



## **GUIDANCE PAPER F**

*(concerning the Construction Products Directive - 89/106/EEC)*

# **DURABILITY AND THE CONSTRUCTION PRODUCTS DIRECTIVE**

(Revision December 2004)

### **Preface**

*Article 20 of the Construction Products Directive (89/106/EEC) states that the Standing Committee may, "at the request of its Chairman or a Member State, examine any question posed by the implementation and the practical application of this Directive".*

*In order to ensure as far as possible a common understanding between the Commission and the Member States as well as among the Member States themselves as to how the Directive will operate, the competent services of the Commission, assuming the chair and secretariat of the Standing Committee, may issue a series of **Guidance Papers** dealing with specific matters related to the implementation, practical implementation and application of the Directive.*

***These papers are not legal interpretations of the Directive.***

***They are not judicially binding and they do not modify or amend the Directive in any way. Where procedures are dealt with, this does not in principle exclude other procedures that may equally satisfy the Directive.***

***They will be primarily of interest and use to those involved in giving effect to the Directive, from a legal, technical and administrative standpoint.***

***They may be further elaborated, amended or withdrawn by the same procedure leading to their issue.***

## **GUIDANCE PAPER F**

### **DURABILITY AND THE CONSTRUCTION PRODUCTS DIRECTIVE**

- This Guidance Paper was originally issued by the European Commission Services, following consultation of the Standing Committee on Construction at the 47th meeting on 1 July 1999, as document CONSTRUCT 99/367.
- It underwent some editorial changes, in September 2002, following consultation of the Standing Committee on Construction.
- It was updated in December, following a consultation of Standing Committee on the document CONSTRUCT 04/655 Rev.1

## Acronyms used

AB:	Approval Bodies (Bodies authorised by the Members States according to Article 10 of the CPD to issue European Technical Approvals)
AoC:	Attestation of conformity according to Chapter V in conjunction with Annex III of the CPD
CEN:	European Committee of Standardisation (Comité Européen de Normalisation)
CEN/TC:	Technical Committee of CEN
CENELEC:	European Committee for Electrotechnical Standardization (Comité Européen de Normalisation de l'Electricité)
CPD:	Council Directive 89/106/EEC (Construction Products Directive)
CUAP:	Common Understanding of Assessment Procedure for European Technical Approval without guideline (art. 9.2 of the CPD)
EOTA:	European Organisation for Technical Approvals
EOTA/WG:	Working Group of EOTA
ETA:	European Technical Approval (CPD Chapter III type of “technical specification”)
ETAG:	Guideline for European Technical Approval
GP:	Guidance Paper issued by the Construction Unit of the European Commission
hEN:	harmonised European Standard (CPD Chapter II type of “technical specification”)
IDs:	Interpretative Documents (No 1 to No 6) according to Art. 3.3 of the CPD, as published in OJ C 62 of 28.2.1994, p. 1 – 163
NB:	Notified Body (also called “Conformity Assessment Body” for others New Approach Directives). According to the CPD and Guidance Paper A, Notified Bodies includes <i>certification bodies, inspection bodies and testing laboratories</i>

# DURABILITY AND THE CONSTRUCTION PRODUCTS DIRECTIVE

## 1. Scope

- 1.1. Durability is the property of lasting for a given or long time without breaking or getting weaker.
- 1.2. This paper addresses the issue of durability within the context of the implementation of Council Directive 89/106/EEC<sup>1</sup> (hereafter referred to as the Construction Products Directive or CPD), as amended by Council Directive 93/68/EEC<sup>2</sup>. Only aspects related to the immediate production of technical specifications are considered.
- 1.3. The Guidance Paper is intended for technical specification writers (CEN/CENELEC and EOTA members), for consideration together with the respective mandates and provisions given therein, and regulators and enforcement authorities within the European Economic Area (EEA). It takes account of the Communication of the Commission with regard to the interpretative documents of Directive 89/106/EEC<sup>3</sup>.

## 2. References relating to durability in the CPD and IDs

- 2.1. CPD 2<sup>nd</sup> whereas – “Member States have provisions, including requirements, not only to building safety but also to health, durability, energy economy, protection of the environment, and other aspects important in the public interest.”
- 2.2. CPD Article 3.1 and Annex I – Essential Requirements (applicable to works) shall be satisfied during an economically reasonable working life.
- 2.3. IDs, para 1.3.5 – “**Economically reasonable working life:**  
(1) The working life is the period of time during which the performance of the works will be maintained at a level compatible with the fulfilment of the essential requirements.  
(2) An economically reasonable working life presumes that all relevant aspects are taken into account, such as: costs of design, construction and use; costs arising from hindrance of use; risks and consequences of failure of the works during its working life and costs of insurance covering these risks; planned partial renewal; costs of inspections, maintenance, care and repair; costs of operation and administration; disposal; environmental aspects.”
- 2.4. IDs, para 5.1(2) – “It is up to the Member States, when and where they feel it necessary, to take measures concerning the working life which can be considered reasonable for each type of works, or for some of them, or for parts of the works, in relation to the satisfaction of the essential requirements.”
- 2.5. IDs, para 5.1(2) - “where provisions concerning the durability of works in relation to the essential requirement are connected with the characteristics of products, the mandates

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<sup>1</sup> OJ L 40, 11.2.1989

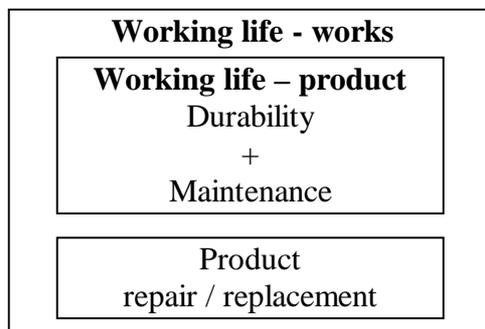
<sup>2</sup> OJ L 220, 30.8.1993

<sup>3</sup> OJ C 62, 28.2.1994

for the preparation of the European standards and guidelines for European technical approvals, related to these products, will also cover durability aspects.”

- 2.6. IDs, para 5.2 (1) – “Category B specifications and guidelines for European technical approval should include indications concerning the working life of the products in relation to the intended uses and the methods for its assessment.”
- 2.7. IDs, para 5.2 (2) – “The indications given on the working life of a product cannot be interpreted as a guarantee given by the producer, but are regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.”
- 2.8. ID 1, para 4.3.1(3)(iv) - “durability (referred to the values of characteristics) is intended to mean the extent to which the values of the characteristics are maintained during the working life under the natural process of change of the characteristics, by excluding the effect of aggressive external actions.”
- 2.9. ID 1, Appendix – identifies durability aspects for some products: “Durability (with respect to the values of the above characteristics and under the following actions)”.

### 3. Definitions



- 3.1. **Working life (works)** - the period of time during which the performance of the works will be maintained at a level compatible with the fulfilment of the Essential Requirements.
- 3.2. **Working life (product)** - the period of time during which the performance of a product will be maintained at a level that enables a properly designed and executed works to fulfil the Essential Requirements (i.e. the essential characteristics of a product meet or exceed minimum acceptable values, without incurring major costs for repair or replacement). The working life of a product depends upon its inherent durability and normal maintenance.

A clear distinction has to be made between the assumed economically reasonable working life for a product (also called: *design working life*), which underlies the assessment of durability in technical specifications, and the actual working life of a product in a works. The latter depends on many factors beyond the control of the producer, such as design, location of use (exposure), installation, use and maintenance. **The assumed working life can thus not be interpreted as being a guarantee given by the producer.**

Technical specification writers will have to take a view about the “normal” working life of the products that they deal with. The assumed working life of a product should take

account of the assumed working life of the works, the ease and cost of repair or replacement of the product, maintenance requirements and exposure conditions.

- 3.3. ***Durability of a product*** - the ability of a product to maintain its required performance over a given or long time, under the influence of foreseeable actions. Subject to normal maintenance, a product shall enable a properly designed and executed works to fulfil the Essential Requirements for an economically reasonable period of time (working life of the product).

Durability is thus dependent on the intended use of the product and its service conditions. The assessment of durability can relate to the product as a whole or to its performance characteristics, insofar as these play a significant part with respect to the fulfilment of the Essential Requirements. In either case, the underlying assumption is that the performance of the product will be maintained at an acceptable level, in relation to its initial performance, throughout its working life.

- 3.4. ***Foreseeable actions*** – potential degradation factors that may affect the compliance of the works with the essential requirements. They include, for example, temperature, humidity, water, UV radiation, abrasion, chemical attack, biological attack, corrosion, weathering, frost, freeze-thaw and fatigue (i.e. actions related to “normal” agents that could be expected to act on the works or parts thereof).

#### **4. Factors affecting durability**

- 4.1. ***Exposure conditions*** – as the severity of actions related (e.g.) to climate and geography vary considerably across Europe, technical specifications should aim to define an appropriate range of exposure conditions and relate the assessment of durability to these. The definition of use categories for products may be a suitable manner to achieve this.

Examples of the types of exposure that should be considered are temperature variations (daily, monthly, annual, freeze-thaw conditions etc), incidence of solar radiation, humidity, rainfall, wind speed etc (i.e. related to “normal” use of the product).

- 4.2. ***Other*** – the chemical and physical characteristics of a product will have an influence on its durability. For example, some types of plastics may be susceptible to UV degradation, porous materials to freeze-thaw damage, composite materials to temperature variations etc. Such material-specific factors will need to be considered by specification writers, particularly in performance-based standards that potentially cover a wide range of different materials.

#### **5. The verification of durability**

- 5.1. The durability of construction products may be verified using performance-based methods, descriptive solutions or a combination of the two.
- 5.2. European technical approvals are based on examinations, tests and an assessment of the product (*Article 9.1*), giving scope for both types of solution mentioned above. Again, a balance must be struck between performance testing and descriptive solutions, bearing in mind that information may be lacking on the acceptability of the latter. For innovative

products, rather than an extensive testing programme, an examination of the practical experience available in Europe for similar products may provide an appropriate solution.

### ***Performance testing for durability***

- 5.3. A main route to durability assessment involves the performance testing of a product to determine the variation in its characteristics under a given action or cycle of actions. The most common types of performance testing are :
- Direct testing – the achievement of a certain level of performance is recognised as being sufficient to give an acceptable durability (e.g. abrasion, fatigue, closing, and impact tests).
  - Indirect testing – the measurement of “proxy” characteristics that can be correlated to actual performance and hence durability (e.g. porosity for freeze-thaw resistance and hardness for abrasion resistance).
  - Natural weathering/ ageing tests – such tests either give a direct indication of durability (e.g. corrosion tests) or enable normal performance tests to be carried out after treatment, thus allowing the degradation in performance to be determined.
  - Accelerated weathering/ ageing tests – as above, but with the normal ageing process speeded up to reduce the duration of the test.
  - “Torture” tests – the product is subjected to conditions that are much harsher than those ever encountered in use (e.g. boil testing of glass reinforced polyester or laminated timber products).
- 5.4. Although performance testing can provide useful data on the degradation of performance over time, often allowing greater scope for innovation, it can be expensive and is still the subject of much research around the world, particularly in relation to service life prediction. To avoid unnecessary costs, alternatives to full-scale testing should be considered wherever possible.
- 5.5. As requested for each harmonised characteristic, the hEN or ETAG-CUAP should include only one assessment method per parameter to which durability is related. Where this is not practicable, however a hEN or ETAG-CUAP may contain more than one test method, provided that this can be justified in accordance with the mandate<sup>4</sup> and the results of the various tests are presumed as equivalent or correlated.
- 5.6. Durability should be assessed according to the current state of the art, therefore using one method of assessment which existed previously. Nevertheless, in some cases it may be necessary to develop a new test method for durability, but the production of the hEN/ETAG-CUAP should not, in general, be delayed by the development of a new method.

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<sup>4</sup> Chapter II.9 of all the mandates state that *“In general, only one method should be referred to for the determination of each characteristic, for a given product or family of products. If, however, for a product or family of products because of justifiable reasons, more than one method is to be referred to for the determination of the same characteristic, the situation must be justified. In this case all referenced methods should be linked by the conjunction "or" and an indication of application should be given. In any other case, two or more test/calculation methods for the determination of one characteristic can be accepted only if a correlation between them exists or can be developed. The relevant harmonised product standard must then select one of them as the method of reference”*

### ***Descriptive solutions for durability***

- 5.7. The non-testing route to durability consists of an experience-based description of a product or of related measures that are known to ensure adequate durability for a given product under assumed conditions (e.g. intended use, service conditions, working life, ...). Examples are :
- specification of protective coating/ cover,
  - composition/ thickness of material,
  - recommendations on installation conditions in the works,
  - specified maintenance requirements.
- 5.8. This type of solution is only suited to well-known construction products for which experience has been gained over a long period of time. The proposed solutions must take account of the intended use(s) of the product and be valid for the range of exposure conditions encountered in Europe (e.g. a descriptive solution providing acceptable durability in Southern Europe may not be appropriate for conditions further north).

## **6. The treatment of durability in technical specifications**

- 6.1. All technical specifications elaborated in the context of the CPD must include provisions for the assessment of durability, taking into account the needs of the Member States and using performance-based methods, descriptive solutions or a combination of the two. They should be written in such a way that a product in conformity with the technical specification can be assumed to have a “normal” working life, subject to proper maintenance.
- 6.2. Whilst the CPD calls for European standards to be expressed as far as practicable in product performance terms (*Article 7.2*), the condition ‘as far as practicable’ also applies to the method used for the verification of durability. Therefore, durability must not necessarily be verified by means of performance testing. Specification writers should adopt a pragmatic approach, striking a balance between the cost of testing, the additional information that can result from such tests, and the apparent simplicity of descriptive solutions. The latter, however, must not be used as an arbitrary means of discrimination between products or producers.
- 6.3. The current, generally accepted “*state of the art*<sup>5</sup>” is to be applied in dealing with durability in technical specifications for construction products. The development of performance-based methods of determination, however desirable from a technical point of view, should not delay the delivery of European standards and European technical approvals. Whilst the mandates tend to be expressed in terms of “the durability of characteristic X against action Y”, it is recognised that the current level of knowledge is not always sufficient to follow such an approach. The use of indirect methods of assessment may provide appropriate solutions in such cases.

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<sup>5</sup> In this context, “state of the art” refers to the current level of knowledge that is generally accepted as being technically sound. It does not mean the most advanced technology.

- 6.4. The best judges of the “*state of the art*” are the specification writers themselves and thus durability is to be regarded as a purely technical matter to be dealt with by them<sup>6</sup>. By “state of the art”, the CPD and its mandates ask CEN/TC - EOTA/WG to consider only those aspects of durability which are already required in at least one Member State, and for which a means of assessment exists. Specification writers of hEN or ETAs should not introduce new durability requirements in the first generation of technical specifications. Those who wish to develop new durability requirements, may do so for second-generation technical specifications, taking into account the time needed to develop the necessary assessment methods.
- 6.5. Where entirely descriptive solutions are proposed, compliance with the technical specification will normally indicate that the product meets the required criteria and no further information is required to accompany the CE marking. For performance testing, the general principles contained in the Guidance Papers D “CE marking” and E “classes and levels” should be followed.
- 6.6. In order to prevent undue barriers to trade, the use of prescriptive or descriptive solutions for durability should be limited to the minimum needed. When a harmonised technical specification provides for performance based requirements for mandated characteristics, the specification should systematically contain a basis for accepting equivalently performing products which deviate from a prescriptive or descriptive solution foreseen in the specification.
- 6.7. The same principles as for other characteristics for levels, classes and the “No performance determined” option, as set out in Guidance Paper E and Guidance Paper D, also apply to durability. Technical specifications must not exclude, by setting “high” requirements on durability, existing products that are already placed on the European market<sup>7</sup>.

## **7. Attestation of conformity**

- 7.1. The assessment of durability, as indicated in the technical specification, forms part of the attestation that products are in conformity with the requirements of that specification. The assessment is therefore carried out under the same system of attestation of conformity as for the product itself.
- 7.2. Under a given system of AoC for a product, different tasks may be performed by different parties<sup>8</sup>. The assessment of durability should be done by the same party that assesses the characteristic to which durability is related, even though this will not be always possible<sup>9</sup>.

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<sup>6</sup> Note, however, that Article 5.1 of the CPD constitutes a “technical” safeguard clause on the content of European technical specifications. The mandates also give the Member States the right to participate in the activities of specification writers through their national delegations/ bodies and to present their points of view at all stages of the drafting process.

<sup>7</sup> See Guidance Paper E, clause 3.11 second and third bullet and clause 4.11 second and third bullet.

<sup>8</sup> Additional guidance on the role and tasks of the notified bodies is included in Guidance Paper K.

<sup>9</sup> For example, many products require attestation system 1 for reaction to fire and system 3 for other characteristics. In such cases, with an indirect assessment of durability, the assessment of durability should

## 8. Checklist for technical specification writers

- 8.1. What actions (potential degradation factors) are relevant for the family of products in question? The mandate gives an initial list, for which the Member States have indicated that they regulate, but this is not necessarily exhaustive. Consideration should be given to the intended use of the product, foreseeable service conditions and the potential variability in the severity of actions across Europe. The definition of exposure conditions and use categories should be considered where appropriate. Specific material-related aspects should also be considered, even within the context of purely performance-based specifications.
- 8.2. What assumptions are to be made about the “normal” working life of the product in relation to the possible intended uses? These assumptions underlie the assessment of durability and the severity of any proposed testing requirements. Current market practice should be followed wherever possible. Where different working life assumptions can be made for the same product, the technical specification should provide a means of distinguishing between the different assessments of durability (e.g. working life categories).

The technical specification need not make explicit reference to the working life assumed in the assessment of durability, but may do so if it is felt to be appropriate. In the latter case, it shall be made clear that the assumption does not constitute a guarantee from the producer as to the actual working life of his product. Table 1 below, developed by EOTA, provides an illustration of possible working life assumptions. Whilst useful as a guide, the figures provided need to be adapted to the specific product family in question.

- 8.3. What is the current, generally accepted “*state of the art*” for the family of products in question? This assessment will include a consideration of the current provisions and methods that are deemed to provide adequate durability and a review of available test methods, whether national, European or international in order to choose the assessment method and the technical requirement (see 5.7 and 5.8 above) which will be included in the harmonised technical specification. The possibility of adapting test methods developed by other technical committees or working groups should also be investigated.
- 8.4. The decision whether to adopt performance-based or descriptive solutions to assess durability, or a combination of the two, will depend upon the above analysis. The approach adopted should be practicable and respect the principle of proportionality – the least onerous possible procedure consistent with the objective sought. The underlying basis of the assessment should be readily apparent in the specification.
- 8.5. The requirements for information on durability to accompany the CE marking must also appear in the technical specifications. Guidance on these aspects is given elsewhere (GP D on CE marking and GP E on levels and classes).

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be assigned to a Notified testing laboratory or the manufacturer himself (system 3 or 4) rather than the product certification body (system 1 and 1+), given that it is the characteristics other than reaction to fire which are subject to durability. Another example can be the products for which the durability of a group of characteristics (or all) will be specifically assessed by a Notified Body specialised in this field.

## 9. Assessment methods

**Hierarchy of methods.** The ways in which durability may be dealt with in technical specifications (hEN or ETAs), in accordance with the current state of the art, are shown below in order of preference. This assumes that a performance based approach is used wherever practicable and that, in general, durability should be of a specific characteristic against an action. When a technical specification comes up for review, the treatment of durability should evolve towards the preferred method of assessment (i.e. option 1).

The examples shown here are to illustrate the principles. A technical specification may take different combinations of the options, depending on the nature of the product and the relevant durability requirements. Where a technical specification introduces either direct assessment or proxy testing, the CEN/TC - EOTA/WG should consider also giving lists of '*conventional accepted performance*'<sup>10</sup> products which, from experience, are known to meet the requirement without the need for testing.

- 9.1. **Direct assessment by testing or calculation (preferred).** The product is subjected to a specific action after which one or more of the product characteristics are assessed.

For example “Subject the product to 1000 cycles alternating between 20°C and 80°C. After this, check whether the new performances of the product fulfil the requirements defined in the technical specification.” In this case the specific characteristic “Durability of operational reliability against high temperature” has been assessed. This category may include natural or artificial weathering/ageing tests.

- 9.2. **Indirect (proxy) testing (of durability).** The product is subjected to a specific action and criteria, for which there is known to be a correlation or relationship between the characteristic being tested and the required durability characteristic.

For example “After 100 cycles of freeze/thaw between 10°C and -20°C, the loss of mass shall be less than 5%”. There is a '*correlation*', based on experience and knowledge, between mass loss and characteristics such as strength, but no explicit relationship between the two is established.

Another example: “Frost resistance shall be demonstrated by the water absorption of the product. Frost resistant products shall have absorption less than 10%.”

- 9.3. **Protection requirements.** The hEN or ETA specifies that all products shall be protected (e.g. by coating or painting). In such a case, it may set, for example, minimum thicknesses and types of coating, but does not have to. Consequently, the technical specification will need to require that the producer provides the exact thickness and type of coating as declared value in the CE marking. It may also require the manufacturer to give advice with the CE marking, without taking direct responsibility for the installed product. This, for example, may be done on the commercial documents with the statement “To ensure satisfactory durability, this product, when used externally, should after installation be painted or otherwise protected with ... [*indication of the protective product and/or other details*].”. For products subject to an ETA, this information is provided in the chapter of the ETA that contains assumptions and recommendations.

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<sup>10</sup> See Guidance Paper M, clause 3.5. This concept can be designated as « deemed to satisfy »

- 9.4. **Prescriptive requirements.** The standard “prescribes” certain conditions linked either directly or indirectly to durability. This may be, for example, the material type, its density and its thickness. This often requires that there is previous knowledge of the performance of the product in service, so that experience has demonstrated that products of the defined type are, indeed, durable.

For prescriptive requirements, a clause of equivalence allowing the use of equivalent products should be systematically introduced, in hEN or ETAG-CUAP.

- 9.5. **Indirect assessment.** Indirect assessment differs from proxy testing (see 9.2 above) in that, in the latter, there is a relationship between the proxy characteristic and the desired durability characteristic whereas, in the former, there is no such direct relationship, only a link. For an indirect assessment, it is assumed that a product which meets some or all of the requirements defined in the standard (especially strength requirements) will be inherently durable. For this approach to work, the standard has to set threshold values against those characteristics relevant for assessing inherent durability, otherwise the principle does not apply. In some very limited cases<sup>11</sup>, durability may be assessed indirectly by visual assessment, as long as the criteria for such assessment are defined.

## **10. References to durability in Technical specifications**

- 10.1. Like all other technical characteristics under the CPD, durability requirements shall be a full part of the specification text. For standards, durability may also be included in a normative annex. For this characteristic, it will be necessary to provide the declaration of the performance if the manufacturer is intended to sell the product in a country where the characteristic is regulated, and might be declared (but the NPD option is also possible when selling the products in countries where there is no regulation on it).
- 10.2. For products covered by standards, an informative annex may give advice on the link between the durability as stated by the manufacturer and the likely performance of the product in end-use conditions (see Guidance Paper D) or, where the standard provides for different levels of durability performance, the level necessary for a given use.
- 10.3. For products covered by standards, there should be one or more specific entries for durability (unless indirect assessment is being used) in Annex ZA, Table ZA.1. The results of durability assessment have to be part of the CE marking, with the marking of durability being subject to the same principles as for any other characteristic. If the performance cannot be known by reading the standard itself (e.g. the standard contains simple pass/fail requirements), something needs to be stated (see Guidance Paper D 3.6, b, note 1), otherwise it may be stated if desired).
- 10.4. If direct or indirect testing is used then (subject to the preceding paragraph), the test results have to be shown as part of the CE marking. When the technical specification (hEN or ETA) uses protection requirements, the protection used should be stated with the marking; where prescriptive provisions are included in it (e.g. material type, and the standard covers more than one type of material), the description of the provisions would also need to be marked.

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<sup>11</sup> For products subject to ETA, such an assessment is normally undertaken before issuing the ETA.

## **11. Some considerations on choice of test methods**

- 11.1. Any test method for durability must be technically appropriate and adequate, and have an appropriate level of repeatability and reproducibility. The correct choice should be independent of who will perform the test (manufacturer or test laboratory). Although it is desirable that any test method should be as simple as practicable, there are cases where this is not appropriate and a more complex method needs to be given. However, considerations of whether such tests could be best performed by manufacturers or external laboratories should not be a decisive factor in deciding the suitability of any method. In any case, the use of a third party is always possible, even where the system of attestation of conformity determines that the producer can carry out the test (e.g. voluntary use of a test laboratory by a producer under CPD system 4).
- 11.2. It is also recognised that some tests related to durability may take time to perform. The time involved may be a factor in the choice between competing test methods but should not be a factor in determining whether a particular test method is acceptable. . If the characteristic to be assessed requires, technically, a time to perform, then this has to be accepted.
- 11.3. It must be recognised that anyone (manufacturer, authorised agent) making an unjustified claim about his product is breaking the law, especially when any unjustified claim is apparently “guaranteed” by the CE marking. Test laboratories, whether notified or not, also have a responsibility to ensure that tests are properly carried out.
- 11.4. Technical specifications must set the requirement at the level that is technically appropriate for the product itself, not for any other reason. Anything else has to be dealt with in the framework of market surveillance and control. Durability specifications should be based on technical necessity only. They may not include aspects of market surveillance or take its place.

## **12. Examples**

### ***Durability by performance testing***

- 12.1. “The resistance to SO<sub>2</sub> shall be proven in a test cycle by alternating storage in a warm SO<sub>2</sub> atmosphere and a laboratory atmosphere. Following exposure, the test sample is submitted to the crushing test.”
- 12.2. “Durability of operational reliability against fatigue - Subject the spring to (5000 +/- 10) cycles of normal operation at a rate not exceeding 6 cycles per minute. Record any fracture or rupture. No fracture or rupture shall be permitted.”

### ***Durability using descriptive solutions***

- 12.3. “The following table shows the minimum concrete cover of reinforcement related to different ambient conditions. The cover appropriate for the intended end use shall be used, and its value stated.”

- 12.4. "The tightness of elastomeric sealing joints is presumed to be durable if the joint itself is in conformity with the requirements of the standard and if the sealing elements have been correctly selected and conform to EN 681. Note: the joint needs to be installed according to the manufacturer's instructions."
- 12.5. Metal components shall be protected with one of the following levels of protection/coating, whichever is relevant for the associated level of exposure."

**Table 1: Indicative design working life**  
(Table 2.1 of EN 1990:2002 Eurocode – Basis of structural design)

Design working life category	Indicative design working life (years)	Examples
1	10	Temporary structures <sup>(1)</sup>
2	10 to 25	Replaceable structural parts, e.g. gantry girders, bearings
3	15 to 30	Agricultural and similar structures
4	50	Building structures and other common structures
5	100	Monumental building structures, bridges, and other civil engineering structures

(1) Structures or parts of structures that can be dismantled with a view to being re-used should not be considered as temporary.

**Table 2: Illustrative assumed working lives (design working life) of works and construction products**  
(from EOTA Guidance Document 002, page 2)

Assumed working life of works (years)		Working life of construction products to be assumed in ETAGs, ETAs and hENs (years)		
Category	Years	Category		
		Repairable or easily replaceable	Repairable or replaceable with some more efforts	Lifelong <sup>2</sup>
Short	10	10 <sup>1</sup>	10	10
Medium	25	10 <sup>1</sup>	25	25
Normal	50	10 <sup>1</sup>	25	50
Long	100	10 <sup>1</sup>	25	100

<sup>1</sup> In exceptional and justified cases, e.g. for certain repair products, a working life of 3 to 6 years may be envisaged (when agreed by EOTA TB or CEN respectively).  
<sup>2</sup> When not repairable or replaceable "easily" or "with some more efforts".

**Table3: Illustrative assumed service lives of works and products (from ISO 15686-1)**

Design life of building	Inaccessible or structural component or components where replacement is expensive or difficult (including below ground drainage)	Major replaceable components	Building services
100	100	40	25
60	60	40	25
25	25	25	25
15	15	15	15
10	10	10	10