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Specification for

Thermally insulated underground piping systems —

**Part 4: Specific testing and inspection
requirements for cased systems without
air gap**

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Foreword

This Part of BS 4508 has been prepared under the direction of the Refrigeration, Heating and Air Conditioning Standards Committee, and deals with requirements for the independent certification of components and assemblies of components of cased, thermally insulated underground piping systems without air gap.

Other Parts of the standard are as follows:

- *Part 1: Steel cased systems with air gap;*
- *Part 2: Asbestos-cement cased systems with air gap;*
- *Part 3: General requirements for cased systems without air gap.*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, 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.

1 Scope

This Part of BS 4508 specifies specific requirements for the testing, inspection and certification of pipe-in-pipe systems with an insulated service or product pipe enclosed in a pressure-tight casing; general requirements are specified in Part 3.

Data on soil conductivity are given in Appendix A.

2 References

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

3 Definitions

For the purposes of this Part of BS 4508 the definitions given in Part 3 apply.

4 General

Testing and inspection procedures are necessary to prove compliance with the performance specification, and include type testing and inspection in the laboratory and in the ground, together with production testing and inspection.

Routine service inspections and tests are required to ensure continued compliance with the performance specification, and guidance on such tests is given in Appendix G of BS 4508-3:1977.

5 Type tests and inspections

5.1 Purpose and scope of the tests. Type test and inspection requirements that are common to all piping systems are specified in this Part of the standard.

Type tests and inspections shall be carried out in the order given.

5.2 Type tests and inspections in the laboratory. The tests and inspections specified in 5.2.1 to 5.2.6 shall be carried out on samples of the proposed service or product pipe.

5.2.1 Compatibility of pipes. The vendor shall be responsible for ensuring, throughout the temperature range of the service pipe fluid, that the requirements specified in 5.2.1.1 and 5.2.1.2 are complied with.

5.2.1.1 Pipes protected against external corrosion. Where service or product pipes are protected by surface coatings against external corrosion, such coatings shall be chemically compatible with the insulating material.

In such cases, a sample of pipe-in-pipe shall be prepared and after a 30-day period at the maximum temperature for which the system will be offered, the sample shall be examined for evidence of chemical reaction between the service pipe coating and the insulating material. Deterioration due to chemical reaction as judged by visual inspection shall constitute a failure of the system.

NOTE During this test a certain amount of discoloration of the insulating material may be in evidence, even if the service pipe coating has not reacted chemically with it; such discoloration is entirely an effect of temperature and the extent to which it shall be permitted to occur is stated in 5.2.3.2.

5.2.1.2 Pipes not protected against external corrosion. Where service or product pipes are not protected by surface coatings against external corrosion, the insulation proposed for the system shall provide such protection.

In such cases, a sample of pipe-in-pipe shall be prepared and after a 30-day period at the maximum temperature for which the system will be offered, the sample shall be examined for evidence of corrosion on the service pipe. Any corrosion of this nature shall constitute a failure.

5.2.2 Pressure test on service or product pipe. The service or product pipe shall be subjected to a hydraulic pressure test of 1.5 times the maximum design pressure, at the system design temperature for which the system is offered, with a minimum gauge test pressure of 10 bar¹⁾. This pressure shall be maintained for a period of not less than 30 min.

5.2.3 Tests on insulating material. The tests and inspections specified in 5.2.3.1 to 5.2.3.4 shall be carried out on samples of the proposed insulating material.

5.2.3.1 Thermal conductivity or thermal conductance. The thermal conductivity or thermal conductance of the proposed insulating material shall be tested in accordance with BS 874 and compared with the specification.

For a typical size of pipe-in-pipe offered, calculations shall be made, using the calculation method shown in 7.4 e) of BS 4508-3:1977, to ensure that any casing material temperature limitation is not exceeded, and in no instance shall the casing temperature exceed 30 °C. In no case shall the thermal conductivity or thermal conductance exceed that declared in the specification (see Appendix B of BS 4508-3:1977). The thermal conductivity or thermal conductance shall be obtained from the appropriate test method specified in BS 874.

¹⁾ 1 bar = 10⁵ N/m² = 100 kPa.