

Specification and approval of welding procedures for metallic materials

Part 5. Approval by using approved welding consumables for arc welding

The European Standard EN 288 : Part 5 : 1994 has the status of a British Standard

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National foreword

This British Standard has been prepared under the direction of the Engineering Sector Board and is the English language version of EN 288 *Specification and approval of welding procedures for metallic materials — Part 5. Approval by using approved welding consumables for arc welding*, published by the European Committee for Standardization (CEN).

EN 288-5 was produced as a result of international discussions in which the United Kingdom took an active part.

There has previously been no direct British Standard equivalent to this standard.

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

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EUROPEAN STANDARD

EN 288-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

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Descriptors: welding, arc welding, metals, procedure, qualification

English version

**Specification and approval of welding procedures for
metallic materials —
Part 5: Approval by using approved welding consumables
for arc welding**

Descriptif et qualification d'un mode
opérateur de soudage pour les matériaux
métalliques —
Partie 5: Qualification par utilisation de
produits consommables de soudage agréés
pour le soudage à l'arc

Anforderung und Anerkennung von
Schweißverfahren für metallische
Werkstoffe —
Teil 5: Anerkennung durch Einsatz
anerkannter Schweißzusätze für das
Lichtbogenschweißen

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CEN

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

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Ref. No. EN 288-5 : 1994 E

Foreword

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

This standard consists of the following parts:

- Part 1: *General rules for fusion welding;*
- Part 2: *Welding procedure specification for arc welding;*
- Part 3: *Welding procedure tests for the arc welding of steels;*
- Part 4: *Welding procedure tests for the arc welding of aluminum and its alloys;*
- Part 5: *Approval by using approved welding consumables for arc welding;*
- Part 6: *Approval related to previous experience;*
- Part 7: *Approval by a standard welding procedure for arc welding;*
- Part 8: *Approval by a pre-production welding test.*

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 February 1995, and conflicting national standards shall be withdrawn at the latest by February 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.

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0 Introduction

In EN 288-1, one of the methods of welding procedure approval is by using approved welding consumables.

1 Scope

This standard simplifies the approval of welding procedures especially for repetitive operations.

The standard gives the necessary information to explain the requirements referenced in EN 288-1 about the approval of welding procedures using approved consumables.

In addition it gives the range of approval and the validity.

This standard applies to fusion welding of metallic materials.

The process numbers refer to EN 24063.

Essentially this standard covers the processes with consumables given in table 1.

Other fusion welding processes may be accepted by agreement between contracting parties.

It is intended for application to parent metals which produce acceptable micro structures and properties in the heat affected zone which do not deteriorate significantly in service.

This standard is not applicable where hardness or impact properties, preheating, control heat input, interpass temperature and post-weld heat-treatment are specified.

The use of this standard may also be restricted by an application standard or at the enquiry/order stage by contracting parties.

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 288-1	<i>Specification and approval of welding procedures for metallic materials — Part 1: General rules for fusion welding</i>
EN 288-2	<i>Specification and approval of welding procedures for metallic materials — Part 2: Welding procedure specification for arc welding</i>
EN 288-3	<i>Specification and approval of welding procedures for metallic materials — Part 3: Welding procedure tests for the arc welding of steels</i>
EN 288-4	<i>Specification and approval of welding procedures for metallic materials — Part 4: Welding procedure tests for the arc welding of aluminium and its alloys</i>
EN 439	<i>Welding consumables — Shielding gases for arc welding and cutting</i>
EN 24063	<i>Welding, brazing, soldering and braze welding of metals. Nomenclature of processes and reference numbers for symbolic representation on drawings</i>

Table 1. Applicable welding processes

Process		Process applicable for steel	Process applicable for aluminium and its alloys
Number	Type		
111	Metal arc welding with covered electrode	×	—
114	Flux cored wire metal-arc welding without gas shield	×	—
131	Metal-arc inert gas welding; MIG welding	—	×
135	Metal-arc active gas welding; MAG welding	×	—
136	Flux cored wire metal-arc welding with active gas shield	×	—
137	Flux cored wire metal-arc welding with inert gas shield	×	—
141	Tungsten inert gas arc welding; TIG welding	×	×

Key

× indicates the process for which the standard is applicable

— indicates the process for which the standard is not applicable.

3 Definitions

For the purpose of this standard, the definitions listed in EN 288-1 shall apply.

4 Preliminary welding procedure specifications (pWPS)

The approval of a welding procedure based on approved consumables shall be based on a pWPS according to EN 288-2. This pWPS shall specify the range for all the relevant parameters.

5 Approval of the welding procedure

The approval of the welding procedure shall be carried out by an examiner or test body according to EN 288-1.

The essential items for the approval are:

- specifications of parent metal(s) to be used according to the relevant EN,
- records of the approved consumables to be used according to the relevant EN,
- a specific pWPS according to EN 288-2 and suitable for the application.

6 Range of approval

6.1 General

All the conditions of validity stated below shall be met independently of each other.

Changes of essential variables outside of the ranges specified shall require another welding procedure approval.

6.2 Related to the manufacturer

An approval of WPS obtained by a manufacturer is valid for welding in workshops or sites under the same technical and quality control of that manufacturer.

6.3 Related to the material

6.3.1 Related to parent metal

This standard is applicable for limited groups of materials defined in table 2 and fulfilling all the conditions stated below.

- a) The application standard or contract does not specify Charpy testing or hardness testing of the material in the heat affected zone.
- b) Other mechanical properties (e.g. yield strength) resistance to corrosion and other essential properties of the material in the heat affected zones can be expected to be essentially unaffected by the welding and that testing is not considered necessary.

c) The combination of parent metal(s) and consumables is such that the properties of the weld metal can be expected to correspond to the properties obtained during the approval testing of the consumable. Usually, this means that the consumable and the parent metal shall have:

- 1) similar mechanical properties for steels in group 1;
- 2) similar chemical composition for steels in group 9;
- 3) a compatible filler metal for aluminium and its alloys in groups 21, 22a and 22b;

and that weld metal composition mainly is determined by the composition of the consumable.

Table 2. Applicable groups of materials

EN 288-3 Steel	EN 288-4 Aluminium and its alloys
1 ³⁾	21 ³⁾
9	22a
Specified materials ^{1) 2) 3)}	22b ³⁾
¹⁾ Materials of group 9 excluding those which are sensitive to hot cracking. ²⁾ A list of the acceptable materials will be added when the relevant EN are available. ³⁾ Including casting, forged and wrought material with a similar chemical composition.	

Joints between dissimilar material groups are not permitted, except for joints between group 22a and group 22b.

6.3.2 Parent metal thickness

A welding procedure using approved consumables shall not be approved for thicknesses below 3 mm or above 40 mm.

6.3.3 Fillet weld throat thickness

A welding procedure using approved consumables shall not be approved for fillet weld throat thickness below 3 mm.

6.3.4 Diameter of pipes

Approved welding procedures using approved consumables are only valid for pipes with outside diameters >25 mm.

6.3.5 Branch connection

For thickness: see 6.3.2.

For diameter: see 6.3.3

6.4 Common to all welding processes

6.4.1 *Welding process*

Multi-process procedures are permitted providing approved consumables are used throughout the weld.

In a multi-process procedure the approval is only valid when the processes are used in the approved specified sequence.

6.4.2 *Welding positions*

The position is restricted to the range of approval of the approved consumables.

6.4.3 *Type of joint*

No limitation.

6.4.4 *Filler metal classification*

The approval is valid for any approved filler metal with the same compulsory classification as required by the relevant filler metal specification.

In addition, non-compulsory classification should be included wherever possible.

6.4.5 *Type of current*

No change is permitted.

6.5 Specific to each welding process

6.5.1 *Processes 111 and 114*

The approval given is valid for the diameter of electrode mentioned in the pWPS plus or minus one electrode diameter size for each run, with the exception of the root run on single sided without backing butt welds for which no size change is permissible.

6.5.2 *Processes 131, 135, 136 and 137*

The approval given is restricted to the face and/or back shielding type of gas (nominal composition) mentioned in the pWPS and shall be in accordance with EN 439.

The approval is restricted to the single-wire mentioned in the pWPS.

6.5.3 *Process 141*

The approval given is restricted to the face and/or back shielding type of gas (nominal composition) mentioned in the pWPS.

7 Validity

The welding procedure given is valid providing the approval of the consumables remains valid.

8 Documentation

The pWPS accepted by the examiner or a test body signed and dated is then an approved welding procedure and is to be retained on record by the manufacturer.

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/36 upon which the following bodies were represented:

AEA Technology
Aluminium Federation
Associated Offices Technical Committee
Association of Consulting Scientists
British Constructional Steelwork Association Ltd.
British Gas plc
British Nuclear Fuels plc
British Railways Board
British Stainless Steel Association
British Steel Industry
Electricity Industry in United Kingdom
Engineering Equipment and Materials Users' Association
General, Municipal, Boilermakers' and Allied Trades Union
Health and Safety Executive
Lloyd's Register of Shipping
Ministry of Defence
Power Generation Contractors' Association (BEAMA Ltd.)
Process Plant Association
Railway Industry Association of Great Britain
Welding Institute
Welding Manufacturers' Association (BEAMA Ltd.)
Co-opted members

National annex NB (informative)

Cross-references

Publication referred to	Corresponding British Standard
	BS EN 288 <i>Specification and approval of welding procedures for metallic materials</i>
EN 288-1 : 1992	Part 1 : 1992 <i>General rules for fusion welding</i>
EN 288-2 : 1992	Part 2 : 1992 <i>Welding procedure specification for arc welding</i>
EN 288-3 : 1992	Part 3 : 1992 <i>Welding procedure tests for the arc welding of steels</i>
EN 288-4 : 1992	Part 4 : 1992 <i>Welding procedure tests for the arc welding of aluminium and its alloys</i>
EN 439 : 1994	BS EN 439 : 1994 <i>Welding consumables — Shielding gases for arc welding and cutting</i>
EN 24063 : 1992	BS EN 24063 : 1992 <i>Welding, brazing, soldering and braze welding of metals. Nomenclature of processes and reference numbers for symbolic representation on drawings</i>

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