

Methods of

Destructive testing fusion welded joints weld metal in steel

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- Associated Offices Technical Committee
- British Compressed Gases Association
- British Constructional Steelwork Association
- British Railways Board
- British Steel Industry
- Electricity Supply Industry in England and Wales
- Health and Safety Executive
- Institution of Structural Engineers
- Ministry of Defence
- Water-tube Boilermakers' Association
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Foreword

This revision of BS 709:1971 has been prepared under the direction of the Welding Standards Committee. It retains the general pattern of the 1971 edition but has been modified to take into account developments in the international field. This edition introduces an intercrystalline corrosion test, a fracture toughness test and a test of hardness gradient across a weld. BS 709:1971 is withdrawn.

The standard covers only routine approval tests normally required by application standards. Tests for the susceptibility to lamellar tearing, re-heat cracking and fatigue are therefore not included.

Standards relating to welded constructions in various branches of engineering generally include requirements for certain welding tests to be conducted, primarily for the approval of welding procedures and operators. There is seldom any technical reason for divergence from standard procedures to be followed for such welding tests and there are both practical and economic advantages to be gained in standardization. The main purpose of this standard is to describe test procedures and to specify requirements for test specimens that should be quoted, or incorporated, in engineering application standards that deal with welded constructions. Where differences still exist between application standards, the methods of test given in this standard are to be preferred.

A general indication is given of the purpose served by each of the different tests, but the standard does not purport to lay down when any particular test should or should not be used; again it does not state the number of specimens to be tested or the repeat tests to be allowed in the event of failure. Such requirements are matters to be dealt with in the particular application standard, where this exists, or to be agreed between the manufacturer and purchaser.

It should be realized that variations in the welding procedure or the quality of test specimen preparation can give rise to variations in the test results.

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 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 British Standard describes routine destructive methods of testing fusion welded joints and weld metal in steel (including pipes¹⁾ where appropriate) but does not include non-destructive examination. It also specifies the shape and dimensions of standard test pieces and specimens for the tests described.

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

2 Definitions

For the purposes of this British Standard, the definitions given in BS 499-1²⁾ apply together with the following definitions given in BS 499-1:1965.

2.1

test piece

components welded together in accordance with a specified welding procedure, or a portion of a welded joint detached from a structure for test

2.2

test specimen

a portion detached from a test piece and prepared as required for testing

3 Separation of test specimen

The method employed for the separation of test specimens shall be such as to cause minimum deformation and minimum heating of that part of the test specimen to be used for measurement. Particular attention shall be paid to this when measurement of proof stress, permanent set stress or yield stress is to be made. Machining is usually the best method, but when a specimen is sheared or thermally cut an adequate allowance shall be left for machining if necessary.

Each test specimen shall be marked so that it is possible to identify the exact position in the fabrication or test assembly from which it was taken.

4 Heat treatment

Test specimens shall be heat treated only if specified or allowed by the application standard relating to the welded joint to be tested. Where possible, they shall be treated together with the welded part. Where this is not possible, the specimens shall be heat treated separately, the treatment and the rate of cooling being similar to that given to the welded part.

A hydrogen release treatment shall be applied for the purpose of testing only in those situations where it is permitted under the conditions specified in the application standard, e.g. BS 639, or the particular weld procedure.

Details of any heat treatment applied to the test pieces shall be reported.

5 Tensile tests

5.1 Transverse tensile test

Transverse tensile tests shall be in accordance with BS EN 895.

Table 1 — *Table deleted*

Figure 1 — *Figure deleted*

Figure 2 — *Figure deleted*

Figure 3 — *Figure deleted*

Figure 4 — *Figure deleted*

Figure 5 — *Figure deleted*

¹⁾ In this standard the word “pipe” alone or in combination is used to mean “pipe” or “tube” or “structural hollow section” (circular or rectangular), although these terms are often used for different categories of product by different industries.

²⁾ Under revision.