

BRITISH STANDARD CODE OF PRACTICE
CP 3009 : 1970

THERMALLY INSULATED
UNDERGROUND
PIPING SYSTEMS

THE COUNCIL FOR CODES OF PRACTICE
BRITISH STANDARDS INSTITUTION

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METRIC UNITS

**THERMALLY INSULATED
UNDERGROUND
PIPING SYSTEMS**

**THE COUNCIL FOR CODES OF PRACTICE
BRITISH STANDARDS INSTITUTION**

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This Code of Practice has been prepared by a Committee convened by the Codes of Practice Committee for Mechanical Engineering. Having been endorsed by the Council for Codes of Practice, it was published under the authority of the Executive Board on 31st March, 1970.

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This Code of Practice makes references to the following British Standards and Codes of Practice:

BS 534. Steel pipes, fittings and specials for water, gas and sewage.



BS 1387. Steel tubes and tubulars suitable for screwing to BS 21 pipe threads.



BS 1710. Identification of pipelines.

BS 2765. Dimensioning system and terminology for industrial temperature-detecting elements and pockets.

BS 3601. Steel pipes and tubes for pressure purposes. Carbon steel: ordinary duties.

BS 3602. Steel pipes and tubes for pressure purposes. Carbon steel: high duties.

BS 3656. Asbestos cement pipes and fittings for sewerage and drainage.



BS 3958. Thermal insulating materials.



BS 4147. Hot applied bitumen based coatings for ferrous products.

BS 4164. Coal tar based hot applied coating materials for protecting iron and steel, including suitable primers where required.

BS 4508. Thermally insulated underground piping systems.

BS 4545. Field welding of carbon steel pipelines.

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- CP 413. Design and construction of ducts for services.
CP 2008. Protection of iron and steel structures from corrosion.
CP 2010. Pipelines.
CP 1021. Cathodic protection.
CP 3005. Thermal insulation of pipework and equipment.



British Standard Codes of Practice are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this Code of Practice:
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CODE DRAFTING COMMITTEE MECP/8

THERMALLY INSULATED

UNDERGROUND PIPING SYSTEMS

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THERMALLY INSULATED UNDERGROUND PIPING SYSTEMS

FOREWORD

Service pipes installed underground are designed and protected against mechanical failure due to overstressing or corrosion. Where service or product pipes that are installed underground are required to be insulated, the ingress of water to the insulation can cause failure of the thermal insulation and can result in heavy continuous financial losses. Facilities for regularly testing the thermal efficiency of the installation are therefore necessary.

Water is the greatest single hazard affecting underground piping systems and it is often aggressive and under pressure at some periods on most sites in the UK. Water in the ground will naturally collect or flow where resistance has been lowered, e.g. a duct or back-filled trench.

If a pipe is to be installed below ground level and the contents are such that it has to be insulated against heat loss, three methods are recognized as suitable for the UK:

(1) installation in a back-filled trench; the service or product pipe(s) insulated and enclosed in a pressure-tight casing (pipe-in-pipe systems), either with or without an air gap (see Figs. 1 and 2);

(2) installation in a duct or trench; the service or product pipe(s) surrounded with suitable in situ insulation material (see Fig. 3);

(3) installation in a brick or concrete subway; the service or product pipe insulated with preformed material and protected (see Fig. 4).

The choice of method will be dependent upon the nature of the soil and conditions of the site or pipe route at the wettest periods. It is essential, unless the nature of the site or pipe route is fully known, that a survey and tests be undertaken by an expert in this specific subject before the decision is made as to the method to be adopted.

Initial economy may soon prove false and serious failures occur if the most suitable method is not chosen. Alternatively, other site conditions may dictate the method to be adopted, i.e. where a subway is required for other services or for vehicular or pedestrian traffic, or where the temporary nature of the installation make initial capital expenditure the most important condition. The method selected may also be influenced by the demand of modern building techniques for off-site prefabrication.

'When first published in 1970, this code of practice defined sites as being either Class A (wet) or Class B (dry). An Appendix A was included which indicated how these classifications could be determined by survey. It is, however, no longer considered to be good practice to classify any site as other than wet or (and for practical purposes this is exactly the same) potentially wet.



It follows that, unless a site is unusually or specially protected, only methods using pipe-in-pipe systems (see (1) above) are recommended. Methods using systems other than pipe-in-pipe (see (2) and (3) above) are still included in this code of practice pending a full revision, but these methods should be given consideration only in a protected site.'

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1. GENERAL

1.1 SCOPE

This Code deals with the work involved in the general designing, planning, prefabrication, transport, installation, maintenance and testing of thermally insulated underground piping systems for conveying or circulating steam, hot or chilled water, heated oil and other fluids.

This Code does not deal in detail with the associated civil engineering and building necessary with this type of installation or with systems which depend upon a very high vacuum for thermal insulation.



1.2 DEFINITIONS

For the purposes of this British Standard the following definitions apply:

(1) *Air gap*. An annular space between the insulation and the casing of a pipe-in-pipe assembly.

NOTE. An air gap permits testing to monitor any pipe leakage and controlled drainage. It also allows the casing to be at the soil temperature, the insulation to dry out in case of accidental wetting and the escape of vapour without harming the insulation.



(4) *Duct*. A space provided for the distribution of services.

(5) *Ground water*. Water occurring naturally at or below the water table.

(6) *Holiday*. A hole or flaw in the continuity of a protective coating.

(7) *Pipe-in-pipe*. A pipe assembly consisting of an insulated service pipe or pipes encased in a pressure-tight casing of suitable material. The assembly may or may not incorporate an air gap between the insulation and the outer casing.

(8) *Piping complex*. A network or grid of pipes serving process plant piping within refineries, factories and treatment plant; short connections between adjacent plant and distribution; long transmission and service mains for district

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and group heating schemes all of which are characterized by numerous branch connections.



(9) *Piping system*. An arrangement of pipes which may consist of pipelines, piping complexes or both.

(10) *Pipeline*. A line of pipes having a considerable length; it may have branch lines, but these would not normally be numerous.

NOTE 1. Pipelines are divided by definition in the Pipelines Act, 1962, into two categories, local pipelines (under 10 miles in length) and cross-country pipelines (over 10 miles in length).

NOTE 2. An air gap may be undesirable when conveying products such as hot oil in a pipeline.

(11) *Surface water*. Water from the ground surface, paved areas and roofs.

(12) *Subway*. A passage or duct constructed large enough to accommodate the services required and for a man to walk through.

1.3 EXCHANGE OF INFORMATION

1.3.1 An insulated underground service or product pipe may cross the routes of roads, railways, canals and water courses; it is also likely to cross or lie adjacent to existing underground services operated by water, gas and electricity undertakings, post office, television, drainage, sewage and other authorities. If so, the appropriate body should be consulted and plans of the relevant sections of the project should be submitted in sufficient details to enable proper considerations to be given.

Location of existing or proposed services such as water, electricity, gas, etc., should be ascertained at an early date and before the route of the new pipe is determined. The route of the pipe should be designed to avoid other services in the most economical manner, bearing in mind that alterations to the route of the pipe may be more expensive than with other services.

The contractor should be informed of the location and route of the piping system and be supplied with the necessary drawings or specification to this effect.

All work, including civil work, should be the undivided responsibility of one contractor and any sub-contractor that he appoints should be under his control. Civil work includes all the operations from digging the excavation to construction of the subway, duct or final backfill and leaving ready for use. It also includes any subways under roads, railways, rivers or existing services.

Upon completion of the work, drawings showing the actual position of the buried pipe or duct should be prepared and handed to the client.

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1.3.2 Reference should also be made to the following Regulations:

- (1) the Water Acts, 1945 and 1948, which enable statutory water undertakings to build pipelines for the conveyance of water, via their distribution systems, to individual consumers; and any local Water Acts that may be relevant;
- (2) the Gas Acts, 1948 and 1965, which empower the Gas Council and the Area Gas Boards set up by the 1948 Act to build pipelines for the delivery of gas to consumers or for the conveyance of feedstocks to their works;
- (3) the Requisitioned Land and War Works Acts, 1945 and 1948, and the Land Powers (Defence) Act, 1958, which empower the Government to acquire land or rights for the purposes of Government oil pipelines;
- (4) the Public Health Acts, 1936 and 1961, which enable local authorities to build water pipes, sewers and drains;
- (5) the Pipelines Act, 1962, which regulates the development of privately owned industrial pipelines;
- (6) the Acquisition of Land (Authorization Procedure) Act, 1946, for procedures governing compulsory acquisition by local and public authorities and statutory undertakings;
- (7) the Public Utilities Street Works Act, 1950, for pipelines laid across or along streets;

NOTE. Thrust or auger-bored subways may reduce or obviate procedures in some cases.

(8) the Coast Protection Act, 1949, for parts of pipelines laid below high water; and

(9) the Land Drainage Act, 1961, for pipelines crossing rivers and streams.

 (10) the Health and Safety at Work etc. Act, 1974.

2. MATERIALS

2.1 BRITISH STANDARDS

All materials and tests used should comply with the relevant British Standard or equivalent, such as:

 BS 534. Steel pipes, fittings and specials for water, gas and sewage.

BS 1387. Steel tubes and tubulars suitable for screwing to BS 21 pipe threads.


 BS 3601. Steel pipes and tubes for pressure purposes. Carbon steel: with specified room temperature properties