

Buildings and structures for agriculture —

Part 25: Code of practice for design and installation of services and facilities

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Committees responsible for this British Standard

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AFRC Institute of Engineering Research
 Aggregate Concrete Block Association
 Brick Development Association
 British Cement Association
 British Commercial Glasshouse Manufacturers' Association
 British Constructional Steelwork Association Ltd.
 British Poultry Federation Limited
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 Department of Agriculture and Fisheries for Scotland
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 Institution of Civil Engineers
 Local Authority Organizations
 Ministry of Agriculture, Fisheries and Food
 National Farmers' Union
 Royal Institute of British Architects
 Royal Institution of Chartered Surveyors
 Steel Construction Institute
 Timber Research and Development Association

This British Standard, having been prepared under the direction of the Farm and Horticultural Buildings Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 31 May 1991

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Foreword

This part of BS 5502 has been prepared under the direction of the Farm and Horticultural Buildings Standards Policy Committee and comprises a revision of BS 5502-1.5 which is withdrawn.

While BS 5502 is being revised and added to the opportunity is being taken to restructure the standard into the following broad subject areas:

- *Part 0: Introduction and consolidated index;*
- *Parts 10 to 19: Reference information and legislation;*
- *Parts 20 to 39: General design;*
- *Parts 40 to 59: Livestock buildings;*
- *Parts 60 to 79: Crop buildings;*
- *Parts 80 to 99: Ancillary buildings.*

More specifically, the general design series will comprise:

- *Part 20: Code of practice for general design considerations;*
- *Part 21: Code of practice for selection and use of construction materials;*
- *Part 22: Code of practice for design, construction and loading;*
- *Part 23: Code of practice for fire precautions;*
- *Part 24: Code of practice for energy management;*
- *Part 25: Code of practice for design and installation of services and facilities;*
- *Part 30: Code of practice for control of infestation;*
- *Part 31: Guide to waste management;*
- *Part 32: Guide to noise attenuation;*
- *Part 33: Guide to control of odour pollution;*
- *Part 34: Guide to control of dust;*
- *Part 35: Guide to control of gases and vapours.*

A more detailed description of the new structure of BS 5502 is given in Part 0.

The object of introducing the new structure is to allow subject areas to be broadly characterized, and related subject matter, whether in the form of recommendations, guidance or supporting data, to be rationalized and brought together. It will also allow sufficient flexibility to enable BS 5502 to be expanded and developed in a logical way in the future. Parts 20 to 39 relating to general design will follow broadly the existing structure of BS 5502-1.0 to BS 5502-1.7.

It has been assumed in the drafting of this British Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people, for whose guidance it has been prepared.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 33 and a back cover.

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Sidelining in this document indicates the most recent changes by amendment.

1 Scope

This part of BS 5502 gives recommendations on the design and installation of electrical, gas and water services, and drainage for use in buildings and structures used for agriculture. It also gives guidance on the storage of liquid fuels and the installation of heater chimneys.

NOTE The titles of the publications referred to in this standard are listed on page 31.

2 Definitions

For the purposes of this British Standard, the definitions given in BS 6100 apply, together with the following.

NOTE Work has commenced on a further part of BS 5502 (Part 10) which will be a glossary of terms for buildings and structures for agriculture.

2.1

oil storage tank

tank for the bulk storage of oil for an oil burning installation or vehicles

2.2

oil service tank

auxiliary oil storage tank

NOTE Usually of not more than 3 000 L.

2.3

oil tank chamber

fire resistant chamber to house oil storage and/or oil service tanks

2.4

transportable motor

motor which is not permanently wired to a circuit and is of such size and weight that it can be moved easily

3 Drainage

3.1 General

3.1.1 The recommendations given in **3.1**, **3.2** and **3.3** are applicable to all drainage systems and installations on agricultural and horticultural establishments. Additional recommendations associated with trade wastes are given in **3.4**.

3.1.2 The principal requirements of the relevant legislation with regard to their effects on farmstead drainage are given in BS 5502-11. Reference should also be made to BS EN 12056-3.

3.2 Surface water

Uncontaminated surface water should, wherever possible, be separated from agricultural and horticultural trade wastes and be discharged direct to soakaways or watercourses. Advice should be sought from the Environment Agency, the Scottish Environmental Protection Agency or Heritage Service in Northern Ireland, as appropriate.

3.3 Human waste

Human waste should be handled and disposed of separately from all other waste, and installations should be in accordance with BS EN 12056-2 and BS EN 752-1, -2, -3 and -4.

3.4 Agricultural and horticultural trade wastes

3.4.1 General

The following types of effluent are included within trade waste from agricultural and horticultural operations:

- a) livestock faeces and urine diluted or in raw state, soiled litter and washing-down water from cleansing operations in and around buildings;
- b) liquors resulting from conservation, fermentation and degeneration of crops, e.g. grass, green maize and pea haulm;

- c) disinfection and cleansing agents and chemicals, e.g. as used in cleansing of milking plants, crop sprays, oil, sheep dipping procedures, or dressing or denaturing of grain;
- d) waste from food and vegetable processing;
- e) infected organic matter;
- f) surface water contaminated with any of the above or other agricultural sprays, petrol or other fuels.

3.4.2 Special considerations

3.4.2.1 Waste management

| Recommendations on waste management are given in Part 31 of BS 5502.

3.4.2.2 Slurry storage tanks and reception pits

Recommendations on the design, construction and use of storage tanks and reception pits for livestock slurry are given in BS 5502-50.

3.4.2.3 Diseased animal waste

Where special facilities are provided for diseased animals, the effluent from such accommodation should remain separate from other farm effluent and be disposed of independently and in such a manner that it cannot convey infection to other stock.

3.4.2.4 Milk waste

All washings from milking parlour floors and all wash waters from milk rooms, milk houses and milking parlours should, where practicable, be diverted to separate containment.

3.4.2.5 Silage effluent

Special consideration should be given to the handling, storage and disposal of silage effluent due to its highly polluting and corrosive nature (see BS 5502-31 and BS 5502-75).

3.4.2.6 Chemical waste

Recommendations on drainage for chemical stores are given in BS 5502-81.

3.4.2.7 Liquid fuel stores

Recommendations on liquid fuel stores are given in clause 5.

3.4.2.8 Workshop and food preparation waste

| Installations for plumbing and drainage of wastes from workshops or areas used for the collection, handling, processing and storage of food products should follow the recommendations given in BS 5502-80, BS EN 12056-2 and BS EN 752-1, -2, -3 and -4.

3.4.3 System capacity

Any system for the collection, transport, storage, treatment and disposal of waste should be capable of dealing with the maximum load expected from the particular husbandry system, allowing for any constraints imposed by climate and chosen disposal method.

3.4.4 Movement of waste

Agricultural and horticultural wastes transported by water-borne methods often require dilution to achieve an adequate flow rate in a pipe or ductwork.

Farm waste should not be transported through domestic premises or where food for human consumption is stored or prepared.

3.4.5 Disposal and treatment of wastes

| All wastes on farms should be disposed of in a safe manner. Untreated wastes should be disposed of or treated in such a manner that no unacceptable pollution can occur (see BS 5502-31). The local health authority and/or Environment Agency (or equivalent, see 3.2) should be consulted before treatment or disposal facilities are established.

Particular care should be taken when mixing and/or pumping slurries, especially in confined spaces (e.g. below slatted floors) due to the release of gases hazardous to livestock and humans.

Where possible, facilities should be provided to enable mixing/pumping of tank contents from positions outside the building.

3.4.6 Containment of wastes

3.4.6.1 General

Any containment should be sited in such a way that no unacceptable pollution can occur and so that nuisance is not caused to domestic accommodation (see BS 5502-31).

3.4.6.2 Loadings

All structures intended for the transport, storage or treatment of agricultural and horticultural wastes should be designed to withstand all static and dynamic loads to which they may be subjected (see BS 5502-22 and BS 5502-50). Any covers, including those which are perforated, to which humans, animals or machines may have access should withstand safely all applied loading without causing injury (see BS 5502-22 and BS 5502-51).

For information on the design of storage tanks and reception pits for livestock slurry, see BS 5502-50.

3.4.6.3 Above ground containment

Installations above ground either should be impervious or adequate provision should be made for the safe collection and transport of any waste that may percolate through the structure.

3.4.6.4 Below ground containment

Where wastes are contained below or partly below ground, the construction and waterproofing of the installation should be such that the contents do not percolate into the surrounding subsoil. Installations should be constructed above the water table or designed and constructed to resist flotation and external hydrostatic pressures.

3.4.6.5 Venting

All containment should be provided with a vent and fresh air inlet so that there will be no accumulation of gases.

Access ladders to installations (see BS 5502-50 and BS 5502-80) may be portable or permanent and should, in either case, be safely and securely fixed in position, constructed of suitable material and regularly maintained.

3.4.6.6 Access

Closed tanks (see BS 5502-50) should be provided with secure access.

3.4.6.7 Ramps

Ramps for scraper-tractors should have:

- a) a slip-resistant surface;
- b) a slope preferably of 1 in 8, but not greater than 1 in 5;
- c) curbs along either side not less than 150 mm high, spaced to suit the width of the scraper blade to be used;
- d) a stop rail approximately 1 m high at the end of the ramp, sufficiently strong to stop the tractor from passing over the end of the ramp. Where the height of the ramp above ground level exceeds 1.5 m, guard rails should also be fitted along its length.

3.4.6.8 Fencing

All uncovered lagoons, pits or tanks should be surrounded by a safety fence of the “child restraint” type, with a minimum height of 1.3 m. Chain link fencing should comply with types as specified in BS 1722-1. If round timber posts are used, instead of the sawn posts specified, they should be of equal strength and durability. Any other type of fencing provided should afford equal restraint of children and livestock.

All ramps and access points should be similarly fenced.

NOTE Above ground tanks may be topped with barbed wire (see clause 8.2 in BS 5502-50:1989).

4 Water services

4.1 General

Clean uncontaminated water is required for farm livestock, either as drinking water or for adding to food. (For a guide to the water requirements of various animals see BS 5502-40, BS 5502-41, BS 5502-42 and BS 5502-43.) Water is also required for cleaning buildings either by power hosing or swilling with buckets. In addition a supply of water may be required for dairy purposes and for fire fighting. Water for fire fighting may be direct from the mains or from a static water tank.

4.2 Water supply to farm and horticultural holdings

A mains supply should be installed in accordance with the statutory requirements set out in the Water Supply (Water Fittings) Regulations 1999, a key element of which is the notification requirement set out in Regulation 5. In England and Wales supply other than from a water main, i.e. direct abstraction from surface or underground waters, will need an abstraction licence from the Environment Agency. In Scotland, riparian owners have limited rights to abstract river water and there is no licensing system¹⁾. In Northern Ireland reference should be made to the Department of the Environment.

Recommendations on all aspects of water supply from all sources, and on the use of water, are given in BS 6700, and these should be complied with. Consideration should be given to the storage of uncontaminated yard and roof water for cleansing purposes.

4.3 Water supply for fire fighting

Installations should be in accordance with BS 5306-1 and BS 5502-23.

4.4 General recommendations

Every water fitting, whether inside or outside the building, should be adequately protected from damage by frost (see BS 6700), and effectively protected from possible damage from other causes. Every pipe should be adequately supported and arranged to avoid air locks or reverberation. Pipes laid under the ground should:

- a) be of corrosion-resisting material, or be effectively protected from corrosion;
- b) be laid at not less than 750 mm below the surface.

No pipe should pass into, or through, any ash pit, manure pit, sewer, drain, cesspool or refuse chute or any manhole used for these purposes. Pipes should not be laid in or on any foul soil or material that is likely to cause undue deterioration of the pipe, unless it is effectively protected from contact with that soil or material. No pipe made of a material susceptible to permeation by any gas or hydrocarbon should be used in close proximity to, e.g. a diesel or gas oil store. Neither should pipes be laid or stored in a position where permeation by such substances could occur.

4.5 Service pipework

The recommendations for pipework are given in Table 1.

4.6 Taps and valves

Every water supply to a building should be fitted with a stop valve as near as reasonably practicable to the point where the pipe enters the building. All storage cisterns should be fitted with servicing valves at the inlet and at the draw off. Cisterns supplying water to primary or heating circuits should not have a valve fitted to the cold feed pipe. All plumbing systems should be fitted with drain taps to enable pipelines to be drained in cold weather to prevent frost damage.

¹⁾ At the time of publication, proposals to introduce abstraction licensing to Scotland are being considered.

No animal trough or bowl should be supplied directly from a mains service or by a pump drawing water from a mains service unless the inlet is fitted with the appropriate backflow protection as specified in the Water Supply (Water Fittings) Regulations 1999. Water troughs should comply with BS 3445.

The special conditions and relevant British Standards for taps and valves are given in Table 2.

Table 1 — Recommendations for service pipework

Pipe material	Use	Relevant British Standard
Plain steel	Only for temporary construction work [not exceeding one month and subject to requirements of Water Supply (Water Fittings) Regulations 1999]	BS 1387, <i>Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads.</i>
Galvanized steel	General [subject to requirements of Water Supply (Water Fittings) Regulations 1999]	BS 1387, <i>Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads</i>
Galvanized steel	Fire-fighting installations, including sprinklers [subject to requirements of Water Supply (Water Fittings) Regulations 1999]	As above, but see also BS 5306, <i>Fire extinguishing installations and equipment on premises.</i>
Copper (including connectors)	General, including underground use	BS EN 1057, <i>Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications.</i> BS EN 1254-3, <i>Copper and copper alloys — Plumbing fittings — Fittings with compression ends for use with plastics pipes.</i>
Asbestos-cement ^{ab}	General	BS EN 512, <i>Fibre-cement products — Pressure pipes and joints.</i>
Polyethylene	Cold water services: below ground	BS 6572, <i>Specification for blue polyethylene pipes up to nominal size 63 for below ground use for potable water.</i>
	above ground	BS 6730, <i>Specification for black polyethylene pipes up to nominal size 63 for above ground use for cold potable water.</i>
Unplasticized polyvinyl chloride	Cold water services	BS EN 1452, <i>Plastics piping systems for water supply.</i> BS 4346-3, <i>Joints and fittings for use with unplasticized PVC pressure pipes — Specification for solvent cement.</i>

^a The test pressure should be 1.5 times the maximum working pressure.

^b When asbestos based products are used, certain precautions need to be taken.

The manufacture of all asbestos based products is covered by the requirements of the Control of Asbestos at Work Regulations 1987, introduced on 1 March 1988. These set out comprehensive provisions covering work activities involving exposure to asbestos.

Advice on how to comply with these regulations can be obtained from the manufacturers of the material, from the Asbestos Information Centre, St Andrew's House, 22-28 High Street, Epsom, Surrey KT19 8AH, from the local area office of the Health and Safety Executive or from the Environmental Health Department of the Local Authority.

WARNING. Breathing asbestos dust is dangerous to health and precautions have to be taken during the manufacture and use of these products.

Particular note has to be taken of the Asbestos Products (Safety) Regulations 1985, made under the Consumer Safety Act 1978 and of the Asbestos (Prohibitions) Regulations made under the Health and Safety at Work etc. Act 1974 and the Control of Asbestos at Work Regulations (Northern Ireland) 1988 which prohibit the supply of products containing amosite or crocidolite and set out requirements for the labelling of all products containing asbestos.

All the above legislation implements European Directives.

Table 2 — Types of taps and valves

Taps, valves and components	Relevant British Standard
Draw-off taps	BS 1010-2, <i>Specification for draw-off taps and stopvalves for water services (screw-down pattern) — Part 2: Draw-off taps and above-ground stopvalves.</i> BS 5412, <i>Specification for low-resistance single taps and combination tap assemblies (nominal size 1/2 and 3/4) suitable for operation at PN 10 max. and a minimum flow pressure of 0.01 MPa (0.1 bar).</i>
Draining taps	BS 2879, <i>Specification for draining taps (screw-down pattern).</i>
Stop valves	BS 1010-2, <i>Specification for draw-off taps and stopvalves for water services (screw-down pattern) — Part 2: Draw-off taps and above-ground stopvalves.</i> BS 5163, <i>Specification for predominantly key-operated cast iron gate valves for waterworks purposes.</i> BS 5433, <i>Specification for underground stopvalves for water services.</i>
Float operated valves ^a	BS 1212-1, <i>Float operated valves — Part 1: Specification for piston type float operated valves (copper alloy body) (excluding floats).</i> BS 1212-2, <i>Float operated valves — Part 2: Specification for diaphragm type float operated valves (copper alloy body) (excluding floats).</i> BS 1212-3, <i>Float operated valves — Part 3: Specification for diaphragm type float operated valves (plastics bodied) for cold water services only (excluding floats).</i> BS 1212-4, <i>Float operated valves — Part 4: Specification for compact type float operated valves for WC flushing cisterns (including floats).</i>
Ball floats for valves	BS 1968, <i>Specification for floats for ballvalves (copper).</i> BS 2456, <i>Specification for floats (plastics) for float operated valves for cold water services.</i>

^a BS 1212-1 valves may require additional backflow protection to be fitted.

4.7 Storage cisterns

4.7.1 All storage cisterns from which water is drawn should be installed where they can be readily inspected and cleansed, and protected from probable sources of contamination. Cisterns should be adequately supported and should have suitable close fitting dust covers without being airtight. All storage cisterns should be of adequate strength and be manufactured from, or lined with, materials approved for use in connection with wholesome water. Where the material is not corrosion resistant it should be effectively treated against corrosion.

The relevant British Standards for storage cisterns are given in Table 3.

Table 3 — Recommendations for storage cisterns and tanks

Type and material	Relevant British Standard
Storage cisterns Mild steel	BS 417-2, <i>Specification for galvanized low carbon steel cisterns, cistern lids, tanks and cylinders.</i>
Sectional tanks Pressed steel plate	BS 1564, <i>Specification for pressed steel sectional rectangular tanks.</i>
Glass Reinforced Plastics (GRP)	BS EN 13280, <i>Specification for glass fibre reinforced cisterns of one-piece and sectional construction, for the storage, above ground, of cold water.</i>
Thermoplastic cisterns Polyolefin cisterns	BS 4213, <i>Specification for cold water storage and combined feed and expansion cisterns (polyolefin or olefin copolymer) up to 500 L capacity used for domestic purposes.</i>

4.7.2 All cisterns should be provided with an adequate warning and overflow pipe of suitable corrosion resistant material positioned conspicuously where the discharge can readily be seen. A warning pipe should not be less than 19 mm in diameter and should be sized to accommodate the maximum inflow into the cistern under fault conditions. For storage cisterns not exceeding 1 000 L the warning pipe may also be used as an overflow pipe, provided it is positioned conspicuously where any discharge can be readily seen. For storage capacities exceeding 1 000 L, a separate warning pipe of not less than 19 mm diameter at a level not less than 50 mm below the invert of the overflow pipe should be fitted.

4.7.3 All cisterns should be fitted with a close fitting lid and insulated to prevent frost damage and undue warming of the contents. All overflows, warning pipes and vents should be suitably screened to prevent access by birds, vermin and insects and the ingress of dust.

5 Storage of liquid fuel

5.1 Installation and equipment

The installations and equipment should comply with BS 799 and be in accordance with the recommendations of BS 5410.

NOTE For fuel stores attention is drawn to the Control of Pollution (Silage, Slurry and Agricultural Fuel Oil) Regulations 1991 (as amended 1997).

Careful consideration should be given to tank location taking into account the need for safety, security, access for deliveries and maintenance. It should be sited as far as possible from any watercourse or drain, not less than 10 m.

5.2 Oil tank chamber

5.2.1 Oil tanks sited within a building or structure should be surrounded by a purpose built chamber.

5.2.2 The chamber walls should be constructed to have 120 min fire resistance and should be constructed from either:

- a) 225 mm thick brickwork, or concrete blockwork, rendered to make it oil tight; or
- b) 125 mm thick reinforced concrete.

The roof (roofs are not required if the surrounding structure is open to the atmosphere and the chamber walls extend to full height) and floor should be of concrete at least 125 mm thick and any lining should have a Class 0 spread of flame (see BS 5502-23).

5.2.3 Any doors should open outwards, be readily opened from the inside and should be fitted with a self closing mechanism. They should be of equivalent fire resistance to the walls (see BS 5502-23) and should have a sill level above the chamber floor to ensure that the capacity of the bund is not impaired.

5.2.4 Sufficient space should be provided to allow access for maintenance and repair.

NOTE Guidance on the construction and fixing of fire resistant doors should be sought from the Loss Prevention Council.

5.3 Ventilation of oil tank chamber

Tank chambers should be adequately ventilated to the open air (preferably by natural means) and independently of any other part of the premises. Ventilating piping and ducts should be so arranged that the contents of the tank cannot escape through them in the event of damage.

Any ventilating trunk from the tank chamber to the open air, if it passes through any other part of the building, should be constructed of brickwork, concrete or metal and be independent of any other ventilation system. It should not be vented into a chimney or smoke shaft.

5.4 Electrical and lighting arrangements in tank chambers

See 7.10.

5.5 Storage tanks

5.5.1 Storage tanks should, wherever possible, be installed in the open and above ground. A diagram of a typical storage tank is shown in Figure 1.

5.5.2 The tank should be protected internally and externally against corrosion. Water from within the tank should be capable of being drawn off regularly and where provided any drain valves should be of steel to protect against frost damage. The tank should be situated within an oil tight bund. In order that it can be inspected externally for corrosion or leaks, a minimum distance of 750 mm between the tank and the bund wall and 600 mm between the tank and base is recommended.

5.5.3 The tank should be clearly marked with the product type and tank capacity. It is recommended that a notice giving details on safe delivery emergency procedures at the delivery point is sited (self adhesive notices dealing with each interpretation are available from the Environment Agency and SEPA). Every part of the tank should, where possible, be within the bund, including all valves, taps, filters, filling points and vent pipes.