

**Harmonized method for the
determination of the activity
concentrations of the radionuclides
 ^{226}Ra , ^{232}Th and ^{40}K
in construction products**

EAN-NORM Workshop
Hasselt 1st December 2011

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CEN TC351/WG3
“Radiation from construction products”



CEN/TC 351

Construction products: Assessment of release of dangerous substances

Based on EC Mandate M/366

- Horizontal complement to the mandates to CEN/CENELEC concerning the execution of standardisation work for the development of **horizontal standardised assessment methods** for **harmonised approaches** relating to **dangerous substances** under the **Construction Products Directive (CPD)**
 - Horizontal → one method for everything
 - Harmonised approaches → need to be incorporated in hEN's
 - Dangerous substances → 'regulated' and 'notified'
 - CPD → so not CPR (yet...)

Why and how CEN/TC351 is working

Commission Mandate M/366

- Fulfilling CPD/ER3 Hygiene, health and environment
- Two scenarios: **release to soil&water** and **emissions into indoor air**
- Existing EU/MS regulations (notified to Commission)
 - List of regulated dangerous substances
- Barriers to trade → justification for harmonisation/standardisation process
- Harmonised test methods
 - Existing standards → prENs → Validation → ENs

Commission's parallel work (EGDS, SCC)

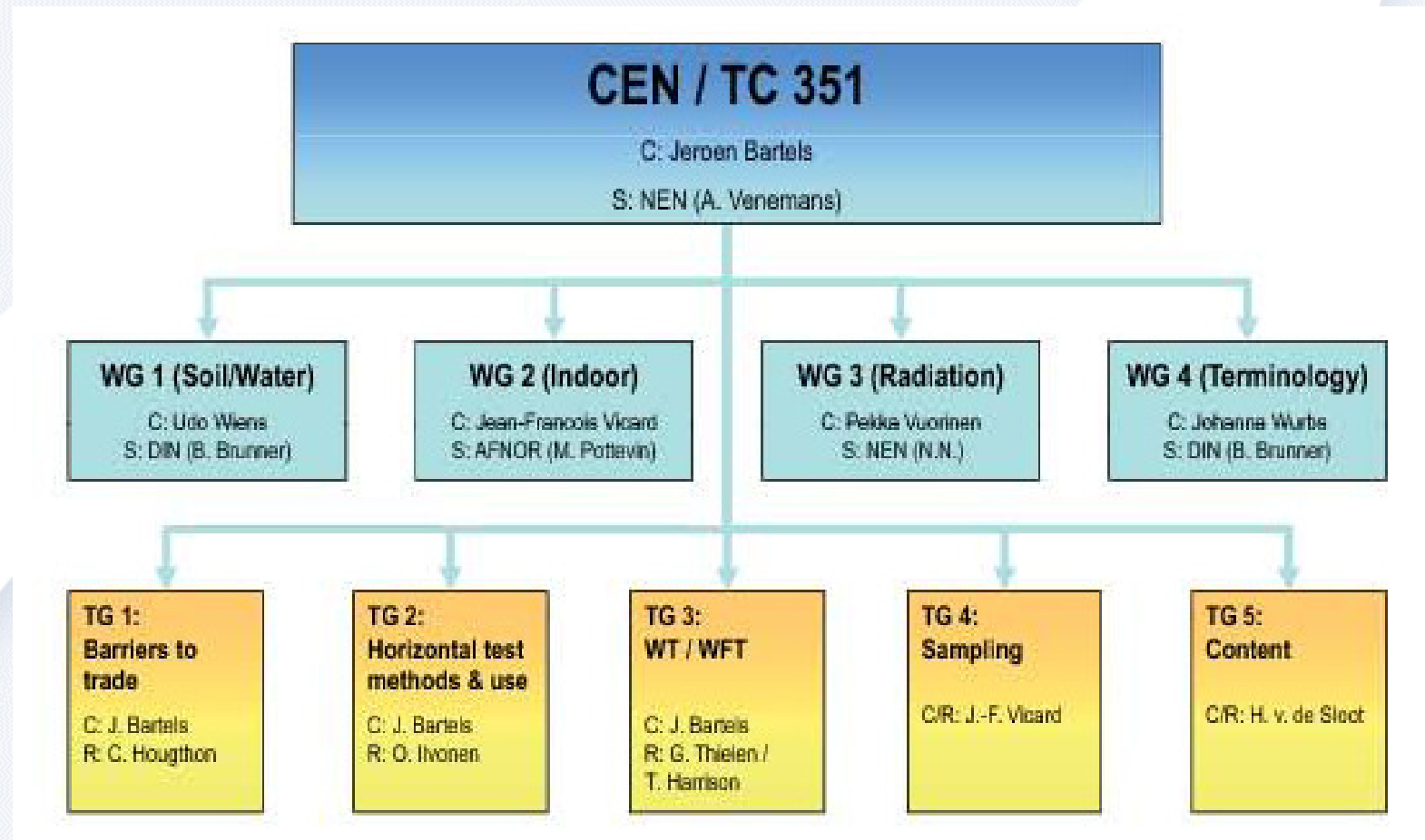
- Amendments to product mandates (products/product groups vs. DSs) → product TCs → hENs
- WT/WFT

Horizontal test methods

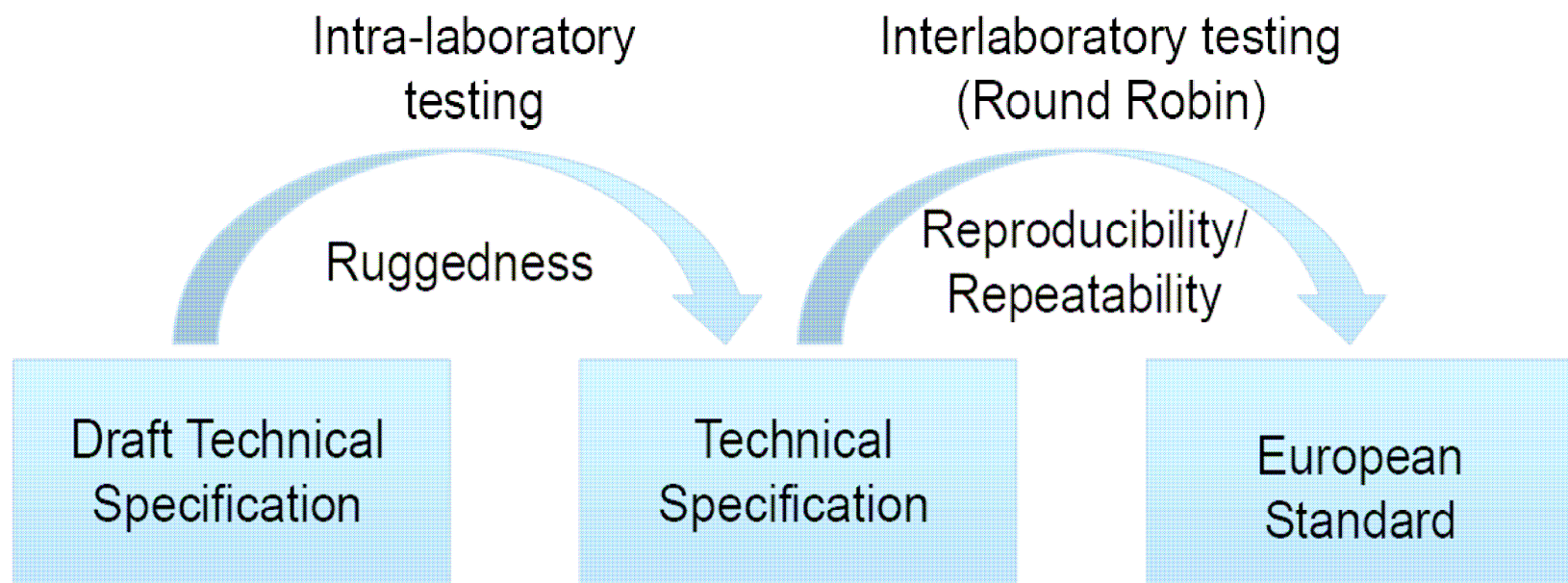
- Prevent 65 product TC's to develop their own methods for each of 200 dangerous substances (efficiency)
- Allowing comparison of test results from different materials (transparency): testing protocol from sampling to reporting
- Validation is possible (quality)
- Reduction of costs of testing (commodity)
- Results in a very limited number of test methods for (almost) all construction products (2 for leaching and 1 for indoor air)
- Adapted from existing methods:
 - WG1 Leaching: test methods of CEN/TC 292
 - WG2 Indoor air emissions: test method ISO 16000-9 (and other parts)
 - WG3 Radiation: **the same goal**



CEN/TC351 Structure



Methods need to be validated for use with construction products

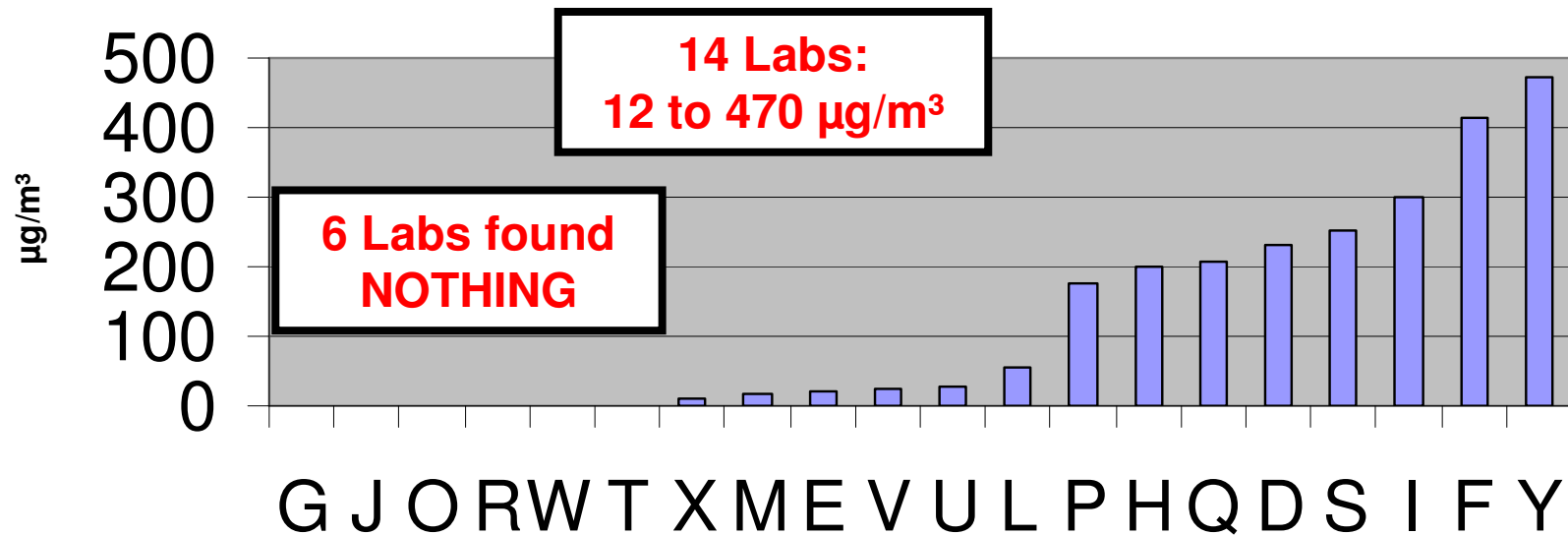


Bron: CEN Guide 13 *Validation of environmental test methods*

Validation needed...

2. GEV Round Robin Test

Ethylene glycol: 20 labs testing ONE adhesive



This was a bad example – some substances showed better results

European standardisation TC 351

- Need in NL (Building Materials Decree) and EC (CPD ER3 Environment, health & hygiene) 2002
- Discussion between countries and with DG Entr 2004
- EC submits mandate M/366 2005
- Establishment CEN/TC 351 2006
- Work Programme and Business Plan 2007
- WG1 Soil&water, WG2 Indoor air 2007
- Text of draft TS's 2010 (WG1 and WG2)
- **Validation 2011-2013**
 - TSs ready 10/2012
- Publication as ENs 2015-2016
- **WG3 "Radiation from construction products" 2011**

WG3 "Radiation from construction products" Mandate M/366 - description

- **Work Package 5: horizontal standards: emission scenarios in indoor air**
 - 3. Horizontal standard on the measurement of radiation from construction products
 - 45. For the preparation of this horizontal standard Radiological Protection Principles concerning the Natural Radioactivity of Building Materials Radiation Protection shall be taken into account.
 - Radiation Protection 112 guidance by DG Environment, Nuclear Safety and Civil Protection 1999
- Measurement of radiation from construction products included in the CEN work

CEN/TC 351

Workshop on Radiation from Construction Products

30 October 2009 in Brussels

- **Issue: Activity concentrations**
 - The new EU BSS introduces specific requirements related to radionuclide concentrations in building materials. Such requirements are also included in Austrian, Finnish and Polish regulations. The activity concentration index (I), as defined in EC guidance RP 112, has to be calculated. This index is a screening tool for identifying materials that might be of concern. For the calculation of the activity concentration index (I) measurement of three radionuclides of gamma radiation (^{226}Ra , ^{232}Th and ^{40}K) will be required. The Workshop noticed that a standardised measurement method for these gamma rays is needed.
- **Recommendation 1**
 - *Develop (in CEN/TC 351) a standardised measurement method for activity concentrations of radioactivity (gamma radiation).*
- **Recommendation 2**
 - *If it is necessary to develop a harmonised method for the calculation of the dose caused by gamma radiation, this should be covered in a separate standard.*



CEN/TC 351

Workshop on Radiation from Construction Products

30 October 2009 in Brussels

- **Issue: Radon measurement**

- One of the main requirements in the proposal for new text in the EU BSS is the demand for an Action Plan on how to manage long term radon exposure both in dwellings and in workplaces for any source of radon, including soil, building materials and drinking water. The Action Plan should include strategies, methods and tools for measuring radon levels. Considering current practices and especially differences in methods and tools on measurement of indoor radon concentration the Workshop recommends developing a standardised method. However, when measuring indoor concentrations, results cannot be addressed to specific sources and are not only construction product specific. Thus this work is not within the scope of CEN/TC 351.

- **Recommendation 3**

- *There is a need for a European standardised method for the measurement of indoor radon concentration.*
- *However, this method is not specific for construction products and thus not covered by the scope of CEN/TC 351.*



CEN/TC 351

Workshop on Radiation from Construction Products

30 October 2009 in Brussels

- **Issue: Radon exhalation**

- Decay of ^{226}Ra produces ^{222}Rn , which will be exhaled from the building materials in the walls, ceiling and floors. This leads to an indoor concentration of radon causing internal exposure by inhalation. Radon exhalation is included only in the Austrian regulation. Considering the complexity and different approaches of radon exhalation measurement the Workshop, after scientific discussion, concluded that a state of the art report on this issue is needed.

- **Recommendation 4**

- *Radon exhalation is covered by the Austrian regulation, but not by the Finnish nor Polish or the revised BSS. As pre-normative research seems necessary, CEN/TC 351 shall not start developing a radon exhalation measurement and dose assessment method now, but CEN/TC 351/TG 6 shall deliver a state of the art report regarding radon exhalation measurement and dose assessment methods.*



CEN/TC 351

Workshop on Radiation from Construction Products

30 October 2009 in Brussels

- **Issue: Thoron**
 - As the experiences with measuring thoron are too few, and the opinions of experts differ, developing an assessment method for thoron has no priority.
- **Recommendation 5**
 - *Development of an assessment method for thoron (^{220}Rn) shall be postponed.*
- **Issue: Involvement of DG TREN in CEN/TC 351 work**
 - The updated information of developments in revision of the BSS as well as the expertise of EURATOM was considered to be utmost valuable for the CEN/TC 351 work. To maintain the fruitful dialogue the Workshop proposes that involvement of DG TREN should not be restricted only to this Workshop but should continue further on.
- **Recommendation 6**
 - *Involvement of DG TREN in this work is highly appreciated and shall be continued.*



CEN/TC 351/WG3

”Radiation from construction products”

1st meeting 1 February 2011 in Berlin

- two work items of the work programme of WG3:
 - 1. a standardised measurement method for activity concentrations of radioactivity (gamma radiation);
 - 2. a state of the art report regarding radon exhalation measurement and dose assessment methods.
- Discussion on scope for the WG, outlines for the 2 documents above

2nd meeting 9 September 2011 in Paris

- Outline for the draft standard (TS) ”gamma radiation”
- Launching tendering procedure

... 3rd meeting 24 April 2012 in London

CEN/TC351/WG3 "Radiation from construction products"

Members

- Pekka Vuorinen, convenor
- Annemieke Venemans NEN, secretary
- Jeroen Bartels, CEN/TC351 observer
- Augustin Janssens, EC/DG ENER D4
- Stephane Calpena, EC/DG ENER D4
- Ciancarlo Bedotti, CEN
- Roselyne Améon, AFNOR
- Marios Anagnostakis, Greece (ELOT)
- Sandor Aranyi, MSZT Hungary
- Paola Blasi, IMMC Italy
- Raphaël Bodet, AFNOR
- Barbara Brunner, DIN
- Marc Bussiere, AFNOR
- Dominique Calmet, AFNOR
- Eva Contival, AFNOR
- Marek Dohojda, PKN Poland
- Magnus Döse, SIS
- Florence Gallay, AFNOR
- Bernd Hoffmann DIN
- Peter de Jong, NEN (WG3/TG31)
- Pieter Lanser, NEN
- Christel van Loock, NBN Belgium
- Franz-Josef Maringer, ASI Austria
- Mika Markkanen, SFS
- Erik Onstenk, NEN
- Marie-Line Perrin, AFNOR
- Marie van der Poel, CEPMC
- Markus Peterson, SIS
- Karl-Heinz Puch, ECOBA
- Neva Razem-Lucovnik, SIST
- Ugo Raviosi, UNI Italy
- Hieke Reijnhoudt, NEN
- Dieter Rosen, CEPMC
- Inge van Schie, NEN
- Durk Smink, Cerame-Unie
- Michael Taylor, CEN/TCs 51, 104, 229
- Rose-Marie Torchia, AFNOR
- Verena Tykiel, EOTA
- Pavlos Vatavalis, EAA
- Govert de With, NEN (WG3/TG31)

... to be updated



CEN/TC 351/WG 3

1st Work Item accepted by TC Plenary (June 2011)

Construction products - Assessment of release of dangerous substances - Determination of the activity concentrations of ^{226}Ra , ^{232}Th and ^{40}K using gamma-ray spectrometry

Scope

- This TS specifies a method for the determination of the activity concentrations of the radionuclides ^{226}Ra , ^{232}Th and ^{40}K in construction products using semiconductor gamma-ray spectrometry. The standard describes sampling, test sample preparation, and the execution of the test. It includes background subtraction, energy and efficiency calibration, analysis of the spectrum, calculation of the activity concentrations with the associated uncertainties, the decision threshold and detection limit, and reporting of the results.

CEN/TC351/WG3 decision 9/9/2011

NEN 5697 as a starting point for the TS

- TG 31 to carry out the proposed in depth review of the available methods.
- Timetable
 - 2011-09-09 Decision on tendering procedure; TG 31 and NEN to provide document for tendering
 - 2011-10-15 Start of tendering procedure
 - 2011-11-08 Date of closure for offers
 - 2011-11-15 Selection
 - **2011-12-01 Assignment (NRG; G. de With, P. de Jong)**
 - 2012-02-half Discussion of 1st draft in TG 31 meeting
 - 2012-06-01 Final draft TS available for submission to TC Approval (~ Projex: 2012-06-29) - resulting in a published document in Spring 2013



Need of a standard on "dose modelling"?

- Regarding release of dangerous substances declared values / technical classes (may) need to be declared under CE marking
 - three radionuclides of gamma radiation (^{226}Ra , ^{232}Th and ^{40}K)
 - or something else?
- Activity concentration index I (RP112, BSS, some regulations) is only a screening tool, describing the worst case scenario by a model room of concrete (20 cms)
 - Unfair to certain mineral based materials (density not taken into account)
- Will MSs develop their own indexes I?
 - A, CZ, FI, P...: own approach to dose assessment?
- In case of declaring only three radionuclides a standard on dose assessment is needed!

Dose modelling

Some conclusions

- TG 32 “Dose modelling” will justify the (technical) need for a method to model the dose (limited to construction products), which will be a separate standard (according to recommendation 2 of the October 2009 workshop).
- “If dose criteria/assessment related questions are not treated in a standardized way, the value of the assessed dose may well vary with over a factor of two. This would mean that for many materials the final decision on whether or not the reference level will be exceeded, will depend on by who and how the assessment is made. Therefore it would be very important to standardize the judgements to be made and parameter values to be used.”

Dose modelling

How to go on / proposals

- CEN/TR...EN?
 - CEN/TC351/WG3
- Review of EC Radiation Protection RP112?
 - Ad hoc group: Article 31 experts and CEN/TC351/WG3
 - CEN/TC351/WG3 excluded (not in its scope)?
 - Meeting needed with DG Energy D4 "Radiation Protection"

Work Item "State of the art report on radon exhalation measurement"

Construction products — Assessment of emissions of regulated dangerous substances from construction products — Determination method of the rate of the radon exhalation of dense building materials (construction products)

Scope of NEN 5699 and ISO/WD 11665-9:

- "This standard specifies a method for the determination of the free radon exhalation rate of a batch of stony building materials. The standard only refers to ^{222}Rn exhalation.
 - NOTE Any contribution made by thoron (^{220}Rn) in relation to the measurement result can be ignored when the described method is performed."



Conclusions

- Go on with a standard measurement of three radionuclides of gamma radiation (^{226}Ra , ^{232}Th and ^{40}K) (three radionuclides)
 - TG31: analysis on existing regulations, standards and methods
 - NWIP and scope accepted the TC Plenary 21-22 June
 - WG3 decision: Dutch NEN 5697 as a starting point
 - **work will start TODAY!**
- A position of WG3: the need of a standard for dose assessment to be analyzed (TG32: Mr Markkanen, Finnish STUK)
- Radon exhalation
 - A state of the art report; second priority

A close-up photograph of autumn foliage. The image shows several bright yellow leaves with serrated edges, some in sharp focus and others blurred in the background. In the foreground, there are clusters of dried, brownish-yellow flower heads or seed pods, likely from a shrub like a dogwood. The overall scene is bathed in soft, natural light, suggesting an outdoor setting during the fall season.

Thank you!

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