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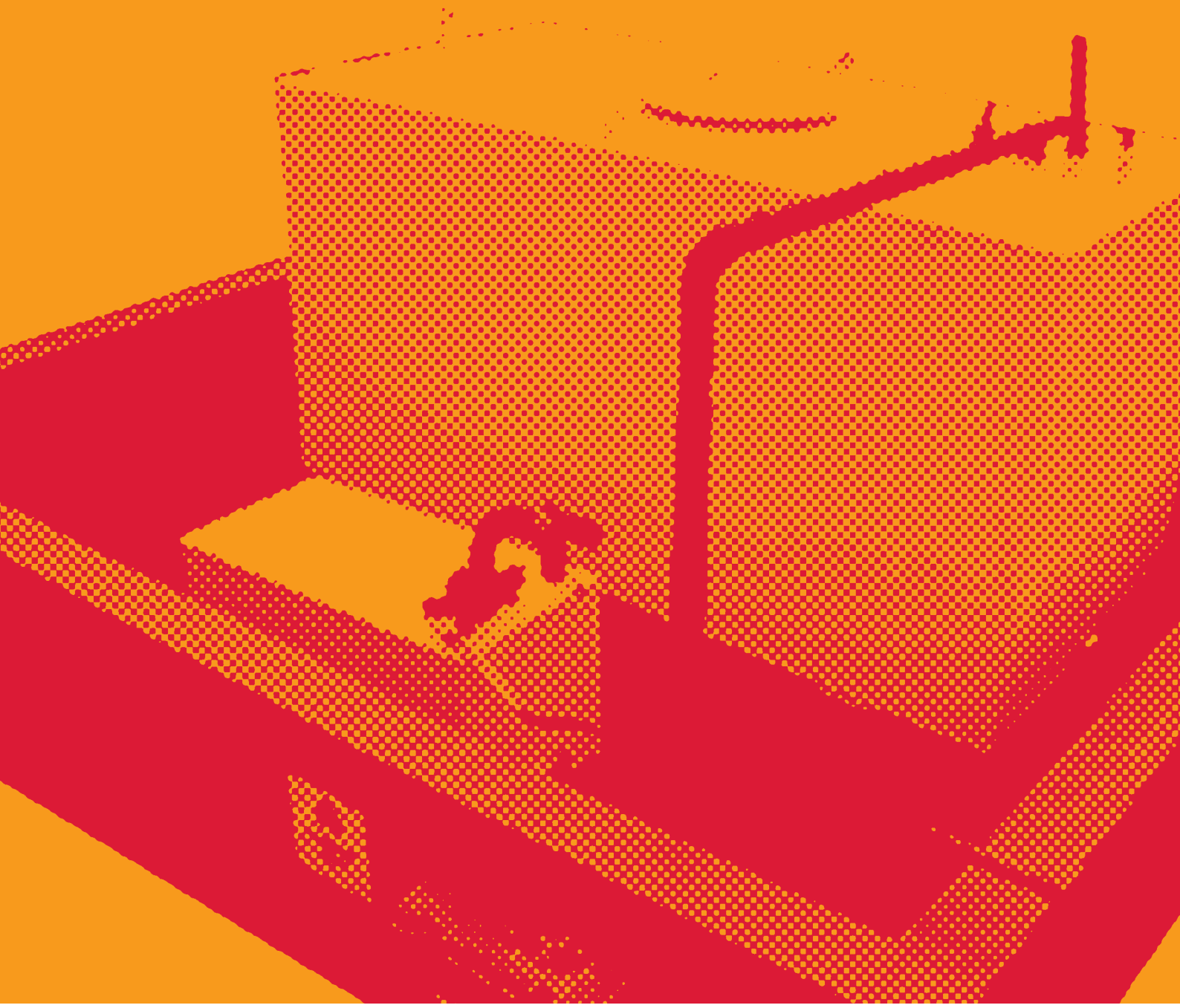
Risk Control

Recommendations for oil-fired heating installations



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CONTENTS

SCOPE

These recommendations are applicable to all installations that use, for heating purposes, petroleum oil fuels having a flashpoint (closed cup) of 38°C and above. Special precautions are necessary if fuels with flashpoints less than 38°C are to be used. These recommendations do not apply to installations fuelled with waste oil, where other guidance applies (ref. 1).

INTRODUCTION

Typical oils covered by these recommendations are shown in Table 1.

Table 1: Typical oils covered by these recommendations

Fuels defined in BS 2869 (ref. 2):

- Class C2 is a distillate kerosene-type fuel, used for vaporising and small atomising burners. It is a 28sec fuel.
- Class D is a distillate fuel, generally known as gas oil. It is supplied for use in domestic and commercial heating installations in larger atomising burners. It is a 35sec fuel.
- Classes E, F and G fuels are residual oils (the residual fuel remaining after the distillation process) and are used in systems requiring preheating before combustion. They are 200-3000sec fuels.

The recommendations also apply to liquid biofuel conforming to EN 14213 (ref. 3) and blends of these mineral oils and liquid biofuel.

Flammable and highly flammable liquids fall within the definition of a 'dangerous substance' as referred to in the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) (ref 4). Where a dangerous substance is either present or liable to be present at the workplace, a suitable assessment of the risks likely to arise should be conducted and action taken to eliminate or reduce the hazard. Where an explosive atmosphere may occur the workplace must be classified into zones based on the frequency and duration of the explosive atmosphere and the zones checked by a competent person.

In addition to complying with the DSEAR Regulations, a suitable and sufficient fire risk assessment of the whole workplace should be undertaken to satisfy the requirements of the Regulatory Reform (Fire Safety) Order 2005 or the equivalent legislation for Scotland or Northern Ireland (refs 5-9).

When considering the design of a fuel reticulation system, there is much confusion and uncertainty over the legal obligations with which companies must comply. In this respect, there are local authority byelaws and a variety of regulations, which involve the relevant British Standards (refs 10-14) and the approval of installation drawings and site plans. A competent engineer should be appointed to:

- prepare design calculations and engineering drawings
- provide a certificate of inspection;
- determine distances of building lines from boundaries
- identify firefighting requirements
- identify bund wall requirements
- specify electrical equipment requirements.

Legislation may impose requirements additional to the provisions contained in this document (for example see refs 15, 16, 17 and 18). Due regard must also be given to environmental protection considerations (for example refs 19 and 20).

DEFINITIONS

Storage tank

A tank for storage of oil in bulk in connection with an oil-fired installation.

Auxiliary tank

A supplementary storage tank having a capacity greater than 1000 litres sited adjacent to oil-burning equipment.

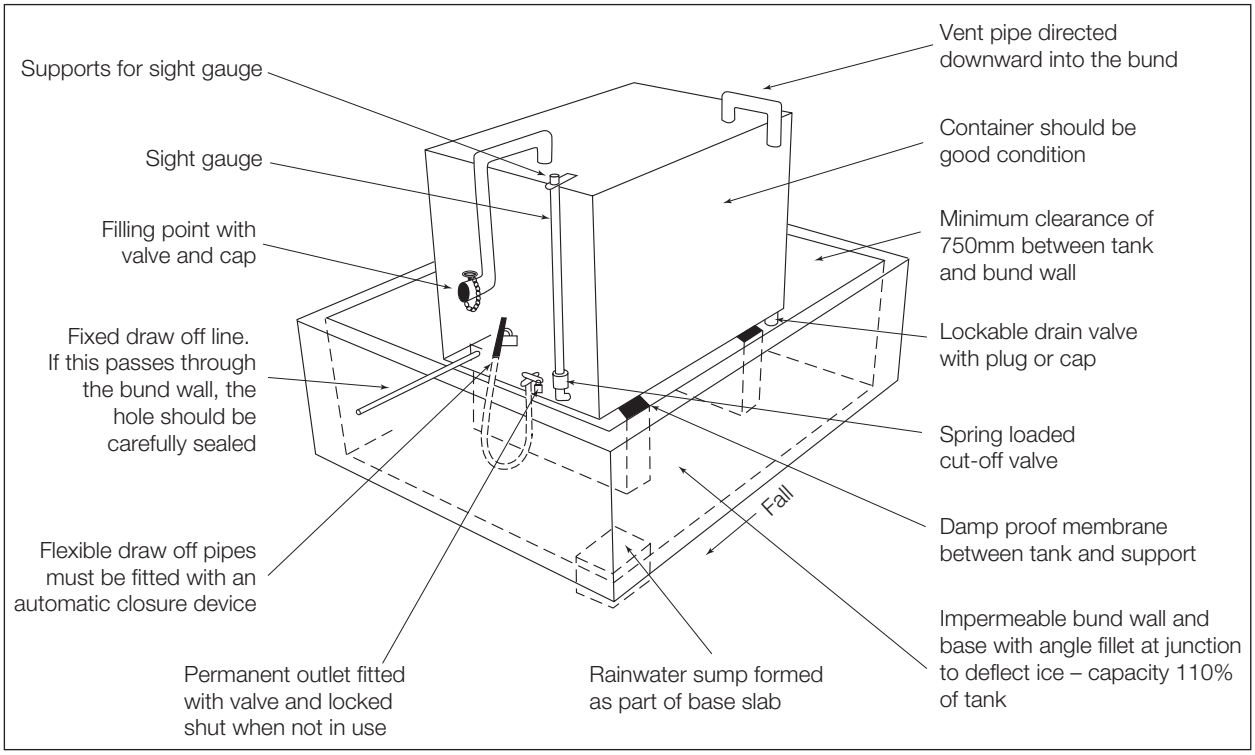

Figure 1: Bunded oil tank (from Environment Agency publication Above Ground Oil Storage Tanks, PPG2 (ref 21))

Service tank

An auxiliary tank having a capacity of not more than 1000 litres.

Tank chamber

A fire-resisting compartment enclosing a tank or tanks and associated pipework.

Bund

An enclosure in which a tank is sited.

Fire valve

An automatically operated, quick-closing valve to shut off the oil supply in the event of fire.

Duct

The passage or connection carrying the combustion products from the burners to the entry of the chimney.

Hazardous area

DSEAR describes a hazardous area as: 'A place in which an explosive atmosphere may occur in such quantities as to require special precautions to protect the health and safety of the workers concerned is deemed to be hazardous.' The regulations classify hazardous areas in terms of zones based on the frequency and duration of the occurrence of an explosive atmosphere.

Secondary containment

A means of retaining any leakage from the tank, ancillary pipework and associated equipment and fittings. Secondary containment normally takes the form of a bund.

Flashpoint

The lowest liquid temperature at which, under certain standardised conditions, a liquid gives off vapours in a quantity such as to be capable of forming an ignitable vapour/air mixture (see BS EN 60079-10-1, ref. 22).

Zone

Hazardous areas are classified into zones based upon the frequency of the occurrence and duration of an explosive gas atmosphere. Full details are set out in BS EN 60079-10-1 (ref. 22).

RECOMMENDATIONS

1. Tank installations

1.1 General considerations

1.1.1 Fuel tanks should be of sufficient capacity to store the usual volume ordered plus two weeks' reserve supply at the maximum rate of consumption (refs. 13 and 14). When considering the volume of tank required for a new installation, it should be of sufficient size when considering:

- the need to avoid business interruption as a result of a lack of heating for the premises;
- the economy of scale when purchasing large quantities of fuel;
- the need for additional capacity to allow against overfilling and the thermal expansion of the fuel in hot weather;
- the additional volume below the fuel take-off required to accommodate sludge and water at the bottom of the tank;
- the additional volume required to accommodate heating and any other equipment within the tank.
- The need for tanks to be filled to no more than 95% of their capacity to allow for expansion of the contents in warm weather.

Consultation with the oil supplier is advisable before finalizing the minimum net capacity.

1.1.2 Storage tanks (for fuels with a flashpoint not less than 38°C) should preferably be installed in the open air above ground level, as specified in section 1.2 below. Where this is not practicable they should be installed within a tank chamber in a building, as specified in section 1.3, or – only if unavoidable – above a roof, as specified in 1.4.

1.1.3 The fuel tanks must be cylindrical steel tanks (not galvanised) of all-welded construction according to BS 10 (ref. 22), BS EN 14015 (ref. 23) or OFS T200 (ref. 24). Alternatively, proprietary double-skinned plastic tanks may be installed. Polyethylene tanks and tank systems should comply with OFS T100 (ref. 25).

1.1.4 Safety, security, access and maintenance needs must be considered when storing oil. All tanks should be positioned, or other steps taken, to minimise the risk of damage by impact.

1.1.5 Oil should not be stored in hazardous locations (for example, within 10 metres of a watercourse or 50 metres of a well or borehole). Storage at or above roof level is also not recommended and should be avoided wherever possible.

1.1.6 Oil should be stored in a tank of sufficient strength and structural integrity to ensure that it is unlikely to burst or leak in ordinary use. It is recommended that tanks with a design life (with proper maintenance) of 20 years are used.

1.1.7 For ease of inspection and maintenance (see Section 9) tanks should not be installed one on top of another.

1.2 Installation in the open air

1.2.1 When selecting a location for above-ground tanks, note should be taken of the following:

- the fall of the ground in relation to residential areas and exposed risks in the event of a large spillage;
- access to all areas around the site;
- drainage systems;
- available water supplies;
- population densities around the site;
- the location of boreholes, aquifers or artesian wells within 500m of the site; and
- the exposure of the tank or its bund to impact damage from vehicular movements.

1.2.2 Tanks should be located not closer than 50m to a source of potable water such as a well, spring or borehole, or 10m to a watercourse. Care should also be taken that spilled oil cannot reach these waters by running across hard ground, or by entering open drains or loose fitting manhole covers. Care should also be taken to locate tanks so as to prevent oil soaking into the ground where it could pollute groundwater.

The storage of fuel on low level ground or on a flood plain should also be avoided wherever possible. Advice should be sought from the insurer if the latter cannot be avoided.

1.2.3 All tanks, valves and ancillary equipment should be situated within an oil tight secondary containment system such as a bund (see Figure 1). Tanks should be located so that the tank vent outlets are visible from the filling point.

1.2.4 To avoid pollution, a bund capable of containing at least 110% of the capacity of the largest tank in the bund or 25% of the aggregate volume, whichever is the greater, should be provided.

[The Control of Pollution (Oil Storage) (England) Regulations (ref. 15) make specific requirements for the provision of containment of oil storage. These include a responsibility on those having custody or control of oil storage facilities to provide secondary containment to prevent oil escaping into the water environment, including premises on which 200 litres or more of fuel oil is stored above ground level.]

Research (ref. 26) involving tanks of 25m^3 or less suggests that the 10% safety margin is inadequate in some circumstances to provide protection from loss of oil due to these factors. Specialist advice should be taken in these situations.

1.2.5 The distance between the tank and the bund wall should be at least 750mm and between the tank and the base at least 600mm to allow access for external inspection. (Further guidance can be obtained from ref. 1.)

1.2.6 Although commonly constructed of metal, proprietary double-skinned plastic tanks with a capacity of 2500 litres or less may be used and need not be protected by a bund provided they are protected from impact and all pipework is routed via the top of the tank. A risk assessed approach to both fire and environmental hazards should be undertaken when consideration is being given to the installation of plastic tanks.

1.2.7 Each fuel tank should be provided with a separate bund; where this is not practicable, low separation kerbs should be provided for each tank within the bund.

1.2.8 The bund should be oil-tight and of non-combustible construction. It should have an impervious base and impervious, reinforced walls.

1.2.9 Provision should be made for removing water/oil from the bund, but such provision should not allow the uncontrolled escape of water or oil. A bund drain valve, which is kept in the closed position, will suffice. Where tank capacities exceed 1000 litres, a drainage sump should be provided within the bunded area.

1.2.10 The bund and the surrounding area should be inspected regularly and kept free of rubbish and other combustible materials.

1.2.11 External oil storage tanks should be located at least 1800mm from any part of a building and 760mm from a boundary of the property (ref. 27). Where this is impractical:

- The wall of the building should be imperforate within 1800mm of a tank, with at least 120 minutes' fire resistance to an internal fire, or
- Provide a fire wall with at least 120 minutes fire resistance between the tank and any part of the building within 1800mm of the tank. This fire wall should extend at least 300mm higher and wider than the tank, or
- Provide a fire wall between the tank and any part of the boundary, with the wall having at least 120 minutes' resistance to fire from either side. The fire wall should extend at least 300mm higher and wider than the tank.

1.2.12 The security of tanks of highly flammable and flammable liquids is of the utmost importance. All oil storage tanks should be within a secure area protected by welded mesh, palisade or similar perimeter protection complying with a recognised standard (such as BS 1722-12 (ref. 38)). If the site is enclosed and there is a security access control system in place, there is no requirement for an additional fence around the tank or bund.

1.3 Installation within a tank chamber

1.3.1 The tank chamber should be located against an outer wall of the building.

1.3.2 The tank chamber should be constructed of bricks, blocks, or concrete and have at least 240 minutes' fire resistance. Any door in the internal wall of the chamber should have a fire resistance equal to that of the wall in which it is situated. (For information on fire doors and shutter assemblies see ref. 28). If a separate bund is not provided, this should be formed by raised door sills to accommodate a leakage equivalent to least 110% of the capacity of the tank.

1.3.3 The roof of the chamber should be of 150mm concrete and the floor of brickwork, stone, concrete, or other material impervious to oil. It should not be overlaid with asphalt.

1.3.4 The tank chamber should be adequately ventilated, preferably by natural means, with an inlet and outlet direct to the open air. Ventilation piping and ducts should be so arranged that the contents of the tank cannot escape from the chamber. Any ventilating trunking between the tank chamber and the open air that passes through any other part of the building should be enclosed with brickwork, concrete or other suitable fire-resistant cladding and be independent of any other ventilation trunking. Trunking must not be vented into a chimney, service shaft or smoke shaft.

1.3.5 If electrical equipment, wiring, or fittings are to be installed in the chamber, they should be selected so as to be suitable for use in the hazardous zone in which they are to be located. Expert assistance may need to be sought to undertake a suitable assessment to identify the appropriate zones (see refs. 22 and 29). This also applies if a double-skinned plastic storage tank is used.

The form of lighting to be installed is dependent on whether the tank chamber is classified by a DSEAR assessment as a 'hazardous area'. Under such circumstances, electrical apparatus should comply with BS EN 60079-10-1 (ref 22).

1.4 Installation above a roof

1.4.1 Installation should only be made at roof level when no practical alternative is available. Only service tanks and storage tanks not exceeding a total capacity of 3500 litres may be installed at roof level above a building, and then only where the roof is constructed of hollow blocks and reinforced concrete at least 130mm thick. It is essential that a bund should be provided in accordance with 1.2.4.

1.5 Auxiliary tanks

1.5.1 Auxiliary tanks should be avoided, but may be used in connection with large installations where oil storage would otherwise be impracticably remote from oil-burning equipment. An oil-circulating system is preferred where multiple use is required.

2. Pipes and fittings

Items of plant and equipment are increasingly expensive, resulting in a small fire having the potential to have a disproportionate effect on the continued smooth running of business operations.

2.1 Oil lines should be of non-combustible material and should be protected, where necessary, against mechanical damage. The pipework should not be run in concealed cavities nor be located within lift shafts, ventilation or service ducts.

2.2 All oil storage tanks should be provided with an oil level indicator clearly visible at the filling point. Sight tubes should be avoided where practicable, but if used should not be of glass. They should be adequately protected against damage and be contained within the boundary of the tank chamber or bund. There should be a valve between the bottom of the sight tube and the tank, which remains automatically closed except when readings are being taken.

2.3 Remote fill-points should be provided with an audible overfilling warning device in addition to an oil level indicator; this includes filling points from which the filler can see the tank.

2.4 A drain valve should be provided at the lowest part of the underside of the tank with screw-down gate valve and either be plugged or blanked off when not in use.

2.5 A vent pipe should be fitted to the top of each tank. The cross-sectional area of this pipe should be at least 50mm internal diameter or equal to the cross-sectional area of the filling pipe. The vent pipe should be free from sharp bends and should have a continuous rise. It should terminate in the open air in a position where it cannot be tampered with and the end of the pipe should be kept away from any zone in which the discharge of air and vapour might be dangerous or offensive. The open end of the pipe should point downwards into the bund to prevent accidental water ingress into the tank and be fitted with an open-mesh wire cage. There should be no architectural screening of the vent termination since that might impede free rapid dispersion of vapours.

2.6 Service tanks and any auxiliary tanks should be fitted with an overflow pipe capable of returning oil to the storage tank or to a safe position in the event of over-filling.

2.7 Filling pipes to storage tanks should be permanently fixed and constructed of non-combustible material. Filling points should preferably be in the open air and the connecting thread fitted with a screwed cap capable of being locked on. The connection for the filling pipe should be within the bund. If the filling point is below any portion of the filling line, a screw-down, full-way type oil valve should be provided close to the inlet. If the fill point is not within a bund spill containers must be used.

2.8 The filling point should be clearly identified to indicate the type of fuel that the tank holds and the capacity of the tank.

2.9 The oil outlet from any tank should be located as far away from the drain valve as is practicable and be located to ensure that any electric immersion heaters in the bottom of the tank and any associated thermostats will remain covered with oil.

2.10 Any oil outlet pipe from a storage tank, auxiliary tank or service tank should be fitted with a fire valve.

2.10.1 The fire valve should be situated as near to its tank as possible, in an easily accessible position and within the boundary of the tank chamber or bund.

2.10.2 The fire valve should be automatically actuated by the operation of a heat-sensitive device, such as a fusible link, electrical contact or pneumatic control, placed directly above each firing place or burner. The temperature rating of the heat-sensitive device should be not less than 30°C above the highest ambient temperature. Normally, a rating of 68°C will be suitable.

2.10.3 A means of manually actuating the fire valve from a safe position by means of a link line or other suitable system should also be provided.

2.10.4 Where there is a long run of oil pipework or a ring main system, supplementary fire valves should be fitted at strategic positions.

2.11 Where there is a risk of undetected leakage, consideration should be given to the provision of pressure-activated devices to shut off the oil supply in such an event.

2.12 Where the service tanks are controlled by a float valve and electric pump drawing fuel from a storage or auxiliary tank, a means of isolating the electric pump in the event of fire should be provided, in addition to the fire valve on the fuel supply.

3. Pumps

3.1 Pumps should be:

- positioned to minimise the risk of impact damage
- fitted with non-return valves in their feed lines
- protected from unauthorised use

3.2 Unless the oil has a flash point of less than 32°C, the pump sets should be installed within the secondary containment system (the tank chamber or bund). Where it is necessary to locate pumps in these areas, all electrical apparatus should comply with BS EN 60079-10-1 (ref. 22). This also applies if a double-skinned plastic storage tank is used.

4. Ducts and chimneys

4.1 Ducts and chimneys should be substantial and constructed of non-combustible material capable of withstanding the gas temperatures to which they may be subjected.

4.2 Chimneys should be carried to such height and position as will ensure freedom from downdraught. Consideration should also be given to the provision of spark arrestors in appropriate circumstances.

4.3 Ducts and chimneys should be fitted with access doors for cleaning.

4.4 Each item of oil-burning equipment should preferably have a separate duct and, in any event, ducts from oil-burning equipment should not be connected to the same chimney as ducts from apparatus burning solid fuel.

4.5 Proprietary sleeves or penetration seals should be fitted where ducts pass through fire compartment walls or floors (see ref. 30).

4.6 Combustible materials should not be located in the vicinity of ducts. Combustible linings and roofing needs to be cut back to at least 100mm from the duct and an incombustible collar fitted.

5. Safety system

The safety system of an automatic boiler or furnace should comprise:

5.1 A remote, safely accessible, manually operated, clearly indicated main fuel valve.

5.2 An automatic start-up control, which should lock out until:

- the safety system lock-out is released;
- no flame at the burner is confirmed;
- the excessive steam pressure or temperature interlock is satisfied; and
- the low-water interlock is satisfied

5.3 An automatic fuel valve safety control, which should lock out until:

- the air fans are started and proved to be running;
- the timed pre-ventilation or purge period has been completed; and
- the spark igniter is powered or the pilot flame is proved alight, which will then unlock and open to permit introduction of fuel but will again lock out and shut down if:
  - the main burner flame sensor does not confirm the main burner flame alight within the predetermined lighting-off period or at any subsequent stage of firing or;
  - any of the safety interlocks such as fuel pressure, excessive pressure, excessive temperature, fan motor failure etc fail to be satisfied.

6. Burner controls

To limit the risk of fire or explosion during the lighting-off sequence and to ensure that firing can only continue while safe conditions prevail, the following principal procedures and facilities are recommended, for both manual and automatic-fired boilers and furnaces.

6.1 During start-up:

6.1.1 The furnace, ducts, and stack should be adequately purged and pre-ventilated with fresh air before any attempt is made to light up the main burner(s).

6.1.2 A reliable ignition source should be confirmed as available before fuel can be introduced to the main burner(s).

6.1.3 After introducing fuel to the main burner, a flame-sensing device should look for the main flame and, if this is not established as correctly alight within a predetermined short period, then the entire start-up sequence should be terminated and the controls locked out.

6.2 During normal firing:

6.2.1 Airflow rate should be continuously monitored and fan motor failure or incorrect damper settings should initiate a shutdown.

6.2.2 Fuel pressure and boiler water levels should be continuously monitored and any fall below predetermined levels should automatically shut down the boiler.

6.2.3 The flame-sensing device should monitor the presence of a satisfactory flame and should initiate a shut down if the flame is lost.

6.2.4 A safety system shutdown should lock out the automatic start-up and firing controls and a restart should only be permissible after the system has been reset manually.

7. General

7.1 Cleaning, maintenance and repair of oil-fired installations should be undertaken in accordance with the guidance set out by HSE (see ref. 31). Particular care should be taken when undertaking hot work on these installations when purging of the tanks with an inert gas may be necessary.

7.2 Equipment should be installed and operated by trained personnel in accordance with manufacturers' instructions.

7.3 Where liquefied petroleum gas (LPG) in cylinders is used to start up oil-fired equipment, the cylinders should be located outside, in the open air and, with exception of the torch end, the gas supply should be by fixed metal piping. In respect of such use, reference should be made to the RC8 (ref. 32). There should be a clear distance of 6m between the LPG cylinders and a storage tank.

7.4 Cleanliness in all parts of the installation is essential. Oil leakages should be cleaned up immediately, preferably using non-combustible absorbent materials, and the source of the oil leak rectified. Cleanliness is especially important during hot works and purging of tanks.

7.5 Before starting up, care should be taken that all duct dampers and air inlet dampers are secured open in the position required for satisfactory operation and the relief doors should be examined to see that they are free to operate. No attempt should be made to light a fully automatic burner by hand in the event of failure of the automatic ignition device. It is essential with semi-automatic and hand-controlled plant that care should be taken to ensure that oil is not allowed to flow to a burner until a satisfactory source of ignition is present. This should be clearly reflected in written start-up procedures.

7.6 The hazards associated with the production of carbon monoxide must always be considered when installing oil fired appliances. Ventilation should be sufficient to ensure adequate air for combustion purposes.

7.7 Where it is necessary to lag tanks and/or pipework, only non-combustible materials should be used. Lagging should be protected against contamination by oil or other flammable liquids.

7.8 Signs which clearly specify the grade of fuel to be used and capacity of the storage tank should be prominently displayed at the fuel filling point.

7.9 A clear space of at least 1m should be maintained around the heater. The provision of a metal guard is recommended to maintain the clear space and protect the heater from impact damage.

7.10 Before starting up, the operator should check the fusible link and cabling connected to the fire valve as these are often found to be defective

8. Maintenance

8.1 Maintenance instructions should be provided by the supplier or installer of the equipment. The instructions should include details of the required frequency of servicing. Unless otherwise advised in that documentation, oil fired boilers and associated equipment should be serviced annually in accordance with the BS 5410-1 and BS 5410-2. (refs 13 and 14).

8.2 Routine maintenance of the heating installation should be undertaken by a competent person. A register of competent persons to carry out this work is maintained by the Oil Firing Technical Association (OFTEC) (see ref. 33).

8.3 All bunds, tanks, pipework and associated fittings should be inspected by the user weekly for signs of damage.

8.4 To ensure the bund retains its integrity, any defects in the bund wall or lining should be repaired promptly; damage to the tank or pipework should be dealt with immediately.

8.5 Any condensation water that accumulates within the tank should be drawn off regularly and disposed of.

8.6 Although rainwater will often evaporate from some areas of an open bund a collection sump should be included in the base. If there is no rainwater in the bund after heavy rainfall, the bund may not be adequately sealed and should be inspected and repaired as appropriate. If there is a need to remove accumulated rainwater, this should be performed with a manually operated pump or by baling from the sump. This water may be contaminated and should be disposed of via a registered waste carrier. In some instances it may be cost-effective to roof the facility.

8.7 Bunds should be kept clear of stored materials or waste. Any accumulated oil or debris should be removed and disposed of properly.

8.8 In all cases where waste is removed, the waste producer is obliged to ensure that the waste contractor removing the waste is a registered waste carrier and that the waste is disposed of properly. Waste contaminated with oil may be designated as ‘special waste’, for which a rigorous consignment note system applies

9. Decommissioning

9.1 Before a tank is taken out of use or removed, it should be fully drained. This work should be undertaken by suitably qualified technicians.

9.2 Hot work should never be carried out on a decommissioned tank until it has been degassed and the appropriate certificate issued (ref. 34).

10. Fire protection

Because of the importance of the facility to the continuity of the business, the fire risk assessment should assess the need for a suitable automatic fire detection and suppression installations for property protection as well as life safety purposes.

10.1 Appropriate extinguishing facilities should be readily available for emergency use in connection with any oil-burning equipment, tank chamber or bund. In certain circumstances fixed fire protection systems may be appropriate.

10.2 Where premises are protected by sprinklers, boiler-rooms or other compartments having oil-fired appliances or tank chambers should be protected in accordance with the provisions of the LPC rules for automatic sprinkler installations incorporating BS EN 12845 (see BS EN 12845 clause 6.2.3 and Technical Bulletin 214, Sprinkler protection of flammable liquid stores) (ref. 35). Adequate provision should be made for the removal of liquid waste.

10.3 A suitable number of appropriate (Class B rated) portable fire extinguishers, approved and certificated by an independent, third-party certification body, should be provided near storage tanks, auxiliary tanks, service tanks, pumps, and burners in accordance with BS 5306-8 (ref. 36).

10.4 Where fire extinguishers are exposed to the environment they should be protected by proprietary cabinets or coverings.

10.5 Where provided in external areas, a suitable anti freeze agent should be added to the contents of water based extinguishers by the service engineer at the time of the annual servicing of the equipment.

10.6 All fire extinguishers should be serviced at least annually by a competent engineer in compliance with BS 5306-3 (ref 37) and more frequently where determined by the fire risk assessment.

10.7 Any extinguisher that has been damaged or partially used should be replaced without delay.

10.8 Awareness should be maintained of the possibility of deliberate fire raising, vandalism and theft of fuel. Such acts include deliberate attempts to cause pollution. An appropriate level of security should be observed and valves on bunds and tanks should normally be kept padlocked in a closed position.

10.9 An automatic fire detection and alarm system should be provided within an oil storage chamber; this should be linked to the main fire alarm indicator panel.

10.10 Sufficient fire alarm sounders should be installed and so positioned to be clearly audible to allow persons in the vicinity of external oil storage tanks to evacuate the site.

11. Checklist

		Yes	No	N/A	Action required	Due date	Sign on completion
11.1	**Tank installations (section 1)**						
11.1.1	Are fuel tanks of sufficient capacity to store the usual volume ordered plus two weeks' reserve supply at the maximum rate of consumption? (1.1.1)						
11.1.2	Are storage tanks for fuels with a flashpoint not less than 38°C installed in the open air above ground level? (1.1.2)						
11.1.3	Are the fuel tanks cylindrical and of all-welded (non galvanised) steel construction? (1.1.3)						
11.1.4	Are safety, security, access and maintenance needs considered when storing oil? (1.1.4)						
11.1.5	Is oil stored clear of hazardous locations? (1.1.5)						
11.1.6	Is oil stored in a tank of sufficient strength and structural integrity to ensure that it is unlikely to burst or leak in ordinary use? (1.1.6)						
11.1.7	For ease of inspection and maintenance are tanks installed on one level and not one on top of another? (1.1.7)						
11.1.8	When selecting a location for above-ground tanks, is note taken of the fall of the ground, access, drainage systems, available water supplies, population densities around the site, proximity to boreholes and the like, and the exposure of the tank or its bund to impact damage from vehicular movements? (1.2.1)						
11.1.9	Are tanks located away from low ground and no closer than 50m to a spring, well or borehole, or 10m to a watercourse? (1.2.2)						
11.1.10	Are all tanks and their ancillary equipment situated within an oil tight secondary containment system such as a bund? (And are tanks so located that the tank vent outlets are visible from the filling point?) (1.2.3)						
11.1.11	To avoid pollution, is a bund capable of containing at least 110% of the capacity of the largest tank in the bund or 25% of the aggregate volume, whichever is the greater provided? (1.2.4)						
11.1.12	Is the distance between the tank and the bund wall at least 750mm and between the tank and the base at least 600mm to allow access for external inspection? (1.2.5)						
11.1.13	Is a risk assessed approach undertaken when consideration is being given to the installation of plastic tanks? (1.2.6)						
11.1.14	If a bund is needed, is each fuel tank provided with one separately? (If this is not practicable, are low separation kerbs provided for each tank within the bund? (1.2.7)						

		Yes	No	N/A	Action required	Due date	Sign on completion
11.1.15	Is the bund oil-tight and of non-combustible construction? (1.2.8)						
11.1.16	Has provision been made for removing water/oil from the bund? (1.2.9)						
11.1.17	Is the bund and the surrounding area inspected regularly and kept free of rubbish and other combustible materials? (1.2.10)						
11.1.18	Are external oil storage tanks located at least 1800mm from any part of a building and 760mm from a boundary of the property? If so, have suitable measures been taken to prevent the spread of fire? (1.2.11)						
11.1.19	Unless the site is enclosed with a security access control system in place, are oil storage tanks within a bund and protected by welded mesh, palisade or similar perimeter protection? (1.2.12)						
11.1.20	If the tank has to be within a building is the tank chamber located against an outer wall? (1.3.1)						
11.1.21	Is the tank chamber constructed of bricks, blocks, or concrete so as to have at least 240 minutes' fire resistance? (1.3.2)						
11.1.22	Is the roof of the chamber constructed of 150mm thick concrete and the floor of brickwork, stone, concrete, or other material impervious to oil, and free of asphalt? (1.3.3)						
11.1.23	Is the tank chamber adequately ventilated, preferably by natural means, with an inlet and outlet direct to the open air? (1.3.4)						
11.1.24	If electrical equipment, wiring, or fittings are to be installed in the chamber, are they selected so as to be suitable for use in the hazardous zone in which they are to be located? (1.3.5)						
11.1.25	Does lighting and electrical apparatus installed comply with BS EN 60079-10-1 where necessary? (1.3.5)						
11.1.26	If the installation is at roof level is no practical alternative available? (1.4.1)						
11.1.27	Are auxiliary tanks only used in connection with large installations where oil storage would otherwise be impracticably remote from oil-burning equipment? (1.5.1)						
11.2	**Pipes and fittings (section 2)**						
11.2.1	Are oil lines of non-combustible material and are they protected, where necessary, against mechanical damage? (2.1)						

		Yes	No	N/A	Action required	Due date	Sign on completion
11.2.2	Is the pipework not within concealed cavities or located within lift shafts, ventilation or service ducts? (2.1)						
11.2.3	Are all oil storage tanks provided with an oil level indicator clearly visible at the filling point? (2.2)						
11.2.4	Are remote fill-points provided with an audible overfilling warning device in addition to an oil level indicator? (2.3)						
11.2.5	Is a drain valve provided at the lowest part of the underside of the tank with a screw-down gate valve? (2.4)						
11.2.6	Is a suitably designed vent pipe fitted to the top of each tank? (2.5)						
11.2.7	Are service tanks and any auxiliary tanks fitted with an overflow pipe capable of returning oil to the storage tank or to a safe position in the event of over-filling? (2.6)						
11.2.8	Are filling pipes to storage tanks permanently fixed and constructed of non-combustible material? (2.7)						
11.2.9	Is the filling point clearly identified to indicate the type of fuel that the tank holds and the capacity of the tank? (2.8)						
11.2.10	Are the oil outlets located as far away from the drain valves as is practicable and located to ensure that any electric immersion heaters in the bottom of the tanks and any associated thermostats will remain covered with oil? (2.9)						
11.2.11	Are oil outlet pipes from storage tanks, auxiliary tanks or service tanks fitted with fire valves? (2.10)						
11.2.12	Is the fire valve situated as near to its tank as possible, in an easily accessible position and within the boundary of the tank chamber or bund? (2.10.1)						
11.2.13	Is the fire valve automatically actuated by the operation of a heat-sensitive device, such as a fusible link, electrical contact or pneumatic control, placed directly above each firing place or burner? (2.10.2)						
11.2.14	Is there a means of manually actuating the fire valve from a safe position by means of a link line or other suitable system? (2.10.3)						
11.2.15	Where there is a long run of oil pipework or a ring main system, are supplementary fire valves fitted at strategic positions? (2.10.4)						

		Yes	No	N/A	Action required	Due date	Sign on completion
11.2.16	Where there is a risk of undetected leakage, has consideration been given to the provision of pressure-activated devices to shut off the oil supply in such an event? (2.11)						
11.2.17	Where the service tanks are controlled by a float valve and electric pump drawing fuel from a storage or auxiliary tank, is there a means of isolating the electric pump in the event of fire, in addition to the fire valve on the fuel supply? (2.12)						
11.3	**Pumps (section 3)**						
11.3.1	Are pumps positioned to minimise the risk of impact damage, fitted with non-return valves in their feed lines and protected from unauthorised use? (3.1)						
11.3.2	Unless the oil has a flash point of less than 32°C, are the pump sets installed within the secondary containment system? (3.2)						
11.3.3	Where it is necessary to locate pumps in buildings does all electrical apparatus comply with BS EN 60079-10-1? (3.2)						
11.4	**Ducts and chimneys (section 4)**						
11.4.1	Are ducts and chimneys substantial and constructed of non-combustible material capable of withstanding the gas temperatures to which they may be subjected? (4.1)						
11.4.2	Are chimneys carried to such height and position as will ensure freedom from downdraught? (4.2)						
11.4.3	Are ducts and chimneys fitted with access doors for cleaning? (4.3)						
11.4.4	Is each item of oil-burning equipment provided with a separate duct? (4.4)						
11.4.5	Are proprietary sleeves or penetration seals fitted where ducts pass through fire compartment walls or floors? (11.5)						
11.4.6	Is the vicinity of ducts free of combustible materials? (4.6)						
11.4.7	Are combustible linings and roofing cut back to at least 100mm from a duct with an incombustible collar fitted? (4.6)						
11.5	**Safety system (section 5)**						
11.5.1	Is a remote, safely accessible, manually operated, clearly indicated main fuel valve provided? (5.1)						

		Yes	No	N/A	Action required	Due date	Sign on completion
11.5.2	Is there an automatic start-up control, which should lock out until the safety system lock-out is released; no flame at the burner is confirmed; the excessive steam pressure or temperature interlock is satisfied; and the low-water interlock is satisfied? (5.2)						
11.5.3	Is there an automatic fuel valve safety control, which should lock out until the air fans are started and proved to be running; the timed pre-ventilation or purge period has been completed; and the spark igniter is powered or the pilot flame is proved alight? (5.3)						
11.6	**Burner controls (section 6)**						
11.6.1	Are the furnace, ducts, and stack adequately purged and pre-ventilated with fresh air before any attempt is made to light up the main burner(s)? (6.1.1)						
11.6.2	Is a reliable ignition source confirmed as available before fuel can be introduced to the main burner(s)? (6.1.2)						
11.6.3	After introducing fuel to the main burner, does a flame-sensing device look for the main flame and, if this is not established as correctly alight within a predetermined short period, then does the entire start-up sequence terminate and the controls lock out? (6.1.3)						
11.6.4	Is the airflow rate continuously monitored and do fan motor failure or incorrect damper settings initiate a shutdown? (6.2.1)						
11.6.5	Are fuel pressure and boiler water levels continuously monitored and if any fall below predetermined levels does the boiler automatically shut down? (6.2.2)						
11.6.6	Does the flame-sensing device monitor the presence of a satisfactory flame and initiate a shut down if the flame is lost? (6.2.3)						
11.6.7	Does a safety system shutdown lock out the automatic start-up and firing controls and a restart only be permissible after the system has been reset manually? (6.2.4)						
11.7	**General (section 7)**						
11.7.1	Is cleaning, maintenance and repair of oil-fired installations undertaken in accordance with the guidance set out by HSE? (7.1)						
11.7.2	Is equipment installed and operated by trained personnel in accordance with manufacturers' instructions? (7.2)						
11.7.3	Where liquefied petroleum gas (LPG) in cylinders is used to start up oil-fired equipment, are the cylinders located outside, in the open air and, with exception of the torch end, is the gas supplied in fixed metal piping? (7.3)						

		Yes	No	N/A	Action required	Due date	Sign on completion
11.7.4	Cleanliness in all parts of the installation is essential. Are oil leakages cleaned up immediately using non-combustible absorbent materials, and are the sources of oil leaks rectified? (7.4)						
11.7.5	Before starting up, is care taken that all duct dampers and air inlet dampers are secured open in the position required for satisfactory operation and are the relief doors examined to see that they are free to operate? (7.5)						
11.7.6	Is ventilation sufficient to ensure adequate air for combustion purposes? (7.6)						
11.7.7	Where it is necessary to lag tanks and/or pipework, are only non-combustible materials used? (7.7)						
11.7.8	Is lagging protected against contamination by oil or other flammable liquids? (7.7)						
11.7.9	Are signs which clearly specify the grade of fuel to be used and the capacity of the storage tank prominently displayed at the fuel filling point? (7.8)						
11.7.10	Is a clear space of at least 1m maintained around the heater? (7.9)						
11.7.11	Before starting up, does the operator check the fusible link and cabling connected to the fire valve to ensure that they are not defective? (7.10)						
11.8	**Maintenance (section 8)**						
11.8.1	Are the oil fired boilers and associated equipment serviced annually? (8.1)						
11.8.2	Is routine maintenance of the heating installation undertaken by a competent person? (8.2)						
11.8.3	Are all bunds, tanks, pipework and associated fittings inspected weekly for signs of damage? (8.3)						
11.8.4	Are any defects in the bund wall or lining repaired promptly to ensure the bund retains its integrity? (8.4)						
11.8.5	Is any condensation water that accumulates within the tank drawn off regularly and disposed of? (8.5)						
11.8.6	Is a collection sump installed in the base of the bund? (If there is no rainwater in the bund after heavy rainfall, is the bund adequately sealed?) (8.6)						
11.8.7	Are bunds kept clear of stored materials or waste? (8.7)						
11.8.8	In all cases where waste is removed from the bund, is the waste removed from site by a registered waste carrier? (8.8)						
11.9	**Decommissioning (section 9)**						

		Yes	No	N/A	Action required	Due date	Sign on completion
11.9.1	Before a tank is taken out of use or removed, is it fully drained with the work being undertaken by suitably qualified technicians? (9.1)						
11.9.2	Is hot work prohibited on decommissioned tanks until they have been degassed and the appropriate certificate issued? (9.2)						
11.10	**Fire protection (section 10)**						
11.10.1	Are appropriate extinguishing facilities readily available for emergency use? (10.1)						
11.10.2	Has consideration been given to installing a fixed fire protection system? (10.1)						
11.10.3	Where premises are protected by sprinklers, has the system been installed in accordance with the provisions of the LPC rules for automatic sprinkler installations and Technical Bulletin 214? (10.2)						
11.10.4	Is there a suitable number of appropriate (Class B rated) portable fire extinguishers, approved and certificated by an independent, third-party certification body, provided near storage tanks, auxiliary tanks, service tanks, pumps, and burners? (10.3)						
11.10.5	Where fire extinguishers are exposed to the environment are they protected by proprietary cabinets or coverings? (10.4)						
11.10.6	Where water based extinguishers are provided in external areas, has a suitable anti freeze agent been added to the contents by the service engineer at the time of the annual servicing of the equipment? (10.5)						
11.10.7	Are all fire extinguishers serviced at least annually by a competent engineer? (10.6)						
11.10.8	Has any extinguisher that has been damaged or partially used replaced without delay? (10.7)						
11.10.9	Is awareness maintained of the possibility of deliberate fire raising, vandalism and theft of fuel, including deliberate attempts to cause pollution? (10.8)						
11.10.10	Are valves on bunds and tanks normally kept padlocked in a closed position? (10.8)						
11.10.11	Is an automatic fire detection and alarm system provided within the chamber? (10.9)						
11.10.12	Are sufficient fire alarm sounders installed and so positioned to be clearly audible to allow persons in the vicinity of external oil storage tanks to evacuate the site? (10.10)						

REFERENCES

1. RC4: **Fixed heating equipment burning waste fuel**, 2011, Fire Protection Association.
2. BS 2869: 2010: **Fuel oils for agricultural, domestic and industrial engines and boilers**. Specification. British Standards Institution.
3. EN 14213: 2003: **Heating fuels. Fatty acid methyl esters (FAME).** Requirements and test methods. British Standards Institution.
4. Dangerous Substances and Explosive Atmospheres Regulations 2002, SI 2002/2776, The Stationery Office.
5. Regulatory Reform (Fire Safety) Order 2005, SI 2005 No 1541, The Stationery Office.
6. The Fire (Scotland) Act 2005, asp 5, The Stationery Office.
7. Fire Safety (Scotland) Regulations 2006, Scottish SI 2006 No 456, The Stationery Office.
8. Fire and Rescue Services (Northern Ireland) Order 2006, SI 2006 No 1254 (NI9), The Stationery Office.
9. Fire Safety Regulations (Northern Ireland) 2010, NI 2010 No 325, The Stationery Office.
10. BS 799-5: 2010: **Oil burning equipment. Carbon steel oil storage tanks**. Specification. British Standards Institution.
11. BS EN 303-1: 1999: **Heating boilers. Heating boilers with forced draught burners**. Terminology, general requirements, testing and marking, British Standards Institution.
12. BS EN 303-2: 1999: **Heating boilers. Heating boilers with forced draught burners**. Special requirements for boilers with atomizing oil burners, British Standards Institution.
13. BS 5410-1: 1997: **Code of practice for oil firing. Installations up to 45 kW output capacity for space heating and hot water supply purposes**. British Standards Institution.
14. BS 5410-2: 1878: **Code of practice for oil firing installations of 45 kW and above output capacity for space heating, hot water and steam supply services**. British Standards Institution.
15. Control of Pollution (Oil Storage) (England) Regulations 2001, SI 2001/2954, The Stationery Office.
16. The Control of Substances Hazardous to Health Regulations 2002, SI 2002/2677 (as amended). The Stationery Office.
17. Chemicals (Hazard Information and Packaging for Supply) Regulations 2009, SI 2009/716. The Stationery Office.
18. The Health and Safety (Safety Signs and Signals) Regulations 1996, SI 1996/341. The Stationery Office.
19. The Control of Pollution (Oil Storage) (England) Regulations SI 2001/2954. The Stationery Office.
20. The Water Environment (Oil Storage) (Scotland) Regulations 2006. The Stationery Office.
21. PPG2: **Above ground oil storage tanks**, Environment Agency Pollution Prevention Guideline, 2010, Environment Agency
22. BS EN 60079-10-1: 2009 **Explosive atmospheres. Classification of areas. Explosive gas atmospheres**. British Standards Institution.
23. BS 10: 2009: **Specification for flanges and bolting for pipes, valves, and fittings**, British Standards Institution.
24. BS EN 14015: 2004: **Specification for the design and manufacture of site-built vertical, cylindrical, flat-bottomed, above-ground, welded steel tanks for the storage of liquids at ambient temperature and above**. British Standards Institution.
25. OFS T200 Oil firing equipment standard: **Steel Oil Storage Tanks and Tank Bunds for use with Distillate Fuels, Lubrication Oils and Waste Oils**, eighth edition, 2010. Oil Firing Technical Association for the Petroleum Industry (OFTEC).
26. CIRIA Report 163: **Construction of bunds for oil storage tanks**, 1997, Construction Industry Research and Information Association.
27. Approved Document J to The Building Regulations 2000: **Combustion appliances and fuel storage systems**, 2010 Edition, The Stationery Office.
28. List of approved fire and security products and services, published annually, Loss Prevention Certification Board. This may also be found at www.redbooklive.com
29. RC 30: **Selection of electrical and non-electrical equipment for use in atmospheres containing flammable and explosive gases or vapours**, 2005, Fire Protection Association.
30. Design guide: **Protection of openings and service penetrations from fire**, 2005, Fire Protection Association.
31. L137: **Safe maintenance, repair and cleaning procedures. Dangerous Substances and Explosive Atmospheres Regulations 2002**. Approved Code of Practice and Guidance, 2003, HSE Books.
32. RC8: **Recommendations for storage, use and handling of common industrial gases in cylinders, including LPG**, 2005, Fire Protection Association.
33. Oil Firing Technical Association, Foxwood House, Dobbs Lane, Kesgrave, Ipswich IP5 2QQ, telephone 0845 65 85 080, fax 0845 65 85 181, email enquiries@oftec.org website www.oftec.org
34. CS15: **Cleaning and gas freeing of tanks containing flammable residues**, 1985, HSE Books.
35. **LPC Rules for automatic sprinkler installations incorporating BS EN 12845**, 2009, Fire Protection Association.
36. BS 5306-8: 2000: **Fire extinguishing installations and equipment on premises. Selection and installation of portable fire extinguishers**. Code of practice, British Standards Institution.

37. BS 5306-3: 2009: **Fire extinguishing installations and equipment on premises. Commissioning and maintenance of portable fire extinguishers**. Code of practice, British Standards Institution.

38. BS 1722-12: 2006: **Fences. Specification for steel palisade fences**, British Standards Institution.

FURTHER READING

1. L133: **Unloading petrol from road tankers**. Dangerous Substances and Explosive Atmospheres Regulations 2002, Approved Code of Practice and Guidance, 2003, HSE Books.

2. L134: **Design of plant, equipment and workplaces**. Dangerous Substances and Explosive Atmospheres Regulations 2002, Approved Code of Practice and Guidance, 2003, HSE Books.

3. L135: **Storage of dangerous substances**. Dangerous Substances and Explosive Atmospheres Regulations 2002, Approved Code of Practice and Guidance, 2003, HSE Books.

4. L136: **Control and mitigation measures**. Dangerous Substances and Explosive Atmospheres Regulations 2002, Approved Code of Practice and Guidance, 2003, HSE Books.

5. L138: **Dangerous Substances and Explosive Atmospheres**. Dangerous Substances and Explosive Atmospheres Regulations 2002, Approved Code of Practice and Guidance, 2003, HSE Books.

6. CIRIA / Environment Agency joint guidelines on masonry bunds for oil storage tanks, 2000, Construction Industry Research and Information Association.

7. HSG176: **The storage of flammable liquids in tanks**, 1998, HSE Books.

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