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Welding and allied processes — Vocabulary —

Part 1: General terms

Soudage et techniques connexes — Vocabulaire —

Partie 1: Termes généraux

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Contents

Page

Foreword

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 7, *Representation and terms*, in collaboration with Commission VI, *Terminology,* of the *International Institute of Welding* (*IIW*).

This first edition of ISO/TR 25901—1, together with the other parts of ISO/TR 25901, cancels and replaces ISO 857—1:1998 and ISO/TR 25901:2007, of which it constitutes a revision.

ISO/TR 25901 consists of the following parts, under the general title *Welding and allied processes — Vocabulary*:

— *Part 1: General terms* [Technical Report]

— *Part 3: Welding processes* [Technical Report]

— *Part 4: Arc welding* [Technical Report]

The following parts are under preparation:

— *Part 2: Safety and health* [Technical Report]

Friction welding is to form the subject of a future part 5.

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Welding and allied processes — Vocabulary —

Part 1: General terms

1 Scope

This part of ISO/TR 25901 contains general terms and definitions applicable to welding and allied processes.

It does not contain terms and definitions related to specific processes or particular aspects of welding and allied processes that are covered in other parts of this Technical Report (see Foreword) or in other ISO standards.

In the main body of this part of ISO/TR 25901, terms are arranged in a systematic order. Annex A provides an index in which all terms are listed alphabetically with reference to the appropriate subclause. In addition, it provides French translations, covering two of the three official ISO languages (English, French and Russian). German translations are also provided; these are published under the responsibility of the member body for Germany (DIN), and are given for information only.

NOTE 1 Only the terms given in the official languages (English, French and Russian) are to be considered as ISO terms and definitions.

NOTE 2 All these terms and definitions are also available on the ISO Online Browsing Platform (OBP): https://www.iso.org/obp/ui/

2 Terms and definitions

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

2.1 Terms related to welding and allied processes

2.1.1 General terms

2.1.1.1
welding
joining process in which two or more parts are united producing a continuity in the nature of the workpiece material(s) by means of heat or pressure or both, and with or without the use of *filler material* (2.1.10.4)

Note 1 to entry: Welding processes may be used also for *surfacing* (2.1.9.1) and remelting.

2.1.1.2
fusion welding
welding (2.1.1.1) involving localized melting without the application of external force in which the fusion surface(s) has (have) to be melted with or without addition of *filler material* (2.1.10.4)

2.1.1.3
weld
result of *welding* (2.1.1.1)

Note 1 to entry: The weld includes the *weld metal* (2.1.2.1) and the *heat-affected zone* (2.1.2.2).

2.1.1.4
weldment
assembly incorporating one or more *welded joint(s)* (2.1.4.2)

2.1.1.5
parent material
base material
material to be joined, or surfaced, by *welding* (2.1.1.1), braze welding or brazing

2.1.1.6
parent material thickness
material thickness
nominal thickness (2.1.7.7) of the materials to be welded

2.1.1.7
parent metal
base metal
metallic *parent material* (2.1.1.5)

2.1.1.8
manual welding
welding (2.1.1.1) in which the *electrode* (2.3.8) holder, gun, *torch* (2.3.9) or blowpipe is manipulated by hand

2.1.1.9
partly mechanized welding
semiautomatic welding
manual welding (2.1.1.8) where wire feed is mechanized

2.1.1.10
mechanized welding
fully mechanized welding
welding (2.1.1.1) where the required *welding parameters* (2.4.1) are maintained by mechanical or electronic means

Note 1 to entry: Manual adjustment of welding parameters by the *welding operator* (2.5.25) during welding is possible.

2.1.1.11
automatic welding
welding (2.1.1.1) in which all operations are performed without *welding operator* (2.5.25) intervention during the process

Note 1 to entry: Manual adjustment of *welding parameters* (2.4.1) by the welding operator during welding is not possible.

2.1.1.12
robotic welding
welding (2.1.1.1) that is performed and controlled by robotic equipment

2.1.1.13
gouging
thermal cutting process variation that forms a groove by melting or burning

2.1.1.14
arc gouging
gouging (2.1.1.13) using an arc cutting process variation

2.1.1.15
air-arc gouging
gouging (2.1.1.13) using a carbon *electrode* (2.3.8) and compressed air

2.1.2 Characterization of welds

2.1.2.1
weld metal
all metal melted during *welding* (2.1.1.1) and retained in the *weld* (2.1.1.3)

2.1.2.2
heat-affected zone
HAZ
portion of non-melted *parent metal* (2.1.1.7) whose microstructure has been affected

2.1.2.3
weld zone
zone containing the *weld metal* (2.1.2.1) and the *heat-affected zones* (2.1.2.2)

2.1.2.4
deposited metal
filler metal that has been added during *welding* (2.1.1.1)

2.1.2.5
fusion line
interface between the *weld metal* (2.1.2.1) and the non-melted *parent metal* (2.1.1.7) as determined on the cross section of a *weld* (2.1.1.3)

2.1.2.6
fusion zone
in the *weld metal* (2.1.2.1), part of the *parent metal* (2.1.1.7) that has been melted, as determined on the cross section of a *weld* (2.1.1.3)

2.1.2.7
all-weld metal
weld metal (2.1.2.1) consisting of *deposited metal* (2.1.2.4) without *dilution* (2.1.2.12)

2.1.2.8
weld pool
molten pool
pool of liquid metal formed during *fusion welding* (2.1.1.2)

Note 1 to entry: In electroslag welding, the term includes the *slag* (2.1.10.9) bath.

2.1.2.9
as welded
condition of the *weld* (2.1.1.3) after *welding* (2.1.1.1), prior to any subsequent thermal, mechanical, or chemical treatments

Note 1 to entry: For alloys that may undergo natural ageing (e.g. some aluminium alloys), the as welded condition lasts only for a limited period of time.

2.1.2.10
ferrite number
FN
arbitrary standardized value designating the ferrite content of nominally austenitic or austenitic-ferritic (duplex) type stainless steel *weld metal* (2.1.2.1) based on its magnetic properties

2.1.2.11
metallurgical deviation
<*welding*> changes in the mechanical properties and/or metallurgical structure of the *weld metal* (2.1.2.1) or *heat-affected zone* (2.1.2.2) compared to the properties of the *parent metal* (2.1.1.7)

2.1.2.12
dilution
mixing of melted *parent metal* (2.1.1.7) and *deposited metal* (2.1.2.4) expressed as a ratio of the melted parent metal to the total melted mass

2.1.2.13
dilution rate
dilution (2.1.2.12) expressed as a percentage

2.1.2.14
residual welding stress
stress remaining in a metal part or structure as a result of *welding* (2.1.1.1)

2.1.2.15
strength weld
weld (2.1.1.3) designed to withstand stress

2.1.2.16
joint efficiency
ratio of strength of a *joint* (2.1.4.1) to the strength of the *parent metal* (2.1.1.7), expressed as a percentage

2.1.3 Imperfections

2.1.3.1
imperfection
discontinuity in the *weld* (2.1.1.3) or a deviation from the intended geometry

Note 1 to entry: Imperfections are cracks, lack of penetration, porosity, *slag* (2.1.10.9) inclusions.

2.1.3.2
internal imperfection
imperfection (2.1.3.1) that is not open to a surface or not directly accessible

2.1.3.3
systematic imperfection
imperfections (2.1.3.1) that are repeatedly distributed in the *weld* (2.1.1.3) over the weld lengths to be examined

2.1.3.4
projected area
area where *imperfections* (2.1.3.1) distributed along the volume of the *weld* (2.1.1.3) under consideration are imaged two-dimensionally

2.1.3.5
hot crack(s)
material separations occurring at high temperatures along the grain boundaries (dendrite boundaries) when the level of strain and the strain rate exceed a certain level

Note 1 to entry: Small cracks visible only at magnifications greater than 50×, are often described as microcracks.

2.1.3.6
solidification crack
hot crack (2.1.3.5) formed during solidification from the liquid phase of *weld metals* (2.1.2.1)

Note 1 to entry: It usually extends up to the surface of the weld metal, but sometimes can be subsurface.

2.1.3.7
liquation crack
hot crack (2.1.3.5) formed by liquation in the *heat-affected zone* (2.1.2.2) of the *parent material* (2.1.1.5) or in multirun welds where *weld metal* (2.1.2.1) is reheated by subsequent *runs* (2.1.8.4)

2.1.3.8
ductility dip crack
hot crack (2.1.3.5) formed during *welding* (2.1.1.1) by a reduction in hot ductility

Note 1 to entry: As with a *liquation crack* (2.1.3.7), it can occur in the *heat-affected zone* (2.1.2.2) of the *parent material* (2.1.1.5) or in multirun welds.

2.1.3.9
cold crack(s)
local rupture (intergranular or transgranular) appearing in a *weld* (2.1.1.3) as a result of a critical combination of microstructure, stress and hydrogen content

2.1.4 Type of joints

2.1.4.1
joint
junction of workpieces or the edges of workpieces that are to be joined or have been joined

2.1.4.2
welded joint
assembly that is produced by *welding* (2.1.1.1) together two or more parts

2.1.4.3
multiple joint
type of *joint* (2.1.4.1) where three or more parts meet at any required angles to each other

2.1.4.4
parallel joint
type of *joint* (2.1.4.1) where the parts lie parallel to each other

EXAMPLE In explosive cladding.

2.1.4.5
butt joint
type of *joint* (2.1.4.1) where the parts lie in the same plane and against one another at an angle of 135° to 180°

2.1.4.6
T-joint
angle joint (2.1.4.8) where the parts meet each other forming a T-shape

2.1.4.7
lap joint
type of *joint* (2.1.4.1) where the parts lie parallel to each other (0° to 5°) and overlap each other

2.1.4.8
angle joint
type of *joint* (2.1.4.1) where one part meets the other at an acute angle greater than 5° but not more than 90°

Note 1 to entry: For a *fillet weld* (2.1.6.11), the angle is over 5° and less than 45°.

Note 2 to entry: For a *butt weld* (2.1.6.3), the angle is between 45° to 90° inclusive.

2.1.4.9
corner joint
type of *joint* (2.1.4.1) where two parts meet at their edges at an angle between 30° and 135° to each other

2.1.4.10
edge joint
type of *joint* (2.1.4.1) where two parts meet at their edges at an angle of 0° to 30°

2.1.4.11
cross joint
type of *joint* (2.1.4.1) where two parts lie crossing over each other

EXAMPLE Wires that cross over each other.

2.1.4.12
cruciform joint
type of *joint* (2.1.4.1) where two parts lying in the same plane each meet, at right angles, a third part lying between them

2.1.4.13
homogeneous joint
welded joint (2.1.4.2) in which the *weld metal* (2.1.2.1) and *parent material* (2.1.1.5) have no significant differences in mechanical properties and/or chemical composition

Note 1 to entry: A *welded joint* (2.1.4.2) made of similar *parent materials* (2.1.1.5) without filler metal is considered homogeneous.

2.1.4.14
heterogeneous joint
welded joint (2.1.4.2) in which the *weld metal* (2.1.2.1) and *parent material* (2.1.1.5) have significant differences in mechanical properties and/or chemical composition

2.1.4.15
dissimilar material joint
welded joint (2.1.4.2) in which the *parent materials* (2.1.1.5) have significant differences in mechanical properties and/or chemical composition

2.1.5 Joint preparations

2.1.5.1
edge preparation
surface prepared on the edges of a part to be welded

2.1.5.2
joint preparation
weld preparation
configuration of the workpieces to be joined after each individual part has been suitably prepared and assembled

2.1.5.3
fusion face
surface of the *parent metal* (2.1.1.7) to be melted during *welding* (2.1.1.1)

2.1.5.4
feather edge
complete absence of a *root face* (2.1.5.10)

2.1.5.5
gap
air gap
distance at any cross section between edges, ends or surfaces to be joined

2.1.5.6
edge distance
distance between the centre of a *weld* (2.1.1.3) and the nearest edge of the workpiece

2.1.5.7
root
DEPRECATED: root of weld
zone on the opposite side from where the *welding* (2.1.1.1) was performed

2.1.5.8
root gap
gap (2.1.5.5) between the *root faces* (2.1.5.10)

2.1.5.9
root radius
radius of the curved portion of the *fusion face* (2.1.5.3) in a part prepared for a single-J, single-U, double-J or double-U weld

2.1.5.10
root face
portion of a *fusion face* (2.1.5.3) that is not beveled or grooved

2.1.5.11
land
part of a *fusion face* (2.1.5.3) that supports the *weld pool* (2.1.2.8)

Note 1 to entry: An example is the horizontal area between the *root face* (2.1.5.10) and the curved part of a J or U preparation.

2.1.5.12
bevel angle
angle between the bevel of a *joint* (2.1.4.1) member and a plane perpendicular to the surface of the member

2.1.5.13
included angle
groove angle
angle between the planes of the *fusion faces* (2.1.5.3) of parts to be welded

2.1.6 Types of welds

2.1.6.1
full penetration weld
weld (2.1.1.3) with a complete *fusion penetration* (2.1.7.3)

2.1.6.2
partial penetration weld
weld (2.1.1.3) in which the *fusion penetration* (2.1.7.3) is intentionally less than full penetration

2.1.6.3
butt weld
groove weld
weld (2.1.1.3) other than a *fillet weld* (2.1.6.11) made in a groove or in a square preparation

2.1.6.4
single-J butt weld
butt weld (2.1.6.3) in a single-J preparation

2.1.6.5
double-J butt weld
butt weld (2.1.6.3) in a double-J preparation

2.1.6.6
single-U butt weld
butt weld (2.1.6.3) in a single-U preparation

2.1.6.7
double-U butt weld
butt weld (2.1.6.3) in a double-U preparation

2.1.6.8
single-V butt weld
butt weld (2.1.6.3) in a single-V preparation

2.1.6.9
double-V butt weld
butt weld (2.1.6.3) in a double-V preparation

2.1.6.10
square butt weld
butt weld (2.1.6.3) in a square preparation

2.1.6.11
fillet weld
triangular *weld* (2.1.1.3) between two or more parts for joining a *T-joint* (2.1.4.6), *corner joint* (2.1.4.9) or *lap joint* (2.1.4.7)

2.1.6.12
plug weld
weld (2.1.1.3) made by filling a circular or elongated hole in one part of a workpiece with filler metal so as to join it to the surface of an overlapping part exposed through the hole

2.1.6.13
seal weld
weld (2.1.1.3) intended primarily to provide tightness against leakage of gas or fluid

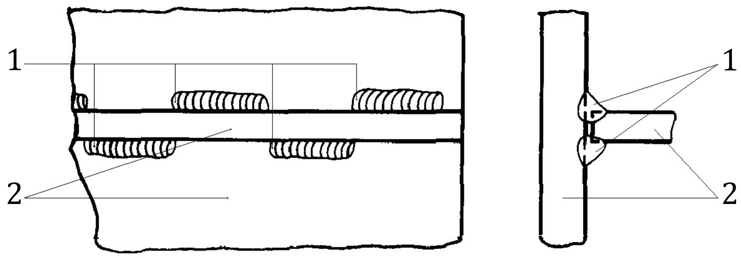
2.1.6.14
slot weld
weld (2.1.1.3) between two overlapping parts made by depositing a *fillet weld* (2.1.6.11) round the periphery of a hole in one part so as to join it to the surface of the other part exposed through the hole

2.1.6.15
intermittent weld
series of weld elements made at intervals along a *joint* (2.1.4.1)

2.1.6.16
staggered intermittent weld
intermittent weld (2.1.6.15) on each side of a *joint* (2.1.4.1) arranged so that the welds on one side lie opposite to the spaces on the other side along the joint

Note 1 to entry: These are usually *fillet welds* (2.1.6.11) in *T-joints* (2.1.4.8) and *lap joints* (2.1.4.7).

Note 2 to entry: A staggered intermittent weld is illustrated in Figure 1.



Key

1 weld

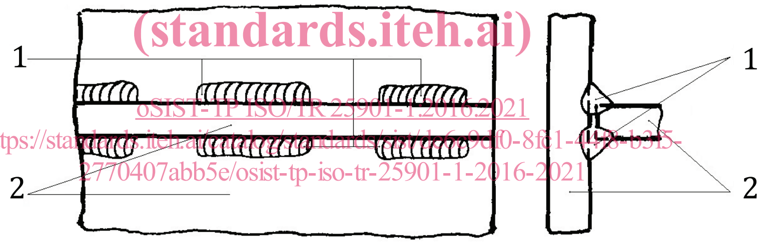
2 workpiece

Figure 1 — Staggered intermittent weld

2.1.6.17
chain intermittent weld
intermittent weld (2.1.6.15) on each side of a *joint* (2.1.4.1) arranged so that the welds lie opposite to one another along the joint

Note 1 to entry: These are usually *fillet welds* (2.1.6.11) in *T-joints* (2.1.4.8) and *lap joints* (2.1.4.7).

Note 2 to entry: A chain intermittent weld is illustrated in Figure 2.



Key

1 weld

2 workpiece

Figure 2 — Chain intermittent weld

2.1.6.18
flare-bevel weld
butt weld (2.1.6.3) between a joint member with a curved surface and another with a planar surface

2.1.6.19
flare-V weld
butt weld (2.1.6.3) between two members with curved surfaces

2.1.7 Weld details

2.1.7.1
weld width
shortest distance between the outer toes of the surface of a *weld* (2.1.1.3)