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Australia



Welding, brazing and cutting of metals — Glossary of terms



AS 2812:2024

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- Bureau of Steel Manufacturers of Australia
- Energy Networks Australia
- Engineers Australia
- Materials Australia
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Preface

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee WD-003, Welding Definitions and Symbols, to supersede AS 2812:2005.

The objective of this document is to provide definitions of terms used in connection with welding, brazing, and cutting of metals to serve as a basis for securing uniformity in terminology in the welding industry, standard, and welding education throughout Australia. Process abbreviations that are commonly used in industry, e.g. MMAW, are included.

Terms may be listed in more than one section. Where the term is repeated in later sections, reference is made to the primary listing location. Non-preferred terms are not defined, rather they refer to the preferred term. In addition, the terms in each section are arranged in a purely alphabetical sequence.

Figures illustrating more than one term or repeated terms are grouped in an appendix. Figures showing derivation of various processes are included.

An alphabetical index of all defined terms is also included.

The major changes to this edition are as follows:

- (a) New terms have been added — 1.001, 1.139, 1.140, 2.012, 2.013, 2.025, 2.033, 2.038, 2.039, 2.073, 2.078, 2.094, 2.095, 2.097, 4.249, 5.013, 10.034.
- (b) The following terms have been modified primarily to clarify their meaning or correct an error — 2.003, 2.040, 2.063, 2.087, 2.091, 2.105, 3.267, 3.275.
- (c) All terms have been renumbered.
- (d) Terms and definitions relating to personnel have been grouped in a new [Section 11](#), and are repeated in other sections, as appropriate.
- (e) Updated the format to the current Standards Australia styling.

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NOTES

Australian Standard®

Welding, brazing and cutting of metals — Glossary of terms

1 Definitions of processes

1.001

additive manufacturing

deposition of weld metal using a welding process and filler metal to create a new component either separately or joined to an existing component

Note 1 to entry: Filler metal can be in wire, strip, or powder form.

1.002

air-arc cutting

thermal cutting using an arc for melting the metal and a stream of air to remove the molten metal to enable a cut to be made

1.003

air-arc gouging

formation of a groove by means of air-arc cutting

1.004

aluminothermic welding

thermit welding

thermite welding

welding process in which an aluminothermic reaction takes place within a crucible and the resultant molten metal and aluminium oxide slag flows into a weld joint contained by a mould (see [Figure 1.1](#))

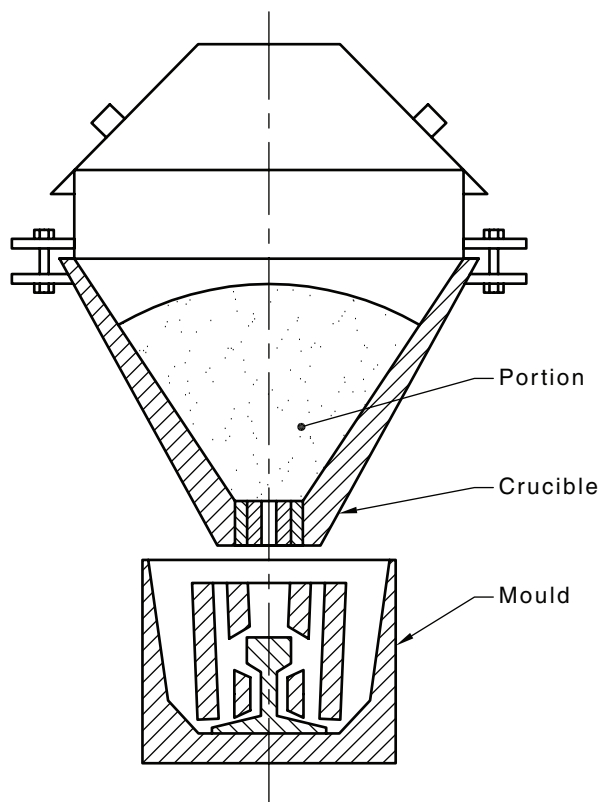


Figure 1.1 — Aluminothermic welding

1.005**arc braze welding**

brazing welding process in which the heat required is obtained from an electric arc

1.006**arc cutting**

thermal cutting using heat of an arc between an electrode, which may or may not be metallic, and the base metal

1.007**arc-image welding**

radiation welding where an optical system is used for focusing the emitted radiation from a high temperature source, such as a high pressure plasma arc, on to the work

1.008**arc spot-welding**

arc welding in which overlapping parts are joined by fusing through one component into the other and so producing a fusion spot weld at the faying surfaces

1.009**arc spraying**

thermal spraying using, as a heat source, an electric arc between two consumable electrodes of a coating material, and a compressed gas, which is used to atomize and propel the material to the substrate

1.010**arc stud welding**

stud welding wherein the heat for the process is obtained from an arc between the stud base and the work piece

Note 1 to entry: The weld may be protected either by a ferrule, flux or gas shielding. The process is usually controlled automatically.

1.011**arc welding**

fusion welding in which heat for welding is obtained from an electric arc or arcs

1.012**atomic-hydrogen welding**

arc welding in which molecular hydrogen, passing through an arc between two tungsten or other suitable electrodes, is changed to its atomic form and then recombines to supply the heat for welding or brazing

1.013**auto-contact welding**

arc welding wherein heating is provided by an arc between the work and a covered electrode which is fed into the weld pool by a spring-loaded mechanism without assistance from the welder. (1.061)

1.014**bare metal arc welding**

arc welding in which a bare electrode is used without gas or flux shielding

1.015**brazing welding****bronze welding**

joining of metals using a technique similar to fusion welding and a bronze welding filler metal with a lower melting point than the parent metal, but neither using capillary action as in brazing nor melting the parent metal

1.016**brazing**

a joining process in which, during or after heating, molten filler metal is drawn by capillary attraction into, or retained in, the space between closely adjacent surfaces of the parts to be joined

Note 1 to entry: In general, the melting point of the filler metal is above 450 °C, but always below the melting temperature of the parent metal

1.017**butt resistance-seam welding**

modification of seam welding in which heat is produced progressively and continuously by means of wheels, rolls, or dies carrying the welding current and the upset weld is completed by pressure applied by other wheels, rolls, or dies not carrying current

1.018**capacitor discharge spot-welding**

resistance spot-welding in which welding current is caused to flow through the secondary winding of a transformer and the welding electrodes by the discharging of a capacitor through the primary winding of the transformer

1.019**capacitor discharge stud welding**

stud welding where a low-voltage electrostatic storage system is used as a heating source

Note 1 to entry: The welding energy, stored at low-voltage in capacitors of high capacitance, is discharged through the stud across a small air gap to the work, in several milliseconds. A flux or protective atmosphere is not normally required.

1.020**carbon-arc cutting**

arc cutting using a carbon electrode

1.021**carbon-arc welding**

arc welding with a carbon electrode, with or without the use of filler metal

1.022**CO₂ welding**

gas metal-arc welding using carbon dioxide as a shielding gas

1.023**coated wire metal-arc welding**

arc welding in which a continuous consumable covered electrode is used

Note 1 to entry: Shielding is obtained by the decomposition of the electrode covering and may be supplemented by externally supplied shielding gas. Filler metal is obtained from both the core wire and the straight or spirally wound surface wires through which the welding current is conducted.

1.024**cold pressure welding**

solid state welding in which pressure alone is used to cause plastic deformation of the welding surfaces

1.025**consumable guide electroslog welding**

electroslog welding in which the consumable electrode is fed through a fixed guide tube located between the fusion faces

Note 1 to entry: As the welding proceeds, the guide tube is progressively melted into the welding pool. Guides may be either bare or flux-coated and more than one wire may be fed through different tubes in the same guide.

1.026**continuous resistance-seam welding**

resistance welding in which force and electric current are applied continuously to produce a linear lap weld, the work piece being between two electrode wheels or between an electrode wheel and electrode bar

Note 1 to entry: The wheels apply the force and current and rotate continuously during the making of the linear weld.

1.027**controlled dip welding**

form of waveform-controlled arc welding specifically applied to the short-circuiting arc transfer process (1.139 and 3.211)

1.028**deseaming**

removal of surface defects from hot or cold ingots, blooms, billets or slabs by means of manual or mechanized oxygen-fuel gas cutting process

1.029**diffusion brazing**

brazing wherein the filler metal is diffused with the base metal to the extent that the joint properties have been changed to approach those of the base metal

1.030**diffusion welding**

solid state welding in which the work pieces being joined are held together at a pressure insufficient to cause macroscopic deformation to take place and the weld is formed by diffusion at the interface

Note 1 to entry: Relative motion of the work pieces does not take place. Heat and solid filler metal may or may not be used.

1.031**dip brazing**

brazing in which the required heat is furnished by a molten chemical or metal bath

Note 1 to entry: When a molten chemical bath is used, the bath may act as a flux. When a molten metal bath is used, the bath provides the filler metal.

1.032**dip soldering**

soldering in which the required heat is furnished by a molten metal or chemical bath that provides the solder filler metal

1.033**electrogas welding****EGW**

arc welding in the vertical or near vertical position using a gas-shielded consumable electrode to deposit metal into a molten pool, retained in the joint by cooled shoes, which move progressively upwards as the joint is made

1.034**electron-beam cutting**

cutting process that uses the heat obtained from a concentrated beam composed primarily of high velocity electrons that impinge upon the work pieces to be cut; it may or may not use an externally supplied gas

1.035 electron-beam welding EBW

radiation welding in which the heat for welding is obtained from the high-energy density of a focused beam of accelerated electrons

Note 1 to entry: Welding may be done in vacuum or part vacuum, or in air.

1.036 electroslag welding ESW

fusion welding utilizing the heat generated by the passage of electric current through a conducting bath of molten slag

Note 1 to entry: The current is supplied through a consumable wire electrode (or electrodes), which is fed continuously into the slag where it melts and joins the weld pool under the slag. Both the weld pool and the slag are contained in a vertical, or near-vertical joint preparation by cooling shoes, which move progressively upward with the progress of the weld (see [Figure 1.2](#)).

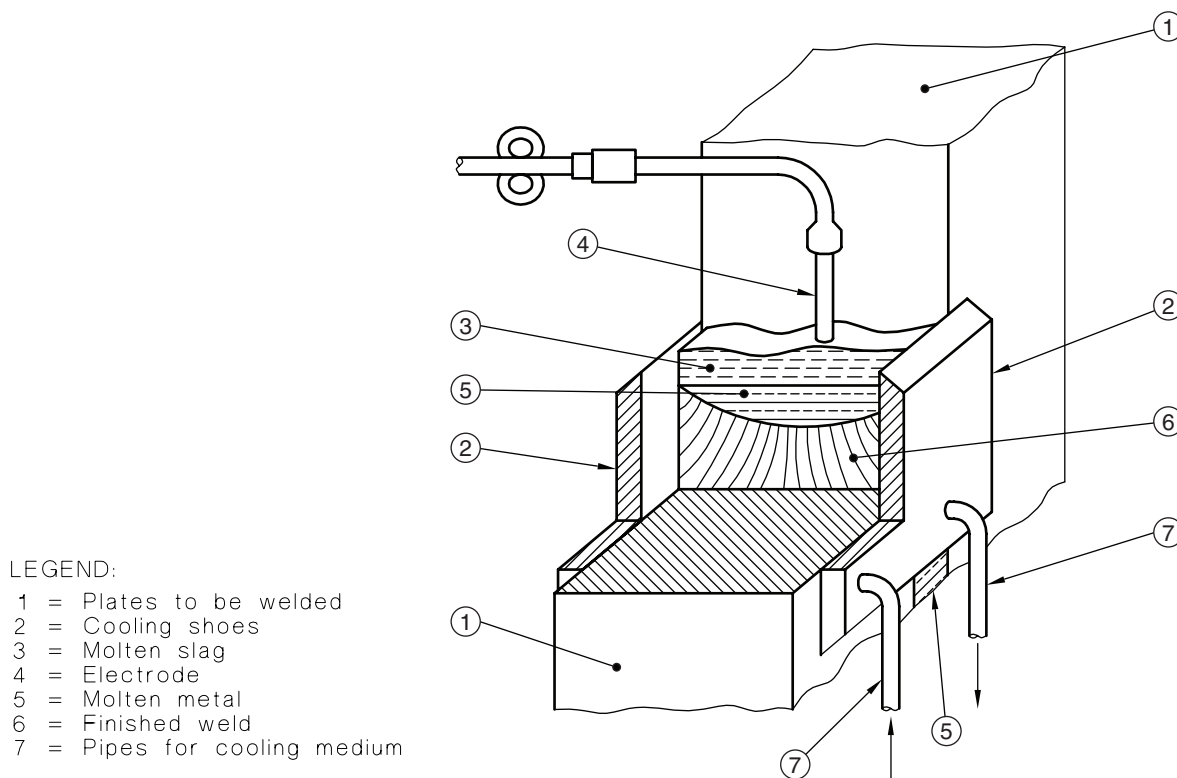


Figure 1.2 — Electroslag welding (ESW)

1.037 explosion welding

solid state lap joining or cladding in which the overlapping work pieces are welded when impacted together by the detonation of an explosive charge

1.038 firecracker welding

metal-arc welding in which a covered electrode or electrodes are laid on the parent metal

Note 1 to entry: The arc is started between one end of the electrode and the work and travels along the work as the electrode melts.

1.039**flame braze welding**

braze welding in which the required heat is furnished by an air-fuel gas or oxygen-fuel gas flame

1.040**flame brazing**

brazing in which heat required is supplied by the flame from an air-fuel gas or oxygen-fuel gas blowpipe

1.041**flame cutting**

oxygen cutting in which the appropriate part of the material to be cut is raised to ignition temperature by an oxygen-fuel gas flame

1.042**flame gouging**

forming of a groove by flame cutting using a special low velocity nozzle

1.043**flame pressure welding gas pressure welding**

hot pressure welding using heat from an oxygen-fuel gas flame

1.044**flame soldering**

soldering in which the heat required is supplied by the flame from an air-fuel gas or oxygen-fuel gas blowpipe

1.045**flame spraying**

thermal spraying in which an oxygen-fuel gas flame is the source of heat for melting the coating material

Note 1 to entry: Compressed gas may or may not be used for atomizing and propelling the material to the substrate.

1.046**flame washing**

method of surface shaping and dressing of metal by flame cutting using a nozzle-shaped cutting oxygen stream

1.047**flash butt welding****resistance flash butt welding****FBW**

resistance butt welding in which the components are progressively advanced towards each other while the current, confined to localized points of contact, causes expulsion of molten metal, where when welding temperature is reached, upset force is applied

1.048**flux cored arc welding****FCAW**

arc welding using a consumable continuous flux cored electrode that provides the filler metal

Note 1 to entry: Shielding is provided by the flux contained within the electrode. Additional shielding may be obtained from an externally supplied gas or gas mixture.

1.049**foil butt seam welding tape butt seam welding**

seam welding of two close square-butt components with metal tape or wire placed or fed centrally to bridge one or both sides of the joint

1.050**forge welding**

solid state welding in which the welding temperature is obtained by heating in a forge or other furnace and the weld achieved by applying impulsive pressure or blows

1.051**friction brazing**

brazing where heat is obtained from mechanically induced sliding motion between the abutting surfaces

1.052**friction welding**

solid state butt welding where one component is rotated relative to and in contact with the mating part to produce heat at the rubbing surfaces, the weld being completed by an upset force maintained after relative rotation has ceased

Note 1 to entry: See also [4.249](#).

1.053**furnace brazing**

brazing in which the parts to be joined complete with pre-placed filler metal are raised to brazing temperature in a furnace that may contain a protective atmosphere

1.054**furnace soldering**

soldering in which the parts to be joined are placed in a furnace heated to a suitable temperature

1.055**fusion welding**

welding in which the weld is made between metals in a molten state without the application of pressure (see [Figure A.3](#))

1.056**gas flux brazing**

a brazing method in which flux is entrained by the fuel gas and passes through the flame to the joint

1.057**gas metal-arc cutting**

arc cutting using an arc between a continuous metal (consumable) electrode and the work

Note 1 to entry: Shielding is obtained entirely from an externally supplied gas or gas mixture.

1.058**gas metal-arc welding****GMAW**

arc welding using a consumable continuous solid electrode that provides the filler metal

Note 1 to entry: Shielding is obtained entirely from an externally supplied gas or gas mixture.

1.059**gas tungsten-arc welding****GTAW****TIG welding****TIG**

arc welding using a non-consumable electrode of pure or activated tungsten with or without the use of filler metal

Note 1 to entry: Shielding is obtained from an externally supplied gas or gas mixture.

1.060**gas welding**

welding in which the heat for welding is produced by the combustion of acetylene with an admixture of oxygen

Note 1 to entry: Filler metal(s) may or may not be used.

1.061**gravity welding**

arc welding wherein heating is provided by an arc between the work and a covered electrode, which is fed into the weld pool by gravitational forces through a mechanism that also provides translatory motion

1.062**high frequency pressure welding****HF pressure welding**

pressure welding in which heat derived from a high frequency alternating electric current of at least 10 kHz, induced or conducted into the work piece, is used to plasticize the surfaces to be united

1.063**high frequency resistance welding****HF resistance welding**

resistance welding in which an alternating electric current of at least 10 kHz is fed through contacts of the work to provide the heat for welding

Note 1 to entry: The high frequency current concentrates along adjacent surfaces to produce highly localized heat prior to the application of welding force.

1.064**high energy rate welding**

solid state welding where the heat for welding is obtained by rapid internal frictional heating at extremely high deformation rates at the weld interface as a result of the discharge of stored energy

Note 1 to entry: The energy source may be pneumatic, hydraulic, mechanical, or chemical.

1.065**hot cropping**

oxygen cutting of hot ingots, blooms, billets, and slabs to required lengths

1.066**hot pressure welding**

solid state welding where both heat and pressure are used to produce plastic flow of the surfaces to be joined

1.067**induction brazing**

brazing in which heat required is obtained from the resistance of the parts to be joined to induced electric current

Note 1 to entry: Filler metal is pre-placed and a protective atmosphere may be used.

1.068**induction soldering**

soldering in which the heat required is obtained from the resistance of the work to induced electric current

Note 1 to entry: Filler metal is pre-placed and a protective atmosphere may be used.

1.069**induction welding**

welding in which the heat for welding is produced by induction heating (usually high frequency) with or without the application of pressure

1.070**inertia friction welding**

friction welding, where the energy provided by the inertia of parts moving relatively produces the heat for welding

1.071**infrared brazing**

a furnace brazing process wherein the heat required is furnished by infrared radiation

1.072**infrared soldering**

soldering in which the required heat is furnished by infrared radiation

1.073**interrupted seam welding**

resistance welding in which force is applied continuously and current intermittently to produce a linear weld, the work piece being between two electrode wheels or between an electrode wheel and an electrode bar

Note 1 to entry: The wheels apply the force and current and rotate continuously during the making of the linear weld.

1.074**ion beam welding**

radiation welding carried out in vacuum, wherein the heat for welding is obtained by concentrating a beam of accelerated ions on the work piece

1.075**iron soldering**

soldering in which the required heat is obtained from a soldering bit

1.076**laser-beam cutting**

cutting process that severs materials with the heat obtained from the application of a concentrated coherent light beam impinging upon the work piece to be cut

Note 1 to entry: The process can be used with or without externally supplied gas.

1.077**laser-beam welding****LBW**

radiation welding wherein the heat for welding is obtained by concentrating a beam of coherent light on the work piece

1.078**MAG welding**

gas metal-arc welding where a reactive gas, a mixture of reactive gases, or a mixture of reactive and inert gases, is used for shielding

1.079**magnetic rotating arc welding**

see 1.080

1.080**magnetically impelled arc butt welding
rotating arc welding**

solid state welding process for tubular components wherein, prior to the application of forging pressure, the heat for welding is obtained by rotating an electric arc between the abutting surfaces by means of electromagnetic forces

1.081**manual metal-arc welding
MMAW**

arc welding with a covered electrode manually applied by the welder, without automatic or semi-automatic replacement of the electrode

Note 1 to entry: Shielding is provided only by decomposition of the electrode covering.

1.082**metal-arc cutting**

arc cutting using an arc between a manual metal arc electrode and the work

1.083**metal-arc welding**

arc welding with bare or covered electrodes, the melting of which provides the filler metal

1.084**micro-plasma welding**

plasma-arc welding at welding currents below 10 A

1.085**MIG braze welding
MIG brazing**

arc braze welding wherein the gas metal arc process is used

Note 1 to entry: Filler material is a continuous wire and gas shielding protects the molten pool.

1.086**MIG welding**

gas metal-arc welding (1.057) where an inert gas or gas mixture, non-reactive to the metal(s) being welded, is used for shielding

1.087**orbital friction welding**

friction welding where an orbital motion of the surfaces is used to generate the heat for welding

1.088**oxy-acetylene welding**

gas welding in which the fuel gas is acetylene

1.089**oxygen-arc cutting**

oxygen cutting in which ignition temperature is produced by an electric arc and oxygen is conveyed through a central passage of a covered electrode, the latter being consumed in the process

1.090**oxygen cutting**

DEPRECATED: gas cutting

thermal cutting using the heat of chemical reaction between oxygen and the material to be cut, which has been raised to ignition temperature

1.091**oxygen-fuel gas cutting****oxy-fuel gas cutting**

see 1.040

1.092**oxygen lancing**

thermal cutting or boring in which an oxygen lance is used

1.093**parallel spot-welding**

spot-welding in which the secondary current of the welding transformer is fed to two or more pairs of welding electrodes connected in parallel

1.094**percussion welding**

resistance welding wherein joining is produced, simultaneously over the entire area of abutting surfaces, by the heat obtained from an arc produced by a rapid discharge of stored electrical energy, with pressure percussively applied during or immediately following the electrical discharge

1.095**plasma arc cutting**

arc cutting using a constricted plasma arc, where a high velocity jet of hot ionized gas issuing from the orifice is used to remove the molten metal and may be supplemented by the kinetic energy of an additional gas stream

1.096**plasma arc welding****PAW**

arc welding with or without the use of filler metal, in which heat is provided by a plasma arc, which may be transferred, non-transferred, or partially transferred

Note 1 to entry: Shielding is obtained from the hot, ionized gas issuing from the orifice and may be supplemented by an auxiliary source of shielding gas, which may be an inert gas or a mixture of gases.

1.097**plasma MIG welding**

hybrid arc welding wherein a consumable electrode and the arc between it and the work are surrounded by a thermally ionized gas, being the arc plasma established by the arc from a non-consumable electrode

Note 1 to entry: Shielding is obtained from an externally supplied gas and filler metal is obtained from the consumable electrode.

1.098**plasma spraying**

thermal spraying in which a non-transferred constricted arc is utilized as the heat source to melt and propel the powder coating material to the substrate

1.099**powder cutting**

thermal cutting using the heat of chemical reaction between the cutting oxygen stream and a suitable powder injected into it

1.100**powder flame spraying**

flame spraying in which the material to be sprayed is in powder form

1.101**powder lancing**

the use of an oxygen lance in which powder is mixed with the oxygen stream

1.102**pressure welding
solid phase welding**

solid state welding in which a weld is made by sufficient pressure to cause plastic flow of the surfaces, which may or may not be heated

1.103**projection welding**

resistance welding in which the localizing of force and electric current to make the weld or welds is obtained by the use of a projection or projections raised on one or more of the faying surfaces

Note 1 to entry: The projections collapse during welding.

1.104**pulsed arc welding**

form of waveform controlled arc welding (1.139) in which pulses of current are superimposed on a constant background electric current

Note 1 to entry: In continuous electrode processes, the pulses control metal transfer.

1.105**radiation welding**

fusion welding in which the heat for welding is obtained by concentrating electromagnetic or particle radiation on to the work piece

1.106**resistance brazing**

brazing in which the filler metal is pre-placed and the required heat is obtained from the resistance to electric current in a circuit of which the work is a part

1.107**resistance butt welding**

resistance welding in which the components are butted together under pressure, and electric current is allowed to flow until the temperature is reached at which upset metal is produced and the weld is completed

1.108**resistance seam welding**

resistance welding in which force and electric current are applied to the work piece by two electrode wheels or by an electrode wheel and an electrode bar to produce a linear lap weld

1.109**resistance soldering**

soldering in which the heat required is obtained from the resistance to electric current in a circuit of which the work is a part

1.110**resistance spot-welding**

resistance welding in which a weld is produced at a spot in the work piece between electrodes, the weld being of approximately the same area as the electrode tips, or as the smaller of tips of differing size

Note 1 to entry: Force is applied to the spot, usually through the electrodes, continuously throughout the process.

1.111**resistance welding**

welding in which, at some stage in the process, force is applied to surfaces in contact and in which the heat for welding is produced by the passage of electric current through the electrical resistance at, and adjacent to, these surfaces

1.112**roll welding**

forge welding in which pressure is progressively applied by mechanically operated rolls

1.113**salt bath dip brazing****flux dip brazing**

brazing in which heat is obtained by immersing the work piece complete with pre-placed brazing filler metal in a bath of molten salt of suitable melting point

Note 1 to entry: The salt used may act as a flux.

1.114**salt bath dip soldering**

soldering in which the required heat is obtained by immersing the work piece complete with pre-placed soldering filler metal in a bath of molten salt of suitable melting point

1.115**shielded carbon arc welding**

arc welding using a carbon electrode, with or without the use of a filler metal, with shielding obtained from the combustion of a solid material fed into the arc or from a blanket of flux on the work, or both

1.116**scarfing**

see 1.027

1.117**shielded metal arc welding****SMAW**

see 1.081

1.118**silver brazing**

brazing in which a silver alloy is used as the filler metal

1.119**soldering****soft soldering**

process in which metallic pieces are joined by means of a molten filler metal having a melting temperature lower than that of the pieces to be joined and lower than 450 °C, and wetting the parent metal(s)

Note 1 to entry: The parent metal(s) does (do) not participate by fusion in the formation of the joint.

1.120**solid state welding**

welding carried out essentially at a temperature below the melting point(s) of the work pieces being joined usually without the addition of filler metal

1.121**spark-erosion cutting**

cutting by means of the eroding action of a recurring series of sparks between an electrode and the work piece

1.122**stack cutting**

thermal cutting of a stack of plates usually held in place by clamping or welding

1.123**step-by-step seam welding**

resistance seam welding in which the wheels apply the force continuously, but are stationary during the normal flow of current and rotate when reduced current, or no current, is flowing

1.124**stitch welding**

use of overlapping resistance spot welds to join two or more parts

1.125**stud welding**

welding in which a metal stud is joined to a work piece by the production of a weld over the whole of the stud base

Note 1 to entry: This weld is achieved by the use of heat and pressure, the heat being produced by arc, resistance, friction, or other suitable heating process.

1.126**submerged arc welding****SAW**

arc welding in which a consumable electrode is used and the arc is submerged in a granulated flux, some of which fuses to form a removable covering of slag on the weld

Note 1 to entry: The electrode may be single or multiple.

1.127**surfacing**

deposition of filler metal over an area of a metal surface for building up, wear or corrosion resistance

1.128**thermal cutting**

parting or shaping of materials by the application of heat with or without a gas stream

1.129**thermal spraying**

deposition of finely divided metallic or non-metallic materials in a molten or semi-molten condition to form a coating

Note 1 to entry: The coating material may be in the form of powder, ceramic rod, wire or molten materials.

Note 2 to entry: See also 1.054 and 1.098.

1.130**thermic lancing**

cutting or boring using a thermic lance

1.131**thermit welding**

see 1.003

1.132**TIG welding**

see 1.058

1.133**ultrasonic brazing**

brazing in which mechanical vibrations of low amplitude and high frequency are used to generate the heat for brazing

1.134**ultrasonic soldering**

soldering in which high frequency vibratory energy is transmitted through molten solder to remove undesirable surface films and thereby promote wetting of the base metal

Note 1 to entry: This operation is usually accomplished without a flux.

1.135**ultrasonic welding**

solid state welding by the local application of high frequency vibratory energy as the work pieces are held together under pressure

1.136**vacuum brazing**

brazing in which the parts to be joined, complete with pre-placed filler metal, are raised to brazing temperature in a vacuum chamber

1.137**vapour deposition**

surface coating, using physical or chemical techniques for the vapour deposition in vacuum of thin films of metals and refractory materials on a work piece

1.138**wave soldering**

soldering where work parts are automatically passed through a wave of molten solder. (1.032)

1.139**waveform controlled welding**

arc welding process modification of the voltage and/or current wave shape to control characteristics such as droplet shape, penetration, wetting, bead shape or transfer modes

1.140**wire-additive manufacturing**

additive manufacturing that uses a filler wire to create a new component either separately or joined to an existing component (1.001)

2 General terms relating to welding

2.001**arc oscillation welding**

welding wherein the arc between a consumable or non-consumable electrode and the work is caused to move in an oscillatory pattern by either an electromagnetic force or a mechanical movement of the electrode

2.002**autogenous welding**

fusion welding that is carried out without the addition of filler metal

2.003**automatic welding**

mechanized welding with robotic equipment or equipment that has the capacity to perform a welding operation without welding operator intervention (2.096)

Note 1 to entry: Manual adjustment of the weld bead placement or welding parameters by the welding operator during welding is not possible. The equipment may or may not perform the loading or unloading of the work.

2.004**back gouging**

removal of weld metal and base metal from the other side of a partially welded joint to assure complete penetration upon subsequent welding from that side

2.005**backhand welding**

welding technique in which the welding blow pipe, torch or gun is directed opposite to the progress of welding (see [Figure A.7](#))

2.006**balanced welding**

welding procedure by which deformation due to shrinkage on cooling is controlled by the placing and sequence of welds

2.007**base metal**

see 2.051

2.008**bead**

see 2.082

2.009**burnt weld**

weld in which the weld metal has been grossly overheated causing excessive oxidation thereby reducing the strength of the joint

2.010**butt weld****groove weld**

weld in which the weld lies substantially within the extension of the planes of the surfaces of one or more of the parts joined. (3.016 and 3.063)

2.011**buttering**

surfacing variation in which one or more layers of weld metal are deposited on the weld face of one member

Note 1 to entry: For example, a buttering layer of a high alloy weld deposit on steel base metal that is to be welded to a dissimilar base metal provides a suitable transition weld deposit for subsequent completion of the butt joint

2.012**competent person**

person who has acquired, through education, training, qualification or experience or a combination of these, the knowledge and skill enabling that person to perform the task required

2.013**construction specification**

set of documents covering technical data and other requirements for a structure, object or equipment being manufactured, including those specified to supplement and qualify the provisions of the application standard

2.014**consumables**

materials directly consumed in the making of a weld including electrodes, flux, heating and shielding gas, and filler wire

2.015**cross sectional area**

see 2.086

2.016**deposited metal**

filler metal after it becomes part of a joint or surface

2.017**deposition rate**

mass of filler metal deposited in a unit of time

2.018**depth of fusion**

depth of the weld from the fusion face

2.019**drag angle**

travel angle when the electrode is pointing backward (see [Figure A.1](#))

Note 1 to entry: This angle can be used to define the position of welding guns and torches, high energy beams, welding rods, and thermal cutting and thermal spraying guns.

2.020**duty cycle**

see 2.057 and 2.049

2.021**electrode**

component of the welding circuit through which current is immediately conducted to the arc, molten slag, or base metal:

- (a) *Non-consumable electrode* — an electrode that does not provide filler metal.
- (b) *Consumable electrode* — an electrode that provides filler metal.

2.022**essential variables**

variables in which a change outside specified limits requires requalification of welding procedure or welder qualification

2.023**fabricator**

see 2.042

2.024**filler metal**

metal to be added in welding, brazing, soldering, or surfacing

2.025**filler rod**

filler metal in rod form

2.026**filler wire**

filler metal in wire form

2.027**fillet weld**

weld of approximately triangular cross-section which —

- (a) if formed in the corner between surfaces of two components (see Figure A.6(ae) and (ag)); or
- (b) is formed in the corner between the square edge of one component and the surface of another component (see Figure A.6(ah) and (al)); or
- (c) is formed in the corner between the square edges of two components (see Figure A.6(af)); or
- (d) forms a reinforcement on a Tee butt weld (see Figure A.6(y))

2.028**flare-bevel weld**

butt weld between a member with a curved surface and another with a flat or planar surface (see Figure A.6(ap))

2.029**flare-V weld**

butt weld between two members with a curved surface (see Figure A.6(aq))

2.030**flux**

substantially non-metallic material used during welding, brazing, braze welding, or soldering, to clean the surfaces of the joint chemically, to prevent atmospheric oxidation, and to reduce impurities or float them to the surface in the form of slag

2.031**forehand welding**

welding technique in which the welding blowpipe, torch or gun is directed towards the progress of weld (see [Figure A.8](#))

2.032**fuel gas**

gas that provides heat when ignited with oxygen or air

2.033**fully mechanized welding**

see 2.044

2.034**groove weld**

see 2.010

2.035**hard surfacing****hard facing**

surfacing with a wear-resistant material

2.036**heat-affected zone****HAZ**

portion of parent metal that has not been fused but has nevertheless been metallurgically affected by the heat of welding, brazing or cutting (see [Figure A.2](#))

2.037**inspection and test plan****ITP**

document that systematically outlines the inspection and/or test activities required to be controlled during manufacture of welded equipment, object or structure to assure product conformity

2.038**inter-pulse time**

period of time between successive pulses during the making of a weld

2.039**lap joint**

joint between two overlapping parts making an angle to one another of 0 degrees to 5 degrees inclusive in the region of the weld or welds (see Figure A.6(ah) and (aj))

2.040**load-carrying weld**

weld designed to withstand forces

2.041**manual welding**

welding performed and controlled completely by hand

2.042**manufacturer****fabricator**

organisation responsible for the welding and manufacture of the equipment, object or structure

Note 1 to entry: In some small organisations, the manufacturer may be a person.

2.043**manufacturer's data report****MDR**

compilation of documents produced during the manufacture of welded equipment, object or structure

Note 1 to entry: Contents of the MDR varies with the item being manufactured and typically includes records of the steps taken to ensure conformance with the construction specification (see 2.013).

2.044**mechanized welding****fully mechanized welding**

welding with equipment that performs the welding operation under preset conditions controlled by mechanical or electronic means, and constant observation and control of a welding operator (2.103) who is qualified to use the applicable welding procedure

Note 1 to entry: Minor adjustments of the welding parameters is possible, and may be made by the welding operator during the welding process to ensure compliance with the welding procedure parameters and weld bead placement.

Note 2 to entry: For mechanized welding, both the wire feed is mechanized (see also 2.067) and the arc welding gun or torch (see [3.120](#) and [3.123](#)) is mechanized.

2.045**micro-welding**

welding wherein heating and melting can be sufficiently concentrated and controlled to enable joining of miniature components

2.046**narrow gap welding**

modification of conventional automatic arc welding of thick sections where square preparations or "V" preparations with small included angles and narrow gaps are used to minimize the filler metal required

2.047**non-essential variables**

variables in which a change does not require requalification of welding procedure or welder qualification

2.048**one side welding**

welding performed from one side of the joint to produce a full penetration weld

2.049**operator duty cycle**

ratio of welding or cutting time to the total work time, expressed as a percentage

2.050**orbital welding**

mechanized welding of circumferential seams wherein the welding torch moves relative to the work piece

2.051**parent metal
base metal**

metal to be joined or surfaced by welding, braze welding, or brazing (see [Figure A.2](#))

2.052**partly mechanized welding**

see 2.067

2.053**pass**

see 2.087

2.054**peening**

mechanical working of weld metal by means of hammer blows or the like, or bombardment with shot or similar pellets

2.055**post-heating**

application of heat to a weld or weldment subsequent to welding or cutting

2.056**post-weld heat treatment****PWHT**

any heat treatment subsequent to welding

2.057**power source**

welding machine that supplies electrical energy in a form suitable for the welding process

2.058**power source duty cycle**

percentage of time, for an arbitrary test period, during which power supply can be operated at its rated output without overloading

2.059**preheating**

application of heat to the parent metal immediately prior to welding or cutting

2.060**procedure qualification record****PQR**

record of welding variables used to produce a test weldment and the results of tests conducted on the weldment to qualify a welding procedure specification

2.061**pulse**

unidirectional flow of current of either polarity or brief duration

2.062**pulse time**

duration of pulse

2.063**push angle**

travel angle when the electrode is pointing forward (see [Figure A1](#))

Note 1 to entry: This angle can be used to define the position of welding guns and torches, high energy beams, welding rods, and thermal cutting and thermal spraying guns

2.064**residual welding stress**

stress remaining in a metal part or structure as a result of welding

2.065**robotic welding**

automatic welding wherein robot equipment is programmed to carry out a complete welding sequence

2.066**run**

see 2.087

2.067**semi-automatic welding****partly mechanized welding**

manual welding (2.041) where the wire feed is mechanized

Note 1 to entry: May also refer to welding in which some of the welding variables are automatically controlled, but where manual guidance is necessary.

2.068**site weld**

weld made at the location where the assembly is to be installed

2.069**sleeve joint**

joint where the ends of two pipes or round bars fit into a short length of pipe, the inside diameter of which approximates to the outside diameter of the other two members

2.070**spatter**

globules of weld metal that are expelled during welding and which do not form a part of the weld

2.071**stake weld**

weld in a T-joint where a laser beam or electron beam is irradiated through a horizontal plate/flange into the vertical plate/web (see Figure A.6(ar))

[SOURCE: ISO 2553, modified]

2.072**stored energy welding**

method of welding in which the welding energy is stored in an inductor, a capacitor, an electric accumulator, or a flywheel during a period of time relatively long compared with the welding time

2.073**stress-relief**

process to reduce residual welding stresses by mechanical or thermal means

2.074**stress-relief heat treatment**

heating to and, if necessary, holding at, some temperature generally below the transformation range, usually followed by slow cooling, for the purpose of reducing internal stresses

2.075**surfacing**

see 1.127

2.076**tack weld**

weld made to hold parts of a weldment in alignment until final welds are made

2.077**temper-bead welding**

welding of a bead at a specific location on a weld for the purpose of improving the metallurgical properties of the heat-affected zone of the previously deposited weld metal

2.078**thermal stress**

stress produced by differences in temperature or in coefficients of expansion, or both

2.079**traceability**

information that demonstrates how a structure, component or equipment was manufactured, and may include by whom, and its component materials

Note 1 to entry: When traceability is required, documentation and record requirements for welding and allied processes is defined in either the application standard or the construction specification (see 2.013).

2.080**underwater welding**

welding performed underwater either in a wet atmosphere, whereby a local gas envelope is formed around the area to be welded, or in a dry habitat

2.081**weld**

joint in material, produced by means of heat or pressure, or both, in such a way that there is continuity in the nature of the metal between these parts

Note 1 to entry: A filler metal, the melting temperature of which is of the same order as that of the parent metal, or may not be used.

2.082**weld bead**

run of weld metal deposited on a surface but not forming part of a joint

2.083**weld junction**

boundary between the fusion zone and the heat-affected zone (see [Figure A.2](#))

2.084**weld map**

document or sketch that shows the location of all welds in a structure, component or equipment

Note 1 to entry: The weld map may also show other information to fulfill traceability requirements (see 2.079), including for example, the assigning of a WPS to a joint (see [2.107](#)), the identification of the welder(s) depositing the weld, specific inspection or testing requirements etc.

2.085**weld metal**

all metal melted during the making of a weld and retained in the weld (see [Figure A.2](#))

2.086**weld-metal area****cross-sectional area**

area of the weld metal as measured on the cross-section of a weld

2.087**weld run**

weld metal resulting from one passage of an electrode, torch, or blowpipe

2.088**weld timer**

device that controls only the weld time

2.089**weld zone**

zone containing the weld metal and heat-affected zone (see [Figure A.2](#))

2.090**weldability**

ability of a metal to be welded under given fabrication conditions in a specific weldment, and to perform satisfactorily in the intended service

2.091**weldability test**

test intended to show that the parent metal can be welded to give an acceptable joint under the conditions prevailing

2.092**welder**

person who performs the welding operation

Note 1 to entry: The term “welder” is often used incorrectly to refer to a welding machine.

2.093**welder certification**

certificate awarded to a welder who has complied with prescribed prerequisites, training, and examination requirements for a specific welding skill

2.094**welder qualification**

assessment of a welder by test or other evidence to establish that the welder has the ability to perform to the level required by regulatory authorities, standards, contractual specifications, or others

2.095**welding**

making of a weld

2.096**welding consumables**

see 2.014

2.097**welding coordinator**

competent person (2.012) who has responsibilities in the manufacturing operation for welding and allied activities

Note 1 to entry: Responsibilities and activities may vary and are typically defined by the manufacturer (see 2.042).

2.098**welding cycle time**

period required to complete a welding cycle

2.099**welding engineer**

professional engineer with full and comprehensive technical knowledge for planning, executing, supervising and testing of all tasks and responsibilities in welding fabrication

2.100**welding inspection**

conformity assessment of welding parameters and specified requirements by observation, measurement, testing and judgment, as appropriate

2.101**welding inspector**

competent person (2.012) performing welding inspection to verify conformance with the specified requirements

2.102**welding machine**

part of the welding plant used to supply power for the welding operation

2.103**welding operator**

competent person (2.012) who performs the welding operation using mechanized welding equipment (2.044)

2.104**welding plant**

entire apparatus for providing and controlling energy, and if necessary movement, for making a weld

2.105**welding procedure**

detailed methods and practices involved in the making of a weld or in the production of a welded component or assembly

2.106**welding procedure qualification**

qualification of a welding procedure by tests or evidence of previous testing permitting the procedure to be used on the work, which is the subject of certain requirements by regulatory authorities, Standards, or contractual specification

2.107**welding procedure specification****WPS**

document given to a welder, which specifies the required range of welding variables within which a welder may weld for a specific application so as to assure its repeatability by properly trained welders and welding operators

Note 1 to entry: The variables specified on the welding procedure specification are those recorded on the weld procedure qualification record (PQR) to which a range of essential variables (see 2.022) are applied.

2.108**welding process**

particular method of welding involving the application of certain metallurgical, electrical, physical, chemical, or mechanical principles

2.109**welding sequence**

order and/or direction in which welds are made

2.110**welding specialist**

see 2.111

2.111**welding supervisor**

competent person (2.012) engaged in the planning, executing and supervision of welding and allied processes, including gouging and thermal cutting

2.112**welding technique**

manner in which the welder manipulates an electrode, a blowpipe, or a similar appliance

2.113**weldment**

assembly, the component parts of which are joined by welding

2.114**wire feeder**

part of a welding plant that feeds the electrode or filler metal at a controlled rate to the weld

3 Terms relating to fusion welding (welding without pressure)**3.1 General**

See [Figure A3](#).

3.2 General terms relating to fusion welding**3.001****actual throat thickness**

DEPRECATED: throat thickness

perpendicular distance between two lines each parallel to a line joining the outer toes, one being a tangent at the weld face and the other being through the furthestmost point of fusion penetration (see [Figure A.4](#))

Note 1 to entry: Diagram (f) of [Figure A.4](#) of [Appendix A](#) illustrates the deep penetration process.

3.002**angle of bevel****bevel angle**

angle at which the edge of a component is prepared for making a weld (see [Figure A.5](#))

3.003**back-step welding**

welding in which short lengths of run are deposited in a direction opposite to the general progress of welding the joint

Note 1 to entry: The short lengths eventually produce a continuous or intermittent weld (see [Figure 3.1](#))

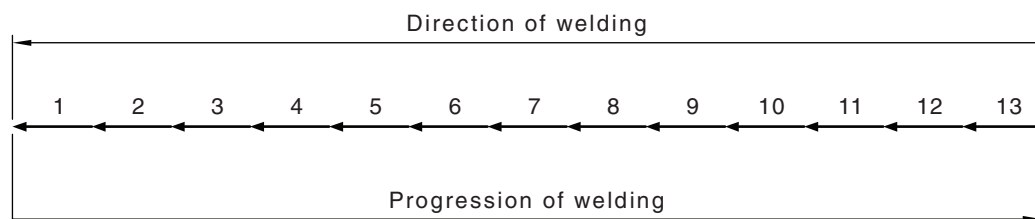


Figure 3.1 — Example of back-step sequence

3.004**backhand welding**

see 2.005

3.005**backing bar**

piece of metal or other material placed at a root and used to control the penetration and profile of a weld but without becoming part of the weld (see [Figure A.6\(c\)](#) and [A.6\(g\)](#))

3.006**backing run**

DEPRECATED: back weld

final run deposited on the root side of a single butt weld

3.007**backing strip**

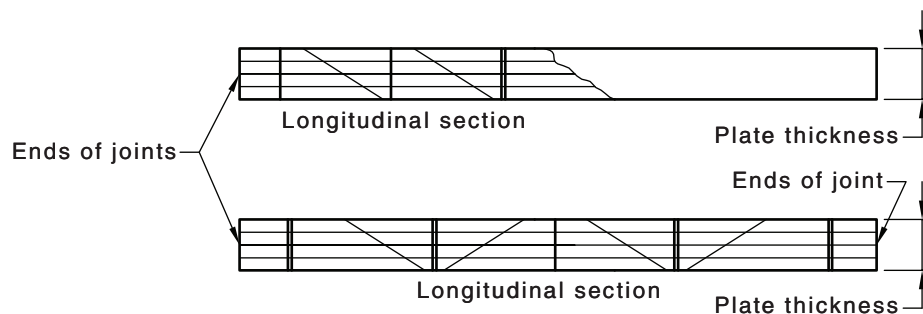
piece of metal placed at a root and penetrated by weld metal (see Figure A.6(c) and A.6(g)). It may remain as part of the joint or be removed by machining or other means

3.008**backing weld**

weld in a root to form a backing to control the penetration

3.009**block welding**

welding in which short lengths of the weld are each made by superimposing a number of runs up to the full or partial size of the weld to form a block before proceeding with the next block

Note 1 to entry: These blocks may be adjacent or spaced (see [Figure 3.2](#)).**Figure 3.2 — Examples of block sequences****3.010****butt joint**

joint between the ends or edges of two parts making an angle to one another of 135° to 180° inclusive in the region of the joint (see Figure A.6(a) to A.6(d) and A.6 (an))

3.011**butt weld**

see 2.010

3.012**capping run**

final run or runs deposited to complete a weld profile of a multi-run weld

3.013**chain intermittent fillet welds**

two lines of intermittent fillet welds on a joint wherein the welds in one line are approximately opposite to those in the other line

3.014**chipping hammer**

device for the removal of slag from weld deposits

3.015**close joint**

preparation in which the components to be joined are substantially in contact before welding

3.016**complete penetration****complete penetration butt weld**

butt weld where fusion exists between weld metal and the parent metal throughout the entire depth of the joint

3.017**concave fillet weld**

fillet weld in which the face of the weld is concave (see [Figure 3.3](#))

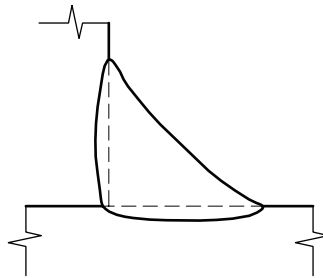


Figure 3.3 — Example of concave fillet weld

3.018**continuous weld**

weld extending along the entire length of a joint

3.019**convex fillet weld**

fillet weld in which the face of the weld is convex (see [Figure 3.4](#))

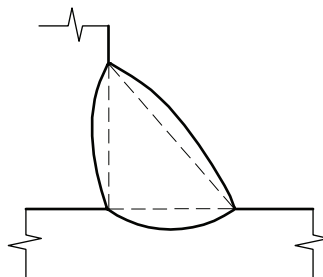


Figure 3.4 — Example of convex fillet weld

3.020**corner joint**

joint between the ends or edges of two parts making an angle to one another of more than 30° but less than 135° in the region of the joint (see [Figure A.6\(t\)](#), [A.6\(u\)](#), and [A.6\(af\)](#))

3.021**cruciform joint**

joint in which two flat plates or two bars are welded to another flat plate at right angles and on the same axis (see [Figure A.6\(ag\)](#))

3.022**design throat thickness**

minimum dimension of throat thickness used for purposes of design (see [Figure A.4](#))

3.023**dilution**

alteration of composition of the metal deposited from a filler wire or electrode due to mixing with the melted parent material

Note 1 to entry: It is expressed as the percentage of melted parent metal in the weld metal.

3.024**double bevel butt weld**

butt weld in which the edge of only one component is double bevelled (see Figure A.6(r), A.6(s), A.6(x), and A.6(y))

3.025**double-J butt weld**

butt weld in which the edge of one component is prepared so that in cross-section the fusion face assumes the form of two opposing Js (see Figure A.6(ac))

3.026**double-U butt weld**

butt weld in which the edges of both components are prepared so that in cross-section the fusion faces form two opposing Us (see Figure A.6(n) and A.6(o))

3.027**double-V butt weld**

a butt weld in which the edges of both components are double bevelled so that in cross-section the fusion faces form two opposing Vs (see Figure A.6(h), A.6(j), and A.6(k))

3.028**downhand position**

see 3.037

3.029**edge joint**

joint between the edges of two parts making an angle to one another of 0° to 30° inclusive in the region of the joint (see Figure A.6(am))

3.030**edge preparation**

<1> squaring, grooving, chamfering, or bevelling an edge in preparation for welding

<2> geometry or contour of the prepared edge

3.031**edge weld**

weld in an edge joint, used for joining two or more parts and in which the weld metal covers part or the whole of the edge widths (see Figure A.6(am))

3.032**effective length**

length of continuous weld of specified size

3.033**face****face of weld**

see 3.095

3.034**feather edge**

edge formed at the root due to bevelling being carried through from one surface to the other

3.035
fillet weld
 see 2.027

3.036
fill run
 run or runs in a multi-run weld deposited after the root run and before the capping run or runs

3.037
flat position
downhand position
 position of welding wherein welding is performed from the upper side of the joint and the weld face is approximately horizontal (see [Figure 3.5](#))

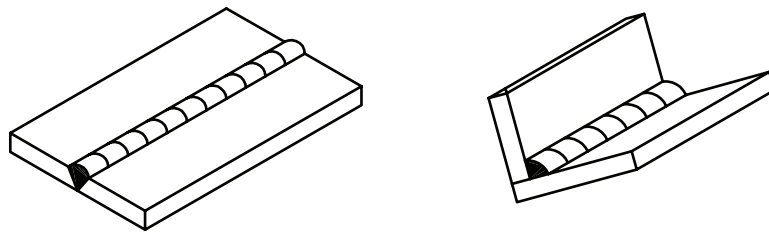


Figure 3.5 — Examples of flat position

3.038
flush weld
 weld in which the weld face follows approximately the contour of the parent material

3.039
forehand welding
 see 2.031

3.040
fusible insert
consumable insert
 pre-placed filler material that is fused to aid the formation of a weld made from one side only (see [Figure 3.6](#))

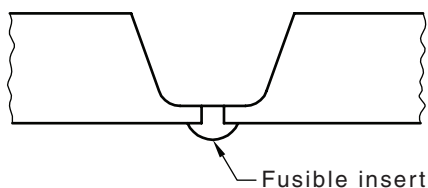


Figure 3.6 — Weld preparation using a fusible insert

3.041
fusion face
 portion of a surface, or of an edge, which is to be fused in making a fusion weld

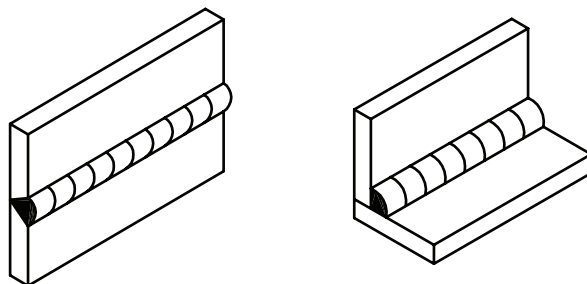
3.042
fusion spot weld
 weld, other than a plug weld, produced by fusion welding at a spot in the work piece through one or more thicknesses of overlapping parts (see [Figure A.6\(a\)](#))

3.043**fusion welding**

see 1.055

3.044**fusion zone**

area of parent metal melted as determined on the cross-section of a weld

3.045**horizontal position**position of welding wherein the line of the weld root is approximately horizontal (see [Figure 3.7](#))**Figure 3.7 — Examples of horizontal position****3.046****hot pass**

second run of a weld in the circumferential joints in pipelines using cellulose type manual metal-arc electrodes and made within a limited time after the root run, while it is still hot

3.047**hydrogen controlled**

process or electrode depositing weld metal containing not more than a specified quantity of diffusible hydrogen in the deposited weld metal when assessed in accordance with the appropriate Standard

3.048**included angle****angle of preparation**angle between the planes of the fusion faces of parts to be welded (see [Figure A.5](#))**3.049****incomplete penetration**

see 3.063

3.050**intermittent weld**

series of welds at specified intervals along a joint

3.051**interpass temperature**see 3.052 *interrun temperature***3.052****interrun temperature**

in a multi-run weld, the temperature of the weld and adjacent parent metal immediately prior to the application of the next weld run

3.053**joint**

junction of members or edges of members that have been joined or which are to be joined

3.054**joint penetration**

minimum depth of fusion into the joint excluding reinforcement (see [Figure 3.8](#))

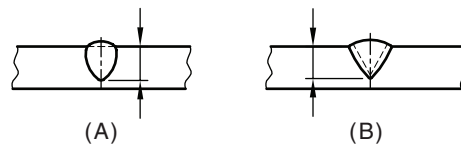


Figure 3.8 — Examples of joint penetration

3.055**joint preparation**

details of the edge preparations and set up of work pieces for welding (see [Figure A.5](#))

3.056**land**

straight portion of a fusion face between the edge of the root face and —

- (a) the sloping face in a bevel preparation; or
- (b) the curved part of a J edge preparation (see [Figure 3.9](#))

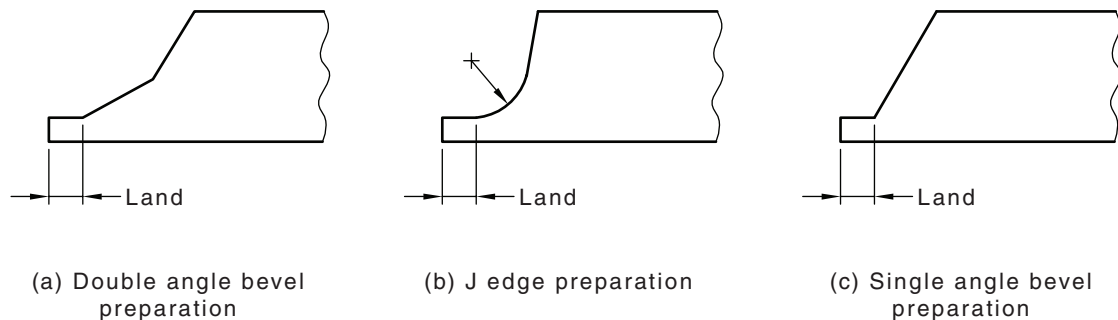


Figure 3.9 — Examples of land

3.057**lap joint**

see 2.039

3.058**leg**

fusion face of a fillet weld (see [Figure A.9](#))

3.059**leg length**

in a fillet weld, the distance from the intersection of the planes of the original surfaces of the parent metal to the toe of the weld (see [Figure A.9](#))

3.060**mitre-fillet weld**

fillet weld of equal leg length in which the face of the weld is essentially flat (see [Figure 3.10](#))

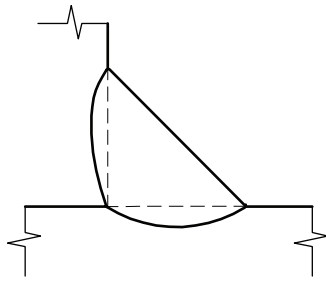


Figure 3.10 — Mitre-fillet weld

3.061**open joint**

preparation in which the components to be joined are separated by a specified gap before welding

3.062**overhead position**

position of welding wherein welding is performed from the underside of the joint (see [Figure 3.11](#))

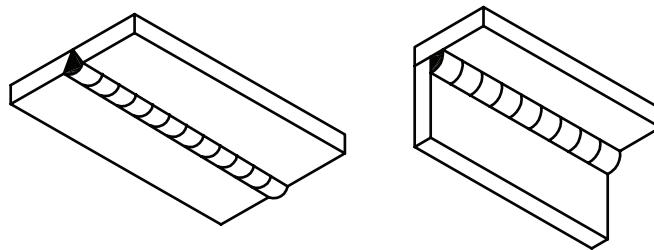


Figure 3.11 — Examples of overhead position

3.063**partial penetration****incomplete penetration**

butt weld where, by design, fusion does not extend the full depth of the joint

3.064**penetration**

see 3.054

3.065**penetration bead**

weld metal protruding through the root of a fusion weld made from one side only (see [Figure 3.12](#))

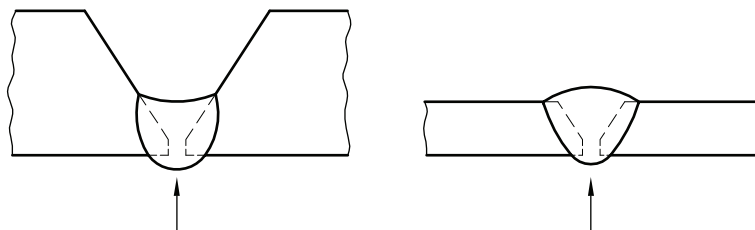


Figure 3.12 — Examples of penetration bead

3.066**penetration run**

run that produces a penetration bead

3.067**pick-up fusion welding**

contribution of alloys to the deposited metal from the parent metal and flux

3.068**plug weld**

weld made by completely or partially filling a circular hole in one component with filler metal, with the filler metal fusing to the entire surface of the contiguous component exposed through the hole (see Figure A.6(ak))

3.069**positioner
manipulator**

mechanical device manually or power operated to hold and tilt or rotate the work to the desired position for welding

3.070**reinforcement**

weld metal lying outside the plane joining the toes (see [Figure 3.13](#))

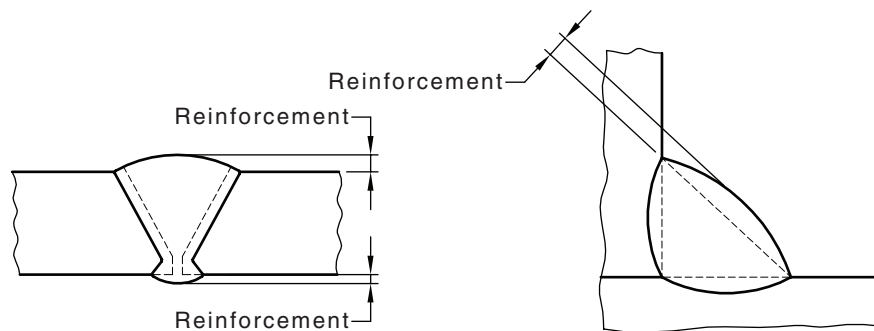


Figure 3.13 — Examples of reinforcement

3.071**root face**

portion of a fusion face at the root, which is not bevelled or grooved (see [Figure A.5](#))

3.072**root gap**

minimum distance at any cross-section between edges, ends, or surfaces to be joined (see [Figure A.5](#))

3.073**root of preparation**

(a) in the preparation of V, U, J and bevel butt welds, the zone in the neighbourhood of, and including, the root gap

(b) in a square butt weld with backing bar or strip, the zone between the prepared edges adjacent to a backing bar or strip

(c) in parts assembled for fillet welding, the zone in the neighbourhood of the actual or projected intersection of the fusion faces (see [Figure 3.14](#))

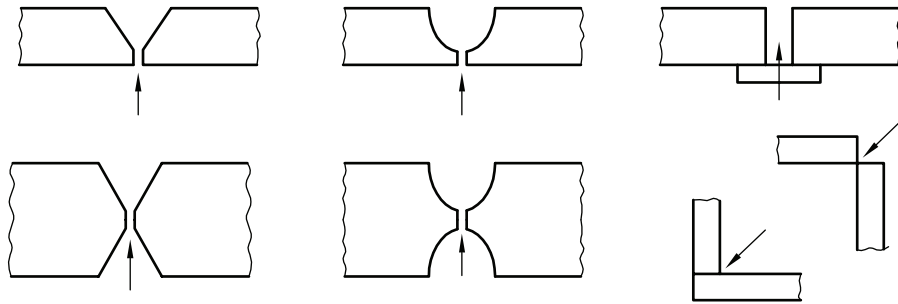


Figure 3.14 — Roots of typical joint preparation

3.074

root of weld

points, as shown in cross-section, at which the back of the weld intersects the base metal surfaces (see [Figure A.2](#))

3.075

root penetration

depth a weld extends into the root of a joint (see [Figure 3.15](#))

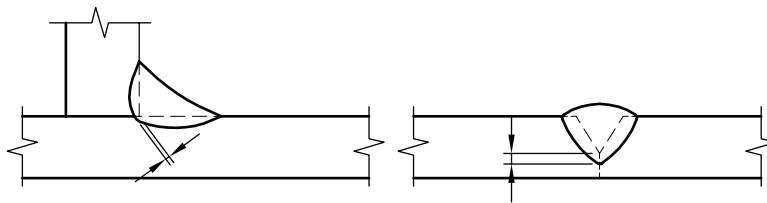


Figure 3.15 — Examples of root penetration

3.076

root radius

radius of the curved portion of the fusion face in a component (see [Figure A5](#) of [Appendix A](#))

3.077

root run

first run deposited in the root of a multi-run weld

3.078

run-on or run-off plates

pieces of metal placed so as to extend the joint in the same plane to enable a full section of weld metal to be maintained at the extremities of the joint

3.079

seal weld

weld used to make a fluid-tight joint

3.080

single-bevel butt weld

butt weld in which the edge of only one component is bevelled (see [Figure A.6](#)(p), (q), (u), and (v))

3.081

single-J butt weld

butt weld in which the edge of one component is prepared so that in cross-section the fusion face assumes the form of a J (see [Figure A.6](#)(aa) and (ab))

3.082**single-U butt weld**

butt weld in which the edges of both components are prepared so that in cross-section the fusion faces form a U (see Figure A.6(l))

3.083**single-V butt weld**

butt weld in which the edges of both components are bevelled so that in cross-section the fusion faces form a V (see Figure A.6(e), A.6(f), and A.6(g))

3.084**size of weld**

<equal leg fillet weld> the length of the equal sides of the largest isosceles triangle that can be inscribed within the fillet cross-section (see Figure 3.16(a))

<unequal leg fillet weld> the lengths of the sides containing the angle of the largest triangle which can be inscribed within the fillet cross-section (see dimensions X and Y in Figure 3.16(b))

<butt weld> the minimum depth to which a butt weld extends into a joint exclusive of reinforcement (see dimension X in Figure 3.16(c))

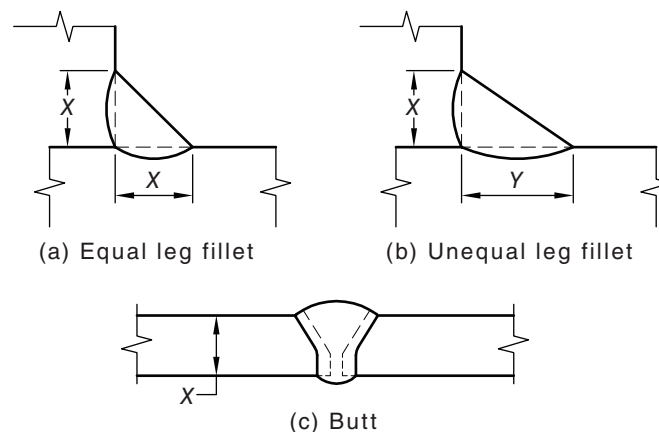


Figure 3.16 — Size of weld

3.085**skip welding**

welding in which short lengths of run are spaced in predetermined order eventually to produce a continuous or intermittent weld, the lengths being laid in either longitudinal direction (see Figure 3.17)

Note 1 to entry: This may be applied to a sequence of runs of more than one line of welds.



Figure 3.17 — Example of skip welding

3.086**slag**

fused, non-metallic material produced from some welding and cutting processes

3.087**slot weld**

weld made by depositing a fillet weld around the periphery of an elongated hole in one component so as to join it to the surface of a contiguous component exposed through the hole (see Figure A.6(al))

3.088**square butt weld**

butt weld in which the fusion faces lie approximately at right angles to the plane of the components to be joined and are substantially parallel to one another (see Figure A6(a), A6(b), A6(c) and A6(d))

3.089**staggered intermittent fillet welds**

two lines of intermittent fillet welds on each side of a joint wherein the welds in one line are staggered with respect to those in the other line

3.090**stringer bead-run**

bead or run made without intentional weaving motion

3.091**stub**

waste of an electrode or filler rod

3.092**tack weld**

see 2.076

3.093**T-joint**

joint between the end or edge of one part and the face of the other part, the parts making an angle to one another of more than 5° up to and including 90° in the region of the joint (see Figure A.6(v) to A.6(ae))

3.094**t-junction**

junction where two welds meet in a T configuration

3.095**toe**

junction between a weld face and the parent metal or between weld faces (see [Figure A.9](#))

3.096**throat thickness**

see 3.001 and 3.022

3.097**transfer efficiency**

degree to which alloying elements in a filler metal or electrode are transferred to the weld metal. It is usually expressed as the ratio of the percentage of the element in an undiluted weld metal pad to the percentage originally present in the filler wire or electrode

Note 1 to entry: The variation in the alloying elements is that due to volatilization, oxidation, or reaction with the flux or shielding gas, and not that due to dilution.

3.098**vertical position**

position of welding wherein the line of the weld root is approximately vertical (see [Figure 3.18](#)), i.e., vertical up or vertical down

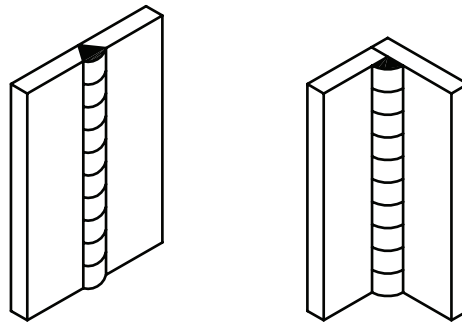


Figure 3.18 — Examples of vertical position

3.099

weaving

transverse oscillation of the end of an electrode, filler metal, or a blowpipe tip during the deposition of weld metal

3.100

weave run

weld run made with weaving

3.101

weld axis

line through the length of the weld, which is perpendicular to and at the geometric centre of its cross-section

3.102

weld bead

see 2.082

3.103

weld face

exposed surface of a weld on the side from which welding was performed (see [Figure A.9](#))

3.104

weld pool

pool of liquid metal formed during fusion welding

3.105

weld position

orientation of a weld expressed in terms of weld slope and weld rotation

3.106

weld preparation

see 3.055

3.107

weld rotation

angle between the upper portion of the vertical reference plane passing through the line of a weld root and a line, drawn from the same root, bisecting the angle between the fusion faces

3.108

weld slope

angle between the line of the root of a weld and the horizontal

3.109**weld-through primer**

paint or film forming a protective coating on the parent metal, which does not interfere with the welding process

3.3 Terms relating to arc welding**3.110****active gas**

see 3.241

3.111**arc blow**

uncontrolled deflection of a welding arc caused by an asymmetric distribution of magnetic flux around the arc

3.112**arc length**

length of the welding arc

3.113**arc oscillation welding**

see 2.001

3.114**arc spot-welding**

see 1.008

3.115**arc stud welding**

see 1.010

3.116**arc time**

time during which the welding arc is maintained

3.117**arc time factor**

ratio of arc time to the total time the supply is available for the arc, usually expressed as a percentage

3.118**arc voltage**

voltage between electrodes or between an electrode and the work, measured at a point as near as practicable to the arc

3.119**arc welding**

see 1.011

3.120**arc welding gun**

device used in semi-automatic, machine, and automatic arc welding to transfer current, guide the consumable electrode, and direct shielding gas when used

3.121**arc welding plant**

complete equipment for providing and controlling an arc welding process

3.122**arc welding power source**

apparatus for providing and controlling electrical energy for arc welding processes

3.123**arc welding torch**

device used in the gas tungsten and plasma arc welding processes to control the position of the electrode, to transfer current to the arc, and to direct the flow of shielding and plasma gas

3.124**arc welding transformer**

transformer designed to provide a.c. electrical energy for one or more welding arcs

3.125**atomic-hydrogen torch**

holder carrying the electrodes and incorporating a means of supplying hydrogen to the arc in atomic-hydrogen welding

3.126**atomic-hydrogen welding**

see 1.012

3.127**auto-contact welding**

see 1.013

3.128**balanced wave**

alternating current wave in which the positive and negative half cycles are symmetrical

3.129**bare electrode**

filler metal electrode consisting of a single metal or alloy that has been produced into a wire, strip, or bar form, and, other than that which was incidental to its manufacture or preservation, has had no coating or covering applied to it

3.130**bare metal arc welding**

see 1.014

3.131**basic electrode**

covered electrode in which the covering contains a high proportion of basic material such as limestone and fluorspar

3.132**braided electrode**

covered electrode with the covering reinforced by a process of braiding

3.133**burn back**

fusing of the consumable electrode to the current contact tube by lengthening the arc in any form of automatic or semi-automatic metal-arc welding using a consumable electrode

3.134**burn-off rate**

linear rate of consumption of a consumable electrode

3.135**carbon-arc welding**

see 1.021

3.136**carbon electrode**

non-filler material electrode used in arc welding or cutting, consisting of a carbon or graphite rod, which may be coated with copper or other coatings

3.137**cellulose electrode**

covered electrode in which the covering contains at least 15 % cellulose and up to 30 % of titania as rutile or titanium white

3.138**CO₂ spot-welding**

arc spot-welding using a consumable electrode in which the arc and molten pool are shielded from the atmosphere by carbon dioxide gas

3.139**CO₂ welding**

see 1.022

3.140**coil**

type of filler metal package consisting of a defined length of electrode in coil form with or without internal support

3.141**collet**

device for retaining a non-consumable electrode in an arc welding torch

3.142**complete penetration butt weld**

see 3.016

3.143**complete rectification**

in gas tungsten-arc welding, the complete loss of current during each half-cycle when the electrode is positive, due to failure of the arc to re-ignite (see [Figure 3.19](#))

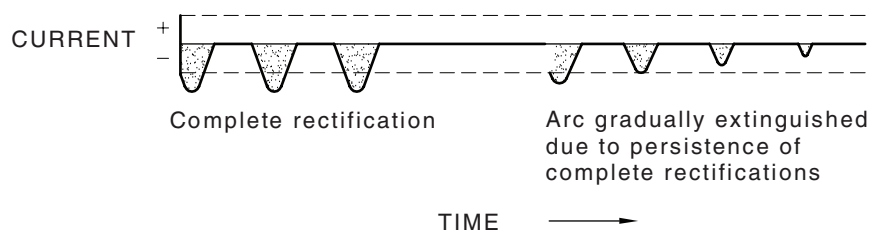


Figure 3.19 — Complete rectification

3.144**composite electrode**

any of a number of multi-component filler metal electrodes in various physical forms such as stranded wires, tubes, and covered wire

3.145**constant-voltage welding power source**

arc welding power source whose terminal voltage remains substantially constant between full load and no load

3.146**consumable electrode**

electrode that provides filler metal

3.147**contact shoe**

grooved component of the welding head, which is forced against the electrode to transfer current to, and guide a continuous consumable electrode

3.148**contact tip**

short contact tube

3.149**contact tube**

tubular component of the welding head, which transfers current to, and guides a continuous consumable electrode

3.150**cored electrode**

consumable electrode having a core of flux, alloying ingredients, or other material

3.151**covered electrode**

consumable electrode consisting of a wire, rod, or tube to which a flux covering has been applied by dipping, extruding, wrapping, or braiding

Note 1 to entry: The covering may contain materials providing such functions as shielding from the atmosphere, deoxidation, and arc stabilization, and can serve as a source of metallic additions to the weld.

3.152**crater fill**

procedure used in automatic and semi-automatic arc welding, or arc spot-welding, whereby the welding current gradually reduces at the end of a weld run or just before the arc is extinguished, thereby preventing the formation of a crater

3.153**cyclic re-ignition voltage**

voltage between the electrode and work required to re-ignite an a.c. arc at the start of each half-cycle

Note 1 to entry: This term is commonly applied to gas tungsten-arc welding.

3.154**d.c. welding generator**

direct current generator designed for providing electrical energy to one or more welding arcs

3.155**dense slag**

slag of limited porosity, which tends to produce a smooth weld face

3.156**deposition efficiency**

<manual metal-arc electrodes> ratio of the mass of deposited metal to the mass of the core wire consumed, exclusive of stubs, expressed as a percentage

<continuous electrodes> ratio of the mass of deposited weld metal to the mass of electrode consumed expressed as a percentage

3.157**dip transfer**

see 3.253

3.158**dipped electrode**

covered electrode produced by single or multiple dipping of the core wire into a paste of flux

3.159**drooping characteristic welding power source**

arc welding power source whose terminal voltage drops to a value appreciably below the open-circuit voltage after the arc has been struck

3.160**drum**

type of package consisting of a continuous length of electrode or filler metal wound or coiled within an enclosed cylindrical container

3.161**dynamic characteristic**

change with time of voltage and current in response to alterations in load, as when initiating a weld

3.162**electrode (arc welding)**

component of the welding circuit through which current is conducted between the electrode holder and the arc (1.011)

Note 1 to entry: It may take the form of a rod, tube, wire, strip of metal, or a length of carbon.

Note 2 to entry: This term should not be confused with the term “electrode (resistance welding)”

3.163**electrode angle**

angle the electrode makes with the axis of the weld in their common plane

3.164**electrode cable**

welding cable conducting current from the power source to the electrode

3.165**electrode current range**

range of current within which an electrode can be used satisfactorily

3.166**electrode efficiency**

for any given electrode, the ratio of the mass of deposited metal to the total mass of the consumed electrode and any wastage

3.167**electrode feed rate****wire feed rate**

linear rate of feeding an electrode wire in automatic or semi-automatic welding

3.168**electrode holder**

device to hold an electrode and to convey current to it

3.169**electrode negative**

arc welding using direct current in which the electrode is connected to the negative pole of the welding power source

Note 1 to entry: This has sometimes been known in practice as “reversed polarity” and in American practice as “straight polarity”. For this reason, both these terms are deprecated.

3.170**electrode polarity**

connection of the electrode cable to the different power terminals on the welding machine to determine the direction of flow of d.c. current

3.171**electrode positive**

arc welding using direct current in which the electrode is connected to the positive pole of the welding power source

Note 1 to entry: This has sometimes been known in practice as “straight polarity” and in American practice as “reversed polarity”. For this reason, both these terms are deprecated.

3.172**electrode stick-out**

length of electrode projecting beyond the region of the current pick-up during welding

3.173**emissive electrode**

consumable electrode to which has been applied a very light coating for the purpose of producing a stable arc

3.174**engine-driven welding power source**

welding power source consisting of a generator driven by an engine, for supplying electrical energy for welding

3.175**extruded electrode**

covered electrode produced by extruding the flux onto the core wire

3.176**firecracker welding**

see 1.038

3.177**fluid slag**

slag that flows freely during deposition of an electrode

3.178**flux cored arc welding****FCAW**

see 1.048

3.179**flux cored electrode**

composite filler metal electrode consisting of a metal tube or other hollow configuration containing ingredients to provide such functions as shielding atmosphere, deoxidation, arc stabilization, and slag formation

Note 1 to entry: Alloying materials may be included in the core. External shielding may or may not be used.

3.180**friable slag**

slag that crumbles easily to aid removal

3.181**gas metal-arc spot-welding**

see 1.008

3.182**gas metal-arc welding****GMAW**

see 1.058

3.183**gas nozzle**

generally detachable part of a GMAW gun or a GTAW torch from which gas or gases emerge

3.184**gas shield**

layer of gas surrounding the weld zone to facilitate the making of a weld. (3.196 and 3.241)

3.185**gas tungsten-arc spot-welding**

see 1.008

3.186**gas tungsten-arc welding****GTAW****TIG welding****TIG**

see 1.059

3.187**globular transfer**

metal transfer that takes place as globules of diameter substantially larger than that of the consumable electrode from which they are transferred

3.188**gravity welding**

see 1.061

3.189**gravity welding electrode**

electrode similar to a manual metal-arc welding electrode but generally longer and specially formulated to suit gravity welding

3.190**guide tube**

rigid tube that guides a filler wire or electrode but does not convey current

3.191**HF ignition****high frequency ignition****spark starting**

ignition of an arc by a high-voltage high-frequency spark applied across the arc gap

3.192**HF ignition unit****high frequency ignition unit**

high-voltage high-frequency electrical oscillator used to enable an arc to be initiated without contact between the electrode and the work piece

3.193**HF re-ignition****high frequency re-ignition****spark re-ignition**

re-ignition of an a.c. arc, after extinction at zero current, by a high-voltage high-frequency spark applied across the arc gap