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ACE/061 Metallic materials for aerospace purposes

Interested committees:

Title: Draft BS EN 4677-001 Aerospace series — Welded and brazed assemblies for aerospace constructions — Joints of metallic materials by electron beam welding — Part 001 Quality of welded assemblies

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Introduction

This draft standard is based on European discussions in which the UK has taken an active part. Your comments on this draft are welcome and will assist in the preparation of the consequent British Standard. Comment is particularly welcome on national, legislative or similar deviations that may be necessary.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	(7)
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/ Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

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ICS: Descriptors: ENGLISH VERSION Aerospace series — Welded and brazed assemblies for aerospace constructions — Joints of metallic materials by electron beam welding — Part 001: Quality of welded assemblies <table border="0"> <tr> <td> Luft- und Raumfahrt — Schweiß- und Lötverbindungen für die Luft- und Raumfahrt — Verbindungen metallischer Werkstoffe mittels Elektronenstrahlschweißen — Teil 001: Qualität der Schweißverbindungen </td><td> Série Aérospatiale — Assemblages soudés et brasés pour constructions aérospatiales — Assemblages de matériaux métalliques soudés par faisceau d'électrons — Partie 001 : Qualité des assemblages soudés </td></tr> </table>		Luft- und Raumfahrt — Schweiß- und Lötverbindungen für die Luft- und Raumfahrt — Verbindungen metallischer Werkstoffe mittels Elektronenstrahlschweißen — Teil 001: Qualität der Schweißverbindungen	Série Aérospatiale — Assemblages soudés et brasés pour constructions aérospatiales — Assemblages de matériaux métalliques soudés par faisceau d'électrons — Partie 001 : Qualité des assemblages soudés
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Edition approved for publication	Comments should be sent within six months after the date of publication to ASD-STAN		

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1 Scope

This European Standard specifies requirements for electron beam welding for aerospace applications.

NOTE This includes flight hardware, prototypes, demonstrator parts and any other test hardware.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 4632-001, *Aerospace series — Welded and brazed assemblies for aerospace constructions — Weldability and brazeability of materials — Part 001: General requirements*

EN 4632-002, *Aerospace series — Welded and brazed assemblies for aerospace constructions — Weldability and brazeability of materials — Part 002: Homogeneous assemblies aluminium and aluminium alloys*

EN 4632-003, *Aerospace series — Weldability and brazeability of materials in aerospace constructions — Part 003: Welding and brazing of homogeneous assemblies of unalloyed and low alloy steels*

EN 4632-004, *Aerospace series — Welded and brazed assemblies for aerospace constructions — Weldability and brazeability of materials — Part 004: Homogeneous assemblies highly alloyed steels*

EN 4632-005, *Aerospace series, Weldability and brazeability of materials in aerospace constructions — Homogeneous assemblies of heat resisting Ni or Co base alloys*

EN 4632-006, *Welded and brazed assemblies for aerospace constructions — Weldability and brazeability of materials — Part 006: Homogeneous assemblies titanium alloys*

EN ISO 6520-1, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 1: Fusion welding*

EN ISO 14744-1, *Welding — Acceptance inspection of electron beam welding machines — Part 1: Principles and acceptance conditions*

EN ISO 14744-2, *Welding — Acceptance inspection of electron beam welding machines — Part 2: Measurement of accelerating voltage characteristics*

EN ISO 14744-3, *Welding — Acceptance inspection of electron beam welding machines — Part 3: Measurement of beam current characteristics*

EN ISO 14744-4, *Welding — Acceptance inspection of electron beam welding machines — Part 4: Measurement of welding speed*

EN ISO 14744-5, *Welding — Acceptance inspection of electron beam welding machines — Part 5: Measurement of run-out accuracy*

EN ISO 14744-6, *Welding — Acceptance inspection of electron beam welding machines — Part 6: Measurement of stability of spot position*

EN ISO 15609-3, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 3: Electron beam welding*

EN ISO 17659:2004, *Welding — Multilingual terms for welded joints with illustrations*

ISO 857-1:1998, *Welding and allied processes — Vocabulary — Part 1: Metal welding processes*

ISO 24394, *Welding for aerospace applications — Qualification test for welders and welding operators — Fusion welding of metallic components*

ISO/TR 25901:2007, *Welding and related processes — Vocabulary*

3 Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions given in EN ISO 17659:2004, ISO 857-1:1998 and ISO/TR 25901:2007 and the following apply.

3.1

electron beam welding

fusion welding using a focused beam of electrons

[SOURCE: ISO 857-1:1998, 4.2.5.4]

3.3

beam alignment

positioning of the beam axis on the joint plane

3.4

beam deflection

<electron beam welding> electromagnetic deflection of the beam from the gun axis

[SOURCE: ISO/TR 25901:2007, 2.39]

3.7

working distance

<electron beam welding> distance between the impact point of the beam on detail parts and a reference surface linked to the gun or the machine (example: middle of the closest focusing coil of the detail part, electron beam source base)

3.10

beam current

<electron beam welding> value of the electric current in the beam

[SOURCE: ISO/TR 25901:2007, 2.37]

3.12

slope down

controlled decrease of the beam power at the end of the welding

[SOURCE: ISO/TR 25901:2007, 2.336]

3.13

slope up

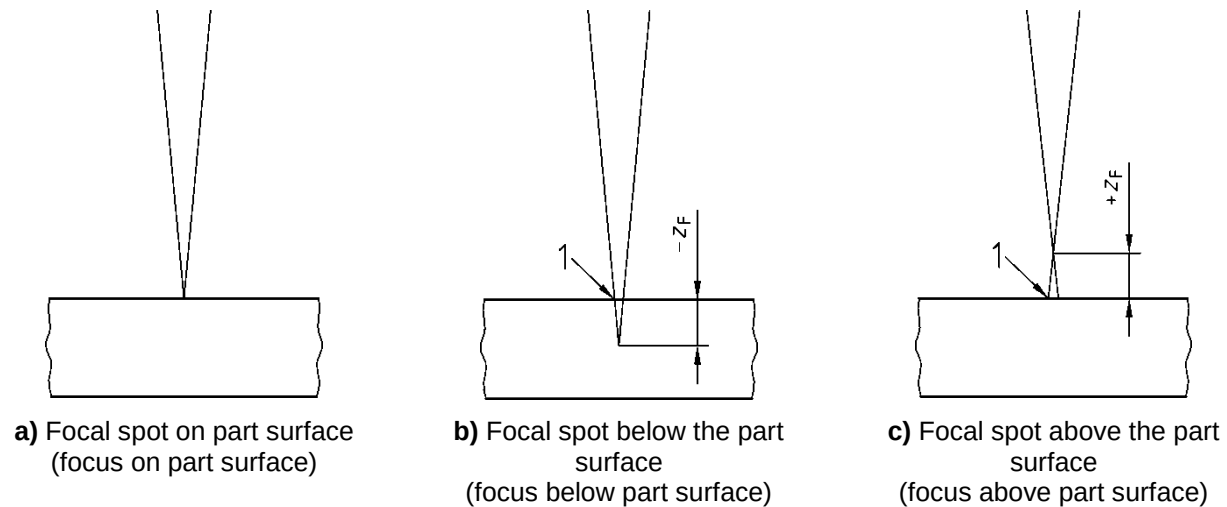
<beam welding> controlled increase of the beam power at the beginning of the welding

[SOURCE: ISO/TR 25901:2007, 2.337]

3.14

focal spot position

coordinates of the focal spot geometrical positions



Key

1 beam spot

z_F distance of the focus to the surface

Figure 1 – Different focal spot positions

Note 1 to entry: Not necessary for machine acceptance or operator qualification.

[SOURCE: ISO 14880-1:2001, 6.2.1.3 – modified: Figure 1 added]

3.15

beam power

energy emitted in the beam propagation direction per unit time at the exit of the beam generator

NOTE 1 to entry In electron beam processes, beam power is the product of accelerating voltage and beam current.

[SOURCE: ISO/TR 25901:2007, 2,41]

3.16

acceleration voltage

difference in potential between the cathode and the anode, used to create the electric field intended to accelerate the electrons

3.18

beam stopper

material to stop the energy from the electron beam after penetration

Note 1 to entry: The material making up the beam stopper should be of a same material or a material compatible with the required quality of the assembly.

3.19

welding speed

rate at which the welding operation progresses in the direction of welding

[SOURCE: ISO 857-1:1998, 5.2.11]

3.20

welding cycle

succession of operations carried out by the machine for the making of a weld and the return to the initial position

[SOURCE: ISO/TR 25901:2007, 2,441]

3.21

cosmetic pass

pass for superficial remelting of the weld in order to enhance appearance

Note 1 to entry: Usually made with a defocused or oscillating beam.

[SOURCE: ISO/TR 25901:2007, 2.75 – modified: Note added]