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Motståndssvetsning – Förfarande vid bestämning av svetsloben för punkt-, press- och sömsvetsning (ISO 14327:2004)

Resistance welding – Procedures for determining the weldability lobe for resistance spot, projection and seam welding (ISO 14327:2004)

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English version

Resistance welding - Procedures for determining the weldability lobe for resistance spot, projection and seam welding (ISO 14327:2004)

Soudage par résistance - Modes opératoires pour la détermination du domaine de soudabilité pour le soudage par résistance par points, par bossages et à la molette (ISO 14327:2004)

Widerstandsschweißen - Verfahren für das Bestimmen des Schweißbereichsdiagramms für das Widerstandspunkt-, Buckel- und Rollennahtschweißen (ISO 14327:2004)

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Foreword

This document (EN ISO 14327:2004) has been prepared by Technical Committee CEN/TC 121 “Welding“, the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 44 “Welding and allied processes“.

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of an identical text or by endorsement, at the latest by October 2004, and conflicting national standards shall be withdrawn at the latest by October 2004.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This European Standard enables the weldability lobe to be determined for resistance spot, projection and seam welding. This standard does not invalidate procedures for the determination of the weldability lobe or their approval documents in current use which complied with the national or International Standards or regulations existing at that time, provided the intent of the technical requirement is satisfied and the specified application, its performance and equipment with which it is performed remain unchanged.

When this standard is referenced for contractual purposes, all questions relating to the specification and implementation of welding procedures should be agreed between the contacting parties at the time of enquiry or at the contract stage.

It has been assumed in this standard that the execution of its provisions is entrusted to appropriately trained, skilled and experienced personnel.

For the quality of welded structures the relevant part of EN ISO 14554 should be applicable. The specification of procedures should follow guidelines as in EN ISO 15609-5.

1 Scope

This European Standard specifies procedures for determining the weldability lobe for producing quality welds. The tests are used in particular to determine the weldability lobe for coated/uncoated steels, stainless steels and aluminium and its alloys but may also be used for other metallic materials.

The aim of this procedure is to allow determination of the range of welding parameters which give rise to an acceptable weld quality as defined within precise limits. The procedure can be used to determine:

a) The influence of electrode material, electrode shape and dimensions on the available welding range for a particular material and welding machine.

b) The influence of material type and thickness on the available welding range when using a particular combination of welding electrodes and welding machine.

c) The influence of welding machine type, or electrode cooling on the available welding range for a particular material using a particular electrode shape.

d) The available welding range in a production situation.

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 (including amendments).

EN ISO 14329:2003, *Resistance welding — Destructive tests of welds — Failure types and geometric measurements for resistance spot, seam and projection welds (ISO 14329:2003).*

EN ISO 15609-5:2004, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 5: Resistance welding (ISO 15609-5:2004).*

ISO 669:2000, *Resistance welding — Resistance welding equipment — Mechanical and electrical requirements.*

ISO 693, *Dimensions of seam welding wheel blanks.*

ISO 5182, *Welding — Materials for resistance welding electrodes and ancillary equipment.*

EN 25184, *Straight resistance spot welding electrodes (ISO 5184:1979).*

EN 25821, *Resistance spot welding electrode caps (ISO 5821:1979).*

ISO 5830, *Resistance spot welding — Male electrode caps.*

EN 28167, *Projections for resistance welding (ISO 8167:1989).*

ISO/DIS 14373, *Resistance welding — Procedure for spot welding of uncoated and coated low carbon steels.*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in ISO 669:2000 and EN ISO 14329:2003, and the following apply.

NOTE Further definitions are given in ISO/DIS 17657-1 (see Bibliography)

weldability lobe
welding current domain allowing the production without splash of spot welds of a diameter equal or more than a pre-determined value under either constant welding time or constant electrode force

4 Weldability lobe limits

The weldability lobe will define the available welding conditions in terms of:

a) Weld current and time at a constant electrode force. Or:

b) Weld current and electrode force at a constant weld time.

In the case of resistance seam welding, welding speed (m/min) is used instead of weld time.

To meet these requirements, the weldability lobes can be a two dimensional plot as indicated in a) and b) above or a three dimensional plot indicating the inter relationship between weld time (welding speed in the case of seam welding), welding current and electrode force.

For the purpose of this standard, the lower and upper limits of the weldability lobe should be as follows:

1) Lower limit – This equates to the welding conditions which result in a weld diameter equal to $3{,}5\sqrt{t}$ where t equal sheet thickness in mm. In the case of two dissimilar thicknesses, "t" refers to the thinner sheet.

NOTE 1 A limit other than $3{,}5\sqrt{t}$ may be acceptable by agreement between contracting parties provided the strength of the weld or welded assembly satisfy the necessary design requirements.

NOTE 2 Guidelines for measuring weld diameter for both plug and interface failure are given in EN ISO 14329. The weld diameter should be measured from a broken specimen, e. g. peel test.

NOTE 3 In 3 or 4 thickness welding the minimum of the diameter specified will depend on the position of the thinner sheets from design process requirements.

2) Upper limit – This corresponds to the welding conditions which give rise to interfacial splash in the case of spot and projection welding. In seam welding the limit corresponds to surface splash or surface cracking in the weld or heat-affected zone areas.

NOTE 4 Alternative criteria may be specified, such as the minimum value of the shear force that the weld can withstand based on recommendations made in ISO or product standards in the case of coated/uncoated steels. Minimum surface indentation or the amount of weld nugget penetration can be specified by agreement.

In the case of resistance seam welding, other intermediate limits may be chosen based on alternative weld sizes or the onset of surface cracking. The use of such limits depend on the application being welded and should be by agreement between contracting parties.

Typical weldability lobes are shown in Figure 1.