SLOVENSKI STANDARD
SIST EN 14728:2019

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Napake v plastomernih zvarih - Razvrstitev

Imperfections in thermoplastic welds - Classification

Unregelmäßigkeiten an Schweißverbindungen von thermoplastischen Kunststoffen - Einteilung

Défauts dans les assemblages soudés en thermoplastiques - Classification

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25.160.40	Varjeni spoji in vari	Welded joints and welds
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Imperfections in thermoplastic welds - Classification

Défauts dans les assemblages soudés en thermoplastiques - Classification

Unregelmäßigkeiten an Schweißverbindungen von thermoplastischen Kunststoffen - Einteilung

This European Standard was approved by CEN on 14 December 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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Contents

Page

European foreword

This document (EN 14728:2019) has been prepared by Technical Committee CEN/TC 249 “Plastics”, the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2019, and conflicting national standards shall be withdrawn at the latest by August 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14728:2005.

In comparison with the previous edition, the following technical modifications have been made:

— Clause 3, Symbols and designations, has been deleted;

— examples of imperfections for the different welding processes are in Tables 1 to 6;

— in Annex A (normative) in the heading, no more reference to CEN ISO/TS 17845;

— in the text of Annex A, Table A.1 — Definition of the first character and Table A.2 — Definition of the second character, have been added.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies a system for classifying imperfections that may be encountered in thermoplastic welded joints during manufacture and provides examples of imperfections for the following welding processes:

— heated tool butt welding;

— heated tool socket welding;

— electrofusion socket welding;

— hot gas welding;

— extrusion welding;

— solvent socket welding.

This document does not describe imperfections that may be generated during service or imperfections present before welding, which are due to poor preparation or assembly of components (e.g. fit up). The correct preparation and assembly of components (e.g. fit up) are described in the relevant welding procedure specification (WPS).

This document is also not concerned with the search for the possible influence of these imperfections on the behaviour of joints in relation to the different types of stress to which the latter may be subjected or on methods for preventing such imperfections.

This document can be used in conjunction with EN 16296 [1] to determine the acceptance of welds.

Only imperfections giving rise to discontinuities of materials or changes in shape are taken into consideration in this document, specifying their type, their shape and their positions. This classification can be used to determine the possible origin or causes of the imperfections.

2 Normative references

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

EN 12201-3:2011+A1:2012, *Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 3: Fittings*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 Definition and classification of imperfections

The numbering system used for the classification of imperfections shall be as defined in Annex A. Examples of imperfections in thermoplastics welded joints are given in the following tables:

— Heated tool butt weld: Table 1;

— Heated tool socket weld: Table 2;

— Electrofusion socket weld: Table 3;

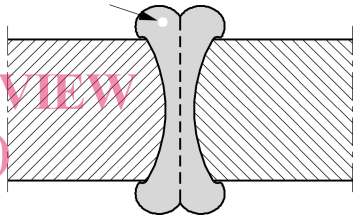
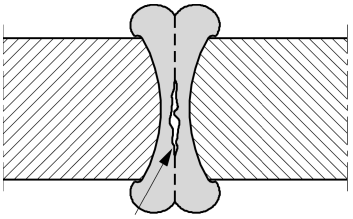
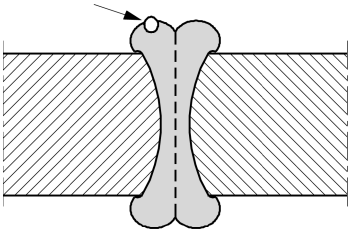
— Hot gas weld: Table 4;

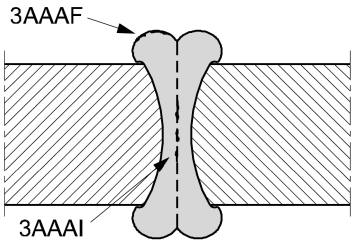
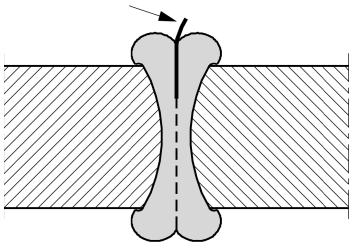
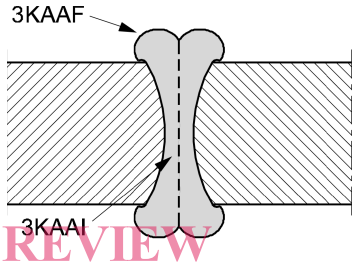
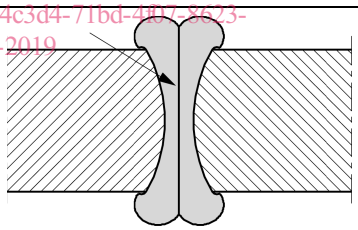
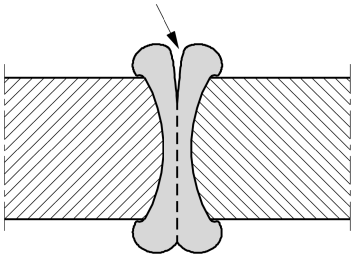
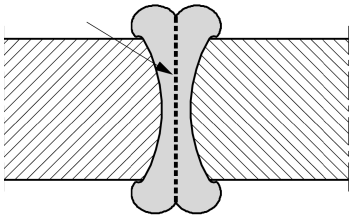
— Extrusion weld: Table 5;

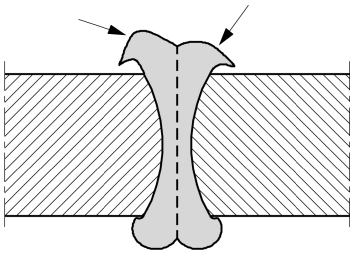
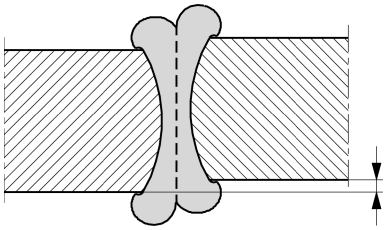
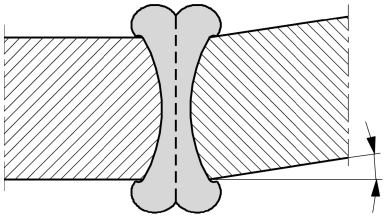
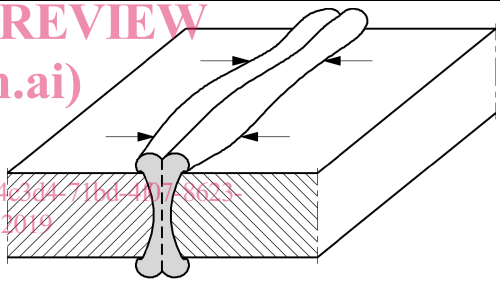
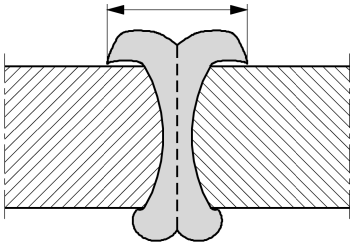
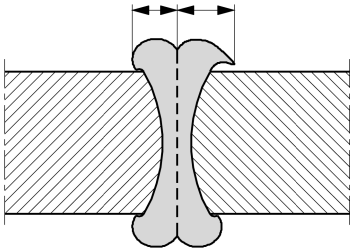
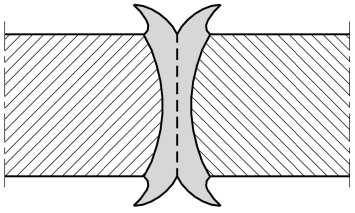
— Solvent socket weld: Table 6.

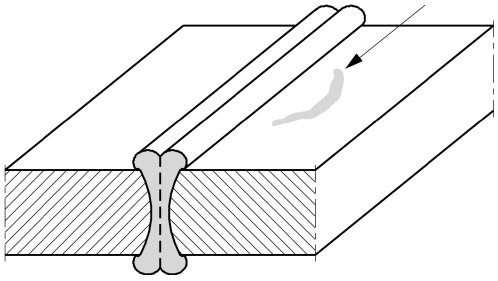
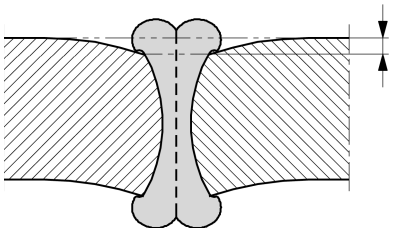
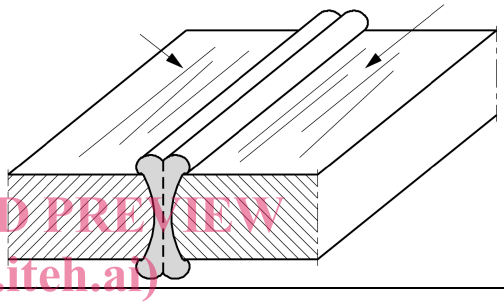
An explanation of each character used in the imperfection numbering system is given in Annex A.

Table 1 — Heated tool butt weld

Number	Designation	Description	Illustration
2BAAA	Gas cavity	Cavity formed by evolution or entrapment of gas(es). This cavity is distinguishable by having a similar colour as the surrounding material. It could be: Spherical Elongated Tubular (wormhole).	
2CAAI	Shrinkage cavity	Cavity due to shrinkage of weld during solidification. This cavity may be distinguishable by evidence of ductility or stress whitening.	
2MAAA	Surface bubble	On weld bead.	

Number	Designation	Description	Illustration
3AAAI 3AAAF	Particulate inclusion	Foreign material trapped at weld interface. Foreign material on surface of weld beads.	
3JAAI	Parent material inclusion	Inclusion of parts of parent material at weld interface.	
3KAAI 3KAAF	Degraded polymer	Inclusion of decomposition products at weld interface. Inclusion of decomposition products on surface of weld beads.	
4BAAA	Lack of fusion	No fusion across weld interface.	
4QBAF	Groove in upset or reinforcement	Excessive groove depth at centre of weld bead.	
4WAAA	Cold fusion	Incomplete fusion across weld interface.	

Number	Designation	Description	Illustration
5CAAA[a]	Incorrect weld profile	Deviation of the specified shape of the weld bead.	
5EIAA[a]	Linear misalignment	Deviation from specified tolerances in coplanarity between two welded pieces.	
5EJAA[a]	Angular misalignment	Deviation from specified angle between two welded pieces.	
5GAAA[a]	Irregular width	Excessive variation in weld or bead width.	
6DAAA[a]	Excessive width	Width of the weld bead greater than specified.	
6HAAA[a]	Excessive asymmetry of welds	Asymmetric weld bead.	
6MAAA[a]	Insufficient upset material	Upset material smaller than the specified value.	

Number	Designation	Description	Illustration
7BAAA	Thermal damage outside of welding	Surface alteration resulting from the accidental action of a source of heat.	
7VAAA[a]	Excessive toe in	Deviation between the outside diameter at the end of the pipe and the outside diameter remote from the pipe end.	
9CAAA	Tool mark	Local damage due to clamping.	

Key

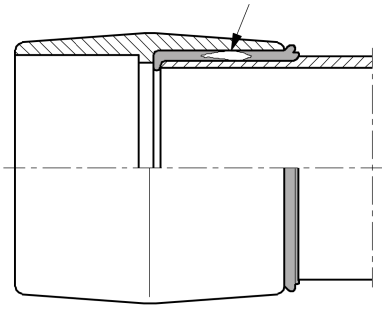
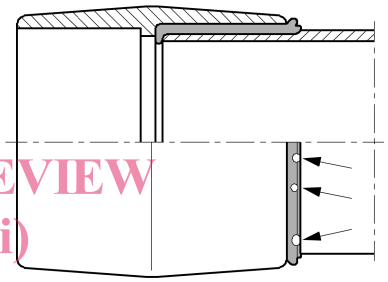
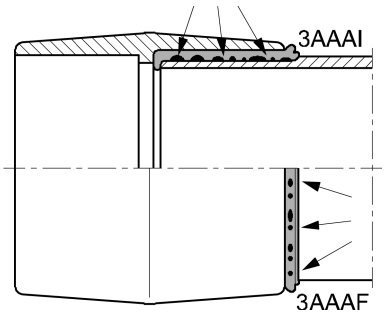
_ _ _ _ good fusion at interface

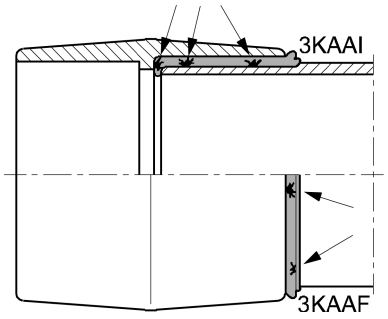
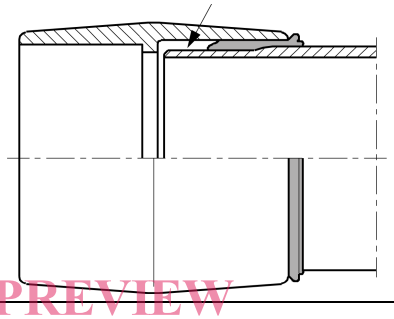
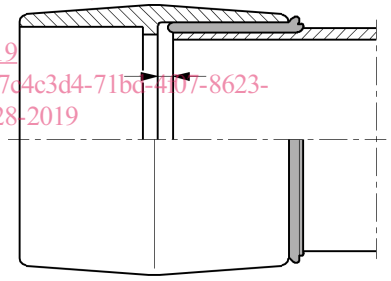
..... cold fusion at interface

_____ lack of fusion at interface

[a] Not applicable to fabricated fittings according to EN 12201-3:2011+A1:2012, Annex B.

Table 2 — Heated tool socket weld

Number	Designation	Description	Illustration
2CAAA	Shrinkage cavity	Cavity due to shrinkage of weld during solidification.	
2MAAA	Surface bubble	On weld bead.	
3AAAF 3AAAI	Particulate inclusion	Foreign material trapped in the weld and/or on the surface of the weld bead.	

Number	Designation	Description	Illustration
3KAAF 3KAAI	Degraded polymer	Inclusion of decomposition products at the weld interface and/or on the surface of the weld bead.	
4BAAA	Lack of fusion	Area of no fusion between pipe and fitting.	
4CAAA	Incomplete penetration	Insufficient penetration of the pipe(s) into the socket.	
4PAAA	Material extrusion	Extrusion of material from the joint (sheeting).