automatic control valves for standard truck fuelling systems:

(1) Operating tank high-level control valve.

(2) Drain tank high-level control valve.

(3) Pump discharge control valve.

(4) Filter/separator rate of flow control valve.

(5) Overpressure control valve.

(6) Filter/separator bypass control valve.

(7) Tank truck loading valve.

b. Types of automatic control valve for aircraft fuelling systems are:

(1) As in paragraph 15.a.(1)–(7) plus:

(2) Emergency shut-off valve.

(3) Back-pressure control valve.

(4) Refuelling control valves with venturi control for use in hydrant pits and (hot) refuelling pits.

0216. Filtration Equipment. Horizontal and vertical filter/separators (coalescing type filter-separator or absorption type monitors) are in use with filter elements of varying sizes. STANAG 3967/AFLP-3967 provides design and performance requirements for these vessels. The following is a description of the types of filter/separator and their components:

a. The majority of fuelling systems are equipped with horizontal filter/separator units.

b. A number of vertical filter/separator units are in use in existing systems which require additional maintenance and special safety precautions during element replacement.

c. Major standard components of filter/separators are:

(1) Vessel, normally with internally coated carbon steel, stainless steel or aluminium.

(2) 1st stage coalescer elements.

(3) 2nd stage separating elements.

(4) Water sump with sight glass level indicator and float control valve with automatic drain valve.

(5) Automatic air vent valve (float operated).

(6) Differential pressure gauge.

(7) Automatic fuel control valve with shut-down device in case of high water level in sump.

(8) Pressure relief valve.

0217. Pipe, Hose and Accessories. Above ground pipes and hoses are commonly used for DFIs. Following is a listing of pipes and accessories:

a. Pipe/Hose. Fuel-approved hoses are normally used between the fuel receiving point and operating storage tank and between the operating storage tank and the inlet flange of the issue filter/separators. Similarly, hoses are normally used between the issue filter/separators and the truck fuel dispensing points and aircraft hydrant pits.

b. Accessories are as follows:

(1) Gate valves: normally with a rising stem used as maintenance (isolation) valves.

(2) Ball valves: normally for frequent operation and quick opening or closing.

(3) Flow meters, pressure gauges, safety devices, sampling devices, pressure/vacuum breather valves, tank level indicators.

(4) Strainers: normally in a vertical, cylindrical housing, and a cover with a lifting/swinging device; the strainer inserts are either basket or cartridge type.

0218. Vehicle and Aircraft Connections. The truck filling and aircraft dispensing points are provided with the following types of dispensing equipment:

a. The NATO coupling (STANAG 3756) should be the primary means for bottom loading of bulk and tactical fuel carrying vehicles. The use of adapters to mate current national bottom loading connections with the NATO coupling is acceptable.

b. STANAG 2946 and 3681 detail the minimum flow rates/pressures for aircraft refuelling systems which are not part of a permanent facility and provides details on aircraft refuelling nozzles. Aircraft dispensing points may also be provided with swivelling mechanical loading arms ('pantographs').

ELECTRICAL SYSTEMS

0219. Power Supply. DFI primary power is supplied from the location’s electrical network and the emergency supply from a standby generator. Both sources are provided with power switches, which are interlocked to prevent simultaneous switch-on.

0220. Stand-by Electric Power. Generators may be installed where required.

0221. Switch Gear. The power distribution panel with all required switch gear should normally be of a module type design for easy maintenance, trouble-shooting and repair.

0222. Solid State Systems. Control panels for the operation of DFIs may be solid state systems and contain all necessary pump control equipment, instrumentation, flow and pressure controls, emergency cut-off circuits, tank level indications and

controls for automatic and manual fuelling operations. They may also contain a programmable logical controller (PLC) system of modular design.

0223. Fire Protection. Local fire protection is to be provided for each fuelling installation and normally consists of portable or mobile fire fighting equipment using foam and/or powder.

0224. Bonding and Grounding. DFIs require bonding and grounding as follows:

a. Bonding. All mechanical metal parts, components and equipment in a fuelling system must be bonded to achieve a balanced static potential throughout the system. Normally metal flanges do not require a bonding strip as long as the flange bolts provide sufficient metallic continuity.

b. Grounding. Two different groundings exist in a fuelling installation. They are:

(1) The electrical ground applying to electrical equipment only and requires low level earthing resistance.

(2) The static ground is only for the metallic mechanical part of the system to ensure ready dissipation of accumulated static electricity. Values below 10000 Ohms are sufficient.

MAINTENANCE PROCEDURES AND RECORDS

0225. General. Definitive written procedures for preventive and field maintenance of DFIs are necessary for efficient, safe operation and assurance that clean-dry fuel is delivered. The preparation of written procedures is the responsibility of the technical maintenance support services. The objectives (of preventive and field maintenance) are to:

a. Prevent breakdowns.

b. Ensure proper and timely maintenance.

c. Provide immediate and adequate minor repair to avoid major repair.

d. Control maintenance cost.

e. Keep a system in operational readiness and ensure the dispensing of clean-dry fuel complying with applicable specifications.

0226. Responsibility. Maintenance should normally be the responsibility of the technical support services. It will be necessary for each country to supplement this Annex with national instructions to cater for variations in design and components of

fuelling systems. It is important that the personnel operating fuelling systems maintain a close relationship with the technical support services responsible for maintaining each system.

0227. Equipment Classification and Maintenance Record. Equipment must be classified and numbered according to its function in the operation of the system. The classification must correspond to the installation plan of the system and equipment components must be keyed to the plan. It is recommended that this information be incorporated in the existing maintenance record file, with each file bearing the following:

a. Name of unit and coding to system plan.

b. Manufacturer of equipment and major components.

c. Code or initial record of inspections.

d. Coded records of repairs and system modifications.

e. Equipment procured by NATO or national funds.

The type of records, forms or files to be used for preventive or field maintenance control must be established by each country concerned.

INTENTIONALLY BLANK

SECTION 3 REQUIRED PREVENTIVE AND FIELD MAINTENANCE SERVICES AD INSPECTIONS

0301. General Information. The following paragraphs describe the required preventive maintenance services and inspections.

0302. Fuelling System Area. Preventive maintenance and safety inspections are as follows:

a. Keep system area free from fire and explosion hazards (written procedures should be developed by fire or safety group). Wipe dirt and grease from piping.

b. Keep all fuel pits clean and dry.

c. Check general ground condition, fence damage, berm erosion and cut grass and weeds when necessary. For skid-mounted modular components, ensure that the skids have not shifted or settled.

d. Check fire extinguishers for date of recharge, pressure, or supply of extinguishing agent.

e. Exercise care to prevent damage to gaskets when removing couplers, strainers, covers, fill caps, gauge covers, valves and the like. Spare gaskets must be available to ensure integrity of systems.

f. Lubricate coupling threads when necessary and check seals for tightness.

g. Inspect hydrant outlets for dents, abrasions or other damage. Dust caps must be in place.

h. Location of signs and markings should be recorded to facilitate ease of inspection. Check for condition, adequacy, possibility of deleting obsolete signs and necessity of additional signs. All signs are to conform to national standards.

0303. a. Rigid Storage Tanks. Ensure that a record exists that includes (as a minimum) the tank serial number, last product held, and date the tank was placed in service. The following steps are required to assure safe functioning of rigid storage tanks:

(1) Check liquid level gauge to verify operational capability and accuracy by comparing stick or dip tape reading with gauge reading.

(2) Check flame arrestor of pressure-vacuum vent valves for free movement and proper functioning. Remove internal mesh plug of flame arrestor and flush out with fuel and compressed clean air. Check antifreeze liquid level within the pressure and vacuum chamber.

(3) Check operation of low-level control switch by observing whether pumps stop when fuel level drops to the specified design minimum. Dip tank to be sure fuel level is at the height specified and adjust low level control as necessary.

(4) Check operation of high-level control for a safe fill-alarm.

(5) Check proper functions of hydraulically operated high-level control valve.

(6) Check functioning of vapour or leak detection equipment.

(7) Check tanks for accumulation of water and sludge. Excessive deposits of water and sludge are to be reported immediately to expedite remedial action.

(8) Tank interior inspection to include: condition of internal coating if applicable; structural integrity of tank bottom and shell; condition of pump suction intakes; and condition of mechanical float of high level control valve and level indicator.

b. Flexible Storage Tanks (bladders). Ensure that a record exists that includes (as a minimum) the tank serial number, last product held, and date the tank was placed in service. The following inspection and maintenance steps are required to ensure safe operation of the fuel storage bladders and berm integrity.

(1) Check bladders for accumulation of water and sludge.

(2) Bladder exterior inspection to include: vent, pump fill line connection, pump suction intakes.

(3) Check exposed bladder surface for signs of sweating through the welded seems, presence of fuel and dirt accumulation.

(4) Berm inspection to include: berm and berm frame condition, removal of any debris that may be present inside or adjacent to the berm, and rain drain.

(5) Follow manufacturer's guidelines for cleaning the exposed surface of the bladders.

(6) Check for surface cracks of bladders.

(7) Evaluate the number and class of weeping on the bladders.

(8) Ensure bladders are not overfilled.

(9) Ensure each bladder is located in a berm and that the berm has a controllable water drain capability.

0304. Pumps. All types of pumps in use require the following checks and inspections:

a. Check for corrosion on pump exterior, visible oil or grease leakage, and pump skid settling,

b. Check for leaks around seals, vibration, noise, overheating, alignment, clearance and rotation of shaft and coupling. Check the condition of all hoses and couplings.

c. Check operating pressure and flow rate, and compare with the initial pressure and flow data when system was new or newly upgraded.

d. Inspections are to be carried out on pump motors, motor connections, overheating and anti-condensation heaters installed in motor casings, power cord and associated plug, all electrical connections, and start and stop reset switch. Electrical and Diesel motor inspection should also include: cathodic converter, spark arrestor, oil and grease, vent ports and cooling fins.

e. Follow manufacturer's guidelines for trouble shooting.

0305. Filter/Manifold Station. The equipment installed in the filter/manifold station requires the following checks:

a. Check function of all installed equipment, strainers, filter/separators, absorption type monitors, flow meters, all valves, pressure gauges and

pressure differential gauges and watch for leaks around connections and flanges during operation.

b. Simultaneously observe and record flow rate and pressure reading of filter/separator differential pressure gauge. When filter/separators are manifolded, isolate each filter/separator when determining flow and differential pressure. Ensure pressure gauge isolating cocks remain open during normal operating procedures.

c. Filter/Separators. Whenever filter elements are replaced, the date of installation shall be recorded; elements shall be replaced when either:

(1) The differential pressure across the unit reaches the maximum recommended by the filter element manufacturer or by national regulations, normally 15 PSID at issue filter/separators and 20 PSID at receipt filter/separators or,

(2) After 36 months use for coalescer elements, unless national regulations specify a shorter service length. Note that separator elements are replaced as required according to manufacturer's direction.

During the installation of replacement elements, they must be handled with the utmost care, since a tear or puncture of any one element will result in inefficient operation of the entire unit. Wear protection on hands to keep oils off elements and separator canisters, as this reduces water removal capability.

Personnel handling used elements must take appropriate precautions and comply with any national directives. Refilling of the filter/separator unit must be carried out at a low flow rate (approximately 5 minutes for a standard 2000 l/min filter/separator) to prevent the risk of internal explosion due to the generation of static electricity. Additional requirements and guidance for filter/separator maintenance shall be taken from the manufacturer's instructions.

d. Strainers. Basket or cartridge type strainers shall be opened and cleaned when differential pressure across the unit reaches the maximum recommended by the manufacturer or national regulations. Strainers are washable and reusable.

e. Pressure Gauges. Check all pressure and differential pressure gauges for proper functioning. Check the readings (inch and metric scale) and ensure that the needle or pressure mark is in alignment, if not, re-adjust according to manufacturer's instructions. Check gauge glass for

cleanliness and breakage or leakage of liquid (glycerin) in liquid filled pressure gauges.

f. Gate and Ball Valves. Inspect for easy operation, adjust packing and re-pack if necessary using aromatic fuel resistant materials.

g. Check filter manifold skid condition for settling and corrosion and berm condition

0306. Dispensing Points for Trucks and Aircraft (including Hydrants and Hot Refuelling Pits if applicable). Installed equipment must be kept free of leaks and checked as follows:

a. Check functioning of installed equipment and watch for leaks around connections and flanges. Observe and record flow rates and pressures, compare with the design data of the facility.

b. Check 'dead-man" control hose for nicks, cuts and leaks on handle. Check handle for cracks.

c. Check grounding wire for continuity, loose connection, fraying and insulation and clip condition; replace if necessary.

d. Check nozzle for operability, and for presence/cleanliness of internal screen. Inspect nozzle for excessive wear and cracks around collar and seal; repair or replace as required.

e. Check general condition of ground reel and hose reel. Ensure that they are greased and free to rotate without obstruction. Ensure locking devices function properly.

f. Check hose condition for nicks, cuts, scuffs on the hose surface, leakage around the connection points and ageing of the material. Check hose couplings and gaskets.

g. Check dispensing skid condition for settling and corrosion and berm condition.

0307. Mechanical Loading Arms (Pantographs) for Truck and Aircraft Refuelling (where applicable). Mechanical loading arms require the following minimum maintenance:

a. Fixed mounted, bottom loading type pantographs, normally made of stainless steel, have a maintenance advantage due to non-lubricated type swivel joints.

b. Check overall electrical continuity between the connecting flange and refuelling nozzle (not to exceed 1000 Ohms resistance).

c. On detachable type pantographs the zerk fitting of the casters needs to be lubricated periodically. The surface wheels should be inspected for wear and abrasion.

d. Follow manufacturer's inspection manual for equipment component repairs.

0308. Flexible Rubber Hoses for Truck and Aircraft Refuelling. Ensure that the hoses are free from oil and grease and that protective end caps are fitted and in position. Hoses must be stowed correctly on racks or hangers and protected from sunlight. Perform the following checks:

a. Test hoses hydrostatically at 1½ times dead head (shut-off head) pressure of system.

b. Check for nicks, cuts and scuffs on the hose surface and ageing of the material.

c. Lubricate ball bearing type swivel joints to ensure easy operation.

0309. Automatic Control Valves. Perform the following maintenance on control valves specified under paragraph 15 of Section 2:

a. Check control valves during operation for proper functioning in accordance with commissioning data.

b. Check for leaks around the control tubing connections and retighten, if necessary.

c. In the event of malfunction, check manufacturer's instructions for corrective action.

0310. Electrical Systems. Electrical systems, including all safety circuits and emergency switches, must be inspected and maintained in accordance with the manufacturer's guidelines and instructions. In order to ensure safe operation of the facilities the following items must be checked:

a. Observe function of the pump flow control by energizing the pump; if there is no flow; pump should stay on line for approximately 45 to 60 seconds and then cut off automatically.

b. Check all equipment indicator lights on control panel; replace any burned-out bulbs.

c. Test the main panel emergency switch when emergency button is energized, all control systems should be off with the exception of the normal indoor and outdoor lighting systems.

d. Check for proper function of all emergency stop switches in pump houses, filter/separator rooms and outdoor locations.

e. Check all sensing, alarm and control functions.

f. Check all exposed wiring, conduits and fuse boxes.

g. Check the interior of power-switch gear panels and control panels and remove dust, moisture, and corrosion from contacts.

h. Bonding and grounding: Inspect the ground cable connection points, wires and clips and replace cable immediately if insulation is damaged or broken. Measure the low-ohm resistance of the cable with a "high-ohm resistivity" meter to ensure adequate conductivity between the grounding connection and the cable clip.

0311. Environmental Protection. Perform the following maintenance services to protect the environment in and around DFIs:

a. Check fuel/water separators (oil interceptors) for operation and inspect internal float switch mechanism for proper functioning.

b. If fuel/water separator contains excessive liquid (fuel or water) containing sludge and debris, take action for removal in accordance with national environmental laws and inspect internal float switch mechanism for proper functioning.

c. Ensure that Environmental Requirements stipulated in STANAG 7102 – Environmental Protection Handling Requirements for Petroleum Handling Facilities and Equipment are followed.

0312. Standby Generator. Generators shall be maintained as follows:

a. Ensure that the day tank has sufficient fuel for operation of the generator.

b. Perform inspection and maintenance services in accordance with manufacturer's instructions.

INTENTIONALLY BLANK

SECTION 4 GUIDANCE FOR FREQUENCY OF PERIODIC INSPECTIONS AND MAINTENANCE SERVICES

0401. **The frequencies listed below are considered minimum requirements.** However, National guidelines, special characteristics of installed equipment, and/or extreme environmental conditions may require more or less frequent maintenance services. The following abbreviations are used:

D	-	Daily	Q	-	Quarterly
W	-	Weekly	A	-	Annually
M	-	Monthly	AR	-	As Required
S	-	Semi-annually			

0402. Fuelling System Area.

a. Inspect for fire hazards.

D - Systems in daily operation.
M - Systems used monthly.
Q - For dormant systems (standby systems not in use).

b. Keep all fuel pits clean and dry.

W - Systems in daily operation.
M - Systems used monthly.
Q - For dormant systems.

c. Check general ground condition, berm erosion, fencing and cut grass and weeds regularly in the growing season. Ensure skid mounted equipment has not shifted or settled. Perform corrective measures to all areas listed in this paragraph as required.

AR -

d. Inspect fire extinguishers or other installed fire fighting equipment.

M - As Required and in accordance with Military Service Regulations and national laws.

0403. Storage Tanks.

Rigid Storage Tanks

a. Check function of liquid level gauge.

W - For tanks in daily use.
A - For dormant tanks (i.e. tanks not currently in use).

b. Check pressure vacuum vent valves and flame arrestors.

W - Tactical/Collapsible Tanks.
M - Fixed Facilities.

c. Check function of low level control and high level alarm of automatic level indicator; check operation (open and close) of electronically and hydraulically operated high level control valves.

W - For tanks in daily operation.
M - For tanks used quarterly.

d. Check function of vapour or leak detection equipment.

W - For daily used tanks.
M - For dormant tanks.

e. Inspect tanks in accordance with the tables below.

Flexible Storage Tanks

Fuel Bladders	D	W	M	Q	S	A	AR
Check any signs of sweating through the welded seems, for any leak's and any fuel presence inside the dike	√						
Check all connection points on the bladders	√						
Check vent for obstruction like dirt and sand accumulation	√						
If equipped, remove test strip for evaluation (by original equipment manufacture)						√	
Wash off any spilled fuel as per the manufacture specification		√					
Remove any sand or dirt accumulation on the tank							√

Tank Inspection Frequency

Rigid and Flexible tanks
(maximum interval between cleaning)

Tank Type	Fixed Tank Interior Uncoated		Fixed Tank Interior Coated	
	Without inlet filter/separator	With inlet filter/separator	Without inlet filter/separator	With inlet filter/separator
Operating Tanks (i.e. tanks which directly serve refuelling vehicles or hydrant systems)	3 years	5 years	5 years	8 years 5 years **
Bulk Storage or buffer tanks	4 years	6 years * 5 years **	6 years 5 years **	8 years 5 years **
Bulk Storage (barge or tanker delivery)	3 years	5 years *	5 years	8 years 5 years **
Drain Tanks (fuel recovery tank)	normally inspected and cleaned concurrently with the inspection/cleaning of operating storage tank			
Flexible Fuel Bladder	3 years or as required ***			

* If a filter/separator or micronic filter is installed in the receipt system
** Recommend tanks be inspected every 5 years to check the mechanical integrity of the interior and components, although the cleanliness requirement for inspections would have a longer extended time period (as indicated above)
*** Fuel tank test strip (if equipped) shall be returned to manufacturer/supplier for testing

Notes:

- Clean tanks more frequently if quality data indicates product quality is deteriorating and is in jeopardy of not meeting specification requirements.
- Newly constructed tanks shall be inspected after one year of initial filling to check the condition of the interior coating.
- A cathodic protection test must be conducted to aide in determining the next test date.

0404. Pumps

a. Check for corrosion on pump-motor unit.

W - For units in daily or monthly use.
Q - For dormant systems.

b. Check for leaks, vibration, noise, overheating, alignment, clearance and rotation of shaft and coupling.

D - For pumps in daily use.
M - For pumps used monthly.
Q - For dormant systems.

c. Check operating pressure and flow rate. Check condition and calibration of flow meters.

D - For pumps in daily or monthly use.
Q - For dormant systems.
A - For calibration of flow meters.

d. Pump motor: check connections, check for overheating, check anti-condensation heaters in motor casings (if installed), and check explosion-proof controls.

D - For units in daily or monthly use.
Q - For dormant systems.

0405. Filter/Manifold Station.

a. Check functions of all installed equipment and watch for leaks; record flow rate and differential pressure readings of filter/separators.

D - For systems in daily use.
M - For systems used monthly.
Q - For dormant systems.

b. Check Filter/separator element replacement frequency for first and second stage elements. If second stage consists of a single permanent strainer or a number of reusable cartridges, it should be inspected and cleaned concurrently with the replacement of the first stage coalescer elements. Check and drain water from Filter Separator when water is detected in the water sight glass indicator.

AR - By national regulations and in accordance with Military Service Regulations; and/or,
- When differential pressure has reached the maximum limit, normally 15 PSID
- Or, for coalescer elements, after 36 months in use.
- For separator elements, replace as required according to manufacturer's direction.

c. Check and clean basket strainers.

AR - By national regulations and in accordance with Military Service Regulations; or,
- If strainer is provided with a differential pressure gauge, it should be cleaned when differential pressure has reached the recommended maximum.

d. Check all installed manual valves and exhaust fans.

D - For systems in daily or monthly use.
Q - For dormant systems.

e. Check overpressure control valve for proper functioning.

D - For systems in daily use.
M - For systems used quarterly.
Q - For dormant systems.

0406. Dispensing Points for Trucks and Aircraft Fuelling. Check functions of all installed equipment, watch for leaks and record operational flow and pressure ratings; check "dead-man" control hose; check grounding wire and inspect nozzles for wear and tear. Ensure all vehicle bulk fuel loading/unloading points are equipped with spill containment designed to meet Military Service and National regulatory guidance.

D - For systems in daily use.
M - For systems used quarterly.
Q - For dormant systems.

0407. Mechanical Loading Arms (Pantographs) for Trucks and Aircraft Fuelling.

a. Check function and easy movement of fixed pantograph; check nozzle and inspect swivel joints for leak proof tightness.

D - For systems in daily or monthly use.
Q - For dormant systems.

b. Check detachable pantographs for easy mobility and proper functioning of all components; inspect swivel joints, automatic pressure equalizing chambers, venting and draining valves, sampling device, pressure gauge, locking device (breaks), dry-break shut-off, hydrant coupler and fuelling nozzle.

D - For systems in daily use.
M - For systems used monthly.
Q - For dormant systems.

c. Perform conductivity test for fixed and detachable type pantographs and inspect grounding wire for continuity.

S - For all pantographs in use.
AR - For pantographs not in use, however prior to each reactivation of a system.

0408. Flexible Rubber Hoses for Truck and Aircraft Fuelling.

a. Check basic issue items such as couplings, gaskets, nozzles, fire extinguisher systems and nozzle screens. Check for nicks, cuts and scuffs on hose surface and ageing of material. If nicks, cuts or scuffs are noted or hose is time-expired, the hose must be replaced before use.

D - For all uses.

b. Lubricate ball bearing type swivel joints.

M - For daily or quarterly use (or AR in adverse climatic conditions).

c. Hydrostatic pressure test at 1½ times dead head (shut-off head) pressure of system

M - For daily or monthly use.

0409. Automatic Control Valves.

a. Check all installed control valves during operation for proper functioning; check for fuel leaks, tightness of all connections for pilot controls; check opening/closing of valves at indicator stem; this is also an indication of proper diaphragm operation.

D - For daily or monthly use.
Q - For dormant systems.

b. Check electric solenoid control (if used) for proper functioning.

D - For daily or quarterly use.

0410. Electrical Systems.

a. Observe function of pump flow control, check control panel, test emergency switches on the main panel, check all emergency stop switches in the fuelling system area, check sensing, alarm and controls, check exposed wiring, conduits and fuse boxes.

D - For systems in daily or monthly use.

Q - For dormant systems.

b. Inspect bonding and grounding for proper conductivity.

M - For systems in daily use.
Q - For systems used monthly.
S - For dormant systems.

0411. Environmental Protection.

a. Check fuel/water separators (oil interceptors) for presence of fuel; find out where it comes from and remove/repair by proper means.

W - For systems in daily use.
Q - For systems used monthly.
Q - For dormant systems.

Note: After heavy rain storms check fuel/water separator for proper functioning since there could be a problem of clogging from debris.

0412. Stand-by Generator.

a. Operate generator for approximately one hour under load condition.

M - For systems in daily or monthly use.
M - For dormant systems.

b. Perform inspection services as specified in the manufacturer's instructions.

AFLP - 4712

Edition A Version 1