British Standard

BRITISH STANDARD

BS EN
729-3:1995

Quality requirements for welding Fusion welding of metallic materials —

Part 3: Standard quality requirements

The European Standard EN 729-3:1994 has the status of a British Standard

UDC 621.791.5:669:658.562

Cooperating organizations

The European Committee for Standardization (CEN), under whose supervision this European Standard was prepared, comprises the national standards organizations of the following countries:

Austria	Oesterreichisches Normungsinstitut
Belgium	Institut belge de normalisation
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Finland	Suomen Standardisoimisliito, r.y.
France	Association française de normalisation
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United Kingdom	British Standards Institution

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The following BSI references relate to the work on this standard:
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Contents

National foreword

This British Standard has been prepared under the direction of the Engineering Sector Board and is the English language version of EN 729-3:1994 *Quality requirements for welding — Fusion welding of metallic materials — Part 3: Standard quality requirements,* published by the European Committee for Standardization (CEN).

EN 729-3 was produced as the result of international discussion in which the UK took an active part.

There has previously been no direct British Standard equivalent to this standard. Application Standards may request the manufacturer to comply with one of the Parts of EN 729.

It is assumed that the execution of the provisions of this document is entrusted to suitably qualified and experienced persons.

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, the EN title page, pages 2 to 8, 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.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 729-3

September 1994

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Descriptors: Welding, fusion welding, welded constructions, metal products, quality, quality assurance, manufacturing

English version

Quality requirements for welding — Fusion welding of metallic materials — Part 3: Standard quality requirements

Exigences de qualité en soudage — Soudage par fusion des matériaux métalliques — Partie 3: Exigences de qualité normale

Schweißtechnische Qualitätsanforderungen — Schmelzschweißen metallischer Werkstoffe — Teil 3: Standard-Qualitätsanforderungen

This European Standard was approved by CEN on 1994-09-06. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 729-3:1994 E

Foreword

This European Standard was prepared by the Technical Committee CEN/TC 121, Welding, of which the secretariat is held by DS.

CEN/TC 121 has decided to submit the final draft for formal vote by its resolution 173/1993. The result was positive.

EN 729 is composed of the four following parts:

— EN 729-1, *Quality requirements for welding — Fusion welding of metallic materials — Part 1: Guidelines for selection and use;*

— EN 729-2, *Quality requirements for welding — Fusion welding of metallic materials — Part 2: Comprehensive quality requirements;*

— EN 729-3, *Quality requirements for welding — Fusion welding of metallic materials — Part 3: Standard quality requirements;*

— EN 729-4, *Quality requirements for welding — Fusion welding of metallic materials — Part 4: Elementary quality requirements.*

This European Standard has been prepared under a mandate given to CEN by the Commission of the European Communities and the European Free Trade Association, and supports essential requirements of EC Directive(s).

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 1995, and conflicting national standards shall be withdrawn at the latest by March 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Contents

1 Scope

This standard has been prepared such that:

— it is independent of the type of welded construction to be manufactured;

— it defines quality requirements for welding both in workshops and on site;

— it provides guidance for describing a manufacturer's capability to produce welded constructions to meet specified requirements;

— it may also be used as a basis for assessing the manufacturer in respect to his welding capability.

The standard is appropriate when demonstration of a manufacturer's capability to produce welded construction, fulfilling specified quality requirements, are specified in one or more of the following:

— a contract between involved parties;

— an application standard;

— a regulatory requirement.

The requirements contained within this standard may be adopted in full or may be selectively deleted by the manufacturer if not applicable to the construction concerned. They provide a flexible framework for the control of welding in the following cases:

— Case 1

To provide specific requirements for fusion welding in contracts which require the manufacturer to have a quality system other than EN 29001 or EN 29002.

— Case 2

To provide specific requirements for fusion welding as guidance to a manufacturer developing a quality system.

— Case 3

To provide specific requirements for references in application standards which uses fusion welding as part of its requirements or in a contract between relevant parties. It may however be more appropriate for EN 729-4 to be used in such cases.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 287-1, *Approval testing of welders — Fusion welding — Part 1: Steels.*

EN 287-2, *Approval testing of welders — Fusion welding — Part 2: Aluminium and aluminium alloys.*

EN 288-1, *Specification and approval of welding procedures for metallic materials — Part 1: General rules for fusion welding.*

EN 288-2, *Specification and approval of welding procedures for metallic materials — Part 2: Welding procedure specification for arc welding.*

EN 288-3, *Specification and approval of welding procedures for metallic materials — Part 3: Welding procedure tests for arc welding of steels.*

EN 288-4, *Specification and approval of welding procedures for metallic materials — Part 4: Welding procedure tests for arc welding of aluminium and its alloys.*

EN 288-5, *Specification and qualification of welding procedures for metallic materials — Part 5: Approval by using approved welding consumables for arc welding.*

EN 288-6, *Specification and qualification of welding procedures for metallic materials — Part 6: Approval related to previous experience.*

EN 473, *Non-destructive testing — Qualification and certification of personnel.*

EN 719, *Welding coordination — Tasks and responsibilities.*

EN 729-1, *Quality requirements for welding — Fusion welding of metallic materials — Part 1: Guidelines for selection and use.*

EN 729-4, *Quality requirements for welding — Fusion welding of metallic materials — Part 4: Elementary quality requirements.*

prEN 1258, *Welding — Measurement of preheating temperature, interpass temperature and preheat maintenance temperature during welding.*

prEN 1418, *Welding personnel — Approval testing of welding personnel for fully mechanized and automatic welding of metallic materials.*

EN 29001, *Quality systems — Model for quality assurance in design development, production, installation and servicing.*

EN 29002, *Quality systems — Model for quality assurance in production and installation.*

EN 29692:1994, *Metal-arc welding with covered electrode, gas-shielded metal-arc welding and gas welding — Joint preparations for steel.*

3 Definitions

For the purposes of this standard, definitions listed in EN 729-1 apply.

4 Contract and design review

4.1 General

The manufacturer shall review the contractual requirements and the design data provided by the purchaser or in-house data for construction designed by the manufacturer. This is to ensure that all information necessary to carry out the fabrication operations is available prior to the commencement of the work. The manufacturer shall affirm his capability to meet all welding contract requirements and ensure adequate planning of all quality related activities. The items in **4.2** are typically considered at or before the time of the contract review. The items in **4.3** usually form part of the design review and should be taken into account during the contract review if the design is not carried out by the fabricator. It shall be ensured that all relevant information has been supplied by the purchaser.

When the contract does not exist, e.g. items made for stock, the manufacturer is required to take into consideration the requirements of **4.2** whilst carrying out his design review (**4.3**).

4.2 Application — Contract review

Contractual requirements to be considered should include, when necessary:

a) the application standard to be used, together with any supplementary requirements

b) the specification of welding procedures, non-destructive testing procedures and heat treatment procedures;

c) the approach to be used for welding procedure approval;

d) the approval of personnel;

e) post-weld heat treatment;

f) inspection and testing;

g) selection, identification and/or traceability, e.g. for materials, welders and welds (see clause **15**);

h) quality control arrangements, including any involvement of an independent inspection body;

i) other welding requirements, e.g. batch testing of consumables, ferrite content of weld metal, ageing, hydrogen content;

j) environmental conditions relevant to welding on site, e.g. very low temperature ambient conditions or any necessity to provide protection against adverse weather conditions;

k) subcontracting;

l) handling of non-conformances.

4.3 Application — Design review

Design requirements to be considered should include, when necessary:

a) location, accessibility and sequence of all welds;

b) surface finish and the weld profile;

c) parent metal(s) specification and welded joint properties;

d) permanent backing;

e) welds which are to be made in the workshop, or elsewhere;

f) dimensions and details of joint preparation and completed joint;

g) use of special methods, e.g. to achieve full penetration without backing when welded from one side only;

h) quality and acceptance requirements for welds;

i) other special requirements, e.g. acceptability of peening, heat treatment.

5 Subcontracting

When a manufacturer intends to use subcontracted services (e.g. welding, inspection, non-destructive testing, heat treatment) all relevant specifications and requirements shall be supplied by the manufacturer to the subcontractor. The subcontractor shall provide such records and documentation of his work as may be specified by the manufacturer.

Any subcontractor shall work under the order and responsibility of the manufacturer and shall fully comply with the relevant requirements of this standard. The manufacturer shall ensure that the subcontractor can comply with the quality requirements of the contract.

The information to be provided by the manufacturer to the subcontractor shall include all relevant data from the contract review (see **4.2**) and the design review (see **4.3**). Additional requirements may need to be specified if the design of a structure is to be subcontracted.

6 Welding personnel

6.1 General

The manufacturer shall have at his disposal sufficient and competent personnel for the planning, performing, supervising and examining of the welding production to specified requirements.

6.2 Welders

All welders and welding operators shall be approved by an appropriate test according to the relevant part of EN 287 or EN 1418. All records of approval shall be maintained up to date.

6.3 Welding coordination personnel

The manufacturer shall have at his disposal appropriate welding coordination personnel according to EN 719 such that the welding personnel can be supplied with the necessary welding procedure specifications or work instructions and that the work can be properly performed and controlled. Such persons having responsibility for quality activities shall have sufficient authority to enable any necessary action to be taken. The duties, interrelationships and limits of responsibility of such persons should be clearly defined.

7 Inspection, testing and examination personnel

7.1 General

The manufacturer shall have at his disposal sufficient and competent personnel for planning and performing, supervising and inspection, testing and examination of the welding production according to specified requirements.

7.2 Non-destructive testing personnel

The non-destructive testing personnel shall be approved according to EN 473.

8 Equipment

8.1 Production and testing facilities

The following equipment shall be available when necessary:

— welding power sources and other machines;

— equipment for joint preparation and cutting, including thermal cutting;

— equipment for preheating and post-weld heat treatment including temperature indicator;

— jigs and fixtures;

— cranes and handling equipment used for welding production;

— personal protective equipment and other safety equipment, directly associated with welding;

— ovens, quivers etc. used for treatment of welding consumables;

— cleaning facilities;

— destructive and non-destructive testing facilities.

8.2 Description of facilities

The manufacturer shall maintain a list of essential equipment, used for welding production. This list shall identify items of major equipment, essential for an evaluation of workshop capacity and capability. This includes for example:

— capacity of largest cranes;

— size of components the workshop is able to handle;

— capability of mechanized or automatic welding equipment;

— dimensions and maximum temperature of furnaces for post-weld heat treatment;

— capacities of rolling, bending and cutting equipment.

Other equipment only needs to be specified by approximate total numbers which cover each general type (e.g. total number of power sources for the different welding processes).

8.3 Suitability and maintenance of equipment

The equipment shall be adequate for the application concerned and properly maintained.

9 Welding activities

9.1 Production plan

The manufacturer shall carry out adequate production planning, compatible with facilities as in **8.1**. This shall include at least:

— specification of the sequence by which the construction shall be manufactured, e.g. as single parts or sub-assemblies, and the order of subsequent final assembly;

— identification of the welding and associated processes required to manufacture the construction and reference to the appropriate procedure specifications. Welding procedure specifications shall be prepared in accordance with the appropriate part of EN 288;

— specification for inspection and testing, including the involvement of any independent inspection body;

9.2 Welding procedure approval

Welding procedures shall be approved prior to production in accordance with the appropriate part of EN 288. The method of approval shall be in accordance with the relevant application standards or as stated in the contract.

Other procedures, e.g. procedure for heat treatment, should only be approved if stated in the relevant application standards and/or as stated in the contract.

9.3 Work instructions

The manufacturer may use the welding procedure specification directly in the workshop for instruction purposes to the welder. Alternatively, he may use dedicated work instructions. Such dedicated work instructions shall be prepared from an approved welding procedure specification and do not require separate approval (see EN 288-1).

10 Storage and handling of welding consumables

The manufacturer shall produce and implement procedures for storage, handling and use of consumables which avoid moisture pick-up, oxidation and damage etc. The procedures shall be in accordance with the supplier's specifications.

11 Storage of parent materials

Storage shall be such that the material will not be adversely affected. Identification shall be maintained during storage.

12 Post-weld heat treatment

The manufacturer shall be fully responsible for the specification and the performance of any post-weld heat treatment. The procedure shall be compatible with the parent metal, welded joint, construction etc. and in accordance with the application standard and/or specified requirements. A record of the heat treatment shall be made during the process. The record shall demonstrate that the specification has been followed.

13 Welding related inspection and testing

13.1 General

Inspection and testing shall be implemented at appropriate points in the manufacturing process to assure conformity with contract requirements. Location and frequency of such inspection and/or testing will depend on the contract and/or application standard, the welding process and the type of construction (see **4.2** and **4.3**).

The manufacturer may carry out additional tests without restriction. Reporting of such tests is not required.

13.2 Inspection and testing before welding

Before the start of welding, the following shall be checked, when necessary:

— suitability and validity of welder's approval certificates (see appropriate part of EN 287 or EN 1418);

— suitability of welding procedure specification (see appropriate part of EN 288);

— identity of parent metal;

— identity of welding consumables;

— joint preparation (e.g. shape and dimensions) (see EN 29692);

— fit-up, jigging and tacking;

— any special requirements in welding procedure specification, e.g. prevention of distortion;

— arrangement for any production test;

— suitability of working conditions for welding, including environment.

13.3 Inspection and testing during welding

During welding, the following shall be checked at suitable intervals, when necessary:

— essential welding parameters (e.g. welding current, arc voltage and travel speed);

— preheating/interpass temperature (see EN 1258);

— cleaning and shape of runs and layers of weld metal;

— back gouging;

— welding sequence;

— correct use and handling of consumables;

— control of distortion;

— any intermediate examination, e.g. checking dimensions.

13.4 Inspection and testing after welding

After welding, the compliance with relevant acceptance criteria shall be checked, when necessary:

— by visual inspection according to relevant EN standards;

— by non-destructive testing according to relevant EN standards;

— by destructive testing according to relevant EN standards;

— form, shape and dimensions of the welded construction;

— results and records of post-weld operations, e.g. grinding, post-weld heat treatment, ageing.

13.5 Inspection and testing status

Measures shall be taken as appropriate to indicate e.g. by marking of the item or a routing card, the status of inspection and test of the welded construction.

14 Non-conforming and corrective action

Measures shall be implemented to control items which do not conform to specified requirements in order to prevent their inadvertent use. When repair and/or rectification is undertaken by the manufacturer, appropriate procedures shall be available at all workstations where repair or rectification is performed. When repair or rectification is carried out, the items shall be re-inspected, tested and examined in accordance with the original requirements.

15 Identification and traceability

Identification and traceability shall be maintained throughout the manufacturing process, where appropriate.

16 Quality records

Quality records, according to the contract requirements, should include, when necessary:

— record of contract/design review;

— material certificates;

— consumables certificates;

— welding procedure specifications;

— welding procedure approval test records;

— welder or welding operator approval certificates;

— non-destructive testing personnel certificates;

— heat treatment records;

— non-destructive testing and destructive testing procedures and reports;

— dimensional reports;

— records of repairs and other non-conformity reports.

Quality records shall be retained for a minimum period of 5 years; in the absence of any other specified requirements.

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National annex NA (informative)

Committees responsible

The United Kingdom participation in the preparation of this European Standard was entrusted by the Engineering Sector Board to Technical Committee WEE/-/1/6 upon which the following bodies were represented:

Associated Offices Technical Committee
British Constructional Steelwork Association Ltd.
British Railways Board
Electricity Association
Institute of Quality Assurance
Power Generation Contractors' Association (BEAMA Ltd.)
Railway Industry Association of Great Britain
Welding Manufacturers' Association (BEAMA Ltd.)

National annex NB (informative)

Cross-references

Publication referred to	Corresponding British Standard
	BS EN 287 *Approval testing of welders for fusion welding*
EN 287-1:1992	Part 1:1992 *Steels*
EN 287-2:1992	Part 2:1992 *Aluminium and aluminium alloys*
	BS EN 288 *Specification and approval of welding procedures for metallic materials*
EN 288-1:1992	Part 1:1992 *General rules*
EN 288-2:1992	Part 2:1992 *Welding procedures specification for arc welding*
EN 288-3:1992	Part 3:1992 *Welding procedure tests for arc welding of steels*
EN 288-4:1992	Part 4:1992 *Welding procedure tests for arc welding of aluminium and its alloys*
EN 288-5:1994	Part 5[a] *Approval by using approved welding consumables for arc welding*
EN 288-6:1994	Part 6[a] *Approval related to previous experience*
EN 473:1992	BS EN 473:1993 *General principles for qualification and certification of NDT personnel*
EN 719:1994	BS EN 719:1994 *Welding coordination — Tasks and responsibilities*
	BS EN 729 *Quality requirements for welding*
EN 729-1:1994	Part 1:1995 *Guidelines for selection and use*
EN 729-4:1994	Part 4:1995 *Elementary quality requirements*
	BS 5750 *Quality systems*
EN 29001:1987[b]	Part 1:1987 *Specification for design/development, production, installation and servicing*
EN 29002:1987[b]	Part 2:1987 *Specification for production and installation*
EN 29692:1994	BS EN 29692:1994 *Specification for metal-arc welding with covered electrode, gas-shielded metal-arc welding and gas welding — Joint preparations for steel*

[a] In preparation

[b] EN 29001:1987 and EN 29002:1987 have been superseded by EN ISO 9001:1994 and EN ISO 9002:1994 respectively which have been implemented as BS EN ISO 9001:1994 and BS EN ISO 9002:1994 respectively.

BSI — British Standards Institution

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