
**Welding — Measurement of
preheating temperature, interpass
temperature and preheat
maintenance temperature**

*Soudage — Mesurage de la température de préchauffage, de la
température entre passes et de la température de maintien du
préchauffage*





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Foreword

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

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

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

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Quality management in the field of welding*.

This second edition cancels and replaces the first edition (ISO 13916:1996), which has been technically revised.

Requests for official interpretations of any aspect of this document should be directed to the Secretariat of ISO/TC 44/SC 10 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

Welding — Measurement of preheating temperature, interpass temperature and preheat maintenance temperature

1 Scope

This document specifies requirements for the measurement of preheating temperature, interpass temperature and preheat maintenance temperature for fusion welding. This document can also be applied as appropriate in the case of other welding processes. This document does not cover the measurement of post weld heat treatment temperatures.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

3.1 preheating temperature

T_p

temperature of the workpiece in the weld zone immediately prior to any welding operation

Note 1 to entry: It is normally expressed as a minimum and is usually equal to the minimum interpass temperature.

3.2 interpass temperature

T_i

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

Note 1 to entry: It is normally expressed as a maximum temperature.

3.3 preheat maintenance temperature

T_m

minimum temperature in the weld zone which to be maintained if welding is interrupted

4 Requirements

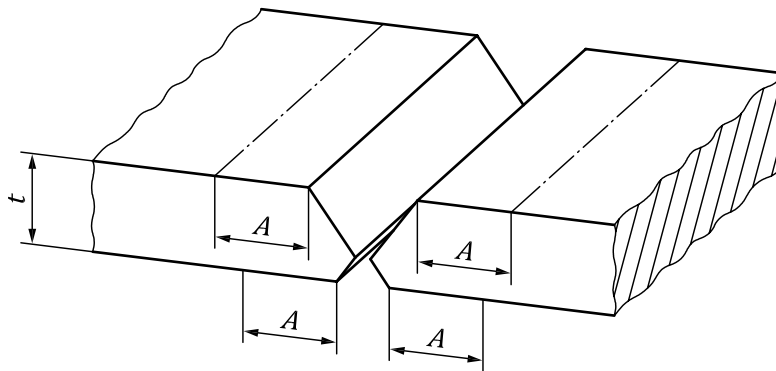
4.1 Point of measurement

The temperature measurement shall normally be made on the surface of the workpiece facing the welder, at a distance of $A = 4 \times t$, but not more than 50 mm, from the longitudinal edge of the groove (see [Figure 1](#)). This shall apply for workpieces thickness t not exceeding 50 mm in the weld.

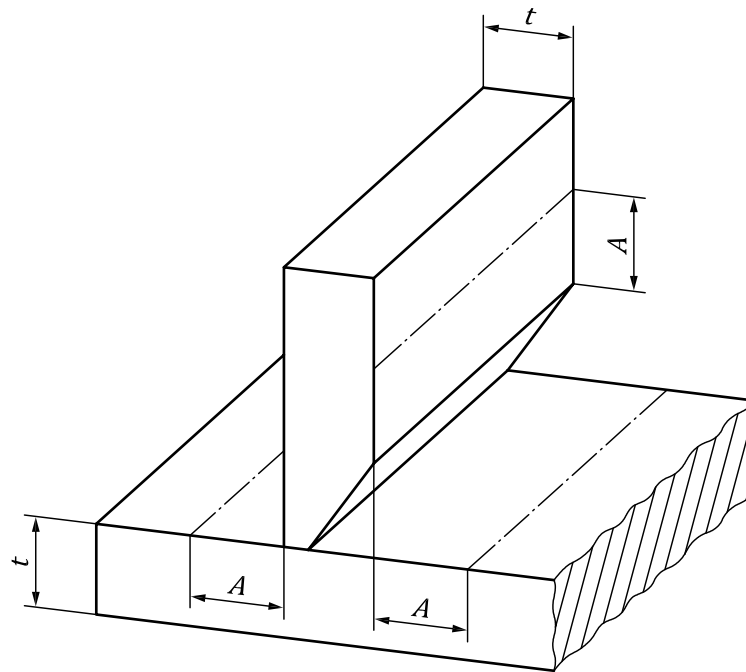
When the thickness exceeds 50 mm, the required temperature shall exist in the parent metal for a distance of minimum 75 mm or as otherwise agreed in any direction from the joint preparation. Where practicable, the temperature shall be measured on the face opposite to that being heated. Otherwise, the temperature shall be confirmed on the heated face at a time after removal of the heat source related to parent metal thickness to allow for temperature equalization. Where fixed permanent heaters are in use and there is no access to the reverse face for temperature measurement, readings shall be taken on the exposed parent metal surface immediately adjacent to the weld preparation. The time allowed for the temperature equalization shall be of the order of 2 min for each 25 mm of parent metal thickness.

Interpass temperature shall be measured on the weld metal or the immediately adjacent parent metal.

Dimensions in millimetres



a) Butt joint



b) T-joint

Key

$t \leq 50$ mm: $A = 4 \times t$, max. 50 mm

$t > 50$ mm: $A = \text{min. } 75$ mm

Figure 1 — Distance between points of measurement

4.2 Time of measurement

Interpass temperature shall be measured in the weld area immediately before welding the next layer.

If the preheat maintenance temperature is specified, it shall be monitored during the period of welding interruption.

4.3 Test equipment

Equipment used for temperature measurement should be specified in the welding procedure specifications, for example:

- temperature sensitive materials (e.g. crayons or paints) (TS);
- contact thermometer (CT);
- thermocouple (TE);
- optical or electrical devices for contactless measurement (TB).

5 Test report

If a test report is required, it shall refer to this document and give the following minimum information in accordance with the specification in welding procedure specification:

- measured preheating temperature, in °C;
- measured interpass temperature, in °C;
- measured preheat maintenance temperature, in °C;
- any deviation from this document, if applicable.

6 Designation

6.1 General

Examples of designation, which should be used in test reports, are as follows.

6.2 Example 1

A preheating temperature, T_p , measured only once in accordance with this document as 155 °C (T_p 155) using a contact thermometer (CT) shall be designated as follows:

Temperature ISO 13916:2017 T_p 155 — CT.

6.3 Example 2

An interpass temperature, T_i , measured more than once in accordance with this document as 130 °C, 153 °C and 160 °C (T_i 130/160) using a thermocouple (TE) shall be designated as follows:

Temperature ISO 13916:2017 T_i 130/160 — TE.

Bibliography

- [1] ISO 17662, *Welding — Calibration, verification and validation of equipment used for welding, including ancillary activities*

