
Gradbeni proizvodi - Ocenjevanje sproščanja nevarnih snovi - Koncept horizontalnih postopkov preskušanja v podporo zahtevam direktive o gradbenih proizvodih (CPD)

Construction products - Assessment of release of dangerous substances - Concept of horizontal testing procedures in support of requirements under the CPD

Bewertung der Freisetzung von gefährlichen Substanzen aus Bauprodukten - Evaluierung von horizontalen Ansätzen zur Bewertung der möglichen Freisetzung von gefährlichen Substanzen aus Bauprodukten im Rahmen von Anforderungen aus der Bauproduktenrichtlinie

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Produits de construction - Evaluation de l'émission de substances dangereuses - Concept des méthodes d'essai horizontales à l'appui des exigences de la DPC

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**Construction products: Assessment of release of dangerous
substances - Concept of horizontal testing procedures in support
of requirements under the CPD**

Produits de construction - Evaluation de l'émission de
substances dangereuses - Concept des méthodes d'essai
horizontales à l'appui des exigences de la DPC

Bewertung der Freisetzung von gefährlichen Substanzen
aus Bauprodukten - Evaluierung von horizontalen Ansätzen
zur Bewertung der möglichen Freisetzung von gefährlichen
Substanzen aus Bauprodukten im Rahmen von
Anforderungen aus der Bauproduktenrichtlinie

This Technical Report was approved by CEN on 7 September 2010. It has been drawn up by the Technical Committee CEN/TC 351.

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Foreword

This document (CEN/TR 16098:2010) has been prepared by Technical Committee CEN/TC 351 "Construction products: Assessment of release of dangerous substances", the secretariat of which is held by NEN.

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.

The European Construction Products Directive (CPD) [1] enables the free trade of construction products that are fit for their intended use on the Single European Market. In addition to the requirements traditionally embedded in construction law, such as stability, fire protection and safety in use, it specifically refers to hygiene, health and the environment (Essential Requirement No. 3, "ER 3"). To implement ER 3, at the beginning of the year 2005 the European Commission issued Mandate M/366 "Development of horizontal standardised approaches relating to dangerous substances under the Construction Products Directive – emissions to indoor air, soil, surface water and groundwater". The mandate envisages the development of horizontal test and assessment methods by the European Committee for Standardisation (CEN), while the specific requirements for construction products will still be defined nationally by the individual Member States.

This report has been drafted under the work item 'Technical Report 2 (TR 2) of the Business plan¹ of CEN/TC 351 in response to Mandate M/366². This report describes a horizontal approach, which can be applied to testing any substances and construction products covered by the Construction Products Directive (CPD). It is anticipated that the methods and procedures described in the report will also fit into the requirements of the future Construction Products Regulation [2], although this issue is outside the scope of this report³.

To assess the feasibility of a common horizontal approach for testing emissions from construction products, the report investigates in general terms the range of construction products covered by the CPD, their intended uses, the state of the art of the relevant test procedures, and the report also makes proposals on how to fit this knowledge into a testing structure. This report addresses release of regulated dangerous substances to soil, surface water and groundwater (excluding drinking water as it is addressed elsewhere) and emission of regulated dangerous substances into indoor air. It takes into account relevant information that had become available by the end of 2009 through the activities in the working groups and task groups of CEN/TC 351 as well as the guidance provided by the European Commission.

This document is intended to present to a wider public, including the product TCs, the EC and the SCC, a general overview of the results achieved so far in CEN/TC 351 concerning horizontal testing for ER3 and the context of this work under M/366. The document describes broadly, how ER3 can be implemented under the CPD in future. Background information to this Technical Report is given in a reference [4]. Another Technical Report (TR 4, WI 00351004) commissioned under M/366 will give more detailed guidance for the selection and integration of the recommended horizontal product testing protocols on dangerous substances into hEN and ETAs. At the moment not all details of the implementation concept have yet been addressed in CEN/TC 351. The remaining questions can only be successfully addressed after the validation stage.

In cases where in the text reference is made to "Product TCs", also EOTA WG's are meant where appropriate.

¹ See CEN/TC 351 N 0026 and N 0022 (available in Internet under: <http://www2.nen.nl/cmsprod/groups/public/documents/bestand/223307.pdf>).

² See CEN/TC 351 N 004.

³ See RESOLUTION 73 taken by CEN/TC 351 (CEN/TC 351 N 0151^{rev}).

Subject: Scope of CEN/TC 351 work in relation to CPD.

CEN/TC 351 thanks the European Commission for confirmation that the scope of the CEN/TC 351 work programme should only cover the existing CPD and the in-use phase of construction products.

The decision was taken by unanimity.

CEN/TR 16098:2010 (E)**1 Scope**

This Technical Report (TR), taking into account the state of the art in the Member States, identifies the role of testing in the assessment of construction products in view of possible emissions and makes recommendations on the testing procedures. This Technical Report reviews in accordance with the experience already gained, the basis for deciding whether the use of horizontal test method standards for construction products is practicable and/or necessary in order to implement obligations arising from the Construction Products Directive (CPD).

The time limit for all information CEN/TC 351/TG 2 has been able to consider is set to be 31 December 2009.

This Technical Report provides recommendations for complete testing procedures in the overall framework of the CPD according to the methods for the Attestation of Conformity (AoC).

2 List of abbreviations

In addition to the terms and definitions listed in CEN/TC 351 N 0218 (under development), in this document the following abbreviations are used.

AoC	Attestation of Conformity
CEN	Comité Européen de Normalisation (European Committee for Standardization)
CEN/TC	CEN Technical Committee
CGLT	Compacted Granular Leach test
CPD	Construction Products Directive
DNPH	2,4-dinitrophenylhydrazine
DOM	Dissolved Organic Matter
ER 3	Essential Requirement 3 "Hygiene, health and the Environment" of the CPD
ETA	European Technical Approval
ETAG	European Technical Approval Guideline
FPC	Factory Production Control
hEN	harmonized European Standard
ID	Interpretative Document
ITT	Initial Type Testing
L/A	Liquid (volume) to Area (surface) Ratio
L/S	Liquid (volume) to Solid (mass) Ratio
NPD	No Performance Determined
MS	Member States

SVOC	Semi Volatile Organic Compounds
TVOC	Total Volatile Organic Compounds
VOC	Volatile Organic Compounds
VVOC	Very Volatile Organic Compounds

3 Horizontal release/emission test procedures for the CPD: an overview

NOTE The report has been prepared taking the following guidance into account:

- Mandate M/366 asks for measurement/test methods that have, whenever possible, a horizontal character applicable to one or several relevant families of construction products.
- The requests of CEN/TC 351(Res.110, Helsinki meeting) have been granted all the attention they were entitled to.
- CEN/TC 351/TG 2 asked experts from CEN/TC 351/WG 1 and CEN/TC 351/WG 2 to give input for this TR. This input, which was pre-consulted in the respective WG per correspondence, has been incorporated in the present document.
- The time limit for all information CEN/TC 351/TG 2 has been able to consider is set to be 31 December 2009. In the WGs of CEN/TC 351 work is still in progress. Discussion on certain matters is still evolving.
- The ongoing activities in the WGs of CEN/TC 351 however do not influence the scope of the present TR, i.e. to give a more general picture.

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3.1 Introduction

This Technical Report covers the points included in the TR 2-description in the CEN/TC 351 Business plan and its Work Programme in response to mandate M/366⁴, taking into account the specifications given in the Mandate 366 to CEN⁵. The main points from this assignment can be summarized as:

⁴ This Technical Report (TR), taking into account the state of the art in the Member States, identifies the role of testing in the assessment of construction products in view of possible emissions and makes recommendations on the testing procedures. The TR reviews in accordance with the experience already gained, the basis for deciding whether or not the use of horizontal test method standards for construction products is practicable and/or necessary in the sense of article 7.2 of the Construction Products Directive, and the Guidance Papers, in particular Guidance Papers H and M. The Technical Report also recommends how harmonized technical specifications (e.g. harmonized product standards) should address the subject of regulated dangerous substances. The TR also recommends how the expertise of product Technical Committees and EOTA Working Groups can be used when drafting the horizontal test method standards. The TR provides recommendations for complete testing procedures in the overall framework according to the methods for the Attestation of Conformity.

⁵ Taking into account the state of the art in the Member States, recommendations shall be elaborated for the testing procedures. The testing procedure shall address the following questions: 1) For which products are measurement/test schemes relevant in regard to indoor air, soil surface water or groundwater? 2) How to define clusters of products that behave similarly in release tests (release scenario)? 3) For which substances or products is the measurement/test of the content relevant? 4) How to combine individual measurement and test methods to an appropriate test programme to allow the determination of the relevant properties and to allow the assessment of the results. This Technical Report shall review in accordance with the experience already gained the basis for deciding whether or not the use of horizontal standards for construction products is practicable and/or necessary in the sense of the CPD art. 7.2. The report shall include the mechanism by which required amendments of horizontal standards or in special cases vertical standards are identified for specific products or product families. In particular it shall identify the procedures and limitations for amending horizontal standards and describe the justification process for vertical standards. Attention shall be given to the intended use conditions as well as to the required specific use conditions for certain products especially in the definition of the testing conditions in order to allow for an adequate assessment. The report shall also recommend how harmonized technical specifications should address the subject of regulated dangerous substances, and how the measurements of emission of regulated dangerous substances are included in its

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Recommendations on testing procedures (3.2)

- The role of release/emission tests in the assessment of products and recommendations of test methods (3.2.1).
- Identification of products for measurement/test schemes relevant in regard to indoor air, soil, surface water and groundwater (3.2.2).
- Definition of clusters⁶ of products that behave similarly in release tests (basic release scenario) and therefore can be assessed by one horizontal standard (3.2.3).
- Relevant substances or products for content measurement/test (3.2.4).
- Combination of individual measurement and test methods to an appropriate test programme to allow the determination of the relevant properties and the assessment of the results (3.2.5).

Recommendations regarding the implementation of testing procedures in the overall framework of the CPD (3.3)

- Review of the suitability of horizontal test standards for construction products (3.3.1).
- Mechanisms for the identification of required amendments of horizontal standards or in special cases vertical standards for specific products or product families (3.3.2).
- The role of intended use conditions in the definition of test conditions (3.3.3).
- Solutions for harmonized technical specifications; recommendations for addressing the subject of regulated dangerous substances and for inclusion of the measurements of emission of regulated dangerous substances in their testing programme (3.3.4).
- Use of the expertise of product Technical Committees when drafting the horizontal test standards (3.3.5).
- Recommendations for complete testing schemes which take into account all relevant elements according to the methods for the control and attestation of conformity according to Annex III of the CPD (3.3.6).

When judging the relevance of construction products for environment and health it was not possible to investigate in detail all currently applicable regulations for ER 3 in the member states for this report. Therefore the assessment of the relevance of products has been carried out on technical grounds. Before the horizontal test concept proposed in this report can be applied to any certain product covered by a hEN further administrative steps are necessary. It is expected that the European Commission will amend the standardisation mandates for construction products under the CPD step by step during the next years. For the preparation of the mandate amendments the applicable notified regulations will be scrutinised more thoroughly than was possible for this report. Therefore not all construction products identified as relevant here may necessarily be affected by the mandate amendments in the future. Only the construction products covered by mandate amendments for ER 3 need or are allowed to implement ER 3 in CE marking in the future.

The document CEN/TC 351 N 0230rev ('indicative list of regulated dangerous substances') lists substances and parameters, which CEN TC 351 should look at when assessing the availability of test methods and the need for developing harmonised test methods. With this document the Commission and its Expert Group on

testing programme. The report shall also recommend how the expertise of product Technical Committees can be used adequately when drafting the horizontal test standards. Recommendations shall be elaborated for complete testing schemes which take into account all relevant elements according to the methods for the Attestation of Conformity (see Annex III of the CPD).

⁶ Please note that the concept of clusters may not lead to any contradiction with the requirements of the main part of mandate M/366. Especially the clusters must be compatible with horizontal test standards.

Dangerous Substances in the field of Construction Products (EGDS) provide guidance as foreseen in Mandate M/366 for CEN/TC 351 and all product TCs and EOTA WGs in the construction sector. The term 'substances' in this report refers to the substances listed in document N 0230^{rev}.

3.2 Recommendations on testing procedures

3.2.1 Release/emission⁷ tests

This subclause describes the role of release/emission tests in the assessment of products and gives recommendations for release/emission tests.

The use of release/emission tests as a tool for the assessment of the environmental and health effects of construction works and the construction products used in them has been increasing during the last decade. Some EU Member States refer to emission tests in a binding way in their building regulations. CEN/TC 351 has provided harmonised draft standards for three release/emission tests that have been used most widely so far. These release/emission tests are described in detail in Clause 4. CEN/TC 351 recommends the use of these release/emission tests when implementing the essential requirement 'Hygiene, health and the environment' of the CPD in harmonised technical specifications for construction products. The test methods for radiation are not addressed here.

Mandate M/366 requires the horizontal, harmonised methods to be based on existing test methods/standards as far as possible. The general requirements for horizontal standards used to test/evaluate construction products on their emission of dangerous substances in their intended use conditions under the CPD are the following:

- Integrate the requirements of current valid, notified regulations on emission of dangerous substances applicable to products and/or construction works;
- Make use of existing test methods for release/emission from construction products;
- Provide for tests that are efficient, precise enough, reliable and applicable for the products to be tested;
- Take into account current developments in legislation and in evaluation of release/emissions as far as they are well enough established to be included, without extra development time;
- Include a 'hierarchy of testing' in line with the methods for the control of conformity under the CPD, i.e. a reference test used for initial type testing (ITT) and a simplified test for factory production control (FPC);
- Cover construction products mandated under the CPD.

The tests recommended in Clauses 4 and 5 have been chosen and amended in line with these requirements.

3.2.2 Relevant products

3.2.2.1 General

All products mandated under the CPD are obliged to fulfil ER3. The mandate M/366 refers to products that (1) are or risk becoming subject to technical barriers to trade arising from regulated dangerous substances and (2) influence the satisfaction of ER3 by the construction works, in which they are incorporated in. This clause identifies products that are potentially relevant in regard to indoor air, soil, surface water and groundwater due their intended use and the nature of the products. Only the currently starting revision process of the product mandates will actually show, whether tests for these products will become relevant in a mandatory context.

⁷ The terms 'emission' and 'release' have fundamentally the same meaning. However it is convention to use the term 'emission' when describing liberation of chemical substances or radiation into indoor air and to use the term 'release' when describing the liberation of chemical substances into soil, surface water or ground water (see CEN/TC 351 N 0218).

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The lists presented in Annex A contain the product groups that have been considered by TG 2. The information presented is based on a questionnaire enquiry of CEN construction product TCs and EOTA [4] as well as on other available documents from the EGDS, CEN and EOTA⁸. For some products or product groups content regulation may imply that the content of one or more specific substances be measured. In this report that issue is not addressed for product or product groups that are not susceptible for release or emission of dangerous substances,

The horizontal tests to be harmonised for assessing release into soil, surface and groundwater and emissions into indoor air need to be applicable to as many products covered by regulation as technically feasible. A preliminary assessment is made whether construction products covered by CEN/TCs and EOTA WGs may potentially release substances to soil, surface water and groundwater or emit into indoor air during service life. The main criterion to judge relevance beyond the regulatory requirements is whether the product is, under conditions of intended use, used outdoors and exposed to soil, ground, rain and/or surface water or indoors in contact with indoor air. From 65 CEN/TCs and 32 EOTA WGs identified by CEN/TC 351 as belonging to the construction sector, not all deal with products that may potentially release substances to soil, groundwater and/or surface water or emit into indoor air (see Annex A).

3.2.2.2 Products relevant for soil, surface water or groundwater

Based on technical considerations (see [4]), products that may immediately release substances to soil, surface water and groundwater are deemed relevant. Constituents that may contribute to release as a part of another product are deemed relevant, when they are mandated under the CPD and covered by independent hEN or ETAs. Such constituents are treated as products under the CPD.

Products only used in interiors or embedded in structures without water contact do not release substances into soil or water during service life and are therefore not considered relevant here.

Tables 1 and 2 in the Annex A show the mandated work under the CPD in the CEN/TCs and EOTA WGs. The mandates that cover products with potential leaching into soil or water during service life have been grouped together. Some mandates cited in the tables may cover products that are used both outdoors and indoors. Tables 1 and 2 have an informative character and are intended to give a broad overview.

The products identified as not relevant with respect to their impact to soil, surface and groundwater during service life, are as expected now, due to their intended use, not submitted to regulation. Here no testing for this aspect is required. However, regulations on the content of dangerous substances may apply also to these products.

3.2.2.3 Products relevant for indoor air quality

Tables 3 and 4 in the Annex A show the mandated work under the CPD in the CEN/TCs and EOTA WGs. The mandates covering products groups with potential emissions to indoor air during service life have been grouped together. Some mandates cited may cover products that are used both indoors as well as outdoors. Construction products not used in interiors are not considered relevant for indoor air quality. Tables 3 and 4 have an informative character and are intended to give a broad overview.

3.2.3 Clusters of products**3.2.3.1 General**

3.2.3 defines clusters of products that behave similarly in release tests (basic release scenario) and therefore can be assessed by one horizontal standard.

⁸ By the end of 2009 the discussions in the EGDS on paints had not yet reached a conclusion. Paints are therefore not considered in this CEN Technical Report.

3.2.3.2 Release scenarios for soil, surface water and groundwater

A release scenario describes for a certain product category with the same general properties (i.e., impermeable surface, low-permeable, permeable) the dominant release mechanism expected in practice. Based on the fundamental mechanisms that determine release of substances, a basic distinction is made between construction products that are granular (percolation dominated release) or monolithic, plate like or sheet like (surface area related and mass transfer controlled release). Within the group of monolithic, plate like or sheet like construction products distinction is made between products with impermeable surfaces (like metal sheets) and products with measurable porosity and thus diffusion based release behaviour. So three clusters of products are distinguished.

Three horizontal release scenarios and a horizontal test suitable for each scenario / group of construction products respectively are recommended as described in detail in Clause 4.

For the vast majority of products and product groups the distinction granular/monolithic is straightforward. For materials for which the distinction granular/monolithic is not straightforward (e.g. metal plates, heterogeneous and coarse granular material) recommendations have been included in the horizontal test methods described in Clause 4.

Within the basic release scenarios further specifications can be made without the need of changing the main test procedure and the main basic scenario description.

3.2.3.3 Emission scenario for indoor air

For indoor air, there is consensus that one "basic emission scenario" can be used to cover all emission situations. Products used in interiors can be dealt within a single cluster. It was not considered necessary to build finer clusters. The chosen horizontal scenario is described in the horizontal draft standard currently accepted by CEN/TC 351 as a draft, ready for robustness validation. The draft standard is based on the test procedure so far established in the EN ISO 16000 series (see [19] to [23]). The different contributions of products to indoor air quality are addressed with appropriate loading factors in the reference room. The loading factors reflect the average area covered by a product. In the basic emission scenario the products are tested in the form or in the way as specified in the hEN or ETA, in direct contact to indoor air.

The possible decrease of emissions through covering layers is not taken into account unless the assembly, including the cover, is specified in the hEN or ETA.

3.2.4 Measurement of content of dangerous substances

This subclause describes in which cases the measurement of content is relevant for substances or products.

NOTE A content test may be carried out directly also for products used as constituents for other products (e.g. cement) whereas for a leaching test only a test on the final product (concrete) would be necessary to reflect the release situation.

For all construction products general regulations in the EU or in individual member states on substances that fall under restrictions on the manufacture, placing on the market and use are equally applicable. Many content regulations apply independently of the intended use to all products. Methods that may possibly be needed to demonstrate compliance with these general or product based regulations will be covered by a Technical Report on content (see CEN/TR 16045:2010 "Construction products – Assessment of release of dangerous substances – Content of regulated dangerous substances – Selection of analytical methods").

In addition to control of compliance with legal requirements, methods based on content should be used when an assessment of release is not possible, or deemed to be too expensive or not practicable.

3.2.5 Test programme

This subclause describes how to combine individual measurements and test methods to an appropriate test programme to allow determination of the relevant properties and to allow the assessment of the results.

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Testing for release/emission of dangerous substances from construction products consists of several fixed steps, the measurement chain. In short, it starts with the sampling procedure, it is followed by storage and test portion or specimen preparation, conducting the test, analysis of the eluates or measurement of concentration in test chamber air and finally, reporting the results.

The horizontal standards of CEN/TC 351 described in Clauses 4 and 5 cover as far as practicable all the steps of the measurement chain as illustrated in Figure 1. The recommended emission/release test standards are normative. For details of the sampling steps of the measurement chain guidance will be provided for the adaptation to the specific features of different products (foreseen for the forthcoming TR on Complement to sampling). For specific items in the standards options are foreseen for a product TC to select (and apply) according to the provided criteria. The mandate M/366 requires the horizontal standards developed under the mandate to make use of existing standards wherever possible. This is done by the conventional normative reference method which allows for incorporation of existing standards (or their parts) with amendments where necessary.

For each step in the test programme shown in Figure 1, a toolbox with horizontal test modules exists or is under development in CEN/TC 351, each covering a specific parameter, a specific set of parameters or a specific technique (e.g. a technique for extraction of inorganic substances and one or more techniques for extraction of organic substances). For each step in each required measurement, a TC shall select the relevant module(s) from the toolboxes made available. CEN/TC 351 will establish criteria and guidance for selection of the proper test modules. In cases where the horizontal modules cannot be made to fit for specific products, solutions should be found in cooperation between product TCs and CEN/TC 351.

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