SLOVENSKI STANDARD
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Konstrukcijska lepila - Karakterizacija anaerobnih lepil za koaksialne kovinske konstrukcije v stavbah in objektih

Structural adhesives - Characterisation of anaerobic adhesives for co-axial metallic assembly in building and civil engineering structures

Strukturklebstoffe - Charakterisierung anaerober Klebstoffe für koaxiale Metallverbindungen im Bauwesen

Adhésifs structuraux - Caractérisation des adhésifs anaérobies pour assemblages métalliques coaxiaux dans les bâtiments et ouvrages de génie civil

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Structural adhesives - Characterisation of anaerobic adhesives for co-axial metallic assembly in building and civil engineering structures

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 15275:2015) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by October 2015, and conflicting national standards shall be withdrawn at the latest by January 2017.

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

This document supersedes EN 15275:2007.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

For relationship with EU Regulation see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Anaerobic adhesives are single component adhesives that cure in absence of oxygen, curing being inhibited by the presence of oxygen and catalysed by metal ions. Polymerisation takes normally place at room temperature. Due to their curing properties these adhesives are well suited for easy assembling threaded and otherwise, pipes and tubes in building and civil engineering structures. By the curing reaction a polymeric material is formed, which fills narrow gaps or micro-imperfections of threads thus sealing and bonding the joint. In addition, anaerobic adhesives may be used to joint load-bearing parts of the structures when used in tubular lap joints or pin-into-bore type joints.

The primary aim of the test methods presented herein is for ranking and quality control of anaerobic adhesives and reliance should not be placed on any test results for design purposes. Design data should preferably be obtained from tests using the construction materials and configurations used in the actual design. The requirements to the assemblies are strongly depending on the intended use. Apart from the sealing ability, strength requirements may conflict with the intention to regular or occasional dismantling the joint for maintenance purposes. The values defined in this standard are considered to indicate a general or typical suitability for use of an anaerobic adhesive in a particular application in building and civil engineering structures.

1 Scope

This European Standard specifies requirements and test methods for the characterisation of anaerobic adhesives intended for the general assembly of co-axial metallic elements in building and civil engineering structures including fasteners- threaded and otherwise, pipes and tubes. It is applicable to single adhesives and systems (kits) comprising adhesives, activators and/or primers for both internal and external construction elements.

This European Standard only applies to metallic substrates.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 751-1, *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water — Part 1: Anaerobic jointing compounds*

EN 923:2005+A1:2008, *Adhesives —Terms and definitions*

EN 13999-1, *Adhesives — Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application — Part 1: General procedure*

EN 13999-2, *Adhesives — Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application — Part 2: Determination of volatile organic compounds*

EN 15337, *Adhesives — Determination of shear strength of anaerobic adhesives using pin-and-collar specimens (ISO 10123)*

EN 15865, *Adhesives — Determination of torque strength of anaerobic adhesives on threaded fasteners (ISO 10964)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 923:2005+A1:2008 and the following applies.

3.1
anaerobic adhesive
adhesive that cures in absence of oxygen, curing being inhibited by the presence of oxygen and catalysed by metal ions

Note 1 to entry: Deviating from this definition, anaerobic adhesives may be defined also as anaerobic polymerisable compounds, or anaerobic jointing compounds including liquid, gel like or pasty sealants.

4 Performance characteristics for intended uses

The manufacturer shall undertake initial performance tests on the product in accordance with Table 1 and corresponding to the type of the defined application [e.g. retaining co-axial assemblies (see 5.1), threaded fasteners (see 5.2) and threaded joints in contact with 1st, 2nd and 3rd family gases and hot water (see 5.3)].

Table 1 — Performance characteristics for relevant applications

No	Characteristics	Clause in this European Standard	Units	Reference Test Method	Additional information and test methods
1	Static shear strength	5.1.1	N/mm²	EN 15337	Only for products intended for use for retaining metallic co-axial cylindrical joints such as load bearing tubular or pin-and-collar-type cylindrical assemblies. The test method can be also used to determine the shear strength of threaded fasteners. However, in this case it is recommended to assess the bond ability of the threaded assembly by means of the torque strength according to EN 15865.
2	Breakloose torque	5.2.1	Nm	EN 15865	Only for products intended for use for securing or locking metallic threaded assemblies. The fastener specimen should be preloaded at 5 Nm, otherwise the input torque has to be explicitly mentioned in brackets (Input Torque in Nm). If unseated assemblies have been used, use the expression Unseated Assemblies in brackets.
3	Prevailing torque	5.2.1	Nm	EN 15865	
4	Durability [a]	5.1.2	N/mm² or as ratio to shear strength at room temperature, No. 1	EN 15337	Shear Strength after 1 000 h exposure to 100 ºC. Only for products intended for use for retaining metallic co-axial cylindrical joints such as load bearing tubular or pin-and-collar-type cylindrical assemblies. Expresses durability as shear strength or retention of the shear strength measured in accordance with EN 15337 after 1 000 h exposure to 100 °C (and if required to 150 °C).
5	Durability [a]	5.2.2	Nm or as ratio to breakaway torque at room temperature, No. 2	EN 15865	Breakaway Torque after 1 000 h exposure to 100 °C. Only for products intended for use for securing or locking metallic threaded assemblies. Expresses durability as torque strength or retention of the torque strength measured in accordance to EN 15865 after 1 000 h exposure to 100 °C (and if required to 150 °C, after 168 h in boiling water, or after 2 h exposure to -20 °C).
6	Heat resistance	5.1.3	N/mm²	EN 15337	Shear strength at 100 ºC. Only for products intended for use for retaining metallic co-axial cylindrical joints such as load bearing tubular or pin-and-collar-type cylindrical assemblies.
7	Heat resistance	5.2.3	Nm	EN 15865	Breakloose torque at 100 ºC. Only for products intended for use for securing or locking metallic threaded assemblies.
8	Sealing ability	5.3	-	EN 751-1	Only for products intended for use to seal threaded metallic joints in contact with 1st, 2nd and 3rd family gases and hot water of heating systems. The sealing ability includes the resistance to gas condensates, resistance to hot water, resistance to temperature cycling, and resistance to vibration as defined in EN 751-1. Use the expression Meets the Requirements Accordingly to EN 751-1.

No	Characteristics	Clause in this European Standard	Units	Reference Test Method	Additional information and test methods
9	Release of dangerous substances	5.4	µg/m^3	EN 13999-1 and EN 13999-2	

[a] The determination of the strength and torque strength under the additional environmental conditions is only partly needed for specific applications by demand of the user or operator. To assess the heat resistance of an anaerobic adhesive measurement of the static shear strength in accordance with EN 15865 or torque strength in accordance with EN 15337 may be conducted at other specified environmental conditions.

Indicative performance requirements are given in Annex A depending on the intended use. These values are drawn from laboratory and practical experience and can be considered to indicate satisfactory performance under normal practical use and conditions.

The torque strength of anaerobic adhesives on threaded fasteners is expressed as breakloose torque measured on assemblies preloaded with an input torque of 5 Nm. Also, identical input torque is assumed to be applied to the specimens when measuring the prevailing torque.

Attention shall be drawn to the fact, that shear strength properties measured in accordance with EN 15337 and EN 15865 are valid for low-carbon respectively zinc-phosphated steel substrate materials. In general, curing of anaerobic adhesives may be significantly affected by the nature of the used adherends, thus testing using the specific materials of the intended application is recommended. It is also recommended to evaluate heat resistance or durability of the intended joint under conditions reflecting the environmental loading expected to encounter in practice.

5 Test methods

The test methods could be divided according to the type of the application, and the properties relevant to meet the requirements by the joint as follows:

5.1 Retaining co-axial assemblies

5.1.1 Static shear strength

The static shear strength expresses the bond strength of an adhesive joint formed between a metal pin and a metal collar measured as compressive force required to push out the pin from the collar at constant crosshead speed according to EN 15337. The test method is primarily to be used for the determination of the shear strength capability of retaining metallic co-axial joints such as tubular lap joints or pin-and-collar type joints.

The test method can be also used to determine the shear strength of threaded fasteners. However, in this case it is recommended to assess the bond ability of the threaded assembly by means of the torque strength according to EN 15865.

5.1.2 Durability

Durability is expressed as retention of the static shear strength measured in accordance with EN 15337 after 1 000 h exposure to 100 ºC and if required to 150 ºC.

NOTE If required durability can be assessed at other specified environmental conditions in accordance with EN 15337.

5.1.3 Heat resistance

To assess the heat resistance of an anaerobic adhesive measurement of the static shear strength in accordance with EN 15337 shall be conducted at 100 ºC or at a particular, elevated temperature.

5.2 Threaded fasteners

5.2.1 Torque strength; breakloose torque; breakaway torque

The torque strength expresses the bond strength on threaded fasteners according to EN 15865. It shall be expressed as breakloose torque evaluated on seated assemblies preloaded with specific input torque. This property can be used to make comparative assessments of the securing or locking effects of anaerobic adhesives used in threaded assemblies. In order to obtain well-defined test results, which primarily reflect the strength capacity of the used anaerobic adhesive, it is recommended to apply low input torque of 5 Nm to load the assembly. Higher input torque values may lead to higher torque strength results however with a relatively lower contribution from the adhesive and thus, they may be insufficient in order to clearly differentiate the securing performance of the used adhesive as its intrinsic property.

The prevailing torque specified in EN 15865 to be measured on unseated or preloaded assemblies is used in addition to indicate the ability of the threaded assemblies to be disassembled for maintenance or inspection purposes.

5.2.2 Durability

Durability is expressed as retention of the torque strength measured in accordance with EN 15865 after 1 000 h exposure to 100 ºC and if required to 150 ºC, after 168 h in boiling water, or after 2ºh exposure to -20 ºC. For anaerobic adhesives used to seal threaded metallic joints in contact with 1st, 2nd and 3rd family gases and hot water durability and heat resistance are measured in conjunction to the sealing ability in accordance with EN 751-1 thus no separate assessment of the torque strength retention after climate exposure is required.

5.2.3 Heat resistance

To assess the heat resistance of an anaerobic adhesive measurement of the torque strength in accordance with EN 15865 shall be conducted at 100 ºC or at a particular, elevated temperature. For anaerobic adhesives used to seal threaded metallic joints in contact with 1st, 2nd and 3rd family gases and hot water durability and heat resistance are measured in conjunction to the sealing ability in accordance with EN 751-1 thus no separate assessment of the torque strength retention after climate exposure is required.

5.3 Threaded joints in contact with 1st, 2nd and 3rd family gases and hot water

5.3.1 General

Details about 1st, 2nd and 3rd family gases can be found in EN 751-1 and EN 437.

5.3.2 Sealing ability

The sealing ability of anaerobic adhesives in threaded metallic joints in contact with 1st, 2nd and 3rd family gases and hot water of heating systems shall be measured according to EN 751-1. The sealing ability includes the resistance to gas condensates, the resistance to hot water, the resistance to temperature cycling, and the resistance to vibration.

5.4 Release of dangerous substances

For each type of application defined in 5.1, 5.2 and 5.3 the manufacturer shall measure the release of dangerous substances according to EN 13999-1 and EN 13999-2.

6 Assessment and verification of constancy of performance (AVCP)

6.1 General

The compliance of anaerobic adhesives with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— determination of the product type;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

6.2 Type testing

6.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests. (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

— For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family.

NOTE Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

— at the beginning of the production of a new or modified anaerobic adhesives (unless a member of the same product range), or

— at the beginning of a new or modified method of production (where this may affect the stated properties); or

they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the anaerobic adhesives design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility