

CHAPTER 16

VEHICLES AND MOBILE MECHANICAL HANDLING EQUIPMENT (MHE) IN EXPLOSIVES FACILITIES

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1 VEHICLES AND MOBILE MECHANICAL HANDLING EQUIPMENT (MHE) IN EXPLOSIVES FACILITIES

1.1 Introduction

1.1.1 Power operated vehicles, mobile Mechanical Handling Equipment (MHE) and cranes present a risk of fire or explosion. The regulations in this chapter have been prescribed to minimise such risks when such equipment is used within, or close to, explosives facilities and detail their conditions of use and standards of construction. The construction and use of vehicles for the conveyance of explosives on public roads is covered in detail in JSP 800 Vol 4b. Power driven lifting appliances used for handling explosives or Nuclear Weapons shall comply with the requirements of JSP 467.

1.1.2 If procuring for Category A & B¹ environments contracts should require full ATEX compliance with associated certification and marking. Additional marking (Cat A, Cat B, Cat C etc), appropriate to the intended use, must be contractually detailed. The very specialised nature of these equipments is acknowledged and additional advice is available from Technical Advisor (Electrical Safety) ESTC.

¹ Refer to JSP482 Chapter 8 for definitions of Categories A, B, C and D environments.

1.2 Legislative Changes Related To Vehicles and Mobile MHE For Use Within Category A and B Facilities

1.2.1 All vehicles and powered mobile MHE for use within Category A and Category B environments, are to be fully compliant with the requirements of EN1755:2000 and any additional requirements as detailed in this chapter.

1.2.2 Vehicles and powered mobile MHE to which authority has been granted to enter Category A and B explosive facilities before 1 July 2003 can continue to be authorised for use until they are due for replacement.

1.3 Vehicles and MHE Authorised To Enter A Potential Explosion Site (PES)

1.3.1 Electrically operated vehicles and MHE, including lifting or stacking appliances, are preferable from a safety viewpoint to those operated by internal combustion engines for use in explosives facilities. Electrically powered vehicles and powered mobile MHE are permitted in a PES under certain specific conditions.

1.3.2 Petrol engines are not permitted in a PES. However, military diesel powered vehicles and diesel powered mobile MHE are permitted in such facilities under certain specific conditions. Diesel engines that have petrol starting systems and vehicles powered by liquid petroleum gas (LPG), butane or propane are to be treated as petrol engines and are therefore not permitted but see para 1.3.3.

1.3.3 Notwithstanding paras 1.3.1 and 1.3.2 above, a standard vehicle or powered mobile MHE, (unprotected vehicles, and PLG) may be brought into an explosives storage area (ESA), in particular into a holding yard or marshalling yard, subject to the restrictions detailed in Annex C.

1.4 Vehicles and Powered MHE Authorised To Enter ESA

1.4.1 On certain occasions, an unprotected vehicle (e.g. trucks, lorries and PLG) or an unprotected powered mobile MHE is required to enter the ESA without entering a PES. The requirements for these unprotected vehicles are detailed in para 5.

1.5 Weapon Systems

1.5.1 Special consideration may have to be given to internal combustion engine powered vehicles or MHE which are specifically designed to be an integral part of a weapons system and which are necessarily housed with their explosives. In these cases, deviations from the regulations in this chapter are only permitted on the authority of CIE (MOD) and with the agreement of TA (Elec Safety).

1.6 Lifting Appliances – Scope

1.6.1 Any stationary or mobile appliance and every part thereof, which is used for the purpose of suspending, raising or lowering loads or moving them from one position to another whilst suspended directly from above the load. It includes attachments used for anchoring, fixing or supporting that appliance, but not the vehicle coupling arrangements.

1.6.2 This scope covers the following Lifting Appliance types:

- (1) Mobile Cranes.
- (2) Fixed Pedestal Jetty Cranes.
- (3) Travelling Portal Jetty Cranes.
- (4) Ship and Barge mounted Cranes.
- (5) All Overhead Travelling Cranes.

1.6.3 It does not include:

- (1) Lifts.
- (2) Conveyors.
- (3) Lifting gear used to attach the load to the crane hook.

2 CATEGORY AND ZONING OF PES

2.1 Introduction

2.1.1 Chapter 8 of these regulations categorises buildings containing explosives according to the nature of explosives stored, handled or processed in the building. Electrical installations and equipment are afforded the same category as the building in which they are installed or used. The same categorisation system is used to determine the protection to be afforded to vehicles and MHE permitted inside buildings containing explosives.

2.2 Category A, Zone 0

2.2.1 Vehicles and powered mobile MHE are not permitted in Category A, Zone 0 environments.

2.3 Category A, Zone 1 and 2

2.3.1 Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE are permitted in Category A, Zone 1 and Zone 2 environments, provided they meet the specifications as detailed in Annex A.

2.4 Category B, All Zones

2.4.1 Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE are permitted in Category B environments, provided they meet the specifications as detailed in Annex B.

2.5 Category C

2.5.1 Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE are permitted in Category C environments, provided they meet the specifications as detailed in Annex C.

2.5.2 For the purposes of this chapter the following Category C environments have been identified:

2.5.2.1 Explosive Storage and Marshalling Areas. These are Category C areas where explosives/munitions are handled and/or stored whilst in their approved ESTC packaging only. These areas do not include processing areas.

2.5.2.2 All Areas. This covers all Category C areas including explosive storage and marshalling areas as well as processing areas where explosives/munitions are removed from their approved ESTC packaging and are subject to processing activities.

2.6 Category D

2.6.1 No special requirements need be specified for vehicles permitted within Category D environments.

3 GENERAL DESIGN, CONSTRUCTION AND SPECIFICATION REQUIREMENTS FOR VEHICLES AND POWERED MHE FOR USE WITHIN A PES

3.1 General

3.1.1 Vehicles and powered mobile MHE authorised for use within a PES are to conform, as a minimum, to the standards set out in Annexes A, B and C. It is not to be assumed that a vehicle compliant with Annex A is suitable for use within a Cat B environment and visa versa. It can be assumed that a Cat A or Cat B vehicle is suitable for any Cat C environment. In addition to these standards the criteria in paras 3.1 to 4.6 are to be observed.

3.2 Identification of MHE

3.2.1 Mobile MHE, including Cranes, are to be clearly identified by sign writing, plating or other suitable means to define the areas in an explosives facility in which it is cleared for use.

3.3 Internal Combustion Engines

3.3.1 Internal combustion engines are to be Compression Ignition (CI) engines. Cold starting fluids are only to be used in a permanently installed system that injects fluid into the inlet air manifold downstream of the inlet flame arrestor. The length and bore dimensions of any cold start fluid injection jet are to be proportioned such that the jet is flameproof. Cold starting fluids are not to be used in conjunction with any electrical starting aids.

3.4 Fuel

3.4.1 Diesel fuel is to have a flash point of not less than 55°C. Other fuels may be used in diesel operated internal combustion engines provided that it has a flash point of not less than 38°C and the ambient temperature of the area in which the vehicle is working is at least 5°C below the flash point of the fuel. Due allowance is to be made for solar heat gain where vehicles are working in strong sunlight. The auto-ignition temperature of either fuel is to be not less than 250°C. All the temperatures above are derived from the Institute of Petroleum Method 170.

3.4.2 When fuels are used with additives (i.e. for cold climates) flash point and auto-ignition temperature will normally be reduced.

3.4.3 Fuel and cold starting aid fluid is only to be carried in a fixed tank. No provision is to be made for the carriage of spare fuel or starting fluid.

3.5 Tyres

3.5.1 The tyre of at least one road wheel is to be electrically conducting in accordance with the requirements of BS ISO 2878:2005. Vehicles designated for use in CAT C storage, marshalling and transit environments are not required to be fitted with electrically conducting tyres. All wheels on any one axle are to be fitted with tyres of the same type.

3.6 Ancillaries

3.6.1 Ancillary items in use with vehicles and powered mobile MHE are to comply with the equivalent standards as the main equipment with which they are utilised.

3.7 Electromagnetic Compatibility

3.7.1 All vehicles and powered mobile Mechanical Handling Equipment must be compliant with the requirements of EN 12895:2000 (with the exception of legacy vehicles).

Note: Equipment may be CE marked and the manufacturer states it meets the requirements of a relevant EN EMC standard without an EMC test having been conducted. Those purchasing equipment must therefore obtain test results for the equipment from the supplier/manufacturer to demonstrate compliance.

3.8 Lifting Appliances used for Handling Explosives or conducting Nuclear Weapons Lifts

3.8.1 All new Lifting Appliances being procured for handling explosives or Nuclear Weapons shall be specified in accordance with and assessed against the requirements of JSP 467 (The Specification of Power Driven Lifting Appliances used for Handling Conventional and Nuclear Armaments). All Lifting Appliances procured for use on board HM Naval Ships and Royal Fleet Auxiliary ships etc shall also conform to the requirements of NES 113 and BR 3027.

3.8.2 It is the responsibility of the Technical Authority (defined as the authority responsible for the technical specification and acceptance of the lifting appliance from the manufacturer or hire company) to ensure that a lifting appliance obtained for this purpose complies with:

- (1) The Technical requirement.
- (2) Appropriate statutory regulations and is;
- (3) Considered fit for purpose.

3.8.3 For all Lifting Appliances it is the responsibility of the providing authority² to ensure that lifting appliances used for this purpose are operated, maintained and periodically tested in accordance with³:

- (1) The original manufacturer's instructions or approved maintenance regime.
- (2) Appropriate regulations of the specific providing authority, and
- (3) Appropriate Statutory Regulations.

3.8.4 The providing authority is also responsible for the planning, organisation and control of the lifting operation. Personnel engaged in these activities are advised to consult BS 7121, part 1 (safe use of Cranes) and LOLER ACOP (organisation of lifting operations).

3.9 Mobile Cranes, Ship and Barge Mounted Cranes and Cranes not in Regular Use

3.9.1 All mobile cranes, ship/barge mounted cranes of all kinds and cranes not in regular use, shall be subjected to the following tests before use:

- (1) All pre-use checks recommended by the manufacturer.
- (2) Testing of every crane motion for several minutes without load, each motion individually at first then by a combination of two or more motions simultaneously as appropriate, and then repeating the test with an inert load on the crane. For this test the load is to be at least equal to the maximum load to be handled. For mobile cranes the strength and stability of the crane at its location is important. The test should include simulating the maximum reach the crane would be required to move the load.

² the providing authority is defined as "The owner of the Lifting Appliance, or in the specific case of Lifting Appliances hired from outside the MOD, the user of the appliance"

³ approval to vary from the regulations/standards for Lifting Appliances is to be obtained from the sponsor of JSP 467, as the Competent Technical Authority, and authorised by the appropriate Inspector of Explosives (see Chapter 1)

- (3) On floating cranes, the test lift (with load) is to be repeated after any break of one hour or more, or at any time when required by the ship's Commanding Officer's representative, the loading supervisor/master stevedore or the crane driver. The test lift is to be witnessed by a representative of both the loading and receiving parties.
- (4) Assurance shall also be obtained that cranes not in regular use are adequately maintained and that the probability of failure shall be at least equal to that which the crane would be afforded if it was subject to regular use.

3.10 Nuclear Weapon Lifts

3.10.1 A Nuclear Weapon lift⁴ is defined as a lift by crane or other handling equipment of an object which in being itself damaged or causing damage due to dropping or other mishap during the lift could prejudice Nuclear Weapon safety or serviceability⁵. Lifts of heavy objects over, or in such close vicinity as to be in danger of coming in to contact with Nuclear Weapons, stores or transporters containing Nuclear Weapon components, Nuclear alarm monitor services etc, are included in this definition.

3.10.2 A series of Nuclear Weapon lifts is defined as a sequence where the lifting appliance is not used for any other purpose. Normally a series lasts for up to 21 days before another Nuclear Weapon test lift, in accordance with para 3.11 below, shall be required. During a series of Nuclear Weapon lifts the lifting appliance must not be left idle for a period exceeding 80 hours. To meet this requirement, the crane may be functionally exercised through all its motions without a load.

- (1) If, exceptionally, during a series the lifting appliance is required to be used for another purpose (Unrelated Use), in order not to invalidate the Nuclear Weapon test lift series, the Unrelated Use must be performed to the same level of supervision and control as for a Nuclear Weapon lift. If this is not possible another Nuclear Weapon test lift shall be required before restarting the series.
 - (a) In this Unrelated Use, the lifting appliance must not be used to lift loads heavier than the heaviest Nuclear Lift required during the series.
 - (b) The Unrelated Use must be authorised by the Duty Holder (defined as the person within the establishment who has responsibility for authorising and controlling nuclear weapon lift crane activities). Only the Duty Holder may give authorisation for the Unrelated Use.
- (2) Where, because a potentially hazardous situation may occur, it is impractical to carry out Nuclear Weapon test lifts within a processing environment on a 21 day cycle, or during an idle period in excess of 80 hours, then the series of Nuclear Weapon lifts may be defined as:
 - (a) The period between local maintenance routines. This shall be 3 months maximum unless a suitable period, which recognises local conditions and usage, can be defined and approved by a local competent authority, The Duty Holder must give authorisation for the increase in period of the series of Nuclear Weapons lifts above 21 days.

3.10.3 For Nuclear Weapon Lifts, Duty Holders must, ensure:

- (1) That the lifting appliance is not subject to any defect, repair or maintenance which may affect the load bearing structure, lifting mechanism (including

⁴ Reference shall be made to BR 3018/JSP 518 for Nuclear lifts, i.e. those lifts in the vicinity of Nuclear reactors

⁵ Nuclear Weapon safety and/or serviceability would be prejudiced if any event occurs which could lead to either a Nuclear Weapon incident or Nuclear Weapon accident situation

their associated braking systems and limit switches) and/or the crane/lifting appliance safety generally.

- (2) That if any part of the lifting appliance not covered by (1) above is subject to any defect, repair or maintenance during a series of lifts, suitable tests are carried out to re-validate that part of the appliance. These functional tests must not create a hazard as defined in para 3.8.3 above.
- (3) Compliance with any special regulations relating to a particular lifting appliance or a particular Weapon's lift that stipulates more frequent testing.
- (4) The functional tests in (2) above do not create a hazard as defined in para 3.8.3 above.

3.10.4 For all Nuclear Weapon lifts, the Duty Holder or his appointed representative shall approve local control procedures. These control procedures are to include checks to verify that lifting appliances used in Nuclear Weapon lifts are:

- (1) Maintained, examined, tested and certified before acceptance, in accordance with paras 1.6 and 4.9 above for Depots and BR3027 for Ships items.
- (2) Have been tested in accordance with the requirements of para 3.11 below.
- (3) Are operated by appropriately certified personnel.

3.11 Nuclear Weapon Test Lift

3.11.1 The specific requirements for Nuclear Weapon test lifts are:

- (1) A Nuclear Weapon test lift shall apply a load of 125% of the heaviest Nuclear Weapon lift to the lifting appliance to be used provided that this does not exceed the safe working load.
- (2) Any part of the lifting arrangements for a Nuclear Weapon lift, not included in a Nuclear Weapon test lift at 125% of the heaviest Nuclear Weapon (e.g. slings, eyebolts and particularly, lifting gear attachments points on items to be lifted), shall be tested separately to 125% of the load which will be carried during the heaviest Nuclear Weapon lift. Exceptionally, where this is impracticable, a non-destructive examination approved by the Duty Holder or his appointed representative is acceptable.
- (3) The conditions during each Nuclear Weapon test lift are to be documented and approved by the Duty Holder or his appointed representative. The procedures are to include a statement on obtaining approval to vary from regulations (see Chapter 1).

3.12 Safe Working Load

3.12.1 On no account is the Safe Working Load to be exceeded in any circumstance other than those prescribed in the relevant test procedures, and then only under the supervision of a competent person.

3.13 Exclusion Clause

3.13.1 These requirements do not apply to special to type equipment and Surface Support Equipment (SSE) that has been designed for and exclusively used with Strategic Weapons. Such equipment operating and maintenance procedures are to be approved for use by the Procurement Authority, the User and the appropriate Safety Authorities.

3.13.2 The Trident Missile Hoist "A" frame (which is part of the Missile Hoist Assembly Part No 594623) is the subject of such an exclusion, i.e. 3 months test validity commencing from a test date which relates to the anticipated use of the "A" frame.

4 MANAGEMENT AND CONTROL OF VEHICLES AND POWERED MHE WITHIN EXPLOSIVES FACILITIES

4.1 Authorisation of Vehicles

4.1.1 Service vehicles and powered MHE to be used in connection with explosives and Nuclear Weapon lifts must satisfy the requirements of this chapter, JSP 800 Vol 4(b) and, where applicable, JSP 467.

4.1.2 Vehicles are then only to be used as detailed in this chapter taking full account of all conditions and restrictions relating to particular vehicles.

4.2 Speed Limits

4.2.1 The maximum speed limit within an above ground explosives area for each type of vehicle and MHE is to be fixed by the HoE. The maximum speed limit in an underground site is 5 mph (8 kph). Speed limits are to be clearly indicated by signs or notices and are to be promulgated within local orders.

4.3 Serviceability

4.3.1 No unserviceable vehicle or powered MHE is to be permitted to enter an explosives facility. Furthermore, if a fault is discovered on any vehicle or MHE during use that affects its safety, it is to be promptly withdrawn from use.

4.4 Maintenance

4.4.1 Vehicles and powered MHE are to be maintained and periodically tested in accordance with the approved equipment maintenance schedules; rail vehicles and appliances are to be maintained in accordance with DETR requirements. The vehicle/MHE manufacturer is to provide maintenance schedules, which include the maximum performance limits and test criteria, to ensure the continuing effectiveness of any safety devices or other safety features. These schedules are to be incorporated into the maintenance schedules. Vehicles and MHE for use in both above and underground explosives facilities are to be properly maintained and periodically tested in accordance with these schedules.

4.4.2 Following any maintenance to the exhaust system it must be reassembled with new gaskets and tested for leaks before the MHE is put back into service. Exhaust system flame emission tests are not required during routine maintenance.

4.5 Parking

4.5.1 Vehicles and powered mobile MHE are not to be left unattended in a PES. Vehicles and mobile MHE shall only be parked in designated areas within the ESA, each site shall determine suitable parking areas. Parked vehicles loaded with explosives are required to be treated as a PES, i.a.w. Chapter 10, Section 3.

4.6 Garaging – Above Ground

4.6.1 Garaging in an above-ground explosives facility is not to be within the IMD of any PES.

4.7 Garaging – Underground

4.7.1 Vehicles and MHE used in underground sites should normally be garaged at a selected area above ground. Where this is not possible, the appropriate IE may authorise a selected area underground that is sited as far as possible from the explosives.

4.8 Breakdown

4.8.1 Should a breakdown, including failure to start readily, occur in the vicinity of a PES, the vehicle or MHE is to be off-loaded of any explosives before repairs are commenced. Normally, only minor repairs, sufficient to permit the vehicle or MHE to be moved, are permitted. Where a major repair is essential, the prior sanction of the HoE or their appointed Safety Representative is to be sought, and precautions taken to minimise the risk involved. In these cases, the vehicle or MHE is to be towed outside the explosives area.

4.9 Modifications

4.9.1 No unauthorised modifications are to be made to any protected MHE. Authorisation for modification may only be given, in writing, by CIE (MOD).

4.10 Refuelling

4.10.1 Vehicles and MHE are normally only to be refuelled at authorised above-ground refuelling points, and tanks are not to be filled beyond the specified capacity. No spare fuel is to be carried. Where refuelling points are authorised in underground sites, the fuel is to be taken underground in approved containers in sufficient quantities for one days work only. The refuelling point is to have a floor of concrete impervious to fuel and a suitable method of spillage containment as detailed in Defence Estates Design and Maintenance Guide No 14.

4.11 Battery Charging

4.11.1 The batteries of electrically powered vehicles and electrically powered mobile MHE are to be maintained and charged at authorised locations that are above-ground and well ventilated i.a.w. HSE Leaflet INDG139 and Crown Fire Standard F6. After battery charging the MHE must stand for a period as determined by the MHE supplier/manufacturer, seek advice from local maintenance advisor.

4.12 Fire Fighting Equipment

4.12.1 Vehicles and powered MHE are to carry fire extinguishers that are of a type suitable for the fuel used and which will also tackle electrical fires. Additional means of fire fighting are to be available at garages, refuelling points and battery charging facilities.

4.13 Ventilation

4.13.1 Where vehicles and MHE are permitted in an explosives building, adequate ventilation is to be provided to remove exhaust fumes.

4.14 Loading/Unloading of Vehicles

4.14.1 The engines of all load carrying road vehicles are to be switched off during loading and unloading of explosives unless the engine is required to facilitate the loading or unloading of the vehicle (e.g. HIAB).

5 VEHICLES AND POWERED MHE REQUIRED TO ENTER EXPLOSIVE AREAS WITHOUT ENTERING A PES

5.1 Privately Owned Vehicles

5.1.1 Privately owned vehicles may enter an explosives area for the sole purpose of transiting personnel, provided that they are equipped with a dry powder fire extinguisher and do not present an increased fire risk. Authority for such vehicles is subject to the written permission of the HoE. Privately owned vehicles are not allowed in a PES and are to be parked in designated car parks.

5.2 Emergency Vehicles

5.2.1 Subject to the requirements of Chapter 15 of this publication, emergency vehicles are to be granted unimpeded access to explosives areas. During an emergency practice or exercise, due regard to the content of this Chapter is to be given.

5.3 Contractors

5.3.1 On certain occasions contractors are permitted to enter explosives areas with vehicles and powered mobile MHE. Whenever possible the requirements of this Chapter are to be met. Where the requirements cannot be met, the procedure incorporated in Chapter 18 of this publication is to be adopted.

6 CASUALTY WEAPONS

6.1 General

6.1.1 Casualty weapons shall be subject to a local risk assessment before being moved by MHE. If possible the MHE with the highest grade of protection available locally should be used for moving casualty weapons as defined by the local risk assessment.

6.1.2 If necessary advice should be sought from the weapon IPT, DOSG or the MHE supplier.

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CHAPTER 16

ANNEX A

SPECIAL CONSTRUCTIONAL REQUIREMENTS FOR CATEGORY A (FLAMMABLE GAS/VAPOUR) MECHANICAL HANDLING EQUIPMENT

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 - 1.2 Minimum Standards
 - 1.3 Additional Requirements

1 VEHICLES AND POWERED MHE AUTHORISED TO ENTER CAT A ZONE 1 AND ZONE 2 PES

1.1 Introduction

1.1.1 Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE are authorised to enter a Cat A Zone 1 PES (for Category 2G vehicles) and CAT A Zone 2 PES (for Category 2G and 3G vehicles) subject to the restrictions detailed in this Annex.

1.2 Minimum Standards

1.2.1 Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE are to comply with the applicable standards in Table 1 below.

BS EN 1127-1: 1998	Explosive atmospheres – Explosion prevention and protection – basic concepts and methodology
BS EN 1175: 1998	Safety of industrial trucks – electrical requirements
EN 1755: 2000	Safety of industrial trucks – operation in potentially explosive atmospheres – use in flammable gas, vapour, mist and dust
BS EN 1834-1: 2000	Reciprocating internal combustion engines - Safety requirements for design and construction of engines for use in potentially explosive atmospheres - Part 1: Group II engines for use in flammable gas and vapour atmospheres
BS EN 60079	Series of standards covering electrical apparatus for use in explosive gas atmospheres
EN 12895:2000	EMC

Table 1 – Standards for vehicles and powered mobile MHE for use in a Cat A Zone 1 PES and CAT A Zone 2 PES

1.3 **Additional Requirements**

1.3.1 The maximum surface temperature of any part of the vehicle or powered mobile MHE is to be specified for the potentially explosive atmosphere that is anticipated but must not exceed T4 135°C.

CHAPTER 16

ANNEX B

SPECIAL CONSTRUCTIONAL REQUIREMENTS FOR CATEGORY B (DUSTS) MECHANICAL HANDLING EQUIPMENT

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2 VEHICLES AND POWERED MHE AUTHORISED TO ENTER A CAT B PES

2.1 Introduction

2.1.1 Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE are authorised to enter a Cat B Zone 21 PES (Category 2D vehicles only) and Cat B Zone 22 (Category 2D and 3D vehicles only) subject to the restrictions detailed within this Annex.

2.2 Minimum Standards

2.2.1 Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE are to comply with the applicable standards in Table 1 below.

BS EN 1127-1 : 1998	Explosive atmospheres – Explosion prevention and protection – basic concepts and methodology
BS EN 1175: 1998	Safety of industrial trucks – electrical requirements
EN 1755: 2000	Safety of industrial trucks – operation in potentially explosive atmospheres – use in flammable gas, vapour, mist and dust
BS EN 1834-3: 2000	Reciprocating internal combustion engines - Safety requirements for design and construction of engines for use in potentially explosive atmospheres - Part 1: Group II engines for use in flammable dust atmospheres
BS EN 50281:	Series of standard covering electrical apparatus for use in the presence of combustible dust
EN12895:2000	EMC

Table 1 – Standards for vehicles and powered mobile MHE for use in a Cat B PES
Zones 21 and 22

2.3 **Additional Requirements**

2.3.1 The maximum surface temperature of any part of the vehicle or powered mobile MHE is to be specified for the potentially explosive atmosphere that is anticipated but must not exceed T4 135°C.

CHAPTER 16

ANNEX C

SPECIAL CONSTRUCTIONAL REQUIREMENTS FOR CATEGORY C MECHANICAL HANDLING EQUIPMENT

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3 SPECIAL CONSTRUCTIONAL REQUIREMENTS FOR CATEGORY C MECHANICAL HANDLING EQUIPMENT

3.1 Vehicles and Powered MHE Authorised To Enter a Cat C PES (All Areas)

3.1.1 Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE are authorised to enter a Cat C PES in order to handle ESTC classified explosives subject to the following restrictions:

- (1) A spark arrestor is to be fitted to the exhaust system.
- (2) The maximum temperature of the exposed surfaces of the vehicle or powered mobile MHE is not to exceed 135°C. This requirement may be met by shielding which is designed to prevent explosives coming into contact with any surface whose temperature exceeds 135°C.
- (3) The surface temperatures of components under the covers of the powered mobile MHE in its normal operating condition is to be as low as practicable and must not exceed T3 200°C.
- (4) The air intake system is to be fitted with a dry air cleaner.
- (5) When a cold starting aid, which ignites fuel in the air intake manifold, is fitted, an approved flame trap is to be fitted between the air cleaner and the cold start device.
- (6) Electrical equipment enclosures that are accessible when the MHE is in its normal operating condition are to provide protection against the ingress of solids and liquids to comply with the requirements of BS EN 60529, IP44.
- (7) Electrical equipment enclosures are to withstand an impact of one joule, with the exception of light emitting parts with guards which are to withstand an impact of 0.7 joules when tested without the guard.

- (8) The covers of the MHE in the normal operating condition may be regarded as a satisfactory enclosure if:
 - a) They provide protection, from the top and the sides, against contact with live or moving parts inside by tools, wires or such objects of a thickness greater than 1mm. (This requirement may be met by the use of overlaps between parts of the covers and/or upstands behind the covers).
 - b) They cannot be opened without keys or tools which are not normally available to the operator. Such keys or tools may be kept in a sealed container on the MHE to allow access in an emergency, e.g. fire.
 - c) Electrical equipment under the covers is protected so that a 5mm diameter metal sphere cannot cause a short circuit in or between equipment or between equipment and the frame of the MHE.
- (9) Components which may overheat shall be fitted with a sensor arranged to warn the driver or to disconnect the relevant circuit when the maximum permissible temperature is being approached.
- (10) Wiring is to consist of single or multi-core sheathed cable, or harness; conductors are to be multi-stranded. Conductor insulation is to resist chemical attack by engine fuel, lubricating oils and hydraulic and electrolytic fluids. The wiring system may be enclosed by the structure of the MHE in its normal operating condition provided cable entries into electrical equipment enclosures maintain the degree of protection of the enclosure.
- (11) Diesel engines must be fitted with oil pressure loss, and high coolant temperatures warning devices, or an automatic shut down device.
- (12) MHE shall be fitted with an emergency stop device which shall isolate all electrics.
- (13) EMC performance to EN12895:2000.
- (14) Such vehicles are to be marked clearly using the label shown in Annex D Figure 1.

3.2 Vehicles and Powered MHE Authorised To Enter a Cat C PES (Storage, Holding Yard or Marshalling Yard Only For The Purposes Of Loading Or Unloading)

3.2.1 Unprotected Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE may be authorised to access a Cat C storage PES or enter the confines of a holding yard or marshalling yard. Such vehicles may also be authorised to access packaging areas within processing facilities subject to an assessment by the licensing authority. In both cases the following restrictions apply:

- (1) The Cat C PES, holding yard or marshalling yard is to be solely authorised for the storage and handling of ESTC classified explosives but not processing.
- (2) Only handling, loading and unloading of ESTC classified explosives in their approved ESTC packaging may be undertaken by the unprotected, powered, mobile MHE.
- (3) The unprotected, powered, mobile MHE must be compliant with EN12895:2000.
- (4) Such vehicles are to be marked clearly using the label shown in Annex D figure 2.

3.3 Unprotected Vehicles Required to Enter a Cat C PES, Holding Yard or Marshalling Yard In Order To Be Loaded or Unloaded With ESTC Classified Explosives For Onward Transit

3.3.1 Unprotected Military diesel powered vehicles, diesel powered mobile MHE, electrically powered vehicles and electrically powered mobile MHE, trucks, lorries and PLG, may be authorised to access the entrance of a Cat C PES or enter the confines of a holding yard or marshalling yard, subject to the following restrictions:

- (1) The Cat C PES, holding yard or marshalling yard is to be solely authorised for the storage and handling of ESTC classified explosives but not processing.
- (2) The unprotected vehicle is to be utilised solely for the role of receipt or despatch of ESTC classified explosives in their ESTC approved packaging.
- (3) Should the unprotected vehicle be observed to have defects e.g. emitting sparks, leaking fuel/liquid etc. then its engine is to be stopped, the explosive packages offloaded prior to its immediate removal from the explosives area.

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CHAPTER 16

ANNEX D

SIGNAGE TO BE AFFIXED TO MECHANICAL HANDLING EQUIPMENT USED IN EXPLOSIVES AREAS

CONTENTS

Figure 1: Signage to be affixed to MHE protected to enter all Category C environments (processing and storage etc.)

Figure 2: Signage to be affixed to MHE for use in explosive storage, marshalling and transit areas only.



Figure 1: Signage to be affixed to MHE protected to enter all Category C environments (processing and storage etc.)



Figure 2: Signage for MHE, cleared for Explosive Storage, Marshalling and Transit areas only.

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