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Adhesives - Guidelines for the fabrication of adhesively bonded structures and reporting procedures suitable for the risk evaluation of such structures (ISO 21368:2022)

Táto norma obsahuje anglickú verziu európskej normy.
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EN ISO 21368

August 2023

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English Version

Adhesives - Guidelines for the fabrication of adhesively bonded structures and reporting procedures suitable for the risk evaluation of such structures (ISO 21368:2022)

Adhésifs - Lignes directrices pour la fabrication des structures collées par adhésifs et procédures pour l'établissement de rapports pour l'évaluation des risques liés à ces structures (ISO 21368:2022)

Klebstoffe - Richtlinien für die Herstellung geklebter Strukturen und Berichtsverfahren, die für die Risikobewertung solcher Strukturen geeignet sind (ISO 21368:2022)

This European Standard was approved by CEN on 24 August 2023.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword **3**

European foreword

The text of ISO 21368:2022 has been prepared by Technical Committee ISO/TC 61 "Products" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 21368:2023 by Technical Committee CEN/TC 193 "Adhesives" the secretariat of which is held by UNE.

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of an identical text or by endorsement, at the latest by February 2024, and conflicting national standards shall be withdrawn at the latest by August 2026.

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Endorsement notice

The text of ISO 21368:2022 has been approved by CEN as EN ISO 21368:2023 without any modification.

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Adhesives — Guidelines for the fabrication of adhesively bonded structures and reporting procedures suitable for the risk evaluation of such structures

Adhésifs — Lignes directrices pour la fabrication des structures collées par adhésifs et procédures pour l'établissement de rapports pour l'évaluation des risques liés à ces structures

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Contents

Page

Foreword ... **vi**

Introduction ... **vii**

1 Scope ... **1**

2 Normative references ... **2**

3 Terms and definitions ... **2**

4 Core element 1: Classification of adhesively bonded joints according to safety requirements ... **9**
4.1 General ... 9
4.2 Definition of safety classes ... 10
4.3 Documentation of the classification according to safety classes ... 11

5 Core element 2: Adhesive bonding personnel (ABP)— Competences, knowledge and experiences ... **11**
5.1 General ... 11
5.2 Adhesive bonding operators (ABO) ... 12
5.2.1 General ... 12
5.2.2 Functions ... 12
5.2.3 Duties ... 12
5.2.4 Competences, knowledge and experiences ... 12
5.3 Adhesive bonding coordinator (ABC) ... 13
5.3.1 General ... 13
5.3.2 Functions ... 13
5.3.3 Duties ... 13
5.3.4 Competences ... 15
5.3.5 Organizational integration of adhesive bonding coordination ... 15
5.4 Levels of competences, knowledge and experiences for adhesive bonding personnel (ABP) ... 16
5.4.1 General ... 16
5.4.2 Requirements for each level of competences, knowledge and experiences ... 16
5.5 Assignment of the three competence levels to the safety classes depending on the respective scope of work — Correlation of the core elements ... 18
5.6 Comparability of competences, knowledge and experience ... 19
5.7 Monitoring, inspection and testing personnel ... 19

6 Core element 3: Design and verification of adhesively bonded joints ... **19**
6.1 General ... 19
6.2 Assignment to safety classes ... 19
6.3 Requirements to be met by the adhesively bonded joints ... 20
6.4 Design of adhesively bonded joints ... 20
6.5 Adherends ... 20
6.6 Adhesive ... 20
6.7 Surface treatment ... 21
6.8 Factors affecting the adhesive bonding process ... 21
6.9 Verification ... 21
6.9.1 General ... 21
6.9.2 Method 1 — Load in use < maximum load capacity ... 21
6.9.3 Method 2 — Component testing ... 22
6.9.4 Method 3 — Documented experience ... 22
6.9.5 Method 4 — Combination of methods 1 to 3 ... 22

7 Drafting contracts and subcontracting (outsourcing) ... **22**
7.1 General ... 22
7.2 Subcontracting (Outsourcing) ... 23
7.2.1 General ... 23
7.2.2 Deciding on subcontracting ... 24

7.2.3 Details and documentation of procurement ... 24
7.2.4 Selection of external service provider (subcontractor/supplier) and contracting ... 24
7.2.5 Management of external service providers (subcontractors/suppliers) ... 25

8 Workmanship ... 25
8.1 General ... 25
8.2 General process requirements ... 25
8.2.1 Production planning ... 25
8.2.2 Process design ... 25
8.2.3 Planning the use of production aids and tools ... 26
8.2.4 Production documents ... 27
8.2.5 Process approval ... 27
8.2.6 Transport, storage and logistics for adhesives, auxiliary materials and adherends ... 27
8.2.7 Production environment ... 28
8.2.8 Materials ... 29
8.2.9 Preparation of work stations and acclimatization of materials ... 29
8.2.10 Health and safety and environmental protection ... 30
8.2.11 Checking for fitting accuracy concerning shape, position and dimension ... 30
8.2.12 Checks prior to start of production ... 30
8.2.13 Treatment of the adherend surfaces ... 31
8.2.14 Dosing, mixing and application ... 32
8.2.15 Inspection and testing during adhesive bonding and adhesive solidification ... 33
8.2.16 Joining the adherends ... 33
8.2.17 Fixing ... 34
8.2.18 Solidification of the adhesive ... 34
8.2.19 Inspection and testing of finished components ... 35
8.2.20 Packaging and transport of adhesively bonded components ... 35
8.3 Work instructions: minimum requirements ... 35
8.4 Process reliability ... 37
8.4.1 General ... 37
8.4.2 Quality planning ... 37
8.4.3 Control of planning and manufacturing documents ... 37
8.4.4 Process validation ... 37
8.4.5 Production-accompanying work samples as proof of application quality ... 38
8.4.6 Quality control of process reliability/traceability ... 39
8.4.7 Instruction of adhesive bonding personnel (ABP) ... 40
8.4.8 Post-adhesive bonding finishing ... 40
8.5 Rework ... 40
8.6 Quality assurance ... 40
8.6.1 General ... 40
8.6.2 Quality planning ... 40
8.6.3 Quality inspection ... 41
8.6.4 Action in the case of deviations ... 41
8.6.5 Monitoring of measuring and test equipment and of production aids and tools ... 42
8.6.6 Imperfections in adhesively bonded joints ... 42
8.6.7 Control of non-conforming products ... 43
8.6.8 Preventive and corrective action ... 43

9 Maintenance and repair ... 43
9.1 General ... 43
9.2 Planning of maintenance and repair ... 43
9.3 Maintenance and repair instructions ... 44
9.4 Performing maintenance work/execution rules ... 44
9.5 Documentation ... 45
9.6 Sub-contracting ... 45

Annex A (informative) **Assistance for providing adhesive bonding technology competences ... 46**

Annex B (informative) **Requirements** **63**

Annex C (informative) **Guideline for the implementation of the design of adhesively bonded joints and its verification** **64**

Annex D (informative) **Criteria for choosing an adhesive bonding system** **83**

Annex E (informative) **Description of non-destructive and destructive testing methods** **86**

Annex F (informative) **Description of accelerating ageing tests** **89**

Annex G (informative) **Examples of non-decorative and decorative imperfections of adhesive bonds** **93**

Annex H (informative) **Example of a job history sheet** **95**

Annex I (informative) **Notes on quality planning** **96**

Bibliography **98**

Foreword

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

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

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

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

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

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

This second edition cancels and replaces the first edition (ISO 21368:2005), which has been technically revised.

The main changes compared to the previous edition are as follows:

— broadening of the terms and definitions to include relevant processing and manufacturing terms;

— classification of adhesively bonded joints according to safety requirements;

— clarification of the competences, knowledge and experience of adhesive bonding personnel;

— comprehensive explanation the design of adhesively bonded joints;

— thorough description of surface treatment procedures;

— extensive account of how to assemble/manufacture of adhesively bonded joints.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Adhesive bonding technology is used widely internationally to fabricate many of the structures in the adhesive-using industry. In some companies, it is the key feature to production. Such structures range from microelectronic encapsulation to the structure and reinforcement of aircraft wings and bridges. Adhesive bonding technology appeals to industry across sectors and applications because it allows flexibility in the selection of materials, product design and product manufacture up to the final assembly. As such, adhesive bonding technology exerts a profound influence on the cost of fabrication and the quality of the product, thus allowing significant production savings and a competitive advantage in comparison with traditional methods of manufacture. It is important, therefore, to ensure that adhesive bonding technology is carried out in the most effective way and that appropriate control is exercised over all aspects of the operation. If used properly and professionally, the adhesive bonding technology is undoubtedly able to meet the requirements of circular economy and eco-design.

Within the ISO 9000 series of standards for quality systems, adhesive bonding technology is to be treated as a “special process” since adhesively bonded joints cannot be fully verified by subsequent inspection and testing of the product to ensure the required quality standards have been met.

As per today’s knowledge, adhesively bonded joints cannot be inspected into a product. The task is to install them faultlessly from the outset. Even the most extensive and sophisticated non-destructive testing does not improve the quality of adhesively bonded joints.

For adhesively bonded structures to be effective and fit for purpose in service, there is a need to provide controls from the design stage through material selection to manufacture and subsequent inspection. Poor design for adhesive bonding creates serious risks and costly difficulties in the workshop, on site or in service. Inadequate consideration of the materials to be adhesively bonded and the choice of adhesive may result in adhesive bonding problems such as lack of adhesion or inadequate gap-filling of the structure. It is therefore essential for adhesive bonding procedures to be correctly formulated and approved to avoid imperfections. Comprehensive and qualified supervision ensures that the specified quality is achieved.

To ensure the quality of adhesively bonded structures on an international level and to make the quality of adhesively bonded structures internationally comparable, the task of management is to:

— identify possible sources of error;

— create organizational structures that prevent these sources of error from the outset; and

— introduce suitable quality procedures.

For these reasons, this document represents the state of the art for the professional organization of adhesive bonding processes in all areas of industry and trade in a holistic and international view. It also applies analogously to sealing processes if the function of the seal is only to secure and support adhesively bonded joints. The consideration of adhesive bonding technology according to this document comprises, starting with the first idea, the development of adhesively bonded joints (pre-production), continues through production, i.e. the manufacture of adhesively bonded joints (in-production), to the finished adhesively bonded product including its maintenance, repair and disposal (post-production).

This holistic approach also includes the quality assurance of production, inspection and maintenance, including the repair and disposal of adhesively bonded joints. The approach according to this document is, without exception and in any case, independent of the lot size as well as the respective area of application.

This document establishes definitions and sets out organizational, management technical, contractual and technical principles to be followed when manufacturing adhesively bonded joints. This is achieved by defining three essential core elements:

— Core element 1: the classification of each adhesive bond according to safety requirements (see Clause 4);

— Core element 2: the appointment of supervisory personnel [Adhesive Bonding Coordinators (ABCs)] and execution personnel (Adhesive Bonding Operators) who are both capable of objectively verifying the necessary and required adhesive bonding competence, knowledge and experience in each case (see Clause 5);

— Core element 3: the verification that the real load of the respective adhesive bond in the use and application of the adhesively bonded product is in any case less than the maximum load bearing capacity (see Clause 6).

The above-mentioned, necessary worldwide comparability in quality and implementation is achieved through a uniform implementation of these three core elements at the international level.

Since the all numerical values described in this document are reference values, it is advisable for the practitioners to decide on their own when implementing them.

INTERNATIONAL STANDARD ISO 21368:2022(E)

Adhesives — Guidelines for the fabrication of adhesively bonded structures and reporting procedures suitable for the risk evaluation of such structures

1 Scope

This document provides guidelines describing the adhesive bonding quality requirements suitable for use by adhesive user-companies utilizing adhesive bonding as a means of fabrication. In particular, the guidelines define various approaches to meeting quality requirements for fabrication and reporting procedures, both in workshops and on site. These guidelines aim to convey the importance of maintaining quality standards in fabrication and reporting procedures, keeping records and thus enabling documentation to provide the basis for risk evaluation of adhesively bonded structures in service and in use.

These guidelines have been prepared such that:

a) they are independent of the type of adhesively bonded structure;

b) they are independent of adhesive user-companies' and suppliers' product recommendations;

c) they define the quality requirements for adhesive bonding in terms of fabrication and reporting procedures, both in workshops and on site;

d) they can be used as the basis for risk evaluation of adhesively bonded structures in service and in use;

e) they can be used as a basis for assessing a fabricator's capability to produce adhesively bonded structures fulfilling specified quality requirements when they are detailed in one or more of the following:

   — a contract between the parties involved;

   — an application standard;

   — a regulatory statement.

The guidelines contained within this document can be adopted in full or selectively chosen by the adhesive user to suit the structure concerned. The guidelines provide a flexible framework for the control of adhesive bonding activities in the following cases.

Case 1

The provision of specific requirements for adhesive bonding in contracts that require the adhesive user to have a quality system other than ISO 9001.

Case 2

The provision of specific requirements for adhesive bonding as guidance to an adhesive user developing a quality system.

Case 3

The provision of specific requirements for references in application standards that uses adhesive bonding as part of its requirements or in a contract between relevant parties.

Case 4

The provision of a framework for fabrication and reporting procedures to a quality standard, suitable in particular as a basis for the risk evaluation of adhesively bonded structures.

2 Normative references

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

ISO 472, *Plastics — Vocabulary*