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BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 15275:2015. It supersedes BS EN 15275:2007 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/52, Adhesives.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

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

Strukturklebstoffe - Charakterisierung anaerober Klebstoffe für koaxiale Metallverbindungen im Bauwesen

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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of an identical text or by endorsement, at the latest by October 2015, and conflicting national standards shall be withdrawn at the latest by January 2017.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 ºC (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 ºC. 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/mm^2	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	$\mu g/m^3$	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 1^{st}, 2^{nd} and 3^{rd} 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

on the anaerobic adhesives manufacturer to ensure that the anaerobic adhesives as a whole is correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

The number of samples of anaerobic adhesives to be tested/assessed shall be in accordance with Table 2.

Table 2 — Number of samples to be tested and compliance criteria

Characteristics	Requirement	Assessment method	No. of samples	Compliance criteria
Bond strength for threaded joints (as sealing ability)	Subclause 5.3.2	EN 751-1	1	Subclause 5.3.2
Bond strength for threaded fasteners (as Breakloose torque)	Subclause 5.2.1	EN 15865	1	Subclause 5.2.1
Bond strength for retaining co-axial assemblies (as Static shear strength)	Subclause 5.1.1	EN 15337	1	Subclause 5.1.1
Bond strength (as Prevailing torque)	Subclause 5.2.1	EN 15865	1	Subclause 5.2.1
Durability for retaining co-axial assemblies	Subclause 5.1.2	EN 15337	1	Subclause 5.1.2
Durability for threaded fasteners	Subclause 5.2.2	EN 15865	1	Subclause 5.2.2
Heat resistance for co-axial assemblies	Subclause 5.1.3	EN 15337	1	Subclause 5.1.3
Heat resistance for threaded fasteners	Subclause 5.2.3	EN 15865	1	Subclause 5.2.3
Dangerous substances	Subclause 5.4	EN 13999-1 EN 13999-2	1	Subclause 5.4
Sealing ability (including vibration resistance)	Subclause 5.3	EN 751-1	1	Subclause 5.3

6.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the anaerobic adhesives to which they relate.

6.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted[1)] to transmit to the

[1] The formulation of such an agreement can be done by licence, contract, or any other type of written consent.

manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

  — ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

  — keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

6.2.5 Cascading determination of the product type results

For some construction products, there are companies (often called "system houses") which supply or ensure the supply of, on the basis of an agreement[2)], some or all of the components (e.g. in case of windows: profiles, gaskets, weather strips)[3)] to an assembler who then manufactures the finished product (referred to below as the "assembler") in his factory.

Provided that the activities for which such a system house is legally established include manufacturing/assembling of products as the assembled one, the system house may take the responsibility for the determination of the product type regarding one or several essential characteristics of an end product which is subsequently manufactured and/or assembled by other firms in their own factory.

When doing so, the system house shall submit an "assembled product" using components manufactured by it or by others, to the determination of the product type and then make the determination of the product type report available to the assemblers, i.e. the actual manufacturer of the product placed on the market.

To take into account such a situation, the concept of cascading determination of the product type might be taken into consideration in the technical specification, provided that this concerns characteristics for which either a notified product certification body or a notified test laboratory intervene, as presented below.

The determination of the product type report that the system house has obtained with regard to tests carried out by a notified body, and which is supplied to the assemblers, may be used for the regulatory marking purposes without the assembler having to involve again a notified body to undertake the determination of the product type of the essential characteristic(s) that were already tested, provided that:

— the assembler manufactures a product which uses the same combination of components (components with the same characteristics), and in the same way, as that for which the system house has obtained the determination of the product type report. If this report is based on a combination of components not representing the final product as to be placed on the market, and/or is not assembled in accordance with the system house's instruction for assembling the components, the assembler needs to submit his finished product to the determination of the product type;

— the system house has notified to the manufacturer the instructions for manufacturing/assembling the product and installation guidance;

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2 This can be, for instance, a contract, license or whatever kind of written agreement, which should also contain clear provisions with regard to responsibility and liability of the component producer (system house, on the one hand, and the assembler of the finished product, on the other hand.

3 These companies may produce components but they are not required to do so.

— the assembler (manufacturer) assumes the responsibility for the correct assembly of the product in accordance with the instructions for manufacturing/assembling the product and installation guidance notified to him by the system house;

— the instructions for manufacturing/assembling the product and installation guidance notified to the assembler (manufacturer) by the system house are an integral part of the assembler's Factory Production Control system and are referred to in the determination of the product type report;

— the assembler is able to provide documented evidence that the combination of components he is using, and his way of manufacturing, correspond to the one for which the system house has obtained the determination of the product type report (he needs to keep a copy of the system house's determination of the product type report);

— regardless the possibility of referring, on the basis of the agreement signed with the system house, to the latter's responsibility and liability under private law, the assembler remains responsible for the product being in compliance with the declared performances, including both the design and the manufacture of the product, which is given when he affixes the regulatory marking on his product.

6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as foreseen in 6.2.4 and 6.2.5.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 standard and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

6.3.2.2 Equipment

6.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

6.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer’s written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of

performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

6.3.2.4 Traceability and marking

Individual anaerobic adhesives shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

6.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, and the means of control, are indicated in Clauses 4 and 5.

6.3.2.7 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

6.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

6.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

6.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan,

and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

6.3.4 Initial inspection of factory and of FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 6.3.2 and 6.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard are in place and correctly implemented,

and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice,

and

c) that the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

6.3.5 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

6.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 6.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

6.3.7 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity

The anaerobic adhesives produced as a one-off, prototypes assessed before full production is established, and products produced in very low quantities (less than 1 t per year) shall be assessed as follows.

For type assessment, the provisions of 6.2.1, 3rd paragraph apply, together with the following additional provisions:

— in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;

— on request of the manufacturer, the results of the assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The following shall be assessed:

— the FPC-documentation; and

— the factory.

In the initial assessment of the factory and FPC it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard will be available, and

b) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice, and

c) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this European Standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this European Standard has been verified.

Once series production is fully established, the provisions of 6.3 shall apply.

Annex A
(informative)

Indicative values for performance characteristics

Table A.1 — Anaerobic adhesives for co-axial metallic elements in building and civil engineering structures including fasteners- threaded and otherwise, pipes and tubes - Performance requirements and corresponding standards

Type of application	Characteristics	Supporting standard	Performance requirement	Classification	Relevance
Retaining metallic co-axial cylindrical joints	Shear strength, in N/mm²	EN 15337	≥ 20	High shear strength	Load bearing tubular or pin-and-collar-type cylindrical assemblies
			≥ 10, < 20	Medium shear strength	Easy-to-disassemble tubular or pin-and-collar-type cylindrical assemblies
Securing or locking metallic threaded assemblies	Breakloose torque, in Nm, for corresponding fastener specimen preloaded at 5 Nm	EN 15865	≥ 30	High strength	High clamp load retention performance against vibration
			≥ 15, < 30	Medium strength	Medium to high static locking performance
			< 15	Low strength	Low locking performance
	Prevailing torque, in Nm, for corresponding fastener specimen preloaded at 5 Nm		≥ 40	Difficult-to-dismantle	Permanent assembly, very rarely to dismantle
			≥ 20, < 40	Possible-to-dismantle with standard equipment	Standard assembly, dismantling enabled but not regularly
			< 20	Easy-to-dismantle	Temporary assembly, frequently to dismantle

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/127 Construction Adhesives given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the anaerobic adhesives intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses for anaerobic adhesives

Product: anaerobic adhesives as covered under the scope of this standard **Intended use:** to bond co-axial metallic assemblies			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Bond strength for threaded joints (as sealing ability)	5.3.2	-	-
Bond strength for threaded fasteners (as Breakloose torque)	5.2.1	-	Expressed in Nm
Bond strength for retaining co-axial assemblies (as Static shear strength)	5.1.1	-	Expressed in N/mm^2
Bond strength (as Prevailing torque)	5.2.1	-	Expressed in Nm
Durability for retaining co-axial assemblies	5.1.2	-	Expressed in N/mm^2
Durability for threaded fasteners	5.2.2	-	Expressed in Nm
Heat resistance for co-axial assemblies	5.1.3	-	Expressed in N/mm^2
Heat resistance for threaded fasteners	5.2.3	-	Expressed in Nm
Dangerous substances	5.4	-	-
Sealing ability (including vibration resistance)	5.3	-	Use the expression Meets the Requirements Accordingly to EN 751-1

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure for AVCP of anaerobic adhesives

ZA.2.1 System of AVCP

The AVCP system of anaerobic adhesives indicated in Table ZA.1, established by EC Decision 99/470/EC of 1999-06-29 amended by 01/596/EC of 2001-01-8 is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System of AVCP

Product(s)	Intended use(s)	Level(s) or class(es) of performance	AVCP system(s)
Anaerobic adhesives	For bonding co-axial metallic assemblies	none	2+
System 2+: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.3 including certification of the factory production control by a notified production control certification body on the basis of initial inspection of the manufacturing plant and of factory production control as well as of continuous surveillance, assessment and evaluation of factory production control.			

The AVCP of the anaerobic adhesives in Table ZA.1 shall be according to the AVCP procedures indicated in Table ZA.3 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3 — Assignment of AVCP tasks for anaerobic adhesives under system 2+

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.1; 6.3
	Determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.2
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.1; 6.3
Tasks for the notified production control certification body	Initial inspection of the manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared	6.1; 6.3
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared	6.1; 6.3

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

In case of products under system 2+

— the determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; the factory production control and the testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and

— the certificate of conformity of the factory production control, issued by the notified production control certification body on the basis of:

  — initial inspection of the manufacturing plant and of factory production control, and

  — continuous surveillance, assessment and evaluation of factory production control.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011.

According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;

e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

f) for the listed essential characteristics for which no performance is declared, the letters "NPD" (No Performance Determined).

Regarding the supply of the DoP, Article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for anaerobic adhesives

DECLARATION OF PERFORMANCE

No. 001CPR2013-07-14

1) Unique identification code of the product type:

Anaerobic adhesive

2) Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

Anaerobic adhesive

3) Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

For bonding co-axial metallic assemblies

4) Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

AnyCo SA,

PO Box 21

B-1050 Brussels, Belgium

Tel. +32987654321

Fax: +32123456789

Email: anyco.sa@provider.be

5) Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2):

Anyone Ltd

Flower Str. 24

West Hamfordshire

UK-589645 United Kingdom

Tel. +44987654321

Fax: +44123456789

e-mail: anyone.ltd@provider.uk

6) System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

System 2+

7) In case of the declaration of performance concerning a construction product covered by a harmonized standard:

Notified factory production control certification body No. 5678 performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control and issued the certificate of conformity of the factory production control.

8) Declared performance

Essential characteristics	Performance	Harmonized technical specification
Breakloose torque (preloaded at 5 Nm):	24 Nm	EN 15275:2015
Prevailing torque (preloaded at 5 Nm):	22 Nm	
Breakloose torque after 5 000 h at 100 ºC (preloaded at 5 Nm):	19,5 Nm	
Breakloose torque at 100 ºC (preloaded at 5 Nm):	9,6 Nm	
Dangerous substance X:	Less than … ppm	

9) The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8.

This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by:

……

(name and function)

…….. ……

(place and date of issue) (signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the anaerobic adhesive

or

— to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

— to the packaging

or

— to the accompanying documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed;

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;

— the unique identification code of the product type;

— the reference number of the declaration of performance;

— the level or class of the performance declared;

— the dated reference to the harmonized technical specification applied;

— the identification number of the notified body;

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figures ZA.1 to ZA.2 give examples of the information related to products subject to AVCP under each of the different systems to be given on the product, label, packaging and/or commercial documents.

CE 4567	*CE marking, consisting of the "CE"-symbol* *Identification number of the notified production control certification body*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **15** 00001-CPR-2013/05/12	*Name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 15275:2015 Anaerobic adhesives Used to bond co-axial metallic assemblies in particular for use for securing or locking metallic threaded assemblies Breakloose torque (preloaded at 5 Nm): 24 Nm Prevailing torque (preloaded at 5 Nm): 22 Nm Breakloose torque after 5 000h at 100 ºC (preloaded at 5 Nm): 19,5 Nm Breakloose torque at 100 ºC (preloaded at 5 Nm): 9,6 Nm Dangerous substance X : Less than … ppm	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product type* *Intended use of the product as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.1 — Example CE marking information for anaerobic adhesives under AVCP system 2+ to be attached on the product, label, packaging and/or commercial documents

CE 4567	*CE marking, consisting of the "CE"-symbol* *Identification number of the notified production control certification body*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **15** 00001-CPR-2013/05/12	*Name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 15275:2015 Anaerobic adhesives Used to bond co-axial metallic assemblies in particular for use for securing or locking metallic threaded assemblies	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product type* *Intended use of the product as laid down in the European Standard applied*

Figure ZA.2 — Example of simplified CE marking information for anaerobic adhesives under AVCP system 2+ to be attached on the product, label, packaging and/or commercial documents

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