

Code of practice for

Pipelines —

Part 2: Pipelines on land: design,
construction and installation —

Section 2.5 Glass reinforced
thermosetting plastics

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- British Gas plc
- British Plastics Federation
- British Plumbing Fittings Manufacturers' Association
- British Valve and Actuator Manufacturers' Association
- Department of the Environment (Construction Industries Directorate)
- Department of the Environment (Property Services Agency)
- Department of Transport
- Electricity Supply Industry in England and Wales
- Engineering Equipment and Materials Users Association
- Health and Safety Executive
- Institution of Civil Engineers
- Institution of Gas Engineers
- Institution of Production Engineers
- Institution of Water and Environmental Management (IWEM)
- National Association of Plumbing, Heating and Mechanical Services Contractors
- Plastics and Rubber Institute
- Plastics Land Drainage Manufacturers' Association
- Royal Institute of Public Health and Hygiene
- Water Authorities Association
- Water Companies Association
- Water Research Centre

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Association of Consulting Engineers
- British Board of Agrément
- Federation of Civil Engineering Contractors
- Institution of Mechanical Engineers
- Pipeline Industries Guild

This British Standard, having been prepared under the direction of the Plastics Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 August 1989

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Foreword

This Section of BS 8010 has been prepared under the direction of the Plastics Standards Policy Committee in support of publication under the direction of the Civil Engineering and Building Structures Standards Policy Committee of BS 8010 in four Parts to form a complete revision of all five Parts of CP 2010 as follows:

- *Part 1: Pipelines on land: general;*
- *Part 2: Pipelines on land: design, construction and installation;*
- *Part 3: Pipelines subsea: design, construction and installation;*
- *Part 4: Pipelines on land and subsea: operation and maintenance.*

Part 1 (which supersedes CP 2010-1:1966) contains general information which is relevant to a variety of pipelines and a variety of transported materials. It deals with those aspects of pipeline development that affect the owner and occupier of land through which the pipeline passes.

Part 2 is to be divided into several Sections which are to be published as separate documents as follows:

- *Section 2.1: Ductile iron¹⁾;*
- *Section 2.2: Steel (for water and associated products);*
- *Section 2.3: Asbestos cement¹⁾;*
- *Section 2.4: Prestressed concrete pressure pipelines¹⁾;*
- *Section 2.5: Glass reinforced thermosetting plastics;*
- *Section 2.6: Thermoplastics;*
- *Section 2.7: Precast concrete¹⁾;*
- *Section 2.8: Steel (for oil, gas and associated products).*

Each Section will contain information relevant to the design, construction and installation of a pipeline in the particular material. These Sections will supersede Parts 2, 3, 4 and 5 of CP 2010.

Part 3 will include information relevant to the design, installation and commissioning of subsea pipelines in steel and other materials.

Part 4 will contain advice on the operation and maintenance of pipelines, with Sections related to the conveyed material.

This Section 2.5 does not supersede any part of CP 2010. It deals with pressure and non-pressure pipelines constructed using glass reinforced thermosetting plastics and in particular is based on pipes and fittings that comply with BS 5480-1 and BS 5480-2, as applicable.

For supporting information not incorporated in published standards, reference is made to a bibliography provided as Appendix C.

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.

¹⁾ Published.

Attention is drawn to the principal Acts of Parliament enabling pipelines to be constructed and regulating procedures, given in Appendix A of BS 8010-1.

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 to iv, pages 1 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Subsection 1. General

1 Scope

This Section of BS 8010 gives design considerations and recommendations for construction and installation of pressure or non-pressure pipelines incorporating glass reinforced thermosetting plastics pipes and fittings complying with BS 5480-1 and BS 5480-2 as applicable. It should be read in conjunction with BS 8010-1.

This British Standard code of practice is not intended to replace or duplicate hydraulic, mechanical or structural design manuals.

Descriptions of types of joints are given in Appendix A and general requirements for non-metallic materials likely to come into contact with potable water are given in Appendix B.

NOTE 1 A list of documents recommended for further reading for additional information and guidance is given in Appendix C.

NOTE 2 A format for a typical summary for pipeline records and maintenance arrangements is given in Appendix D.

NOTE 3 The titles of the publications referred to in this Section are listed on the inside back cover.

2 Definitions

NOTE The meanings of terms associated with trenching are illustrated in Figure 1.

For the purposes of this Section of BS 8010, the following definitions apply.

2.1

glass reinforced thermosetting plastics (GRP) pipe

a pipe conforming to BS 5480 and produced from thermosetting resins reinforced with glass fibres and possibly containing inert filler and aggregate

2.2

pipeline

a line of pipes, of any length, without frequent branches. It does not include piping systems such as process plant piping within refineries, factories or treatment plant

2.3

flexible joint

a connection that is designed to permit angular deflections or axial movement, or a combination of both, in service, without impairing the efficiency of the joint

NOTE See Appendix A.

2.4

rigid joint

a connection that is designed not to permit angular deflection or axial movement in service

NOTE See Appendix A.

2.5

self-anchoring joint

a connection that is designed to prevent separation under the axial thrust induced by internal pressure, temperature fluctuations or ground movement whilst still permitting angular deflection and/or axial movement without impairing the efficiency of the joint

NOTE See Appendix A.

2.6

site test procedure

the pressure to be applied to the pipeline, or sections thereof, after laying, to test its strength and watertightness

2.7

stringing

the placing of pipes in line on the ground ready for laying

2.8

surge pressure

the maximum and minimum pressure produced by a change in velocity of a moving stream of liquid. It is at its maximum when there is a sudden stoppage such as would be caused by suddenly closing a valve or stopping a pump

2.9

working pressure

the maximum sustained internal pressure excluding surge to which each portion of the pipeline may be subjected when installed

2.10

works hydrostatic test pressure

the internal hydrostatic pressure applied to pipes at the manufacturer's works

3 Applications

The pipelines covered by this Section of BS 8010 are generally suitable for conveying water, sewage, trade waste, slurries, sludges, brine and some chemicals. When used for the conveyance of sewage, reference should be made to BS 8005-0, BS 8005-1, BS 8005-2 and BS 8005-4. GRP pipes and fittings are particularly suitable for pipelines in locations where corrosive environments exist either internally or externally.

4 Safety

4.1 The recommendations of this Section of BS 8010 are considered to be adequate for public safety under conditions usually encountered in GRP pipelines, including pipelines within towns, cities, water catchments and industrial areas. Particular attention is called to the need to prevent damage or leakage arising from one or more of the following factors:

- a) corrosive soil condition;
- b) internal corrosion/erosion;
- c) mechanical equipment used during construction or on other works;
- d) ground settlement, movement or erosion;
- e) any abnormal circumstances, e.g. adjacent trenching.

4.2 Measures to prevent damage may include one or more of the following:

- a) use of a particular resin type and/or an external barrier layer if necessary;
- b) use of a particular resin type and/or an internal liner, if necessary, and limitation of flow velocity to reduce erosion;

c) providing increased cover or a concrete cover as a protection against external mechanical damage or erosion;

d) for subsidence, additional flexible joints, anchored joints, rafts or piling;

e) indicating the presence of the pipeline with additional markers, particularly in congested areas or areas where future development is known to be planned, and adequate marking at river and water course crossings;

f) providing protection from frost for pipelines above ground or in ducts.

5 Inspection

The integrity of a properly designed pipeline depends more on the standards and quality of inspection applied at all stages than on any other single feature.

Particular emphasis is laid on the inspection for possible damage to pipes, fittings and joints before installation and for the correct bedding of the pipeline, jointing, anchoring and testing. Any sub-standard materials or workmanship should be rectified or, where necessary, rejected.

Subsection 2. Materials

6 General

A variety of resin systems and reinforcement structures may be used to make GRP pipes and fittings that comply with the requirements of BS 5480-1 and/or BS 5480-2. Different combinations will have differing properties which may make them particularly suitable for specific fields of usage referred to in clause 3 (e.g. because they are capable of deflecting to a greater extent before their long term performance is significantly impaired, or because of better resistance to cyclic stress or aggressive environments), and may be preferred accordingly.

7 Pipes

GRP pipes should comply with BS 5480-1 and BS 5480-2 as applicable.

NOTE These standards specify diameters, lengths, classification, tolerances and basic performance requirements.

8 Fittings

GRP fittings and relevant aspects of fittings made from other materials should comply with BS 5480-1 and BS 5480-2 as applicable.

9 Valves

9.1 Materials

All material used in valves should be compatible with the products which are to be conveyed in the pipeline. For use with potable water, see the requirements given in Appendix B.

9.2 Control valves

Valves should comply with the requirements of one of the following British Standard specifications:

- a) BS 5150, Cast iron wedge and double disk gate valves for general purposes;
- b) BS 5152, Cast iron globe and globe stop and check valves for general purposes;
- c) BS 5153, Cast iron check valves for general purposes;
- d) BS 5155, Specification for butterfly valves;
- e) BS 5163, Predominantly key-operated cast iron gate valves for waterworks purposes.

Valves outside the range of sizes, or differing in type or otherwise not complying with the specifications listed may be used, provided that they have at least equal strength and tightness and are capable of withstanding the test requirements of the appropriate specifications and the tests recommended in this Section of BS 8010.

A clear indication should be given on all valves of the direction of rotation needed to close the valve. The direction of rotation should be the same for any one pipeline installation. On new installations consideration should be given to standardizing the direction of closure as clockwise.

9.3 Air valves

Automatic air valves are available in a number of forms, the most common being single orifice, double orifice and kinetic.

10 Flanges

Flanges may be made from a variety of materials including GRP or steel, but it is essential that those used are compatible with the use of the pipeline. Flanges should be compatible with flanges as specified in BS 4504. Flanges complying with other standards may be used for particular purposes.

Unless otherwise specified by the purchaser, PN 16 flanges are usually supplied and are therefore suitable for working pressures up to and including 16 bar, particularly for water industry applications.

The use of high tensile bolts of smaller diameter than the corresponding mild steel (MS) bolts to facilitate manufacture and installation of larger diameter flanges is permitted. BS 4772 gives details of the bolt hole diameters for such flanges. Such flanges will be marked accordingly. Where high tensile bolts are used with flanges holed for mild steel bolts, special washers should be used in accordance with the pipe manufacturer's recommendations.

11 Bolts, nuts and washers

Mild steel bolts and nuts should comply with the requirements of BS 4190 and high tensile steel bolts and nuts should comply with BS 3692 to minimum grade 8/8. Washers should comply with BS 4320. Where the pipeline is in a corrosive environment, the bolts, nuts and washers may require special coatings or other protection or to be made from suitable alloy materials.