Ministry of Defence

Defence Infrastructure Organisation

Design, Inspection, Maintenance and Testing of Equipment Installed at MOD Mechanical Transport Filling Installations (MTFIs)

Technical Standard – Petroleum - 04

ESTATE MANAGEMENT

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DIO Sponsor: **Bryan Dunn B Eng (Hons) C Eng MIEE**	**Date of Issue: 26th July 2021**
Contact if different from above Sponsor: **Mark Spooner BSc (Hons) CEng FIMechE** Principal Mechanical Engineer, Technical Services, Engineering and Construction, Defence Infrastructure Organisation, Building 680, RAF Mildenhall, Suffolk, IP 28 8NF.	
MOD telephone: 9205 314 238 5835 **Telephone:** 01638 545835 **Fax:** 01638 54 4045 **Mobile:** 07771913211 | **Email:** Mark.Spooner583@mod.gov.uk | **Website:** www.mod.uk/DIO	
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Author:	Matthew Spare Senior Mechanical Engineer (Petroleum)
Reviewed by:	Mark Spooner Principal Mechanical Engineer
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FOREWORD

This Technical Standard, hereafter known as 'this Standard', is published by Defence Infrastructure Organisation (DIO) for application across all areas of the MOD. This Standard is mandated for all new contracts including USVF, overseas and PFI arrangements. For existing contracts, no work involving expenditure on any MOD account is to be entered into without prior authority from the appropriate MOD officer for that location or facility. The Term Maintenance Management Organisation (MMO) is used throughout this Standard to describe the organisation responsible for undertaking the procurement, operation and maintenance on a MOD site – the term is used generally to include more extensive service partnership arrangements where these exist.

DOCUMENT SYNOPSIS

This Standard defines the requirements for the planning, design, installation and commissioning of all new MOD MTFI installations, and refurbishment of existing MTFIs. This Standard gives the required guidance on the selection of equipment for the safe storage and dispensing of fuels. The technical content of this Standard is sourced from the various British Standards, existing MOD best practice and in particular the EI/APEA Design Construction Modification Maintenance & Decommissioning of Filling Stations.

Additionally, the specification gives direction on maintenance and decommissioning of existing MTFI facilities with the MOD estate. It is not, however, a technical guide on the practical aspects of maintenance, inspection and testing of MTFI installations and associated equipment, which is left to the professional skills and judgement of Competent Person(s) undertaking the work.

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SECTION 1

1. Introduction

1.1 Aim

1.1.1 The aim of this Standard is to provide guidance and direction on the design, construction, repair, maintenance, testing, commissioning and decommissioning requirements of Mechanical Transport Fuelling Installations within MOD (Ministry of Defence) establishments. This Standard provides guidance on the various types of MTFI designs and fuels to be dispensed, as well as the required planning and health and safety implications of both installation and decommissioning.

1.1.2 This Standard is to replace MOD Design and Maintenance Guide 14 (published 1997) and aims to consolidate the guidance stipulated by the Energy Institute and Association for Petroleum & Explosives Administration within the jointly published Design Construction Modification Maintenance & Decommissioning of Filling Stations, and the requirements of all other relevant legislation, British Standards and Codes of Practice, and MOD policy and standards pertaining to the design, repair, maintenance and the decommissioning requirements of MOD MTFIs with the purpose of:

- Enabling the MOD to comply with the requirements of the relevant Legislation, British Standards and UK Regulatory Requirements,
- Promoting a common and consistent approach to the design, repair, maintenance, testing, commissioning and decommissioning of MTFIs throughout the MOD's estate (both UK and overseas),
- Assisting the Designer and installer of new facilities and the modifier and maintainer of existing facilities, in the precautions necessary to ensure that installations are fit for use,
- Providing guidance concerned with all types of MTFI designs and fuels, required to fulfil the vehicle and transport requirements of the MOD, with regards to the selection of mechanical and electrical equipment, materials, drainage, and ancillary features (ladders, vehicle protection) to ensure a working solution,
- Enabling the production of a maintenance regime.

1.1.3 It is not the intention that this Standard be a single source of information, but to refer the reader, where necessary, to the relevant external industry publications. It is therefore expected that whilst this Standard contains technical guidance, the reader should have access to the other industry publications referred to within section 1.4.

1.1.4 The SFG20 Maintenance Schedule referred to within this Standard should be adhered to in order to assist in ensuring that MOD MTFIs are maintained in accordance with statutory and client requirements for:

- Safety of operation,
- Environmental protection,
- Equipment reliability and longevity.

1.2 Scope and Limitations

1.2.1 This Standard is applicable to all existing, new and refurbished MOD MTFIs and associated equipment including:

- Tanks for the storage and dispensing of diesel, kerosene and petrol products, including secondary containment, vents, fill points, inspection hatches and manways, working platforms and access ladders,

- Fuel dispense and accounting equipment including the dispense and fuel monitoring units, hoses and nozzles,
- All pipework, above or underground, associated with the transfer of fuel products,
- All electrical equipment including cabling, wiring, bonding, alarms and level monitoring, lighting, electrical distribution and lightning protection systems,
- Civil ground works including tank foundation, pump dispense island and canopy foundations, surface coatings, and vehicle hardstanding,
- Drainage including type of drainage system, underground Oil Water Interceptors (OWIs), pipework and connections with local drainage where applicable,
- Any vehicle protection barriers or bollards,
- OWI outlet to site drainage.

It is not the intention that retrospective design and construction work is undertaken at existing MTFI facilities as a means of complying with the guidance in this Standard. Existing MTFI facilities should however follow this Standard where the guidance relates to maintenance, decommissioning or where there are planned modification works to the installation.

1.2.2 Additional to the equipment requirements, the following forms part of the scope of this Standard:

- Design and planning of the MTFI including location, layout, and spatial requirements,
- Overview of risk assessments requirements to assist in mitigation of foreseen hazards relating to the operation and maintenance of the facility as well as any hazards impacting the environment,
- Overview of hazardous area classification requirements for identification of potential flammable and explosive zones,
- Testing and commissioning on completion of construction,
- Procedural guidance on the decommissioning of existing MTFIs including isolation of services, making safe equipment left in-situ, and removal of equipment and hazardous waste from site.

1.2.3 This Standard does not apply to the following:

- Fabrication of specific equipment. It is assumed for the purposes of this Standard that the equipment installed shall be supplied by a reputable manufacturer to relevant British Standards and industry codes of practice,
- Technical guidance on the storage and dispensing of CNG, LNG and hydrogen,
- Specific guidance on the creation of risk assessments. Detailed guidance found within JSP 375 Preliminary Document should be followed for the undertaking of risk assessments on the MOD estate,
- Specific guidance on hazardous area classification. Detailed guidance on hazardous area classification is found within JSP 375 Volume 1 Chapter 9 and Practitioner Guide 2018/02 High Flashpoint Class III Fuels – DSEAR,
- The provision of any fixed firefighting equipment in close proximity to the MTFI installation forming part of the site wide firefighting infrastructure,
- Pipework, equipment or appliances downstream of the customer underground OWI,
- Electrical supply upstream of the distribution panel supplying the MTFI installation.

1.3 Safety

1.3.1 All work is to be undertaken in accordance with the JSP 317 - Guidance Volumes 1 to 4, JSP 375 Volume 3 Chapter 5 – Petroleum Installation, and JSP 418 – Management of Environmental Protections in Defence Part 1 - Directive.

1.3.2 The line manager of the Fuels and Lubricants section, hereby known as the Operating Authority (OA), has delegated authority for the installations, in accordance with the current version of JSP 317. Authority must be given by the OA before any works can be undertaken on a Petroleum Installation.

1.3.3 The Authorised Person (Petroleum) (AP) is responsible for the practical implementation and application of JSP 375 Part 2 Volume 3.

1.4 Standards and Regulations

All work shall comply with the latest editions of appropriate standards not only but including:

British Standards:

BS 799 Part 5	Oil Burning Equipment. Carbon Steel Oil Storage Tanks. Specification
BS 2971	Specification for Class II Arc Welding of Carbon Steel Pipework for Carrying Fluids
BS 6187	Code of practice for full and partial demolition
BS 6949	Bitumen-based coatings for cold application, excluding use in contact with potable water
BS 3416	Bitumen-based coating solutions for cold application, suitable for use in contact with potable water
BS 5212 Part 1	Specification for cold poured joint sealants for concrete pavements
BS 7079	General introduction to standards for preparation of steel substrates before application of paints and related products
BS 7430	Code of practice for protective earthing of electrical installations.
BS 7671	Requirements for Electrical Installations. IET Wiring Regulations
BS EN 124 Part 1	Gully tops and manhole tops for vehicular and pedestrian areas. Definitions, classification, general principles of design, performance requirements and test methods
BS EN 752	Drain and sewer systems outside buildings - sewer system management
BS EN 858 Part 1	Separator Systems for Light Liquids (e.g. Oil and Petrol)
BS EN 858 Part 2	Separator Systems for Light Liquids (e.g. Oil and Petrol)
BS EN ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods
BS EN 1610	Construction and testing of drains and sewers
BS EN 10255	Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions
BS EN 12285 Part 1	Workshop Fabricated Steel Tanks (Underground)
BS EN 12285 Part 2	Workshop Fabricated Steel Tanks (Aboveground)
BS EN 13352	Specification for the Performance of Automatic Tank Contents Gauges

BS EN 13160 Parts 1-7	Leak Detection Systems.
BS EN 13617 Part 1	Petrol filling stations. Safety requirements for construction and performance of metering pumps, dispensers and remote pumping units
BS EN ISO 14122	EEMUA Publication 105 Factory stairways, ladders and handrails (including access platforms and ramps)
BS EN 14125	Thermoplastic and Flexible Metal Pipework for Underground Installation at Petrol Filling Stations
BS EN 14188 Part 1	Joint fillers and sealants. Specifications for hot applied sealants
BS EN 60079 Part 10-1	Explosive Atmospheres – Classification of areas. Explosive gas atmospheres
BS EN 60079 Part 14	Explosive Atmospheres – Electrical Installations Design Selection and Erection
BS EN 60079 Part 17	Explosive Atmospheres – Inspection and Maintenance
BS EN 61558-2-6	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V.

MOD Standards:

JSP 317	Joint Service Safety Regulations for the Storage of Fuels and Lubricants
JSP 375	Joint Service Health and Safety Handbook
JSP 418	Management of Environmental Protection in Defence
JSP 850	Infrastructure and Estate Policy
PG 2017/02	The Inspection, Testing, and Certification of Low Voltage Electrical Installations on the Defence Estate.
PG 2018/02	High Flashpoint Class III Fuels – DSEAR (Dangerous Substances and Explosive Atmosphere Regulations)
DIFS	Defence Infrastructure Fire Standards
Technical Standard – Petroleum 01	Inspection. Maintenance and Testing of Equipment Installed at Petroleum Installations on MOD Property
DSA 02	Defence land safety regulator policy and regulations for health, safety and environmental protection
DSA 03 DLSR	Fuel and gas safety and environmental regulations: defence code of practice (DCOP)

Health and Safety Executive (HSE)

HSG 176	Flammable Liquids in Tanks
L133	DSEAR Unloading Petrol Tankers
L138	Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance
INDG216	Dispensing Petrol as a Fuel: Health and Safety Guidance for Employees

	Controlling Fire and Explosion Risks in the Workplace.
INDG370	A Brief Guide to the Dangerous Substances and Explosive Atmospheres Regulations

Energy Institute Publications

APEA/EI – The Blue Book	Design Construction Modification Maintenance & Decommissioning of Filling Stations

Other Publications

National Fire Protection Association	NFPA 30 Flammable and combustible liquids code.
UL 2805	Protected Aboveground Tanks for Flammable and Combustible Liquids
UL 1316	Standard for Safety Fibre Reinforced Underground Tanks for Flammable and Combustible Liquids
Eurocode 1 - EN 1991	Eurocode 1: Actions on structures
Eurocode 3 – EN 1993	Eurocode 3: Design of steel structures
SI 2001/2954	Control of Pollution (Oil Storage) (England) Regulations
SSI 2011/209	Water Environment (Controlled Activities) (Scotland) Regulations
WSI 2016/359	Control of Pollution (Oil Storage) (Wales) Regulations
NISR 2010/412	Control of Pollution (Oil Storage) (Northern Ireland) Regulations

1.5 Abbreviations

AFDS	Automated Fuel Dispensing System
AP	Authorised Person
ATG	Automatic Tank Gauge
AUS 32	Aqueous Urea Solution
BF(G)	British Forces Germany
BS	British Standard
CCO	Continued Certificate of Operation
CDM	Construction Design and Management Regulations 2015
CESO	Chief Environment and Safety Officers
CFFP	Certificate of Fitness for Purpose
CNG	Compressed Natural Gas
CO	Commanding Officers
DEF	Diesel Exhaust Fluid
DIO	Defence Infrastructure Organisation
EA	Environment Agency
EFM	Estate Facilities Managers
EI	Energy Institute
EPA	Environmental Protection Agency
EWR	The Electricity at Work Regulations
FAME	Fatty Acid Methyl Ester
FGSR	Fuel Gas Safety Regulator
GRP	Glass Reinforced Plastic
HDPE	High Density Polyethylene
HoE	Head of Establishment
HGV	Heavy Goods Vehicle
HSE	Health and Safety Executive
LNG	Liquid Natural Gas
LQA	Land Quality Assessment
MMO	Maintenance Management Organisation
MOD	Ministry of Defence
MTFI	Mechanical Transport Fuelling Installation
MWC	Maximum Working Capacity
NFPA	National Fire Protection Association
OA	Operating Authority
OWI	Oil Water Interceptor
PVV	Pressure Vacuum Valve
RCBO	Residual Current Breaker with Over-Current
SB	Siting Board
SCR	Selective Catalytic Reduction
SEFM	Senior Estate Facilities Managers
SEPA	Scottish Environmental Protection Agency
SIM	Site Infrastructure Manager
SOR	Statement of Requirement
SPZ	Source Protection Zone
SRP	Safety Rules and Procedures
SSIM	Site Senior Infrastructure Manager
TA	Technical Authority
TB	Takeover Board
UKCA	United Kingdom Conformity Assessment
UIN	Unit Identification Number
USVF	United States Visiting Forces
VOC	Volatile Organic Compound

1.6 Definitions

The terms used within this Guide are defined below:

Authorised Person: The AP is the individual responsible for the practical implementation and application of JSP 375 Volume 3 for the systems, installations and locations for which they have been appointed.

Automatic Safety Nozzle: A device for controlling the amount of fuel during a dispensing operation which automatically switches itself off and stops the flow when the liquid level rises above the spout.

APEA/EI Blue Book: The use of the term Blue Book throughout this Standard refers specifically to the Energy Institute and Association for Petroleum & Explosives Administration standard – The Design Construction Modification Maintenance & Decommissioning of Filling Stations.

Bund: A wall of appropriate height constructed of concrete, metal or other suitable material, designed to contain and confine spillage of oil from any cause.

Check Valve: A valve which shall only allow flow in one direction.

Class I, II & III (Fuel): Energy Institute classification of petroleum products graded by the product's flash point. Class I is unleaded petrol, Class II is kerosene-based fuels and Class III is diesel-based fuels.

Class I, II, III, IV, V, VI (Leak prevention and Detection): Refer to section 6 of this standard for more detailed overview.

Class I & II (Electrical): Class I appliances have protection from basic insulation and earth connections. Class II appliances have at least two layers of insulation, also known as double insulated.

Competent Person: A person with sufficient technical knowledge or experience to prevent danger or, where appropriate, injury, during their work. A competent individual person (other than an employee) or a competent body of persons corporate or unincorporated. Responsible for preparing or certifying the suitability of a written scheme of examination and for carrying out an examination in accordance with the written scheme of examination.

Contractor: The company employed to carry out installation or maintenance work on an MTFI. The Contractor is to have a suitable background in fuel infrastructure and demonstrated history and experience in forecourts and or MOD MTFIs.

Control Point: A building in which at attended installations the operator controls the pumps/dispensers and in which the wet stock management system is located. A lightweight building may also be located at unattended installations for the environmental protection of the wet stock management system and electrical installation.

Designer: The company employed to carry out the planning and design work on an MTFI. The Designer is to have a suitable background in fuel infrastructure and demonstrated history and experience in forecourts and or MOD MTFIs.

Dispenser: Measuring system containing its own pumping system to draw and deliver liquid fuel from a supply tank or tanks into the tanks of motor vehicles, boats and trains and into portable containers.

Explosive Atmosphere: A mixture of air, under atmospheric conditions, and flammable substances in the form of gas, vapour or mist in such proportions that it can be exploded by excessive temperatures, arcs or sparks.

Equipment Certification: Equipment for use in Hazardous Areas is ATEX certified by one of a number of testing authorities (Notified Bodies) as meeting the requisite standards. This certification is arranged by the manufacturer of the equipment.

Gross Capacity: Is the total volume of the tank as provided by the tank manufacturer. Gross capacity is synonymous with brimful capacity or the point at which the tank overflows into the bund.

Hard Standing: Paved area where motor vehicles park to refuel from dispensers. Area is either bound or laid with a fall to drainage which is connected to the underground OWI.

Hazardous Area: An area where a flammable or explosive gas or vapour-air mixture (often referred to as an explosive gas-air mixture) is, or may be expected to be, present in quantities which require special precautions to be taken against the risk of ignition.

Impact Valve: A valve incorporating a weakened section that shall fail and close under impact conditions.

Integrally Bunded: A storage tank that has a twin wall constructed around the primary tank to provide secondary containment in the event of tank failure. Where all the ancillary equipment associated with the tank is installed within the secondary containment. The terms twin-skinned, double walled are synonymous with integrally bunded.

Leak Detection System: Automated systems to detect product leaks from existing tanks and pipes to the surrounding environment.

Leak Prevention System: Secondary containment systems for tank and pipes that prevent any leaking fuel form being released to the environment, with associated positive monitoring that provides an alarm when a breach of containment is detected.

Mechanical Transport: In the context of MOD refuelling stations, mechanical transport implies motor vehicles; cars, HGVs, trains and boats.

Maximum Working Capacity: Is less than the gross capacity of the tank. It is the maximum volume of fuel that can be safely contained in a tank allowing for thermal expansion and when road tanker unloading is taking place, time to respond to an emergency situation such as an overfill alarm, and the drainage of the pipework and hose from the shutoff valve into the tank. This capacity should vary dependent on the tank size and whether the tank is below or aboveground. Every tank should be labelled to show its maximum working capacity. Maximum working capacity is synonymous with safe working capacity and nominal capacity.

Non-hazardous Area: An area in which an explosive atmosphere is not expected to be present so that special precautions for the construction and use of the electrical equipment are not required.

Operating Authority: The line manager of the Fuels and Lubricants section has delegated authority for the installations, in accordance with the current version of JSP 317. Authority must be given by the OA before any works can be undertaken on a Petroleum Installation.

Overfill Prevention Device: A device or system designed to automatically shut-off and prevent a delivery of fuel overfilling a tank beyond its maximum working capacity.

Pressure/vacuum Valve: A dual purpose valve which automatically prevents excessive positive or negative pressure in the tank or pipe to which it is connected.

Oil Water Interceptor: A device installed in a surface water drainage system to separate out any fuel and thus prevent it reaching public drains, sewers or water courses. The terms separator and interceptor are synonymous within this Standard.

Siting Board: Meeting convened with all responsible stakeholders, to be convened by the Senior Estate Facility Manager (SEFM) / HoE (or Representative) and run in accordance with JSP 317.

Tanker Delivery Stand: Paved area where refuelling bowsers park to fill storage tanks. The paved area is either bound or laid with a fall to drainage which is connected to the underground OWI. The tanker delivery stand can either be separate or part of the wider MTFI hard standing.

Technical Authority: Branch of DIO with responsibility for providing authoritative technical works advice.

Wet Stock Management: A system for checking and keeping records of the fuel stored, delivered and dispensed and comparing them to identify any discrepancies which might indicate an unexplained loss of product.

2. Application of This Standard Elsewhere

2.1 USVF Bases

2.1.1 The guidelines given in this Standard are applicable to MTFIs found on MOD Establishments occupied by the United States Visiting Forces (USVF).

2.1.2 Both in terms of quality and safety, the Standard of work undertaken on USVF sites shall not be inferior to those executed on the UK MOD sites.

2.2 Overseas Estates

2.2.1 The Secretary of State has stated that; “Within the United Kingdom (UK) we comply with all applicable HS&EP legislation” and that “Overseas we apply our UK arrangements where reasonably practicable and, in addition, respond to host nation’s relevant HS&EP expectations”.

2.2.2 The estates occupied by BF(G) apply their own local (German) regulations. The competency of the contractor is established prior to contract let and local procedures apply to the selection and appointment of the Competent Person. For this reason, while the general principles mentioned in this Technical Standard may be applicable, the document will be of limited use to BF(G) staff.

SECTION 2

3. Planning

3.1 Siting Board

3.1.1 The Siting Board (SB) is a mandatory requirement. All new permanent and semi-permanent MTFIs and MTFI refurbishments are to be subject to a properly constituted SB prior to the placing of project management or construction contracts.

3.1.2 A new permanent MTFI cannot be brought into use until the installation has been sited to the agreement of all interested parties, certified as fit for purpose, commissioned and taken over for use and maintenance.

3.1.3 Before a SB can be convened, a Statement of Requirement (SOR) shall have been prepared, as part of the initial planning, to determine the actual details of the work to be undertaken as this should influence the correct stakeholders to be in attendance at the SB. Refer to section 3.2 below for details of the initial planning requirements.

3.1.4 It is the responsibility of the Site Estate Facilities Manager (SEFM) / HoE (or representative) to arrange for the SB to be held.

3.2 Initial Planning

3.2.1 After consultation with the relevant unit stakeholders (end user, fuels section, HoE etc.), the MMO will produce a set of requirements for anticipated work and technical documentation deliverables that shall form the basis of discussion and agreement for the siting board. As a minimum, the following details shall be recorded in the SOR;

- Number of tanks,
- Capacity of tanks,
- Number of fuel dispensers,
- Tank to dispenser pipework proposed routing,
- DEF requirement and proposed storage and dispense strategy,
- OWI requirement and outline specification,
- Electrical supply location and suitability,
- Existing buried services,
- Scope of any decommissioning or demolition works required,
- Historical fuel consumption rate (MTFI refurbishment),
- Anticipated vehicle fuel grades required.

3.2.2 As part of the initial planning process; health and safety, environmental risk assessments and a baseline Land Quality Assessment (LQA) should be completed to establish the facility requirements to form the basis for stakeholder engagement. These assessments should take into account the following;

- The nature, location and depth of any required waste disposal (landfill) and land contamination,
- Any subterranean water courses, aquifers, culverts, pipelines or mine workings; any cuttings or tunnels and any basements or cellars directly beneath or adjacent to the filling station,
- Surface waters and groundwater,
- Protected environmental areas, for example a Site of Special Scientific Interest (SSSI).
- The nature of the previous uses of the land being redeveloped should also be identified and assessed, including where necessary an intrusive investigation.

3.2.3 When redeveloping existing sites remediation may be required. The scope and scale of remediation, if required, should be determined through the LQA process.

3.2.4 Reference should be made to;

- BS 10175 Investigation of potentially contaminated sites Code of practice,
- Land Contamination: Risk Management, (EA, 2020),
- NPPF National Planning Policy Framework (DCLG, 2012) in England, or the relevant planning policies for your country.

3.2.5 Initial planning needs to take into account the guidance in section 2 on Environmental Risk Assessment. In England and Wales, reference should also be made to the Environment Agency's Approach to Groundwater Protection.

3.2.6 Consideration should be given to consultations with responsible public authorities and utility providers during planning where those authorities have jurisdiction within the MOD estate. Consult with the DIO Environmental Ordnance Liability (EOLM) Team (DIOTS-LQA@mod.gov.uk) for SME LQA support as part of this initial planning process.

3.2.7 Initial planning shall give due consideration to the welfare facilities for operational personnel. The MTFI facility should be sited such that welfare facilities (toilets and handwashing) are found within 50m of facilities in accordance with JSP 317.

3.3 Risk Assessment - General

3.3.1 The assessment of risks and inclusion of mitigating measures within the design process and operation of an MTFI, is a legal obligation under UK regulations, primarily the Health and Safety at Work etc Act 1974. A duty of care is placed upon the MOD to review the hazards associated with the storage and dispensing of fuels within the MOD estate, and to put in place measures that either reduce or remove the likelihood of those hazards causing harm to their employees or the general public.

3.3.2 It is not the intention of this Standard to provide specific guidance on the procedures relating to the undertaking of Risk Assessments. Those with a duty to assess the risks relating to the design, operation, inspection, maintenance of an MTFI facility should refer to the JSP 375 Part 1 – Directive and external UK HSE legislation.

3.3.3 It should be noted that the risk assessment shall be revisited if any changes to the operation or design of the facility are made after initial commissioning.

3.3.4 The following sections 3.4 to 3.7 list subjects, whilst not exhaustive, that should be considered when undertaking a risk assessment of any MTFI from the viewpoint of design and maintenance. It shall be noted that they are not listed in any order of priority.

3.3.5 The MTFI Designer, and those responsible for the operation and maintenance of the MTFI facility, should refer to the 4th Edition APEA/EI Blue Book section 2 risk assessments for further supplementary guidance on the types of foreseeable risks related to MTFIs.

3.3.6 Changes to the management, operation or design of an existing MTFI shall not be initiated without a recorded risk assessment. This shall consider the risks to operability, maintainability, product containment, accessibility, plant reliability and life expectancy, environmental, standard operating and emergency procedures that may be introduced by the change or the new procedure. Records of the change should be documented and maintained for the life of the facility.

3.4 Risk Assessment - Fire

3.4.1 The likelihood of a major fire can be minimised by good plant design and layout, sound engineering, good housekeeping, good operating practices and proper instruction, supervision and training of personnel. MTFI design and layout shall include the provision of adequate water supplies, fire protection and firefighting equipment, means of escape for personnel and means of access for fire & rescue in the event of a fire. The level of protection afforded to MTFIs will vary dependent upon the size, complexity and nature of business conducted at each location. It is important to assess the risk involved at each location and provide and install appropriate fire safety measures for each particular risk.

3.4.2 Specific risks to be considered are as follows;

- Provision of lightning protection,
- Proximity of packed petroleum or gas cylinder stores,
- Adequacy of height of vent pipe,
- Provision of telephone to raise alarm,
- Provision of emergency stop to shut off fuel dispensers in an emergency.

3.4.3 The number and location of fire-fighting equipment is to be determined by the Unit Fire Officer. The table below defines the minimum scaling to prevent any small incipient fire spreading to MTFI facilities – reference JSP 317.

Number of Dispensers	Number of extinguishers required
Up to four	At least four
For each additional dispenser	One more

Notes:

1. It is recommended that these extinguishers should be either AFFF 9 litre foam or dry powder with a capacity of at least 4.5kg.
2. Hydrants if required are to be sized and located to enable the requirements of Fire Standard D3 to be met.
3. On operations the number of fire extinguishers shall be commensurate with the increased risk. Where there are up to four dispensers at least four fire extinguishers are required. Then one more extinguisher for each additional dispenser.

Table 1 – Minimum portable fire extinguisher provision at MTFIs.

3.5 Risk Assessment - Environmental

3.5.1 Hydrocarbon fuels contain substances that are hazardous to the environment. It is a legal requirement to prevent pollution by these substances to the wider environment and unless permitted, their discharge is a criminal offence throughout the UK. The storage and handling of such substances and other pollutants can present a significant and ongoing potential for environmental pollution through accidents, vandalism, theft, poor practice, and the deterioration of storage vessels and associated infrastructure such as pipelines.

3.5.2 Groundwater is particularly at risk and once polluted can become expensive and difficult to remediate. Surface waters such as streams and rivers are particularly at risk from spill incidents and the escape of product can impact biodiversity.

3.5.3 Specific issues to be considered are as follows;

- Secondary and tertiary containment,
- Presence and location of drains and OWIs,
- Fitting of overfill prevention devices to tanks,

- Site cleanliness, avoidance of accumulation of rubbish in the immediate vicinity,
- Adequacy of routine for leak monitoring,
- Provision of spill kits,
- Tank condition monitoring.

3.6 Risk Assessment - Construction

3.6.1 Construction works are defined within the Construction (Design and Management) Regulations (CDM) and include construction, alteration, conversion, fitting out, renovation, installation, commissioning, maintenance, repair, upkeep and removal of services. For CDM works procedures, roles and responsibilities refer to JSP 375 Part 2 Volume 1 Chapter 33.

3.6.2 The CDM client or Principal Designer is to:

- Ensure that the design and construction take account of the requirements of JSP 375 Part 2 Volume 3 so they can be satisfactorily implemented throughout the life of the facility,
- Ensure that the effects of the works and the completed MTFI upon the existing site infrastructure are fully understood and considered so as to ensure continuing compatibility.

3.6.3 At the initial design stage of a project the CDM client and or Principal Designer, HoE and other relevant stakeholders of the works are required to initiate the necessary exchange of pre-construction information and to inform design and build deliberations. The MMO is to ensure key stakeholders within their organisation have been notified and that any issues are identified before work commences. The MMO is to liaise with the Client and or Principal Designer as appropriate. The CDM Client and Principal Designer are to coordinate and manage the flow of health and safety information between all stakeholders in the pre-construction phase of a project. Once the construction phase commences the Principal Contractor takes the lead role for coordination.

3.7 Risk Assessment - Dangerous Substances Explosive Atmosphere Regulations (DSEAR)

3.7.1 Installations in which flammable substances are handled or stored should be designed, constructed, operated and maintained so that any releases of flammable substance, and consequently the extent of hazardous areas, are kept to a minimum, whether in normal or abnormal operation, with regard to frequency, duration and quantity of a release.

3.7.2 To ensure compliance with DSEAR, a risk assessment shall be completed by a Competent Person as well as the manager responsible for the process (JSP 375 Volume 1 Chapter 9). If any potentially explosive atmospheres are identified they must be recorded; this should be carried out using the MOD Form 5014.

3.7.3 Site specific (not generic) hazardous area classification drawings, in plan and elevation with all major dimensions shown, shall also be completed if a hazardous area is identified.

3.7.4 Electrical and mechanical equipment used in a hazardous area is to be suitably rated (ATEX certified) to the zone in which it shall operate.

3.7.5 Where the MTFI is only used for high flashpoint Class III fuels then PG 2018/02 should be used to undertake the DSEAR risk assessment. This Practitioner Guide sets the Ministry of Defence (MOD) Standard for the consistent compliance with the Dangerous Substances and Explosive Atmosphere Regulations (DSEAR) for high flashpoint Class III fuels on the MOD estate.

4. Design Preference

4.1 Tanks

4.1.1 The preferred design of new or refurbished Class I MTFIs shall incorporate integrally bunded aboveground tanks designed and manufactured to UL 2805 to provide minimum fire and impact resistance for above ground installation.

4.1.2 The preferred design of new or refurbished Class II or III MTFIs shall incorporate integrally bunded aboveground tanks designed in accordance with BS EN 12285 Part 2 or BS 799 Part 5.

4.1.3 Where there is an operational military need or requirement for underground tanks then the design and installation requirements of the APEA/EI Blue Book shall be followed for tank selection, design and installation. The decision to forego the selection of an aboveground tank in preference for an underground tank shall be made by the SB after consideration of the prepared statement of requirement.

4.2 Tank Location

4.2.1 The positioning of fuel storage tanks shall take into consideration of potential incidents that might threaten the installation, or that might ensue as a consequence of loss or spillage of fuel. For example; vehicle impact, fire and risk of pollution shall be taken into account.

4.2.2 It should also be noted and understood the difference in risk between Class I and Class III fuels. Historically Class I tanks have been located underground to mitigate the higher fire risk from petrol storage and also where there are space constraints due to site layout. To achieve an acceptable level of fire and impact protection aboveground tanks constructed in accordance with UL 2805 enables Class I fuels to be stored above ground.

4.2.3 For Class I fuels, the centre lines of any tank openings or off-set filling points should be a minimum of 4 m from foundations of occupied buildings and not within buildings or within 6m of basements. The location shall allow for tank openings or off-set filling points to be in the open air to ensure adequate ventilation for dispersing any accumulations of vapour.

4.2.4 Any location chosen for an MTFI shall be sufficiently spacious for it to be designed to minimise the risks from the fuel to any person likely to be at or near the facility.

4.2.5 MTFI storage tanks should be located in a manner to allow safe access and subsequent removal if required.

4.2.6 Above ground tanks shall incorporate suitable impact protection against physical damage and be positioned such that any hazardous areas around exposed shells, bunds and exposed pipework are wholly contained within the MTFI boundary.

4.3 Storage and Dispensing

4.3.1 The preference is for dispensers to be located in the open air where they can be adequately ventilated on a refuelling island. This has the advantage of enabling refuelling from two sides catering for the variability of fuel cap orientation on motor vehicles.

4.3.2 They shall be positioned so that vehicles can be parked easily in a convenient position alongside each metering pump/dispenser without restricting the movement of other vehicles.

4.3.3 Designers and installers shall seek further advice from dispenser suppliers regarding the maximum lift capacity of dispenser pumps. Pipework suppliers should be able to provide charts relating flow rate to the friction head loss for their pipework system.

4.4 Road Tanker Delivery Stands

4.2.1 A safe position from which the road tanker can deliver vehicle fuels to the MTFI storage tanks shall be identified.

4.4.1 The tanker stand and the adjacent tank fill point(s) shall be positioned to allow the tanker to discharge without being at risk from other vehicle movements. The tanker stand areas should not lie on the line of access roads or impinge vehicle movements across the site.

4.4.2 The tanker stand shall include a retractable earth grounding reel connected to the MTFI earth tape system.

4.4.3 Access and egress of tanker should be achieved without having to make a reverse manoeuvre.

4.5 Fill Points

4.5.1 The fill points for storage tanks should be positioned adjacent to the road tanker delivery stand. The fill points may be; incorporated in the tank lid (described as direct fill) of underground tanks, positioned remote from the tank (often described as offset) with a connecting fill pipe, or fitted to the side of an aboveground tank within a fill point cabinet.

4.5.2 To mitigate against the risk of leaks or spillage during tanker offloading, the fill point of the tank shall have direct line of sight from the tanker pump control position. The tanker driver, in control of the fuel delivery, must have clear unobstructed view of the tank fill point connection to ensure any emergency action can be taken swiftly.

4.6 Pipework

4.6.1 All underground pipework that distributes fuel from a storage tank to a fuel dispenser, whether by suction or pressurised feed, shall be of the HDPE ‘pipe in pipe’ double containment type in accordance with BS EN 14125.

4.6.2 All aboveground pipework shall be carbon steel or stainless steel and manufactured in accordance with BS EN 10255 or BS EN 10241 to the thickness specified for medium tubes.

4.6.3 Where possible all steel pipes shall employ welded connections to limit potential leakage of product.

4.7 Tank Vent Pipes

4.7.1 Vent pipes shall be located so that vapour should be dispersed safely into the atmosphere. Locations shall take into account conditions at or near the installation which could adversely affect safe dispersal of any discharge (e.g. the height and location of surrounding buildings).

4.7.2 Vent pipes shall extend to a height greater than the maximum liquid level in any road tanker likely to deliver fuel or to a minimum of 5 m above ground level, whichever is the greater. The vent discharge point shall be a minimum of 3 m from building apertures or the installation boundary.

4.7.3 Pressure-vacuum valves (PVV) shall be fitted to vents on tanks in which a product with a flashpoint below 38°C is stored.

4.8 OWI Vent Pipes

4.8.1 Vent pipes shall extend to a minimum of 2.4 m above ground level and be located a minimum of 3 m from access roads or building openings.

4.9 Drainage System

4.9.1 The initial planning of the MTFI should assess the usage of the facility to establish possible contamination of the drainage system and the likelihood of contaminates entering public drains and sewers, water courses and surrounding land. The risk assessment should consider the products (e.g. petrol, diesel, washing detergents, and other effluents) that may be used, and which may enter the MTFI drainage system.

4.10 Electrical Ducts

4.10.1 Duct systems for underground electrical cables should be designed to prevent the transfer of flammable liquid, vapour or gases between potential spillage areas and buildings or other confined spaces on site. All ducts should be sealed at both the point of entry and point of exit with a designed mechanical seal or suitable compound or other filler material which has been proved to provide effective sealing and is resistant to Volatile Organic Compounds (VOCs) in liquid or vapour form.

4.11 Vehicle Movements and Flow

4.11.1 The MTFI access and layout should be designed bearing in mind the safe speeds, turning circles and routes around the forecourt of both customer and delivery vehicles. Particular attention should be paid to the siting of car wash facilities and delivery vehicle unloading areas relative to each other and to the main vehicle flows. The layout should aim to avoid route conflicts and should be enhanced, if necessary, by the provision of extended sight lines, speed restrictions and appropriate signs and markings.

4.12 Fire Fighting Equipment

4.12.1 At all MTFIs a supply of dry sand or similar sorbent material should be provided to clean up small spills and leaks of vehicle fuel. The supply should be kept in a container with a close-fitting lid and be provided with a means of application.

4.12.2 Additionally, to prevent any small incipient fire spreading to the fuel facilities, a number of portable fire extinguishers should be provided as recommended in section 3.2.

4.13 Warning and H&S Notices

4.13.1 The use of conspicuous and clear notices helps the safety of operations at MTFIs by providing clear information and warnings or advice on the actions to be taken in the event of emergencies. Refer to section 5.12 of this Standard for further details of warning signage.

4.14 Control Point

4.14.1 Within the vicinity of the MTFI a lightweight GRP type enclosure may shall be located at unattended installations for the environmental protection of the wet stock management system and electrical installation.

5. Tanks

5.1 General

5.1.1 At an early stage in the planning and design process the criteria for numbers of tanks, tank capacity and MTFI layout shall be determined. Factors to be taken into account include;

- Adequate positioning of fuel storage tanks with awareness from the threat of fire or flammable vapour accumulation,
- Anticipated fuel throughput (new builds),
- Historical fuel throughput (refurbishments),
- Expected and available product delivery cycle,
- Types of product to be stored,
- Types of vehicle to be refuelled,
- Numbers of vehicles to be simultaneously refuelled,
- Safe access for maintenance and subsequent removal,
- Extent of hazardous area.

5.1.2 Tanks should be designed, constructed, and installed so as to provide protection to personnel, and the environment against release of product, fire and explosion. When properly installed the complete system should retain its integrity for the entire duration of its design life. Tanks should have the following essential performance requirements;

- Means to detect any perforation in the primary tank shell before fuel can escape to the environment (secondary containment bund alarm),
- Means to prevent degradation due to corrosion, chemical action or fuel incompatibility,
- Means to contain any uncontrolled release of fuel or vapour,
- Accessibility for routine and essential maintenance,
- Ease of demolition,
- Above ground tanks should be installed to enable access to the underside of the tank for inspection purposes.

5.1.3 Tanks for the storage of fuel at MTFIs shall be certified as having been manufactured and installed in accordance with the appropriate following standards:

- BS EN 12285-1 Workshop fabricated steel tanks. Horizontal cylindrical single skin and double skin tanks for the underground storage of flammable and non-flammable water polluting liquids,
- BS EN 12285-2 Workshop fabricated steel tanks. Horizontal cylindrical single skin and double skin tanks for the aboveground storage of flammable and non-flammable water polluting liquids,
- BS 799-5 Oil burning equipment – Part 5: Carbon steel oil storage tanks – Specification,
- UL 1316 Standard for safety glass-fibre-reinforced plastic underground storage tanks for petroleum products, alcohols, and alcohol-gasoline mixtures,
- UL 2085 Standard for safety protected aboveground tanks for flammable and combustible liquids.

5.1.4 Tanks shall be a minimum of –

- 4m from foundations of buildings,
- Not within buildings,
- 6m from basements,
- 6m from other types of occupied buildings.

5.1.5 Labels shall be fixed adjacent to all tank fill points stating the tank identifier (number), fuel type and the maximum working capacity of the tank. This label shall be securely fitted around the fill pipe located within respective access chambers or at an off-set fill point.

5.1.6 Tanks shall be fitted with connections for filling, discharging and venting. Openings shall be limited to those necessary for fitting those connections and, if applicable, for wet stock management system equipment. Any opening associated with such equipment shall be capable of closure in a way which should prevent unauthorised access.

5.1.7 To avoid a build-up of back pressure wet stock management system equipment shall not be installed in the fill pipework.

5.1.8 Tanks shall have a certificate of conformity supplied by the manufacturer to confirm compliance with the requirements of the appropriate BS standard to which they were designed and constructed. The certificate may include details of class, certifying authority's approval number, client, job number and site. It should also have details of the number of compartments and their capacity, test pressure of tank and of skin exterior finish, interior finish, thickness of any exterior protective coating and interstitial space volume. It should be signed on behalf of the manufacturer.

5.1.9 Aboveground tanks shall meet the requirements of the relevant Oil Storage Regulations.

5.1.10 The dispenser calibration maintenance activity requires the removal of fuel into calibrated jugs/containers. Where these containers are required to be emptied back into the tanks, an appropriate method shall be considered at the design and planning stage to enable this activity to be completed safely for above ground tanks.

5.1.11 All tanks shall be fitted with a mechanical overfill protection device to prevent spillage of product during tank filling.

5.1.12 On all above ground tanks an anti-syphon device shall be installed on the tank discharge pipe upstream of the tank dispenser.

5.1.13 All above and below ground tanks shall be installed with a suitable means to drain water from the tank where necessary.

5.2 Aboveground Tanks (Class I – Petrol Specific)

5.2.1 Aboveground Class I (Petrol) MTFI tanks shall be designed to UL 2805 to provide minimum fire and impact resistance for above ground installation.

5.2.2 Tank fill points may be located within secure cabinets mounted to the tank side or within a secure forward compartment of the tank. The fill points may be located in underground chambers or above ground, in the open or within a protective housing. They shall be located in well ventilated areas, remote from other buildings or other obstructions that might otherwise adversely affect free ventilation of the area, with means of containment of foreseeable spills arising from connection of truck hoses such that they are safely retained in the immediate area and may be readily cleaned up.

5.2.3 Positioning and orientation of the tank fill point shall be as close as possible to the road tanker delivery stand. Where some distance is involved then an off-set fill pipe may be considered to be appropriate.

5.2.4 In order to facilitate ease of visual monitoring and inspection of tank undersides, aboveground tanks should be installed on a skid, saddles or concrete piers providing at least 300mm height from tank underside to foundation level.

5.2.5 Insulated and fire protected tanks are normally contained within a blast protection jacket which prevents the inner tank from reaching a critical temperature when the outer surface is exposed to fire. They can also provide protection against a projectile, vehicle and firefighting (water jet) impacts. UL 2085 addresses test criteria covering such requirements.

5.2.6 Protected aboveground tanks tested and constructed in accordance with UL 2085 should have the following fire resistive properties;

- Prevent release of liquid,
- Prevent failure of primary tank,
- Prevent failure of the supporting structure,
- Prevent impairment of venting for not less than two hours,
- Limit the increase in temperature of the stored fuel when tested using the fire exposure test.

5.2.7 In addition to a UL 2805 tank, further mitigation measures shall be considered, such as;

- vehicle impact protection bollards or barriers,
- high containment kerbing,
- adequate separation distances to other site hazards and buildings.

5.2.8 Currently there is no British Standard for fire-protected aboveground petroleum storage tanks, but it is possible to design a suitable installation that provides the necessary safeguards. Tanks designed to UL 2085 provide a minimum of two hours' fire resistance protection.

5.2.9 Adequate control measures are addressed in the UL 2085 standard which are incorporated into the design of the tank and its installation. At present most petrol tankers are not normally fitted with cargo pumps and it may be necessary to provide a separate fixed pump as part of the storage installation for delivery purposes. Where a fixed pump is necessary it shall be ATEX rated for operation within a Class I installation in accordance with the zone in which it is installed. In all such cases the delivery pipework should be designed as a pressure system and include appropriate control measures to prevent the tank being over-pressurised or overfilled.

5.2.10 Protected tanks used to store petrol should have a closed secondary containment with a leak detection system fitted (refer to section 6). This ensures the tank is under test for the whole of its working life and in the event of a failure of either the inner or outer tank skin the system shall alarm and prevent product from being released.

5.2.11 Where the dependency for emergency relief venting is placed upon pressure-relieving devices, the total venting capacity of both normal and emergency vents should be sufficient to prevent a pressure build-up in a fire situation which would rupture the shell or heads of a horizontal tank.

5.2.12 An emergency relief valve should be provided for each tank/compartment and also the interstitial space. The total emergency relief venting capacity should be not less than 200 mm in diameter in total for a compartment up to 45,000 litres and have a pressure relief setting of 70 mbar. For guidance applicable to larger tank compartments refer to NFPA 30 Flammable and combustible liquids code.

5.2.13 Emergency relief devices should be vapour-tight and installed in the top of the tank above

the maximum liquid level.

5.3 Aboveground Tanks (Class II & III)

5.3.1 The preferred design of new or refurbished Class II or III MTFIs shall incorporate integrally bunded aboveground tanks designed in accordance with BS EN 12285 Part 2, or BS 799 Part 5.

5.3.2 Tank fill points may be located within secure cabinets mounted to the tank side or within a secure forward compartment of the tank. The fill points may be located in underground chambers or above ground, in the open or within a protective housing. They shall be located in well ventilated areas, remote from other buildings or other obstructions that might otherwise adversely affect free ventilation of the area, with means of containment of foreseeable spills arising from connection of truck hoses such that they are safely retained in the immediate area and may be readily cleaned up.

5.3.3 Positioning and orientation of the tank fill point shall be as close as possible to the road tanker delivery stand. Where some distance is involved then an off-set fill pipe may be considered to be appropriate.

5.3.4 In order to facilitate ease of visual monitoring and inspection of tank undersides, aboveground tanks should be installed on a skid, saddles or concrete piers providing at least 300mm height from tank underside to foundation level.

5.3.5 If installed within the Inhabited Building Distance on sites where explosives are stored, above ground fuel tanks (Class II & III) shall be constructed to UL 2085 to provide protection from projectile impact and potential pressure shock waves.

5.4 Underground Tanks

5.4.1 Where there is an operational need or requirement for underground tanks, then all new and refurbished installations shall include integrally bunded tanks with an interstitial space that is constantly monitored for leaks using a Class I leak detection system.

5.4.2 Double-skin steel to with BS EN 12285 Part 2, double-skin steel composite and double-skin GRP tanks should be suitable for most applications.

5.4.3 Filling points may be located within underground or aboveground chambers, in the open or within a protective housing. They should be located in well ventilated areas, remote from other buildings or other obstructions that might otherwise adversely affect free ventilation of the area, with means of containment of foreseeable spills arising from connections and disconnection of truck hoses such that they are safely retained in the immediate area and may be readily cleaned up.

5.5 Aboveground Pipework

5.5.1 Aboveground pipework has the advantage that leaks are more readily detected, and any vapour produced should normally be dissipated by natural ventilation. Inspection, maintenance and repairs are also easier, and corrosion can be more readily identified and controlled.

5.5.2 All aboveground pipework shall be carbon steel or stainless steel manufactured in accordance with BS EN 10255 or BS EN 10241 to the thickness specified for medium tubes. Refer to section 4.6 of this Standard for further details relating to pipework.

5.5.3 Aboveground pipework shall be designed and installed and tested to a suitable standard e.g. ASME B31.3, BS 2971 or BS EN 10226.

5.5.4 Where possible all aboveground pipes shall employ welded connections to limit potential leakage of product. Where this is not possible due to installation constraints, screwed joints are permissible. The use of flange connections should be limited to joints with other apparatus that are supplied with flange connections only. Screwed or flange pipe joints shall only be permitted within areas provided within the OWI intercepted drainage area.

5.5.5 The MTFI design shall allow for differential movement between tanks and pipework to allow for temperature changes in tanks or settlement. Piping supports should be designed to suit the piping.

5.5.6 Aboveground pipework and its supports may be at risk from damage particularly from vehicles. The layout of the MTFI shall minimise the risk of physical damage from vehicles through the use of impact protection such as barriers or bollards.

5.6 Underground Pipework

5.6.1 Underground pipework has advantages such as; providing better fire protection, saving space, and providing greater security. Leakage resulting from damage or corrosion, may be difficult to detect leading to ground contamination and potential environmental problems.

5.6.2 All underground pipework that distributes fuel from a storage tank to a fuel dispenser, or from an offset fill point to storage tank shall be of the HDPE ‘pipe in pipe’ double containment type in accordance with BS EN 14125. The interstitial space for ‘pipe in pipe’ shall be installed complete with a leak detection system connected to a functioning alarm system – refer to section 6 of this standard.

5.6.3 Transitions between the HDPE double containment pipe and metal pipes shall be achieved through the use of a dedicated steel transition fitting. The fitting should suit the design and shall be for a screwed type connection. The transition should be located aboveground and as close to the ground level as possible but allow for installation and maintenance.

5.6.4 All HDPE connections shall be made in accordance with the pipe manufacturer’ instructions.

5.6.5 Pipework trenches shall incorporate a geotextile liner to prevent mitigation of the backfill. Pipework shall be installed on and surrounded by of pea gravel or sand, the depth of which will depend upon the design of the road surface.

5.7 Alarms/Gauges

5.7.1 All tanks or compartments shall be provided with a means for ascertaining the quantity of fuel stored. The preference is for an Automatic Tank Gauge (ATG) system to be installed in all MTFI storage tanks, refer to Section 6 of this standard for further details of ATGs.

5.7.2 Dipsticks are a simple means of measuring the height of fuel in the tank which can be used to provide an indication of the volume of fuel in a tank. Each dipstick is calibrated to a specific tank or compartment and should be marked with that tank or compartment number and should show the tank maximum working capacity. The dipstick shall be marked with calibration marking in maximum 100L increments. If provided, tank access and working platforms shall be required to afford a safe location to use the dipstick at the tank top. Refer to section 5.8 for guidance relating to the design of access stairways and working platforms.

5.7.3 The level of accuracy provided by a dipstick may be insufficient due to several factors such as; deformation of the stick, incremental markings in comparison to size of tank, wear and illegible markings. It is therefore not recommended that a dipstick is used as the only means of measuring fuel quantity within a tank. The necessity of a dipstick should be considered based on the operational requirements of the installation in accordance with Table 10 found in section 6.6 of the 4th Edition Blue Book.

5.7.4 Aboveground integrally bunded tanks shall be also fitted with alarm(s) with the following functions;

- Tank high level,
- Tank low level,
- Bund alarm.

5.7.5 Tanks shall be fitted with a level gauge that provides a capacity reading of the tank. This level gauge may be of the electronic or hydrostatic type and shall be fitted at or near the tank fill point for reference during tanker offloading.

5.8 Working Platforms, Stairways and Access Ladder

5.8.1 At the design and planning stage the risks and hazards associated with operation and maintenance of the MTFI should be identified. Where practicably possible, these risks such as working at height, should be removed through a risk-based design approach. Where there is a necessity to access the top of the fuel storage tank for foreseeable repair, maintenance activities and normal operational requirements, a suitable means of access and working platform may need to be included.

5.8.2 If deemed necessary, these structural elements shall be designed and constructed taking account of safe movement around the tank, tasks being undertaken that may require tools to be carried, and other spatial requirements. Loading and local environmental conditions shall be evaluated during the design stage with the structures being designed to BS EN ISO 14122 and other relevant standards referenced within this standard.

5.9 Testing

5.9.1 Before any tank or pipework is brought into service it should be checked to confirm its integrity. Various methods may be used to fulfil this requirement. Correctly performed pressure and tightness tests are essential to ensure the quality of the installation and problem-free operation.

5.9.2 All tests should be fully documented including a clear indication of the scope, type and results of the tests. Copies of all such test certificates (including calibration certificates for test equipment) should be provided as part of the operation and maintenance manuals at handover.

5.9.3 Before leaving the manufacturer's works, the following tank tests shall be undertaken in accordance with the tank design code and manufacturer's standard procedure;

- A pressure test,
- A vacuum test,
- Double skinned underground tanks require a pressure test of the interstitial area,
- Additionally, for GRP tanks a deflection test to ensure that the vertical diameter has not changed by more than +2% or -1%.

5.9.4 Underground pipes shall undergo a mandatory tightness test prior to trench backfill. Both the primary and secondary pipe shall be tested to ensure there are no leaks in the system.

Manufacturers' guidelines and installation instructions shall be consulted for the correct procedure.

5.10 Vapour Recovery Systems (Class I Fuels)

5.10.1 The Environmental Permitting (England and Wales) (Amendment) Regulations 2011 ensures the recovery of petrol vapour that would otherwise be emitted to the air during vehicles refuelling at service stations. Petrol is a complex mixture of VOCs which readily evaporates contributing to several environmental problems. These include excessive levels of toxic benzene in ambient air and photochemical formation of ozone.

5.10.2 During a delivery from a road tanker, vapour is displaced through the tank vents by the petrol filling the tank. To comply with the UK Regulations vapour is now returned to the top of the road tanker, through a vapour collection hose connected to a vapour return pipe which is attached to the manifolded vent pipes, thus filling the space vacated by the delivered fuel.

5.10.3 Section 5.8 of the 4th Edition APEA/EI Blue Book provides information for the design, construction, installation, modification and maintenance of systems for the recovery of vapour during the unloading of petrol from road tankers.

5.11 Painting/Coating

5.11.1 The surfaces of steel tanks to be painted shall be clean, dry and free from rust.

5.11.2 After tank erection and satisfactory completion of tank testing, the exterior surfaces of the roof plates, shell plates and all associated external mountings, and other steelwork shall be prepared and painted in accordance with the following requirements;

- Surface preparation - Abrasive blast clean to BS 7079 Sa 2½,
- Surface profile - 50 – 75 microns,
- Primer coat - Epoxy zinc phosphate. Minimum dry film thickness 50 microns,
- Intermediate coat - Epoxy micaceous iron oxide. Minimum dry film thickness 100 microns,
- Finish coat - Polyurethane. Minimum dry film thickness 100 microns.

5.11.3 The tank coating shall be in accordance with BS EN 12285 Part 1. Coatings shall be inspected for thickness, continuity and hardness prior to installing the tank. As per BS EN 12285 Part 1 bituminous coatings are not recommended where gravel is used as back fill. The designer shall check the type of backfill to be used for installation and chose an external coating to suit.

5.11.4 On completion of the tank coating and other internal work, the interior of the tank shall be left clean, dry and free from foreign objects and in all other respects, fit to receive fuel.

5.12 Tank Labelling and Marking

5.12.1 A requirement of the Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972 is that tanks containing highly flammable liquids should be clearly identified and marked.

5.12.2 Each tank shall be clearly marked using a durable label which shall be corrosion resistant and resistant to the stored product. The label shall be fixed to the tank on or close to the manhole or fill point. The label shall contain the following information as a minimum;

Tanks designed to BS EN 12285;

- Name and address of manufacturer,

- Year of manufacturer,
- Serial number of tank,
- Tank design standard,
- Maximum working capacity (Nominal capacity),
- Diameter (underground tanks only),
- Tank type,
- Tank material,
- Weight of empty tank.

Tanks designed to BS 799-5;

- Manufacturer's name or trademark,
- Manufacturer's reference number,
- Number and date of standard,
- Maximum working capacity (nominal capacity),
- Type of tank,
- Design pressure,
- Test pressure and date of testing.

Tanks designed to UL 2085;

- Manufacturer's name or trademark,
- Year of manufacturer,
- Tank design standard,
- Maximum working capacity (Nominal capacity),

5.12.3 Aboveground tank signage shall include as a minimum and to be visible from all angles of approach;

- Class I tanks shall be marked with 'Highly Flammable', 'No Smoking', 'No Naked Lights' 'No Mobile Phones' (figure 1),
- Class II & III tanks shall be marked with 'Flammable', 'No Smoking', 'No Naked Lights' (figure 2)
- NATO product and grade identification markings (as per Defence Standard 05-52 Part 2) (figures 3-6),
- Tank capacity shall be clearly marked,

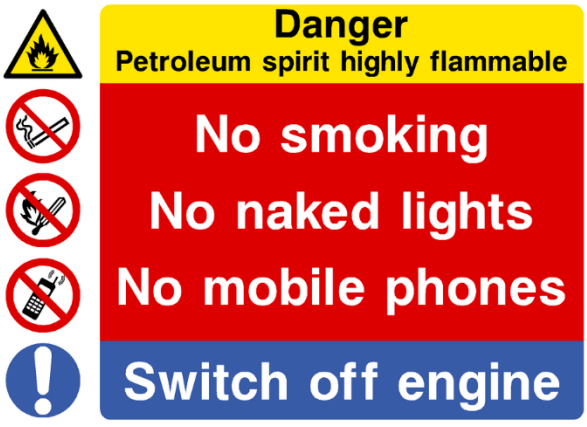

Figure 1 – Class I tanks Highly Flammable Sign.

Figure 2 – Class II & III tanks Flammable Sign.

Figure 3 – F-67 ULGAS Product Identification Marking.

Figure 4 – DIESO UK Product Identification Marking.

Figure 5 – F-54 Dieso MT Product Identification Marking.

5.12.4 Each tank fill point (direct and remote fill points) shall include (figure 6):

- Tank number,
- Maximum working capacity,
- Fuel grade.

Figure 6 – Typical Tank Sign at Fill Point(s).

5.12.5 Each tank fill point shall also be clearly marked with the following:

'DISCONNECT TANKER HOSE'

5.12.6 Each connection point for a vapour return hose shall be marked:

'CONNECT VAPOUR LINE BEFORE OFFLOADING'

5.12.7 Each tank connected to a common vapour collection point shall be marked:

'WARNING. THIS TANK IS MANIFOLDED. ISOLATE TANK VENT PIPE BEFORE COMMENCING ANY WORK'

5.12.8 The following notice shall be located at each metering pump/dispenser, at the control point and at the off-set filling points:

Figure 7 – Typical Sign at Dispensers and Tank Fill Points.

5.12.9 At the MTFI control point the following shall be displayed;

- The Safety Rules and Procedures for Work on Petroleum Installations poster shall be fixed in a prominent position,
- A schematic diagram of the fuel delivery system shall be displayed,
- Certificate for Continued Operation (CCO),
- Hazardous area classification drawing (where applicable).
- Latest electrical test certificates (hardcopy).

6. Leak Containment and Leak Detection

6.1 General

6.1.1 Wet stock management systems are required to enable monitoring of fuel transactions for recording and reporting purposes, additionally they are able to detect variances in product storage/delivery processes which may result in the discovery of leaks.

6.1.2 A wet stock management system shall incorporate the following;

- Reconciliation reports to enable inventory monitoring of fuel transactions,
- Automatic tank calibration to interface with the pump/dispenser controller and with tank gauge readings.
- Water detection sensors where required by the system class.

6.1.3 A complete leak detection system shall be incorporated with regard to the integrally bunded tank and pipework. Leak containment and detection systems are generally in accordance with BS EN 13160.

6.1.4 The following guidance shall also be applicable to a DEF storage tank for containment and leak detection of urea-based products.

6.2 System Class

6.2.1 In accordance with BS EN 13160, five class categories are assigned to the leak containment and detection systems, being Class I to V. It is not the intention of this Standard to provide specific details of each type of Class system, this can be found within BS EN 13160. Further description is provided in the 4th Edition APEA/EI Blue Book section 6 (note that it also provides details of a Class VI and VII systems that do not form part of BS EN 13160.

6.2.2 Classes I-II subjects the storage tank secondary containment system to a permanent pressure test for the life of the installation and will contain leaked fuel within the containment system. The secondary containment shall not allow a release of fuel to ground. Class I and II are considered inherently safe.

6.2.3 A Class III system shall detect and contain a leak from the primary containment system but doesn't subject the secondary containment system to a permanent pressure test. These systems are reliant on a secure secondary system and rely on the monitoring system sounding an alarm which notifies the responsible person of a failure of one of the skins.

6.2.4 Classes I-III are therefore considered to be leak containment and/or prevention systems and can detect a leak from either the secondary or primary containment system, unlike Classes IV-VI which are leak detection systems.

6.2.5 Class IV – VI systems use a combination of software and sensors to detect either a drop in the tank level, when comparing the volume of dispensed fuel against the volume of fuel in the bulk tank, or detect the presence of leaked product in the ground surrounding the tank.

6.2.6 Classes IV and VI rely upon the accurate measuring of the fuel level within the tank. For Class IV systems this is achieved using Automatic Tank Gauges (ATG), whilst Class VI primarily uses manual dipping.

6.3 Leak Containment

6.3.1 Whenever it is reasonably practicable to do so, leak containment systems should be installed

to eliminate the risk of a release of fuel to ground. Environmental regulators require new build sites or those undergoing significant redevelopment which are within a Source Protection Zone (SPZ) 1 to incorporate leak containment systems in accordance with Class I or Ill (Class Il systems are no longer permitted for new installations therefore shall not be discussed further), and may require the same on other sites outside SPZ 1 but representing a significant environmental risk.

6.4 Leak Detection

6.4.1 It is not always possible to visually detect a leak of fuel from the MTFI storage tank or associated pipework. A leak detection system shall be provided as a means of monitoring the status of the fuel within the MFTI facility through the reconciliation of the stored fuel against the volumes of fuel dispensed.

6.4.2 Tank gauge systems shall comply with BS EN 13352. Tank gauge systems provide an indication of the quantity of liquid contained in a storage tank without the need to access the tank and take manual dip readings. Like dipsticks, the gauge measures the height of fuel in the tank, from which the volume of fuel is then determined. The effects of variations in the properties of the fuel and other factors, which shall influence the measurement of height and computation of volume, can be taken into account depending on the sophistication of the system used.

6.4.3 Tank gauge systems may interface with other equipment and shall provide automated stock control, overfill prevention and leak detection information. Where a tank gauge is used as the leak detection system it should also comply with EN 13160-5. In these systems, the ability to measure average fuel temperature and to allow for such variations in the computations is desirable for accuracy of stock control. Any electrical or electronic equipment included in such systems and used in hazardous areas should always be certified as appropriate for use in any hazardous zone in which it is installed.

6.4.4 Where required by the system class the tank gauge system shall have the capability of detecting and determining the volume of any water within the fuel tank.

6.4.5 Tank gauge systems should be checked for compatibility of use when a vapour recovery system is fitted and should never be installed within a fill or vent pipe.

6.5 System Selection

6.5.1 The preference is for aboveground integrally bunded tanks complete with a bund alarm, as specified in section 5 of this Standard, therefore a Class III type containment system is required. The use of a bund alarm within the tank's interstitial space (bund) is seen as an acceptable means of containing a leak and alerting a Competent Person of the presence of leaked product.

6.5.2 A Class IV leak detection system shall be installed in new and modified MTFI facilities using an ATG to reconcile the fuel level in the tank with the volumes that have been dispensed. The ATG shall link with the Automated Fuel Dispense System (AFDS) to allow for accurate real time monitoring. The ATG shall be linked to an alarm or other suitable means to alert a Competent Person that a possible leak has been detected.

6.5.3 Where operational or physical constraints require an underground tank to be installed, the choice of system(s) will depend upon the circumstances at the MTFI and its surrounding environment and shall be determined by a risk assessment conducted at the design and planning stage. In these circumstances reference shall be made to section 6 of the 4th Edition

APEA/EI Blue Book for the correct selection of an ATG for underground tanks.

7. Fuel Dispensers

7.1 General

7.1.1 Dispensers for new or refurbished MTFIs shall be constructed, certified and installed in accordance with BS EN 13617 Part 1, irrespective of the type of fuel to be dispensed.

7.1.2 All new dispensers, with or without vapour recovery, to be installed shall carry the UKCA mark from 1st January 2022. MTFIs within Northern Ireland shall carry the combined UKNI & CE mark from 1st January 2022.

7.1.3 Dispensers for use with class I & II fuels shall be marked as ATEX Group II Category 2 equipment and carry a certification number issued by an ATEX Notified Body.

7.1.4 Dispensers for diesel only MTFIs which are not certified to the ATEX Equipment Directive may be used providing that appropriate DSEAR risk assessments have been performed. In this scenario the dispenser shall be installed outside any of defined hazardous zones while being aware of any possible transient hazardous zones around road tankers.

7.1.5 The preference where possible is for dispensers to be island or kerb side mounted above ground level and constructed with an impact resistant concrete kerb of a height and design commensurate with the types of vehicle to be fuelled at the installation.

7.1.6 Alternatively, dispensers may be integrally mounted within a secure forward compartment of the aboveground tank. This arrangement has the advantage that the tank, dispenser and ancillary components are all installed within a manufacturer's works and brought to site as a single package ready for positioning and connection to the electrical supply.

7.1.7 Dispensers shall be a minimum of –

- 4m from access roads or the installation boundary,
- Separated by a distance of 9m from living accommodation,
- 6m from other types of occupied buildings.

7.1.8 Dispensers with suction systems should include a leak-proof drip tray or membrane arrangement beneath the dispenser which directs any internal leaks onto the forecourt surface, where it is observable. With pressure systems, leak-proof sumps may be used instead of, or in addition to, a drip tray. Where a drip tray is fitted in conjunction with a sump, it should allow access to under-pump valves.

7.1.9 Dispensers may be of twin or single pump construction. If single pumps are installed, they shall be grouped in pairs, positioned back-to-back.

7.1.10 Dispensers shall have a design life of at least 15 years.

7.1.11 Dispensers shall be calibrated, tested and dispensing operations checked at the manufacturer's works prior to installation on site.

7.1.12 Dispensers shall be suitable for interfacing with the selected AFDS and wet stock management system.

7.1.13 Dispensers shall incorporate the following features;

- Illuminated liquid crystal volume display indicating litres only,
- Electric auto reset,
- memory backup for the computer display to maintain a display for 15 minutes during a power failure,
- Non-resettable volume totaliser,
- Drip tray,
- Dry break couplings at the housing and at the nozzle,
- Check valve,
- Impact valve for positive pressure delivery systems,
- Industrial quality hose, of minimum length 3.3 m, with automatic cut-off nozzle,
- Support/base plates.

7.1.14 Each dispenser shall be marked with the NATO Product and Grade Identification Markings (as per Defence Standard 05-52 Part 2). See figures 3 – 5 above.

7.1.15 Methods to protect the dispenser delivery hose from ground abrasion should be considered to prevent damage and removes any trip hazard from cause by a coiled hose at ground level.

7.1.16 All new and refurbished MTFIs shall have the ability to dispense fuel 24 hours a day. An AFDS enables safe and secure fuel delivery, monitoring and reconciliation.

7.1.17 The AFDS system to be installed at all new and refurbished MTFIs is the Transflo ERIC system. The TransFlo Fuel Management System (FMS) has been developed to meet the needs of the MOD. The ERIC (Exclusive Refuelling Information Computer) GFMS (Ground Fuels Management System) is a 24/7 unmanned automated fuel distribution service.

7.1.18 The Transflo ERIC system is not ATEX certified for installation within a hazardous zone. Therefore, the installation location must be out with any hazardous zone as defined by the DSEAR risk assessment. Consideration must also be given to any transient hazardous zones produced by offloading road tankers.

7.2 Suction / Pressure Delivery

7.2.1 Preference shall always be given to suction type dispensers due to their ease of maintenance, however, where the dispense point is located at a significant distance from the storage tank consideration shall be given to the use of submerged pumps. The metering pump/dispenser manufacturer shall be advised of the installation layout, for his comment/acceptance prior to final pump type selection.

7.3 Diesel – F-54 MT DIESO / UK DIESO

7.3.1 Where multiple diesel dispensers are installed at MTFIs, and where deemed a requirement at the planning stage, they shall consist of different flow rates to cater for the refuelling requirements of both cars and heavy goods vehicles. At installations where abnormal vehicles are fuelled, e.g. tank transporters, an extra high-speed design shall be considered.

7.3.2 Dispensers for motor vehicles shall be capable of delivery at 40 litres per minute. Dispensers for HGVs shall be capable of delivery at 70 litres per minute.

7.4 Impact Protection

7.4.1 Where the dispensers are kerb mounted and are adjacent to the hardstanding or flow of vehicles, the concrete kerb shall be impact resistant of a height commensurate with the types of vehicle to be fuelled at the MTFI.

7.4.2 Bollards or other forms of vehicle impact protection may be necessary to protect the dispensers from vehicle impacts.

7.5 Dispenser Labelling and Marking

7.5.1 Each dispenser shall be marked using a durable label which shall be corrosion resistant and resistant to the stored product. The label shall be fixed to the dispenser and visible from all angles of approach. The label shall contain the following information as a minimum (see figures 8 & 9);

- Name and address of manufacturer,
- Mandatory markings UKCA, UKNI & CE and ATEX,
- Year of construction,
- Designation of series or type,
- Serial number if any,
- Design standard.

Figure 8 – Typical Dispenser Product Identification Marking.

Figure 9 – Typical Dispenser Manufacturer Label.

8. Drainage and Hardstanding

8.1 General

8.1.1 The products stored and activities undertaken at an MTFI provide an inherent risk to the surrounding environment if released to the ground. As such the MTFI requires to be equipped with a suitable drainage system and hardstanding design to prevent the contamination of ground or surface waters through leaked or spilt products.

8.1.2 Prior to developing the MTFI design, an assessment of the facility requirements should be undertaken to assess not only the vehicle spatial requirement but also the possible risks to the environment through contamination. The assessment should cover the types of product being dispensed, activities being undertaken in and around the MTFI (vehicle washing, fire training, fuel dispensing etc), and the surrounding environment. It is recommended that the guidance as laid out in section 8.2 of the 4th Edition APEA/EI Blue Book is followed as a basis for the assessment.

8.2 Tank Foundation and Hardstanding

8.2.1 Areas that are liable to contamination shall be impermeable to all hydrocarbons and should not allow products to seep through or below the surface. These areas should always be protected at the perimeter by a suitable means of restraint such as kerbing, drainage channels or walling, to prevent the flow of contaminants towards permeable surfacing. Any walling should be impermeable where it meets the surface to ensure that in the event of a substantial spill, hydrocarbons cannot pass through and pollute beyond the perimeter of the site. Typically, concrete or similar highly impermeable materials such as sealed block paving with a concrete sub-base should fulfil this requirement, provided any associated expansion or jointing material is also impermeable and resistant to degradation by hydrocarbons.

8.2.2 The Designer shall liaise with the tank manufacturer to ascertain any specific foundation requirements that may not be met by the guidance within this Standard.

8.2.3 Materials used for construction of the hardstanding, tank foundations and tanker delivery stands shall meet the performance requirements as provided in section 8.3.3 of the 4th Edition APEA/EI Blue Book. All sealant and mastic to be a fuel resistant material complying with BS EN 14188 part 1 or BS 5212 part 1 applied in accordance with the manufacturer's requirements.

8.2.4 Concrete reinforcement to be A393 fabric top and bottom. Cover to reinforcement shall be 60mm. The top surface of concrete shall be a brushed finish and brushed in the direction of the fall.

8.2.5 The hardstanding shall be laid with a suitable fall towards the drainage channels.

8.3 Road Tanker Delivery Stands

8.3.1 Although it is expected that in most instances the road tanker should fill the MTFI tank(s) whilst parked on the vehicle refuelling hardstanding, limitations to space or orientation of the tank(s) may dictate that a separate "road tanker delivery stand" is required. This should be considered during the initial planning stage. The following sections provide guidance particular to the road tanker delivery stand. Refer to section 8.2 for general requirements of the vehicle surface area.

8.3.2 The road tanker delivery stand for offloading fuel shall be in the open away from buildings,

metering pumps/dispensers and emergency escape routes. It shall be not less than 17.5 m long and 5 m wide. The location shall allow the road tanker to have a clear and unobstructed forward escape route. The stand shall be level with enough clearance above the tanker from any overhanging obstruction to permit dipping and access to foot valve controls.

8.3.3 The tanker delivery stand surface area, shall be suitable for the axle loading of a fully laden road tanker, typically having a capacity of 41,200 litres, and shall be impervious to liquids and resistant from hydrocarbons.

8.3.4 The tanker delivery stand should be laid with a fall towards the fill point, to prevent spills from migrating under the tanker.

8.3.5 Adequate drainage channels/gullies should be provided adjacent to the tank fill points to accommodate a likely spillage from a single hose failure of 1,000 litres per minute for seven minutes.

8.3.6 The tanker delivery stand area and the adjacent tank fill points shall be positioned to allow the tanker to discharge without being at risk from other vehicle movements. The tanker stand areas should not lie on the line of access roads and shall be painted with hatched road markings.

8.3.7 The tanker delivery stand shall include a retractable earth grounding reel connected to the MTFI earth tape system. The vehicle clamp shall be ATEX certified with signage placed at the filling point and above the cable reel.

8.4 Drainage System

8.4.1 Drainage systems facilitate the capture, conveyance and storage of surface water run-off while delivering interception and pollution risk management. Under no circumstances should any liquid run off be allowed to leave the MTFI in an uncontrolled manner. It is critical that the entire area where fuel is stored, delivered and dispensed is isolated from direct discharge into the surface water system, foul sewer systems or local environments and is protected by a surface impermeable to hydrocarbons.

8.4.2 When considering the design of drainage pipework, the rainfall, proximity of high buildings and levels of surrounding land should be considered. The drainage pipework shall be;

- Sized to suit the storm return periods appropriate to the location and in accordance with the requirements of BS EN 752 including a spill from the tanker area as defined within 8.3.5,
- Laid to falls determined from the calculated flow rate,
- Sealed at all joints,
- Adequate surface drainage of the road tanker standing area and the vehicle filling area adjacent to the fuel dispensers,
- Resistant to the effects of light hydrocarbon liquids and alcohols when tested as specified in BS EN 752,
- Tested in accordance with BS EN 752 and BS EN 1610,
- Certified as complying with the planning regulations and approved building standard documents local to the installation.

8.4.3 Access chambers should be provided at each change of direction or gradient and should be sized in accordance with BS EN 752 and the approved planning document for drainage. All covers and frames in vehicle circulation areas and paved areas should be to the minimum standard of BS EN 124.

8.4.4 Car washes and steam cleaners may produce large volumes of wastewater, possibly at high temperatures, contaminated with detergents, oil and road dirt. The wide range of cleaning agents used in the washing process can form stable emulsions. These emulsions take time to degrade and separate into the oil and water phases. This type of effluent should be passed through a silt trap before discharging into a separate drainage system to the one used to drain the MTFI forecourt. Under no circumstances should waste water from car wash facilities enter the MFTI's forecourt drainage system or be discharged through the MFTI OWI.

8.4.5 It is necessary to test and assess the performance of the drain systems during construction and at the completion of the construction stage. To commission the drainage system a tightness test shall be carried out in accordance with BS EN 752 and BS EN 1610.

8.5 Oil Water Interceptors (OWI)

8.5.1 In order to minimise the risk of any spillage or seepage from reaching the sewerage system, causing contamination leading to a possible build-up of explosive vapours, a separate contaminated drainage and OWI system is required at all MTFIs.

8.5.2 OWIs are designed to prevent hydrocarbons, grit and sediment from leaving the site. OWI selection and specification should be based on the requirements and test methods in EN 858 Part 1.

8.5.3 OWIs for MTFIs should include the following;

- A sludge trap,
- Automatic closure device and alarm,
- Sampling chamber. The sampling chamber should be fitted with a manually operated shut-off valve irrespective of the type of OWIs used.

8.5.4 A Class 1 type OWI shall be used within MTFI facilities in accordance with EN 858-1.

8.5.5 As a minimum, OWIs should be sized to suit the storm return periods appropriate to the location. In the UK this is normally based on a rainfall rate of 65 mm/h. For an MFTI facility a full retention type shall be used as per JSP 317. The inlet and outlet pipework diameters should be sized according to the maximum expected flow rates. OWIs should be vented to the atmosphere.

8.5.6 It is important to install an OWI of an appropriate size. On an MTFI where road tanker deliveries are received, an OWI with an oil storage capacity of 7,600 litres shall meet the requirements of BS EN 858-2, clause 4.3.6. If a smaller unit is proposed, the size should be determined by undertaking a risk assessment incorporating catchment size, potential spillages during delivery, and other risks such as safety issues. If the compartment size of the tanker that delivers fuel is greater than 7,600 litres the OWI should be sized accordingly.

8.5.7 Secured to the OWI tank vent or in the ground at the surface manholes, a durable label shall be fitted. The sign shall be made from corrosion resistant material and be indelibly engraved with the following information (see figure 10);

- Manufacturers' reference,
- Site reference number,
- Year of manufacture,
- Bypass/Full retention,
- Class of interceptor,
- Flow rate,
- Volume of OWI,
- Silt storage capacity,

- Oil capacity,
- Oil warning device details,
- Closure device details,
- Nominal size.

Figure 10 – Typical Sign at OWI.

8.5.8 The OWI should be located such that suitable access is available around the manways for maintenance and removal of products. Consideration should be given to the location of the nearest site drainage network into which the OWI discharges, it is recommended that a survey is undertaken during the initial planning stage to identify the drainage connection point.

8.5.9 All OWIs should be regularly inspected and properly maintained to ensure they work effectively. Prior to removal or installation of an OWI the maintenance contractor shall furnish the OA with a “Letter of No Objection”. Additionally, an updated specification shall be received and recorded on site if an OWI is installed or any part of the OWI is upgraded.

9. Diesel Exhaust Fluid (DEF)

9.1 General

9.1.1 Stricter exhaust emission rules for vehicles with diesel engines have been issued by the UK Government. One system that helps meet the standards is Selective Catalytic Reduction (SCR), where harmful exhaust gases are converted to nitrogen and water by catalytic conversion. Diesel Exhaust Fluid (DEF; also known as Aqueous Urea Solution (AUS) 32 and marketed as AdBlue) is used in this process. Specifically, DEF is an aqueous urea solution made with 32.5% urea and 67.5% deionized water. DEF stored at MTFIs is a requirement where there is motor transport diesel refuelling.

9.1.2 In the water environment, in large quantities, DEF is a polluting substance. Good design and operational practices should be followed in order to reduce the likelihood of leaks and spillages.

9.1.3 DEF is soluble in water and should be kept out of surface water drainage systems that discharge to the environment.

9.1.4 It's important that DEF is stored in containers and dispensed using equipment, pipework, valves and nozzles that are specifically designed and manufactured from materials that are suitable for use with urea. Steel containers used to store DEF should have an internal lining to prevent corrosion.

9.1.5 The ISO 22241 series are the governing legislation that provides the specification for the quality of the DEF agent as well as the transportation, handling and storage of DEF. The design and installation of the DEF storage and dispensing equipment should not in any way degrade the quality of the DEF.

9.1.6 DEF should be decanted from the storage tank and dispensed into the vehicle by a means that limits exposure to contamination. The chosen method should be determined through a risk assessed approach with consideration given to the operational requirements of the facility at the planning stage.

9.2 Storage

9.2.1 Storage and handling of DEF shall meet the requirements of ISO 22241 Part 3.

9.2.2 Materials used for the storage tank or container shall be in accordance with recommended materials list provided in ISO 22241 Part 3 Table 1. Because urea solution contains ammonia it's corrosive to some metals, such as copper and its alloys. If storage containers and pipework become corroded there is a risk of a spill that could cause pollution. Generally, they shall be manufactured from high density polyethylene, polypropylene, or stainless steel. The materials used shall not include additives that may migrate into the DEF solution.

9.2.3 In some instances, DEFs are decanted from elevated IBCs (1,000 L), drums (205 L) and containers (≤ 25 L) into a secondary vessel, such as a hand-held jug, then poured directly into a vehicles' DEF tank. This method of decanting DEF leads to the following issues;

- Manual handling issues,
- Higher risk of spillage,
- Increased chance of contamination through exposure to the open environment.

As such, this practice should not take place within MTFIs.

9.2.4 Where the expected throughput of DEF is low and at a level where it would be uneconomic to install a dedicated tank and dispenser, then the methods listed in 9.2.3 shall be deemed acceptable. Wherever IBCs, drums or containers are used to dispense DEF then extra mitigation measures must be put in place to limit spillage and manual handling.

9.2.5 All DEF tanks shall have integral secondary containment.

9.2.6 DEF tank vent pipes shall be the same the diameter of the fill pipe. As a minimum the vent should be no less than 50mm in diameter.

9.2.7 DEF tanks shall be fitted with a mechanical overfill protection device to prevent spillage of product during filling.

9.2.8 To prevent crystallisation of stagnant product the DEF within the tank and dispenser requires agitation and recirculation if throughput is low. This should be added to the normal maintenance procedures for the MTFI facility.

9.3 Gauges and Alarms

9.3.1 As noted in 9.1.3, DEF is soluble in water and should be prevented from entering the surface water drainage, therefore consideration should be given, through a risk assessed approach, to providing a means of manging and monitoring the contents of the DEF storage tank.

9.3.2 Leak detection shall be included where integrally bunded storage tanks are installed. The sensor shall sound an audible and visual alarm on the control panel to alert a Competent Person that a leak has been detected. The alarm should continue until manually reset. Refer to section 6 of this Standard for further details of tank leak detection.

9.3.3 Where dedicated dispensing units are used (refer to section 9.4) level sensors shall be fitted within the DEF storage container to detect the volume of solution within the tank. Both high- and low-level sensors should be fitted to detect when the tank is at full capacity and when the volume is too low for dispensing activities to continue.

9.3.4 Where there is a recognised risk of overfilling the tank an overfill alarm shall be included within the installation to alert personnel that the storage container has reached its full capacity.

9.4 Dispenser

9.4.1 Parts of the dispenser that come into contact with the DEF solution should be constructed from materials suitable for use with urea as defined in ISO 22241.

9.4.2 Where a dedicated dispensing unit is installed, then the dispensing unit should generally follow the same guidance as prescribed in section 7.1 for fuel dispensing with additional consideration given to specific manufacturer recommendations for the use of DEF.

9.5 Pipework and Valves

9.5.1 To avoid contamination of the DEF solution and to limit corrosion, pipework materials shall be selected from table 1 from ISO 22241.

9.5.2 For aboveground pipework austenitic stainless steel is recommended and shall be sized to suit the flow rate of the dispenser. If a plastic type pipe is used it shall be suitable for exposure

to UV (if aboveground) and frost (to be clarified with manufacturer prior to installation).

9.5.3 For underground pipework a double walled ‘pipe-in-pipe’ HDPE type shall be used. Where possible welded or electrofusion joints shall be used to limit the leak paths and mitigate against spillage of product. Mechanical joints shall be avoided where practicably possible in underground piping.

9.5.4 Isolation valves shall be ball type valves manufactured form austenitic stainless steel.

9.6 Location of Equipment and Surrounding Area

9.6.1 Generally, tanks and storage containers should be installed on a flat even surface in an area that does not inhibit pedestrian or vehicle movements. Where there exists the potential for vehicle impact of the tank or container it should be protected by means such as vehicle protection barriers or bollards. The storage container shall be positioned such that there is clear area around all sides to allow for maintenance and inspection.

9.6.2 The location of the DEF storage tank or container should ideally provide the optimal temperature conditions, being between -5°C and 25°C. Where installed in temperate climates it may be necessary for the storage container to be shaded, by means of canopy or similar, to limit the rise in temperature. Note that optimum temperatures result in a DEF shelf life of 18 months, this can reduce to 6 months within increased temperature conditions.

9.6.3 Storage, dispensing and decanting of DEF should take place away from open drains and nearby water courses. Spill kits should be provided around delivery points to prevent spillages entering water courses.

9.6.4 The tank and dispensing equipment should be located within a non-hazardous area unless certified for use in hazardous zones. Consideration should also be given to the location of the DEF delivery area as the DEF tankers may not be built to petroleum tanker standards.

9.6.5 Ensure that any essential equipment for clean-up is located nearby the DEF installation and is ready for use. Ensure that the spill kit for DEF is compatible with aqueous solutions.

9.7 Tank Sizing

9.7.1 To determine a suitable DEF tank capacity the historical throughput (if available) of diesel shall be determined to inform the anticipated DEF consumption. Care must be taken to ensure the tank is not undersized to avoid too frequent top up deliveries, and conversely not oversized as low turnover of DEF leads to stagnation and reduction in quality of the DEF.

9.7.2 For most vehicles the DEF requirement is usually between 2–6% of the vehicle’s diesel consumption, with diesel vans and lorries tending to inhabit the upper half of this range at 4–6%.

9.7.3 The tank size shall be discussed and agreed at the planning stage.

10. Canopy

10.1 General

10.1.1 Canopies help protect against inclement weather and provide illumination in the hours of darkness. A requirement for a canopy on an MTFI on the MOD estate should be determined at the initial stages of any new project. Where the decision has been made to incorporate a canopy, the requirements of this section should be followed.

10.1.2 While not specifically covered by building regulations or standards, canopies should be constructed of materials that shall not contribute to any fire occurring within the underside of the canopy area. The design of the structure shall be in accordance with Eurocodes, in particular Eurocode 1 Part 1-3 and Eurocode 3 Part 1-1 relating to structural design and loadings of steel structures.

10.1.3 The Designer shall take into account the local conditions when finalising the loads imposed on the structure (wind, snow etc) as well as local soil conditions.

10.1.4 In view of the high degree of ventilation and heat dissipation achieved by the open sided construction, and provided the canopy itself is 1 metre or more from any boundary, a free standing canopy above a limited or controlled hazard (e.g. over fuel dispensers) would not need to comply with the provisions for space separation. However, any cladding to the canopy itself should not readily contribute to any fire and the selection of materials should inhibit fire growth. Refer to section 4.4.3.1 in the 4th Edition APEA/EI Blue Book for further guidance on canopy cladding requirements.

10.1.5 The canopy should be designed as an integral part of the MTFI. To avoid impact damage from high-sided vehicles it is recommended that a clear height of no less than 4.75 metres is achieved. The Designer should consider the vehicle height of the services that will use the MTFI when assessing the minimum underside clearance of the canopy.

10.1.6 There exists the potential of explosive atmospheres forming in and around the confines of the canopy structure. Where the canopy design incorporates electrical apparatus, such as electrical switches or luminaires, the equipment shall be suitably ATEX rated for any Hazardous Area Classification zones determined during the DSEAR risk assessment exercise. Refer to section 3.7 for guidance relating to DSEAR compliance.

10.1.7 All electrical equipment installed within the canopy structure shall comply with section 11 of this Standard.

11. Electrical Equipment

11.1 General

11.1.1 To ensure safety, it is essential electrical installations are correctly planned, designed, installed, inspected, tested and commissioned.

11.1.2 Within the APEA/EI Blue Book, comprehensive guidance is given on design, installation, inspection and testing of new and refurbished installations to be carried out at existing refuelling stations. This Standard provides an overview of the main topics to be considered for MTFIs at MOD facilities, however, the APEA/EI Blue Book is to be consulted where specific issues are not covered within this Standard.

11.1.3 The MTFI shall be supplied by underground cables (power, telecommunications etc.) suitably protected against mechanical damage and routed outside and not below any hazardous areas. Where the operation of the site may be adversely affected by surges in the supply, surge arrestors should be provided as part of the installation.

11.1.4 A risk assessment should be carried out by the Designer to determine the need for lightning protection of structures at an MTFI.

11.1.5 For all new or refurbished MTFIs an earthing facility derived from a shared supply over which the site has no control, shall not be used. Earthing shall be derived from an isolated TN-S or TT system.

11.2 Hazardous Area Classification

11.2.1 Section 3.7 of this Standard provides guidance on the requirements when undertaking a DSEAR risk assessment at MTFIs. It is imperative that any Competent Persons who provide, maintain or verify electrical installations and equipment in, or associated with, hazardous areas at MTFIs have a thorough understanding of hazardous area classification. Refer to JSP 375 Volume 1 Chapter 9 for further details of competencies.

11.3 Selection and Installation of Equipment

11.3.1 Where installed within hazardous zones the electrical installation shall comply with the requirements of BS EN 60079-14. Equipment shall be ATEX certified to a standard suitable for the zone in which it is to be used.

11.3.2 A test socket for measuring the earth electrode resistance, earth fault loop impedance and prospective fault current should be provided at the origin of the installation.

11.3.3 The all-insulated test socket shall be wired to the supply side of the main isolating switch, via an all-insulated device incorporating means of isolation and overcurrent protection, by two cable tails not exceeding 3 m in length, which are either insulated and sheathed or enclosed in a non-conducting conduit.

11.3.4 A suitably labelled insulated protective conductor, which is segregated from the earthing arrangements within the electrical installation, should connect the earth terminal of the test socket to the earthing conductor side of the main earth terminal test link (see Figure 36 of the 4th Edition APEA/EI Blue Book).

11.3.5 The isolating device shall have locking or interlocking facilities and should be labelled:

'THIS DEVICE IS NOT ISOLATED BY THE MAIN ISOLATING SWITCH AND MUST REMAIN LOCKED OR INTERLOCKED IN THE OFF POSITION WHEN NOT BEING USED FOR TEST PURPOSES'.

11.3.6 All fixed equipment should be hard wired to the distribution system. No plugs or socket outlets shall be used to provide power to electrical apparatus.

11.4 Location of Electrical Equipment

11.4.1 Where fuel dispensers are installed within a hazardous area, the dispensers shall be ATEX certified and appropriate for the zone in which it is installed.

11.4.2 Vent pipes for tanks or OWIs shall not be used for mounting or securing luminaires, cables, or other electrical apparatus.

11.4.3 Canopies are generally constructed above, and clear of, hazardous areas related to dispensers and associated apparatus. The selection of canopy luminaires should be in compliance with the MTFI's DSEAR risk assessment. However, care should be taken when siting such luminaires to anticipate hazards (such as breakages) which may be created if tanker dip sticks are used beneath the canopy. Also, vapour releases from nearby vent pipes or tanker compartment manholes should be considered.

11.4.4 Dispensing areas of the forecourt and road tanker unloading area shall be adequately illuminated at all times of use. A minimum design illuminance of 100 lux at ground level is required in these areas and at the read-out level of any dispenser. At tanker delivery stands this level of illumination should be achieved with the tanker in the unloading position.

11.5 Isolation and Switching

11.5.1 Means of isolation and switching shall comply with Regulation 12 of EWR.

11.5.2 Suitable means shall be available for cutting off the supply of electrical energy to electrical equipment, and for the secure isolation of any electrical equipment from every source of supply of electrical energy. Where standby supplies are installed, they require the same isolation and switching requirements as a main supply. A typical supply arrangement is shown in Figure 37 of the 4th Edition APEA/EI Blue Book.

11.5.3 Devices for isolation and control of equipment that are located in a hazardous area shall interrupt all live poles, including the neutral, simultaneously. Devices for isolation and control shall be located in a non-hazardous area.

11.5.4 Devices used for switching off equipment for maintenance purposes are required to have locking-off facilities.

11.6 Main Switchgear

11.6.1 The electrical intake and main switchgear position for the installation shall be located in an easily accessible low fire risk position outside any hazardous areas and kept unobstructed. The main switchgear, test socket and main earthing terminal for the MTFI shall be located within a weatherproof GRP cabinet or similar, if not located inside another building

11.6.2 The main switchgear shall incorporate the main isolating switch and the means of secure isolation required by Regulation 12 of EWR. All live conductors of the installation, including the neutral, are to be interrupted simultaneously.

11.6.3 Every circuit which is not intrinsically safe shall be provided with an isolating switch or isolating RCBO in the non-hazardous area for isolation of the equipment from the source of electrical energy.

11.6.4 An emergency switching device shall be provided to cut off all electrical supplies, including data circuits to all metering pumps/dispensers and associated equipment, other than certified intrinsically safe equipment. Means of operating the emergency switching device shall be provided outside of any hazardous areas, visible from all dispensing positions and readily accessible for rapid operation in emergency (i.e. it should not be positioned more than 2 m above the ground). On larger sites multiple emergency switches may be required to ensure rapid isolation.

11.6.5 The emergency switching device is to be coloured red against a yellow background. Resetting this device alone should not restore the supply. The separate single means of restoring the supply should be manual and located within a building where it is inaccessible to unauthorised persons.

11.6.6 A conspicuous, durable and legible notice shall be fitted adjacent to every operating means of the emergency switch device (see figure 11).

Figure 11 – Typical Dispenser Electrical Cut-Off at MTFI.

11.6.7 Supplies to essential monitoring equipment, such as leak detection and tank gauging systems, should be installed via individual, dedicated, final circuits. RCBOs feeding such circuits should be clearly labelled and marked 'DO NOT SWITCH OFF'. Local means of isolation or switching should not be provided for this equipment.

11.7 Overcurrent Protection

11.7.1 Each circuit should be individually protected against fault current and overload by a suitably rated RCBO arranged to break all live conductors including the neutral. This does not apply to data and signalling circuits which are not liable to overload or fault currents.

11.8 Protection Against Static Electricity

11.8.1 Providing the continuity of any metal pipework has electrical resistance of 0.01 Ω per m or less, fuel flow rates are unlikely to cause a build-up of electrostatic charge capable of presenting a static hazard.

11.8.2 Steel tanks and pipework are required to be well-coated with corrosion resistant materials to prevent electrolytic action. Alternatively, non-conductive (typically glass-reinforced plastic (GRP)) tanks and/or pipework may be employed. With these types of installations, the following recommendations apply;

- Ensure that metalwork of MTFI dispensers is connected to the earthing terminal of the associated electrical installation,
- Electrostatic earth bonding of tank/pipe metalwork should not be connected directly to the earthing system of an electrical installation,
- Isolated metal parts of non-conductive tanks/pipework should be electrically bonded together and connected directly to an earth electrode exclusive to those parts,
- Isolating joints (e.g. plastics inserts) should be provided in the pipework near to each dispenser connection,
- The tank(s)/pipework should be connected directly to an earth electrode provided exclusively for the purpose of dissipating electrostatic charge.

11.8.3 For further guidance on controlling static electricity at petroleum installations see El Model Code of Safe Practice Part 21: Guidelines for the control of hazards arising from static electricity.

11.9 Protection Against Electric Shock

11.9.1 Basic and fault protection should be provided by automatic disconnection of supply, or by use of equipment of Class II construction where such equipment is under effective supervision in normal use. To provide fault protection, all circuits supplying equipment are required to disconnect in a time not exceeding 100 ms. RCBOs shall provide protection against fault current and overload.

11.9.2 For data and other non-intrinsically safe systems, operating at ELV, with combined protection comprising basic and fault protection should be provided by the installation of separated extra-low voltage (SELV) circuits, supplied via a power supply in accordance with BS EN 61558-2-6.

11.9.3 Where an MTFI installation forms part of a TT system, RCBOs shall be required to provide automatic disconnection of the supply when earth fault conditions occur.

11.9.4 Because of the undesirability of an earth fault causing disconnection of supply to the MTFI, it is inappropriate to provide a single 'front end' RCD at the main switch position as the sole means of earth fault protection for the installation.

Earthing

11.9.5 Where an existing electrical installation is supplied from a TN-C-S system in which the neutral and protective functions are combined in part of the system to provide PME, stray currents passing through metalwork located in potentially hazardous areas may pose an increased risk of fire or explosion. Where the installation is supplied from a public low voltage network described as a TN-S system, the neutral and earth functions may not be separated throughout the system and may behave in a similar manner to a PME system and create similar risks.

11.9.6 For all new or refurbished MTFIs an earthing facility derived from a shared supply over which the site has no control, shall not be used. Earthing shall be derived from an isolated TN-S or TT system.

11.9.7 The earthing arrangements for the MTFI should include the connection of the main earthing terminal to;

- the distributor's earthing facility separate from the neutral (TN-S system); or
- an electrode arrangement independent of the incoming supply (TT system); or
- the star point of an isolating transformer secondary winding, which is also connected to the transformer casing, core and screen and to an independent earthing electrode (thus forming a local TN-S system).

11.9.8 Prior to the installation of any earth electrode, a soil resistivity test should be carried out in accordance with the recommendations in BS 7430, to determine the location and type of electrode arrangement to be employed.

11.9.9 The electrode arrangement should be provided by suitably driven earth rods, earth mats, tapes etc and be located outside any hazardous area. Individual electrodes of the electrode arrangement should be located to provide a common electrode resistance area for the MTFI.

11.9.10 Provision should be made for the testing of individual electrodes, by separate radial connections to the main earthing bar. It may be necessary to install one or more independent electrodes for test purposes, depending on the electrode arrangement. For general earthing requirements reference should be made to BS 7430.

11.9.11 A main earthing bar or terminal for the MTFI should be provided at the junction of the earthing arrangements and main bonding conductors connected to the main extraneous conductive parts, including metallic service pipes, structural metalwork etc. The bar or terminal should be in an accessible position and be located near to the point of supply to enable disconnection of the earthing conductor from the main bonding conductors and protective conductors of the installation to facilitate testing of the earthing arrangements. This joint should be in the form of a mechanically strong and electrically reliable link which can only be disconnected by means of a tool.

11.9.12 A label worded as follows should be permanently fixed adjacent to the main earthing bar;

'SITE SAFTEY ELECTRICAL EARTH – DO NOT REMOVE LINK OTHER THAN FOR TESTING AFTER ISOLATION OF THE INSTALLATION. REPLACE LINK AFTER TESTING AND BEFORE RE-ENERGISING THE INSTALLATION'.

11.9.13 The protective conductor for every circuit supplying LV equipment should be provided by means of an integral cable core connected to the earthing bar at the distribution board and the earthing facility provided in the equipment.

11.9.14 An earthing bar or terminal should be provided in every enclosure of electrical equipment other than equipment specified as having Class II construction. A suitably terminated circuit protective conductor should be provided where an item of Class II equipment may be replaced by an item of Class I equipment. Protective conductors of related incoming and outgoing circuits should be terminated at the earthing bar or terminal in the enclosure. When more than two protective conductors are involved, an earthing bar having an appropriate number of terminal ways is necessary.

<u>Conduit ducting, pipes and trunking</u>

11.9.15 Electrical trunking and similar enclosures are not to pass through or beneath a hazardous area. Conduits entering or passing through hazardous areas should be installed in accordance with BS EN 60079-14 Clause 9.4. A separate protective conductor having a cross-sectional area of not less than 2.5 mm^2 should be provided within the conduit. Where the protective conductor is common to several circuits its cross-sectional area should correspond to that of the largest line conductor.

11.9.16 Where ducting, pipes, trunking, access chambers or similar enclosures are used to accommodate cables, precautions should be taken to prevent the passage of flammable vapour or liquid from one hazardous zone to another zone, or to a non-hazardous area, and to prevent the collection of flammable vapour or liquid in such enclosures.

11.9.17 Care should be taken to ensure that the earthing arrangements for data cable screening and armouring do not introduce potentially dangerous levels of energy into a hazardous area. The screening or armouring may not be capable of carrying fault or other currents from the electricity supply system or the electrical installation which might pass to earth through it via the electrical installation earthing terminal. In order to avoid such an occurrence, it is common practice to insulate and isolate data cable screening or armouring from contact with earth at its hazardous area end and to earth it only in the non-hazardous area.

11.9.18 Where the operation of data equipment depends on functional earthing, a separate conductor should be provided for that purpose. Reference should be made to the equipment manufacturer's instructions regarding functional earthing of data cable screening or armouring. The cable screen or armour should not be used for functional earthing purposes.

11.9.19 Care should be taken to ensure that metallic screening or sheaths of intrinsically safe circuit cables are earthed at one point only and do not constitute a path for electrical fault current. Where the intrinsically safe circuit contained within the screen or sheath is earthed, the screen or sheath should be earthed at the same point of the circuit.

11.9.20 Care should also be taken to ensure that metallic screening or sheaths of data cables either do not constitute an earth path for electrical fault current or are otherwise rated to carry such current where it is not likely to adversely affect transmitted data.

11.9.21 All such cables should be sheathed overall and the screen/armour should not be exposed anywhere along its length.

Bonding for electric shock and explosion protection

11.9.22 Electrical bonding of extraneous-conductive-parts and other metallic parts such as pipes, rails, steel framework etc, which do not form part of the electrical installation, should, where a hazard is foreseeable, be installed to provide:

- protection against the potential explosion hazard from sparks caused by contact between metal parts having different potentials,
- protection against electric shock by avoiding the presence of potentially dangerous voltages between simultaneously accessible conductive parts under fault conditions.

11.9.23 Such supplementary bonding should be provided locally across the gap between the conductive parts regardless of any main bonding connections elsewhere. There is no requirement to provide a direct connection to the installation earthing system. Care should be taken to ensure that both aspects of bonding are taken into account and that incompatibilities between the two forms of protection do not arise. The bonding provided should be capable of carrying safely the largest foreseeable current.

11.9.24 In general, an electrical bond between two metallic parts may be achieved by a permanent and reliable metal-to-metal joint of negligible resistance. Bonded metal pipework should have an electrical resistance of 0.01 Ω per m or less at 20 °C.

11.9.25 Where sound metal-to-metal joints cannot be achieved, flanged joints in pipework should be fitted with corrosion-resistant metal bridges to ensure good electrical continuity. Connection should be by means of a conductor having a cross-sectional area of not less than 4 mm^2 copper equivalence.

11.9.26 Apart from local supplementary bonding, the electrical installation main earthing terminal and lightning protection, together with the metalwork or other non-electrical installations, should be connected together.

11.9.27 The connection of the bonding conductor to the lightning protection system should be as short and direct as practicable and should be made immediately above the lightning conductor test clamp and to the down conductor side thereof (i.e. to the side of the clamp opposite the earth electrode connection). The conductor should not pass through any hazardous area.

11.10 Wiring Systems

11.10.1 Within hazardous areas attention should be given to the requirements of the BS EN 60079 suite of standards, especially to the concepts of explosion protection. For areas other than hazardous areas, the relevant parts of this document and BS 7671 should be followed.

11.10.2 All conductors (except where the "armouring" of SWA cable is used as a protective conductor) having a cross-sectional area of 16 mm^2 or less should be of copper. Every protective conductor not forming part of a cable or cable enclosure should be identified throughout by green/yellow insulating covering.

11.10.3 Adequate precautions shall be taken to prevent contact between the conductors of intrinsically safe circuits and those of non-intrinsically safe systems. In order to maintain long-term integrity of intrinsically safe circuits, these cables shall be run in a duct or pipe reserved solely for that purpose. More than one intrinsically safe circuit may be run in a multicore cable provided that the requirements of the BS EN 60079 standards are met.

11.10.4 Intrinsically safe conductors are not to be run in the same multicore cable with conductors of non-intrinsically safe circuits. The cables of intrinsically safe circuits should not be run in the same enclosure or duct with non-intrinsically safe circuits unless segregated by an earthed metal screen or shield. Cables of intrinsically safe circuits should be of such construction as not to be damaged by the installation of other cables sharing a common duct.

11.10.5 Where circuits of ELV and other voltages are contained in a common trunking, duct etc, or a multicore cable is used, the higher voltage system has to be provided with an earthed metallic screen or sheath of equivalent current carrying capacity to that of the cores. Alternatively, the conductors of ELV systems should be insulated individually or collectively for the highest voltage present on other conductors in the same enclosure.

11.10.6 All cables installed underground or in site-formed ducts or ducting etc. should be laid at a depth of not less than 500 mm or be otherwise protected against mechanical damage.

11.10.7 Cables laid directly in the ground should be protected against damage from rocks or stones (e.g. by surrounding with sand) and be protected by cable covers or identified by suitable marking tape. The route of such cables should be accurately shown, with measurements, in the site records.

11.10.8 Duct systems for underground cables in hazardous areas shall be designed and constructed to minimise the possibility of fuel or vapour entering other areas, while at the same time preventing fuel and vapour from accumulating within the system. The Designer of the electrical installation should advise the architect, Designer and/or builder of the requirements for underground cable duct systems.

11.10.9 Duct systems shall be designed to positively prevent petroleum products or other VOCs

entering any building. Consideration should be given to installing spare ducts for future services when constructing or modifying a site.

11.10.10 Ducting should be laid straight between cable chambers or draw pits, but if deviation is necessary, then proprietary formed bends of large radius should be used.

11.10.11 Non-degrading draw-ropes shall be left in position for future use.

11.10.12 Cabling should be routed round the walls of access chambers, preferably on suitable supports (e.g. cable tray or 'J' hooks), between the various ducts. If these supports are metal, they should be corrosion resistant.

11.10.13 It should be noted that underground cable chambers, with the exception of chambers containing a fill point or points, in hazardous areas may be classified as part of the DSEAR risk assessment. If cable connection or termination boxes are installed in them, the boxes and any associated accessories (e.g. cable glands) have to be ATEX certified for use within the zone in which it is installed and also be ingress protected to at least IP67 rating.

11.10.14 Where an underground chamber contains fill points it may be classified as a hazardous zone as part of the DSEAR risk assessment. Any electrical equipment installed within the chamber shall be suitable for the zone in which it is installed.

11.10.15 Other than for forced ventilated duct systems, it is of the utmost importance that after cables have been installed and tested, and before any vehicle fuel is brought on site, all ducting terminations are adequately sealed in underground chambers, at dispensers and particularly where ducting passes from hazardous to non-hazardous areas, for example, where entering buildings. Suppliers of mechanical seals, foams and fillers intended for this application should be asked to demonstrate their compatibility with petroleum products or other VOCs in liquid or vapour form. Sealing should be achieved preferably with mechanical seals. Conventional builders' foams or filler are not suitable for this purpose.

11.10.16 In any location available for vehicular access, cables, trunking or other enclosures should be positioned or protected to a height of at least 1.5 m so that they are unlikely to be damaged by moving vehicles.

11.10.17 Cables drawn or laid in ducts should be of such construction that they are not liable to be damaged by the drawing in or withdrawal of other cables.

11.10.18 Generally, types of cable and the methods of their installation should comply with BS 7671.

11.10.19 Within and under Zone 1 and Zone 2 hazardous areas mineral insulated cable is preferred due to its superior resistance to degradation from contact with vehicle fuels.

11.11 Labels and Warning Notices

11.11.1 The Contractor shall provide and install the labels and warning notices as detailed in this section. They should be of a permanent nature (e.g. 'sandwich' plastics material) so that filling of engraved characters is not required.

11.11.2 Use should be made of contrasting colours (e.g. black on a white background, white on a red background) where this is appropriate. Labels and their lettering should be sized in proportion to the equipment on which they are mounted and should be securely fixed.

11.11.3 Where equipment is not to be drilled (e.g. explosion-proof or watertight apparatus) a suitable adhesive should be used, the manufacturer's recommendations on preparation of surfaces

etc. being fully observed. Where adjacent equipment has interchangeable removable covers, labels should not be fitted to the covers but should be in fixed positions.

11.11.4 If any of the labels are provided to warn of a significant risk to health and safety, or are required under any other relevant law, then they have to comply with the Health and Safety (Safety Signs and Signals) Regulations 1996.

11.12 Inspection and Testing

11.12.1 Whilst this Standard gives guidance on requirements for construction and major refurbishment of electrical installations at MTFIs, the majority of MTFI facilities shall predate the modern electrical safety standards and industry codes of practice expected at modern MTFIs.

11.12.2 As part of the commissioning and testing of new or refurbished Section 9.10 of the 4th Edition APEA/EI Blue Book shall be referenced and followed.

11.12.3 BS 7671 is intended to be generally applied to the electrical installation at MTFIs. However other standards, Regulation and statutory requirements will apply and must be complied with. For example, BS EN 60079, MOD Defence Regulations and DSEAR. In order to satisfy the requirements of the licensing authorities for MTFIs, MMOs are required to provide the appropriate electrical inspection and test certificates in hardcopy. Annex D of PG 2017/02 provides the model forms for petroleum facilities and including MTFIs.

12. Testing, Commissioning and Acceptance

12.1 Certificate of Fitness for Purpose

12.1.1 A Certificate of Fitness for Purpose (CFFP) represents formal confirmation by the project manager that new, or modified installations, are fit for purpose. A CFFP should be provided before first fill or use. This forms one of several requirements which shall be fulfilled to enable the Fuel Gas Safety Regulator (FGSR) to license the installation.

12.1.2 The CFFP may be issued by the project manager, the Contractor or the MMO. It shall state that the MTFI has been constructed, or modified, in conformance with the approved design and that it is fit for its intended purpose. The certificate shall be counter signed by;

- Project Manager,
- Principal Contractor,
- DFRMO Officer.

12.2 Verification

12.2.1 Verification is part of the commissioning procedure that should be carried out before the MTFI, or part of the site where changes have been made or new equipment has been installed, is brought into use. The purpose is to ensure the fire and explosion risks from potentially flammable atmospheres will be properly controlled.

12.2.2 Verification procedures are required by legislation (DSEAR) and in their entirety will also include consideration of the operational and work procedures, together with any emergency arrangements that are necessary to ensure the installed plant and equipment can be operated correctly and safely. Verification carried out during commissioning should include the review of a list of measures required to ensure that:

- Records show that the storage tanks and all associated vehicle fuel and vapour pipework have been pressure tested and are leak-tight,
- Leak detection systems for tanks and pipes are installed and operating correctly,
- A hazardous area classification drawing (if applicable) has been prepared and a visual inspection has been carried out to confirm that equipment is of the correct type and category for the zone where it is installed,
- A verification dossier is compiled and held on site, as detailed within BS EN 60079 Part 14,
- Equipment in the identified hazardous areas has been installed correctly and has been tested. All warning and information notices are in place,
- All electrical and other ducts from hazardous areas are properly sealed,
- Vapour emission control systems have been tested for integrity and operate correctly. Gauging and leak detection monitoring systems operate correctly,
- Drainage systems, including OWIs, are complete and tested,
- All emergency equipment has been installed and is in working order,
- The electrical installation has been completed and the relevant electrical certificate has been issued,
- The system is appropriate to all the fuels being stored,
- The environmental risk assessment has been properly undertaken.

12.2.3 Some of the verification checks can be carried out at an early stage, for example during the design, but others can only be carried out during commissioning. However, all the measures listed should have been installed before the first fuel delivery is permitted.

12.2.4 The MMO should ensure that a Competent Person carries out the verification. The MMO may

be the Competent Person but the help of others may also be needed, including the Designer, the installer of the equipment, test companies or an independent person or organisation. The person or persons involved shall have practical and theoretical knowledge of the fire and explosion hazards arising at filling stations, which may have been obtained from experience and/or professional training.

12.3 Commissioning

12.3.1 Commissioning of an MTFI is the Contractor's responsibility. To commission an MTFI the appropriate products shall be used and supplied by the Contractor. Prior to receiving product, a CFFP shall be issued. The AP (Petroleum) is to be provided with the commissioning procedure adopted by the Contractor and all relevant method statement and risk assessments to enable control under JSP 375 Volume 3 Chapter 5.

12.3.2 In addition to the measures listed in the verification procedure, the following elements of the MTFI should also be checked as part of the commissioning process prior to the first delivery of fuel;

- Site is cleared of rubbish, weeds or long grass, Contractors' plant and equipment,
- All means of escape from buildings are clear, unobstructed and available for use,
- All tanks, fill points, vents and associated equipment are correctly marked and identified,
- Tightness testing of the complete drainage system, in accordance with BS EN 752, has been carried out certified as fit for purpose,
- Tanker delivery stand area, entry and exit are complete,
- All hardstanding surfaces are completed, and all hot work finished.

12.3.3 When the MTFI is then ready to receive a delivery of fuel, after which the dispensers, tank gauges, pump control systems and all operating valves and components within the installation can be checked, adjusted and commissioned in accordance with the manufacturers' requirements to ensure correct and proper operation of the installation.

12.3.4 On completion of the commissioning activities, and prior to general use, there should be a final check for evidence of leaks from any equipment containing fuel. It should also be confirmed that all results and certificates from testing and commissioning operations are available and have been given to the MMO.

12.3.5 It is essential to maintain records of the results of initial tests and commissioning procedures for future reference. Copies of the records should be kept in a technical file as part of the CDM procedures, and also be retained electronically, together with other relevant documents for the MTFI. By comparing these with future test results or other information (e.g. from maintenance work) it will be possible to identify any changes in the performance of the equipment, which may indicate a potential risk to safety.

12.4 Takeover

12.4.1 Once an installation has been commissioned and is considered ready for takeover by the OA, the original SB is to re-convene as a Takeover Board (TB). All relevant certificates must be completed and made available to FGSR prior to the TB to support licencing of the MTFI.

12.4.2 Two sets of Operation & Maintenance Manuals shall be supplied in hardcopy to the OA as well as a digital copy. These should include

- As-built P&ID drawings,
- Electrical single line diagram drawings,
- All Mechanical and Electrical Test and Installation Certifications,

- An Asset Register, and
- Operating and installation instructions for equipment installed.

SECTION 3

13. MTFI Change of Use

13.1 Change of Product

13.1.1 As the design life of MTFIs are in the range of 25-30 years, due consideration must be given to the possibility of changing fuel grades stored in tanks and dispensed to motor vehicles.

13.1.2 Units that are intending to close or change the use of their MTFIs must liaise with FGSR if they have a Certificate for Continued Operation (CCO). If a change of grade is required, then the custodian must first gain permission from the TLB. The procedures listed in section 15.3 are then to be referenced in consultation with the Technical Authority. FGSR will need to be informed of the process as change of grade will result in a change of inspection regime.

13.1.3 Should conversion from unleaded to diesel be required then reference should be made to the APEA/EI Blue Book where detailed instructions are given.

13.2 Conversion from Diesel to Unleaded

13.2.1 The conversion of an above ground diesel tank to unleaded shall only be permitted if the tank is compliant with all standards relating to the storage of unleaded products refer to section 4.1. If the tank is found to be compliant the following guidance should be adhered to.

13.2.2 All residual product shall be removed as detailed within sections 16.2.3 and 16.2.4 of this Standard. In all cases, tanks, lines etc. are to be drained to their fullest practicable extent.

13.2.3 Particular attention shall be given to draining any installed sumps, filters, hoses, and any other component likely to contain diesel.

13.2.4 The tank shall be gas freed and thoroughly cleaned, the objective of cleaning is to ensure that residues from the previous use will not contaminate the new product to be stored in the tank. Any water used for cleaning should be pumped out and disposed of by either removal from site by a hazardous waste specialist or by-passing water through an OWI.

13.2.5 The following change of grade procedures are to be followed as a minimum:

- Flush the tank with unleaded fuel and dispense no less than 100 litres through the dispenser, drain the tank and fill with new product,
- In cases where the previous grade was a fuel with a FAME content of ≥15%, The first load shall be tested for FAME prior to its release to validate the procedure.

13.2.6 Documents relating to the conversion process shall be archived for a minimum of 5 years or at least 20 fillings with the new product.

13.2.7 The DSEAR risk assessment and hazardous area classification drawing shall be updated and amended to reflect the more volatile product to be stored. The Electrical Installation shall be verified as appropriate for the risk assessment and HAC.

13.2.8 The fuel dispenser shall be confirmed as suitable for use with unleaded fuel and the correct equipment group for the zone in which it is installed.

13.2.9 The tank vent shall require replacement with a pressure vacuum valve with integral flame arrestor certified to EN ISO 16852.

SECTION 4

14. Decommissioning

14.1 General

14.1.1 All MTFI infrastructure which are to be taken out of use shall be made safe. The method should vary depending on the location of the asset, the product it has or does contain leaded product and whether it is to be temporarily or permanently decommissioned. For each specific project, all appropriate actions should be determined as part of the plan created from the activity detailed in JSP 317.

14.1.2 All decommissioning works undertaken within an MTFI facility shall be undertaken in accordance with JSP 375 Volume 3 Chapter 5. Employers, the MMO and all Contractors have a legal obligation to ensure the work is carried out safely and that any equipment is left or maintained in a safe state.

14.1.3 The decommissioning shall commence as soon as practicable after the facility is taken out of service.

14.1.4 Decommissioning activities range from the complete closure and removal of an installation, to the replacement of individual tanks or lengths of pipe work. During decommissioning of MTFIs, product could be lost to ground as a result of either deliberate or accidental release during dismantling and removal of the tanks and pipe work. In addition, a risk could arise off-site if contaminated tanks and pipe work are not disposed of in an appropriate manner. It is preferable to remove all permanently redundant tanks. If tanks are left in-situ, a risk could arise if any residual product remains in the tank as the integrity of the equipment would no longer be maintained or monitored. In general, the decommissioning shall include the following activities as a minimum;

- Completion of a risk assessment shall be undertaken by DIO and HoE staff. This shall include health and safety hazards to personnel, risks to the environment with a view to determining the decommissioning requirements,
- Disconnection and making safe any equipment to left in situ,
- Disconnection and removal of equipment not being retained on site,
- Collection, storage and safe removal of waste product from site,
- Any soil contamination encountered during removal of underground equipment should be assessed through a Land Quality Assessment (LQA). Refer to JSP850 and consult DIO EOLM SME (DIOTS-LQA@mod.gov.uk) for advice.

14.1.5 The following subsections within this Standard set out the guidance to be followed for the main elements of a standard MTFI. It is the intention that any site-specific issues are established within the risk assessment mentioned above and dealt with accordingly.

14.1.6 Those responsible for the decommissioning of the MTFI facility should refer to the Public Health Act 1961 (or the Civic Government (Scotland) Act 1982), Dangerous Substances and Explosive Atmosphere Regulations 2002 and the accompanying L138 Dangerous Substances and Explosive Atmosphere Regulations – Approved Code of Practice, for statutory duties to be undertaken where the storage of petrol or other flammable products has been stored and is no longer in use.

14.1.7 For each specific asset project, all appropriate actions will be determined as part of the plan created from the activity detailed in JSP 317. In depth decommissioning guidance is provided in section 12 of the 4th Edition APEA/EI Blue Book. The Contractor undertaking the decommissioning should be conversant with the recommendations within, prior to

commencing any works.

14.1.8 Where specialist activities are required, such as removal of hazardous waste, those responsible for the works shall use specialist Contractors with suitable documented experience.

14.2 Tank Decommissioning

14.2.1 The risk assessment should determine through consideration of health and safety and environmental risks whether underground tanks are to remain in situ or be uplifted and removed from site. Refer to section 15.3.1 relating to aboveground tanks.

14.2.2 For the purposes of this Standard the Contractor undertaking the decommissioning is to assume that ground surrounding the tank is likely to have been contaminated with the product stored in the tank, more so where the tank is located underground. Where evidence suggests that product has contaminated the surrounding ground, the Contractor shall have the suspected area investigated by a Competent Person with a view to dealing with contaminant in accordance with local legislation. Further guidance on this issue is provided in BS 6187 Code of practice for full and partial demolition.

14.2.3 Prior to any work being carried out on the tank, or entry into the tank, the tank shall be made safe by having all residual fuel removed as far as reasonably practicable. This is referred to as 'bottoming'. All associated pipework attached to the tank should have all residual fuel drained back to the tank before bottoming can be undertaken. Tank vents should be detached and dismantled. The Contractor shall use a specialist Contractor for safe disposal of waste product from site.

14.2.4 Only in the most extreme circumstances, and where there is no alternate method of work, should entry into a tank be permitted. The final decision for tank entry lies with the AP (PET). If entry to the tank is required then reference shall be made to Confined Spaces Regulations, Control of Lead at Work Regulations (if applicable) and EI Code of Practice for Entry into Underground Storage Tanks at Filling Stations should be consulted and carried out in accordance with JSP 375 Volume 3 Chapter 5.

14.2.5 On completion of the tasks described above, the tank requires to be inerted to remove the risk of explosion. This may lead to one of the following methods being undertaken;

- Fill the tank with an inert substance (water, hydrophobic foam or nitrogen foam),
- Fill the tank with inert gas (Nitrogen, dry ice, combustion gas) - recommended for above ground tanks,
- Clean and degas tank.

Details of each of these methods are provided in detail within the 4th Edition APEA/EI Blue Book sections 12.2.2.4 to 12.2.2.10.

14.2.6 When filling the tank with an inert substance or gas it shall be assumed that explosive vapours will be displaced through the opening of the tank creating an explosive atmosphere. The Contractor responsible for the decommissioning shall ensure that the extent of any hazardous area is minimised and take all precautions under DSEAR to remove any possible sources of ignition.

14.3 Aboveground Tanks

14.3.1 It is a requirement that all aboveground tanks to be taken out of service shall be removed from site for appropriate disposal.

14.3.2 A specialist Contractor should be used for the uplifting and removal of the tank. The Contractor shall be fully informed of all potential hazards prior to undertaking the works. No work should be started prior to the production of a risk assessment which should cover as a minimum the lifting operation, any dismantling or cutting of the tank, cleaning and shot blasting of steelwork and removal of the tank.

14.4 Underground Tanks

14.4.1 The preference is that all underground tanks when permanently out of use shall be removed from site to remove the risk of any future environmental hazards. However, it is recognised that there may be scenarios where the tank is to be decommissioned and left in situ.

14.4.2 Prior to excavating and lifting the tank, the water table level should be investigated to determine the likelihood of the tank moving during its removal. This may have a bearing on the Contractor's choice of whether to fill the tank with foam or water as the density of foam is such that the tank may float when the holding down straps are released.

14.4.3 The tank should not be lifted by chains or wire ropes as the potential of sparking exists, only fabric lifting straps should be used. The APEA/EI Blue Book provides detailed guidance on the removal of underground tanks however attention is given to the following precautions;

- The tank shall be disconnected from all attached pipework,
- All tank openings sealed to prevent escape of inerting gas or liquid. This includes any holes to tank structure caused by corrosion,
- A suitable pressure relief valve should be fitted to the tank.

14.4.4 Where tanks are to be made safe and left in situ then tasks identified in section 15.2 shall be completed in the first instance to remove the potential explosive atmosphere within the tank. It is then recommended that the tank is filled by one of the following three options.

- Sand and cement slurry,
- Hydrophobic foam,
- Foamed concrete.

Refer to the 4th Edition APEA/EI Blue Book section 12.2.4 for detailed procedures relating to the tank filling methods above.

14.5 Pipework

14.5.1 The removal of pipework should not be carried out until it has been drained and isolated from sources of vehicle fuel and the site earth bonding arrangements. A flammable atmosphere or residual petrol may be present in pipework and a precautionary measure of flushing with water should precede the removal and dismantling work.

14.5.2 Excavated pipework should be removed from the MTFI as soon as possible and disposed of safely. Care should be taken to ensure that no vehicle fuel or water contaminated with fuel is allowed to enter any drainage system or watercourse or to be released into the ground. Water used to flush out the pipework should be collected for safe disposal. It may be possible, with appropriate approval, to discharge this water through the MTFI OWI.

14.6 OWI and Drainage

14.6.1 Where the OWI will serve no useful purpose in connection with any intended future use of the site, it should, wherever practicable, be uplifted and removed from site for safe disposal. Alternatively, the OWI chamber(s) should be filled, in situ, with concrete slurry, sand or other similar inert material.

14.6.2 Before removing or infilling the OWI it shall first be necessary to carry out the following preparatory work;

- Arrangement should be made for a hazardous waste disposal contractor to remove any liquid or sludge contained in the chambers,
- All inlets to any associated redundant drainage system should be sealed off,
- The outlet pipe from the redundant OWI should be sealed and capped off at the point where it connects to any remaining live drainage system within the site. Where the surface drainage is to remain operational the inlet and outlet pipes to the OWI should be linked.

14.7 Electrical Installation

14.7.1 Where the MTFI is to be totally decommissioned and demolished, the Electrical AP should be requested to disconnect the supply to the MTFI prior to the commencement of the decommissioning work.

14.8 Dispensers

14.8.1 Dispensers shall be removed from the MTFI where no longer required. The following precautions should be taken to ensure that the MTFI is maintained in a safe condition;

- Isolate electrically, drain all suction pipework and disconnect the flexible connectors,
- Drain dispensers of residual petrol and purge with nitrogen. The suction entries should be plugged off before the dispenser is placed in storage or despatched for scrap,
- Cap off the suction pipework and any vapour pipework in the under-pump cavity,
- Infill the under-pump cavity with suitable backfill material.

14.9 Land Quality Assessment

14.9.1 During the decommissioning process it shall be necessary to undertake an LQA specific to the area to determine the associated risk to human health, the environment and infrastructure (buildings and services). Specialist advice on LQA can be found in the, “Contaminated Land Management Land Quality Assessment (LQA) Management Guide”, published by the DIO Environmental Ordnance and Liability Team. LQAs can be conducted via external contractors with the support of DIO EOLM (DIOTS-LQA@mod.gov.uk) as required.

14.9.2 An LQA should be undertaken prior to decommissioning. If contamination is found in the soil and groundwater around the facility and a risk to the environment is established, then a remediation options appraisal should be commissioned to define options for remediation to be completed as part of the decommissioning works.

SECTION 5

15. Periodic Inspection and Maintenance Schedules and Frequencies

15.1 General

15.1.1 The following tables list the required maintenance tasks for each element of an MTFI and the frequency of which the tasks shall be undertaken. The inclusion of these activities, extracted from the MTFI SFG 20 schedule, within the facilities maintenance regime are intended to maintain the facility such that it is fit for purpose, safe to operate, and to achieve the desired operational design life.

15.1.2 It is not the intention of this Standard to provide instruction on how to undertake these tasks, however, it is envisaged that those responsible for completing the inspection and maintenance activities are competent to do so.

15.1.3 All inspection and maintenance carried out on MTFI facilities shall be recorded.

15.2 Repairs and Modifications

15.2.1 Where repairs and modifications are made to an existing MTFI facility, the works shall comply with the guidance provided within this Standard. Like-for-like replacements of equipment or designs shall only be permitted where a review against this Standard has first been undertaken. In all cases, a design risk assessment shall be completed in accordance with JSP 375 Preliminary Document and external UK HSE legislation such that any change to the current facility shall in no way increase the risk to the user or the environment.

15.2.2 All repair and modifications shall be undertaken by Competent Persons or suitable qualified contractors.

15.3 Periodic Inspection and Maintenance Schedules Index for MTFIs

Job No	Description of Job
1	External Inspection of Storage Tanks
2	Tank Integrity Testing
3	Internal Tank Cleaning
4	Tank Ancillary Equipment - Valves and Strainers
5	Fuel Dispensing and Metering Pumps
6	Pipework - Secondary Containments Systems
7	Pipework - Single Wall Pipework
8	Vapour Recovery Systems - Visual Inspection
9	Vapour Recovery Systems - Operational Check
10	Leak prevention, Containment and Leak Detection Systems (including contents measurement and wet stock control) - Monitoring
11	Leak prevention, Containment and Leak Detection Systems (including contents measurement and wet stock control) - Tank Gauging System
12	Drainage and Oil Water Separators
13	Electrical Installation and Equipment - Hazardous Area
14	Electrical Installation and Equipment - Non-Hazardous Area
15	Lightning Protection
16	Cathodic Protection
17	NOx Reduction Agent AUS 32 / Diesel Exhaust Fluid (DEF) Storage and Pipework
18	NOx Reduction Agent AUS 32 / Diesel Exhaust Fluid (DEF) Dispensers an Metering Pumps

15.4 Periodic Inspection and Maintenance Schedules for MTFIs

Job No	Description of Job and Criteria	Interval
1	**External Inspection of Storage Tanks**	
	Above Ground Storage Tanks. External visual inspection should include: • Signs of leaks, drips or spills, • Mechanical damage or corrosion on shelf and roof plates (deformations, dents, warping & laminations), • Where tank bottom can be viewed inspect for damage and corrosion, particularly on supports or saddles, • Cracks and signs of stress, deterioration or leakage from manways, nozzles and reinforcing plates, • External protection/coating damage on roof/shell and associated appurtenances, • Correct operation and condition of pipework and ancillary equipment, • Inspect wire mesh gauze, hoods, pressure vacuum valves and flame arrestors where fitted to tank vents ensuring their integrity and free from dirt and debris, • Check condition of vehicular impact protection, • Visual inspection of tank underside. **Underground Tanks.** External visual Inspection is generally not possible.	6 Monthly
Notes	Special attention should be given to vulnerable areas such as welded or riveted seams, saddles, water ingress or lodgement which could lead to corrosion.	
2	**Tank Integrity Testing**	
	Tanks and associated pipework are to be subjected to an industry standard precision testing technique. This will include all buried tanks and associated pipework including buried pipework on above ground tanks.	20 Years after Installation then Every 5 Years
Notes		
3	**Internal Tank Cleaning**	
	Tank is to be cleaned internally including removal of any solids, silt, or wax on tank floor or fittings prior to any inspection and/or repairs, changed of stored product or decommissioning.	Not Specified
Notes	Where possible tank cleaning to be undertaken without the need for tank entry. Any internal entry must be in accordance with JSP 375 Part 2 Volume 3 Chapter 5.	

Job No	Description of Job and Criteria	Interval
4	**Tank Ancillary Equipment - Valves and Strainers**	
	Inspect to ensure they are: • Clean and free from sludge, • Operate freely and seat/seal correctly, • Maintenance in accordance with the manufacturer's instructions.	Following Internal Inspection
Notes		
5	**Fuel Dispensing and Metering Pumps**	
	All parts to be cleaned and lubricated. Housings to be checked as undamaged and securely fixed to bases. Vent openings to be clear of obstructions. Vapour barriers are installed and complete. Hoses and fittings are sound and free from leaks. Cables are sound and their routing is free from moving items of equipment. Delivery nozzle shut off devices operate correctly. Pumps do not leak and do not make excess noise or vibration when operating. Display is unbroken, illuminated and resets to zero when nozzle is removed from its holster. Emergency hand gear, where fitted, operates correctly. Pressure relief and bypass valves operate correctly. Suction filter is not blocked. Drive belts, where fitted, are not frayed or subject to non-uniform wear Flowmeter testing is carried out in accordance with the requirements of SI 1995 no. 1014 The Measuring Equipment (Liquid Fuel and Lubricants) Regulations.	12 Monthly
Notes	Flowmeter testing to be carried out as follows: • Test 1 20 litre capacity, • Test 2 10 litre capacity, • Test 3 5 litre capacity. Pumps to be set at their fastest rate for test. Acceptable tolerances are; • +/- 0.5% for new or repaired pumps or pumps with new meter fitted, • +1%, -0.5% for pumps which have been in operation for more than 12 months. If tolerances from all three tests are less than those stated but are either all positive or all negative, then at least one of the test tolerances shall not exceed half of those specified above.	

Job No	Description of Job and Criteria	Interval
6	**Pipework - Secondary Containments Systems**	
	Interstitial monitoring to be carried out at all times.	Continuously
Notes		
7	**Pipework - Single Wall Pipework**	
	Carry out integrity test of single skin pipework.	5 Yearly
Notes		
8	**Vapour Recovery Systems - Visual Inspection**	
	Carry out visual inspection of system and components.	1 Monthly
Notes		
9	**Vapour Recovery Systems - Operational Check**	
	Check: (a) operation of overfill prevention devices, (b) installation of flame arrestors, (c) Vapour connection coupling seals/caps, (d) operation and sealing of pressure/vacuum valve.	12 Monthly
Notes		
10	**Leak prevention, Containment and Leak Detection Systems (including contents measurement and wet stock control) - Monitoring**	
	System monitoring to be carried out at all times to ensure correct functionality.	Continuously
	System should be calibrated in accordance with the manufacturer's recommendations.	12 Monthly
Notes	System to be in compliance with EN 13160 Parts 1-7.	

<table>
<tr><th>Job No</th><th>Description of Job and Criteria</th><th>Interval</th></tr>
<tr><td>11</td><td>Leak prevention, Containment and Leak Detection Systems (including contents measurement and wet stock control) - Tank Gauging System</td><td></td></tr>
<tr><td></td><td>Automated Tank Gauging and Leak Detection systems are to be maintained in accordance with manufacturer's instructions. Annual inspection to check gauges, switches and sensors for correct operation.</td><td>12 Monthly</td></tr>
<tr><td>Notes</td><td></td><td></td></tr>
<tr><td>12</td><td>Drainage and Oil Water Separators</td><td></td></tr>
<tr><td></td><td>Maintenance should follow requirements of schedule 1320-01.</td><td></td></tr>
<tr><td>Notes</td><td></td><td></td></tr>
<tr><td>13</td><td>Electrical Installation and Equipment - Hazardous Area</td><td></td></tr>
<tr><td></td><td>Within any hazardous area as defined by the DSEAR hazardous area classification drawings. The electrical installations within these areas shall be inspected, tested and maintained in accordance with BS EN 60079 part 17 and the requirements of PG 2018-01. The inspection and testing regime in schedule 1120-01 should be followed.
Electrical equipment associated with Diesel Only MTFIs should be inspected on a 3-year rolling schedule, as per the below guide:
<table>
<tr><th>YEAR</th><th>GRADE</th><th>PROPORTION</th></tr>
<tr><td>1</td><td>Visual</td><td>100% of Equipment</td></tr>
<tr><td>2</td><td>Close</td><td>100% of Equipment</td></tr>
<tr><td>3</td><td>Detailed</td><td>100% of Equipment</td></tr>
</table></td><td>12 Monthly</td></tr>
<tr><td>Notes</td><td></td><td></td></tr>
<tr><td>14</td><td>Electrical Installation and Equipment – Non-Hazardous Area</td><td></td></tr>
<tr><td></td><td>Installation and equipment totally outside any hazardous area as defined by the DSEAR hazardous area classification drawings. These installations shall be inspected, tested and maintained in accordance with BS7671 and Guidance Note 3. The requirements in PG 2017/02 should be followed.</td><td>Not Specified</td></tr>
<tr><td>Notes</td><td></td><td></td></tr>
</table>

Job No	Description of Job and Criteria	Interval
15	**Lightning Protection**	
	Inspection and testing regime should be in accordance with schedule 1130-01.	
Notes		
16	**Cathodic Protection**	
	Inspection and testing regime should be in accordance with schedule 1220-12.	
Notes		
17	**NOx Reduction Agent AUS 32 / Diesel Exhaust Fluid (DEF) Storage and Pipework**	
	All DEF storage and equipment at MTFIs are to be inspected and maintained in accordance with manufacturer's instructions. Annual inspection to check gauges, switches and sensors for correct operation. External visual inspection should include: • Signs of leaks, drips or spills, • Mechanical damage or corrosion, • Where tank bottom can be viewed inspect for damage and corrosion, • Correct operation and condition of pipework and ancillary equipment, • Check condition of vehicular impact protection, • Visual inspection of tank underside.	6 Monthly
Notes	Storage of DEF is to be in compliance with ISO 22241 Part 3.	

Job No	Description of Job and Criteria	Interval
18	**NOx Reduction Agent AUS 32 / Diesel Exhaust Fluid (DEF) Dispenser**	
	All parts to be cleaned and lubricated. Housings to be checked as undamaged and securely fixed to bases. Vent openings to be clear of obstructions. Hoses and fittings are sound and free from leaks. Cables are sound and their routing is free from moving items of equipment. Delivery nozzle shut off devices operate correctly. Pumps do not leak and do not make excess noise or vibration when operating. Display is unbroken, illuminated and resets to zero when nozzle is removed from its holster. Emergency hand gear, where fitted, operates correctly. Pressure relief and bypass valves operate correctly. Suction filter, where fitted, is not blocked. Drive belts, where fitted, are not frayed or subject to non-uniform wear Flowmeter testing is carried out in accordance with the requirements of SI 1995 no. 1014 The Measuring Equipment (Liquid Fuel and Lubricants) Regulations.	12 Monthly
Notes		

SECTION 6

16. Technical Authority

16.1 General

16.1.1 MOD Technical Authority is vested in Head of Engineering, DIO Technical Services. Technical advice and assistance on MTFI matters can be obtained from DIO. Approaches may be made through local DIO offices or directly to:

Principal Mechanical Engineer,
Technical Services,
Engineering and Construction,
Defence Infrastructure Organisation,
Building 680,
RAF Mildenhall,
Suffolk,
IP 28 8NF.
Email: Mark.Spooner583@mod.gov.uk

16.1.2 This Standard have been devised for the use by the Crown and its Contractors in the execution of contracts for the Crown and, subject to the Unfair Contracts Terms Act 1977, the Crown shall not be liable in any way whatever (including but without limited negligence on the part of the Crown its servants or agents) where the specification is used for other purposes.