
**Welding for aerospace applications —
Fusion welding of metallic
components —**

**Part 2:
Acceptance criteria**

iTeh STANDARD PREVIEW
*Soudage pour applications aéronautiques — Soudage par fusion des
composants métalliques —
Partie 2: Critères d'acceptation*
(standards.iteh.ai)

ISO 17927-2:2020

<https://standards.iteh.ai/catalog/standards/sist/82709c88-ad25-47aa-8f25-0a8d8a8fe6f2/iso-17927-2-2020>



iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 17927-2:2020

<https://standards.iteh.ai/catalog/standards/sist/82709c88-ad25-47aa-8f25-0a8d8a8fe6f2/iso-17927-2-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and abbreviated terms	2
5 Conformance	2
6 Acceptance criteria	2
6.1 General	2
6.2 Limits for imperfections	3
Bibliography	10

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 17927-2:2020

<https://standards.iteh.ai/catalog/standards/sist/82709c88-ad25-47aa-8f25-0a8d8a8fe6f2/iso-17927-2-2020>

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 14, *Welding and brazing in aerospace*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html. Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

A list of all parts in the ISO 17927 series can be found on the ISO website.

Welding for aerospace applications — Fusion welding of metallic components —

Part 2: Acceptance criteria

1 Scope

This document specifies acceptance criteria for fusion weldments on metallic components.

It is to be applied provided it is referenced or approved by the responsible engineering/design authority.

This document covers the following processes given in [Table 1](#) and the material groups given in [Table 2](#).

Table 1 — Fusion welding processes covered by this document

Process	Process number (ISO 4063:2009)
Oxyfuel welding	31
Gas shielded arc welding with non-consumable tungsten electrode, gas tungsten arc welding	14
Plasma arc welding	15
Electron beam welding	51
Laser welding, laser beam welding	52

Table 2 — Material groups covered by this document

Material group	Description
A	Unalloyed steel, low alloyed steels, high alloyed ferritic steels
B	Austenitic, martensitic and precipitation hardening steels
C	Titanium and titanium alloys, niobium, zirconium and other reactive metals
D	Aluminium and magnesium alloys
E	Materials that do not conform to other material groups (e.g. molybdenum, tungsten, copper alloys)
F	Nickel alloys, cobalt alloys.

NOTE Material groups according to ISO 24394.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 design/engineering authority

organization having the responsibility for the structural integrity or maintenance of airworthiness of the hardware and compliance with all relevant documents

[SOURCE: ISO 24394:2018, 3.8]

4 Symbols and abbreviated terms

- t* nominal wall or plate thickness
- h* dimension of imperfection
- b* width of weld reinforcement or fillet
- a* nominal throat thickness
- z* nominal leg length

iTeh STANDARD PREVIEW
(standards.iteh.ai)

5 Conformance

When conformance to this document is claimed, all provisions of this document are to be complied with, except those for provisions that the design/engineering authority specifically exempts.

<https://standards.iteh.ai/catalog/standards/sist/82709c88-ad25-47aa-8f25-0a8d8a8fe6f2/iso-17927-2-2020>

6 Acceptance criteria

6.1 General

The dimension of any discontinuity shall be defined by its largest dimension. Two or more discontinuities shall be treated as one when the spacing between them is less than the dimension of the larger discontinuity.

Surface imperfections of the weld may be mechanically removed provided that the weld and adjacent base metal maintain the minimum thickness without undercutting the plane of the base metal. Any additional engineering requirements (e.g. surface roughness) shall also be met. In the case of weldments with variations in cross-section along the joint, the thickness, *t*, shall be considered to be the minimum thickness at the imperfections.

Imperfections that will be removed in subsequent machining shall not be cause for rejection provided inspection is carried out after machining. Any weldment with unacceptable imperfections which has gone through a subsequent manufacturing operation that affects the metallurgical characteristics (other than hydrogen embrittlement relief) or that cannot be rewelded without affecting final metallurgical or surface characteristics shall be rejected.

For fillet welds, the minimum size shall be as specified on the engineering drawings.

When fillet weld size is not specified, the minimum leg length shall be:

- for single side weld: $1,5 t_{\min}$;
- for double side weld: $1 t_{\min}$;

where t_{\min} is the minimum nominal wall or plate thickness.

6.2 Limits for imperfections

Quality level A weld: Weld with high quality acceptance requirements.

Quality level B weld: Weld with moderate quality acceptance requirements.

Quality level C weld: Weld with typical quality acceptance requirements.

The quality levels are as defined by the engineering/drawing and/or specified by the design/engineering authority.

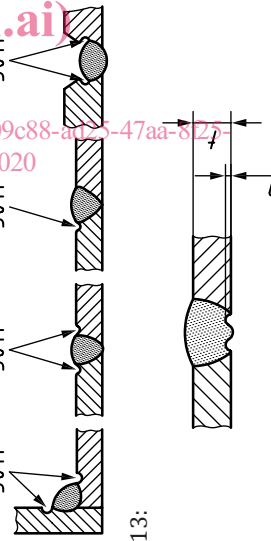
Welds shall be acceptable if they satisfy the conditions of [Table 3](#). Welds not meeting these requirements shall be rejected.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 17927-2:2020](#)

<https://standards.iteh.ai/catalog/standards/sist/82709c88-ad25-47aa-8f25-0a8d8a8fe6f2/iso-17927-2-2020>

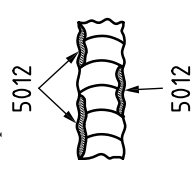
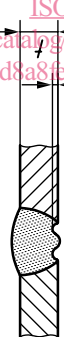
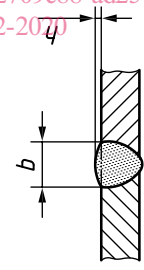
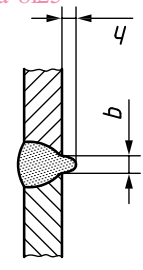
Table 3 — Limits for imperfections

No.	Reference to ISO 6520-1	Imperfection designation	Remarks	t mm	Limits for imperfections for quality levels		
					A	B	C
1 Surface imperfections							
1.1	100	Crack		—	Not permitted	Not permitted	Not permitted
1.2	104	Crater crack		—	Not permitted	Not permitted	Not permitted
1.3	2017, 2018	Surface pore, Surface porosity	Individual size maximum	—	0,25 t or 0,76 mm, whichever is less	0,33 t or 1,50 mm, whichever is less	0,50 t or 2,30 mm, whichever is less
1.4	2018, 516	Surface porosity ^b Root porosity ^b	Spacing minimum ^a	—	8 times the size of the larger adjacent imperfection	4 times the size of the larger adjacent imperfection	2 times the size of the larger adjacent imperfection
			Accumulated length in any 75 mm of weld maximum	—	1 t or 3,00 mm, whichever is less	1,33 t or 6,00 mm, whichever is less	2 t or 9,00 mm, whichever is less
1.5		Craters	Maximum depth	—	0,20 t or 0,80 mm whichever is less	0,20 t or 1,30 mm whichever is less	0,20 t or 1,30 mm whichever is less
			Maximum length	—	1 t	1 t	2 t
1.6	401	Lack of fusion (incomplete fusion)	—	—	Not permitted	Not permitted	Not permitted
1.7	402	Incomplete penetration	Not applicable for fillet welds.	—	Not permitted	Not permitted	Not permitted
1.8	5011, 5013	Continuous undercut Shrinkage groove (root undercut)	Undercut of significant length without interruption (in accordance with ISO 6520-1).	—	0,05 mm	0,015 t or 0,05 mm, whichever is greater	0,025 t or 0,05 mm, whichever is greater
			Maximum depth, h		—		

^a Multiple pores with spacing below the minimum may be evaluated as a single pore with a size measured from the furthest extent of one pore to the furthest extend of the other.

^b Ignore discontinuities that are 0,13 mm, or smaller.

Table 3 (continued)

No.	Reference to ISO 6520-1	Imperfection designation	Remarks	t mm	Limits for imperfections for quality levels		
					A	B	C
1.9	5012,	Intermittent undercut	Short length of undercut, intermittent along the weld (in accordance with ISO 6520-1). Individual maximum depth 	—	0,07 t or 0,76 mm, whichever is less	0,10 t or 1,27 mm, whichever is less	0,20 t or 1,78 mm, whichever is less
	5013	Shrinkage groove (root undercut)					
1.10	502,	Excess weld metal (butt weld)	Maximum accumulated length greater than that allowed for No. 1.8 in any 75 mm of weld length 	—	5,08 mm	15,24 mm	25,4 mm
	504	Excessive penetration					
		Machine welds					
		Manual welds					
				≤9,53	1/3 t or 0,76 mm whichever is greater	No stated requirement	No stated requirement
				>9,53	max. 3,18 mm	No stated requirement	No stated requirement
				<3,18	1 t maximum	No stated requirement	No stated requirement
				3,18 to 12,9	1/3 t or 2,54 mm, whichever is greater	No stated requirement	No stated requirement
				>12,9	4,32 mm maximum	No stated requirement	No stated requirement

iTeh STANDARD PREVIEW (standard.iteh.ai)

ISO 17927-2:2020
<https://standards.iteh.ai/catalog/standards/sist/82709c88-ad25-47aa-8f25-0a8d8a8fb6f2/iso-17927-2-2020>

^a Multiple pores with spacing below the minimum may be evaluated as a single pore with a size measured from the furthest extent of one pore to the furthest extend of the other.

^b Ignore discontinuities that are 0,13 mm, or smaller.