Should the EN 15534-5 for cladding become a construction product norm?

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1: Construction products under the CPR

What is the CPR?

- **CPR = Construction Product Regulation**
- **Regulation (EU) No 305/2011** …….laying down harmonized conditions for the marketing of construction products……[1]
- **Declaration of Performance (DoP) and CE marking**
  - Information about material and product characteristics
  - Making data public (=harmonization of building market)
1: Construction products under the CPR

Which products are covered by the CPR?

- Summary list of titles and references of harmonized standards under Regulation 305/2011 for construction products → www.ec.europa.eu

- EU 305:2011_ANNEX Table 1 - Product areas: No.21: Internal & external wall and ceiling finishes

- Reference Products under the CPR:
  - EN 12467:2012_Fibre-cement flat sheets - Product specification and test methods
  - EN 438-7:2005_High-pressure decorative laminates (HPL) ….for internal and external wall and ceiling finishes
  - EN 490:2011_Concrete roofing tiles and fittings for roof covering and wall cladding - Product specifications
  - EN 13245-2:2008_ PVC-U profiles and PVC-UE profiles for internal and external wall and ceiling finishes
EN15534-5:2015-05_Current status

- Part 5: Specifications for cladding profiles and tiles

- Section 1. Scope:
  - “This document is applicable to extruded profiles ….”
  - “It is not applicable to support rail profiles, cover strip profiles and fastener devices”
  - “This document also specifies assessment methods, provisions for the assessment and verification of constancy of performance (AVCP) and for marking, e.g. EN 15534–5 PP W60 UC3“
  - Initial Type-Testing necessary (test reports)
  - Implementation of Factory Production Control (FPC)
EN15534-5:2015-05_Future status under CPR

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- Annex ZA (informative) _Relationship of this European Standard with Regulation (EU) No.305/2011_
Annex ZA: Consequences for the Manufacturer

- Annex ZA: “When applying this standard as a harmonized standard under Regulation (EU) No. 305/2011, manufacturers and Member States are obliged by this regulation to use this Annex” (→ no choice between old and new version!)

- EN 15534-5 will be cited in the Official Journal of the European Union (OJEU) under Regulation (EU) No 305/2011

- Declaration of Performance (DoP) and the CE marking necessary

- Assessment and Verification of Constancy of Performance by manufacturer (AVCP)
2: Consequences for the Manufacturer

Assessment and Verification of Constancy of Performance (AVCP):

- Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)
- WPC cladding mostly show D and E class ⇒ Conformity System 3
2: Consequences for the Manufacturer

- **Tasks for the manufacturer**: Initial Type Testing of general parameters....

<table>
<thead>
<tr>
<th>Declared Characteristics</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical resistance:</td>
<td>According to EN 15534-1:2014, Annex A</td>
</tr>
<tr>
<td>Flexural properties</td>
<td></td>
</tr>
<tr>
<td>Resistance to fixings:</td>
<td>According to EN 15534-1:2014, 7.6 and 7.7</td>
</tr>
<tr>
<td>Nail and screw withdrawal</td>
<td></td>
</tr>
<tr>
<td>Pull Through resistance</td>
<td></td>
</tr>
<tr>
<td>Impact resistance</td>
<td>According to EN 15534-1:2014, 7.1.2.2</td>
</tr>
<tr>
<td>Biological agents (Basidiomycetes)</td>
<td>According to EN 15534-1:2014, 8.5.2</td>
</tr>
<tr>
<td>Ageing and moisture</td>
<td>According to EN EN 15534–1:2014, 8.1 and Annex A</td>
</tr>
</tbody>
</table>

- **plus:**
  - Factory Production Control (FPC)
  - CE-marking of WPC cladding products

- **Tasks for notified laboratory**: Type Testing of selected parameters, namely....

<table>
<thead>
<tr>
<th>Declared Characteristics</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction to fire</td>
<td>According to EN 13501-1</td>
</tr>
<tr>
<td>Release of dangerous substances</td>
<td>EN 15534–1:2014, Annex A</td>
</tr>
</tbody>
</table>
After Release of EN 15534-5 as Construction Product Norm:

- Manufacturers must officially declare results from Initial Type Testing as DoP using the format given by the CPR
- Products must be CE-marked
- Fire resistance must be declared by notified body

What is not covered by a CPR-based EN 15534-5?

- Results from large-scale WPC-cladding performance tests
  - Wind resistance values for a 1m²-façade section
  - Durability of WPC cladding expressed by an ageing coefficient (→ Ref.[2]+[3])
How are results from DoP and other in-house tests used in façade planning?

- **DIN 18516**: Cladding for external walls, ventilated at rear [4]
  - Performance values must consider the material itself (from DoP)
  - *And*: Performance values must consider the load carrying behavior of interacting cladding panels and integrated fixations (additionally to DoP)

  - Wind tests in a suction chamber or foil bag tests
  - Derivation of an ageing coefficient of cladding material (→ weatherometers)

3: Is it too early for a CPR-based EN15534-5?

*Does an early regulation of WPC cladding under the CPR limit further innovations?*

**Impacts on production:**

- AVCP system for WPC products with similar design, construction and functionality
- Manufacturers must group products into families, with individual representative characteristics for all products within that same family
- Declaration of properties starts at the beginning of the production of a new or modified cladding profile....
- ....or at the beginning of a new or modified method of production which affects the stated properties

→ Early standardization potentially restricts flexibility of manufacturers
3: Is it too early for a CPR-based EN15534-5?

- **Research in economic effects from early standardization:**
  - Projects executed at the Cooperative State University of Mosbach
  - Literature research and economic modeling and analysis

- **Findings:**
  - General effects from early standardization →

- **Early standardization limits product differentiation**

- **Market becomes a polypoly**

<table>
<thead>
<tr>
<th>pros</th>
<th>cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost savings at production</td>
<td>Costly certification process</td>
</tr>
<tr>
<td>Higher compatibility of materials and components</td>
<td>Annual audits at the producer</td>
</tr>
<tr>
<td>Smaller range of inflow-products</td>
<td>Cannibalization among existing product varieties</td>
</tr>
<tr>
<td>Cascading of testing results</td>
<td>Higher attraction of newcomers to enter market</td>
</tr>
<tr>
<td>Small degree of knowledge rebuilding</td>
<td>Danger of downtrend of further innovations</td>
</tr>
<tr>
<td>Harmonization of consumer tastes</td>
<td>Earlier decline of rents for incumbents</td>
</tr>
<tr>
<td>Strong networking effects</td>
<td>Early loss of innovation image of the new technology</td>
</tr>
<tr>
<td>Increased incumbent’s profits from larger consumer demand</td>
<td></td>
</tr>
</tbody>
</table>
3: Is it too early for a CPR-based EN15534-5?

Expected effects on the market:

- **Demand for WPC cladding increases** \( (Y_{\text{mon.}} \rightarrow Y_{\text{stand.}}) \)
- **Prices decrease** \( (P_{\text{mon.}} \rightarrow P_{\text{stand.}}) \)
- **All in all, social welfare is expected to increase by** [-area -](Ref.[6])
Effect on manufacturer`s profit:

- Profit Equations Firm1 (=Incumbent) and Firm 2 (Follower):

\[ \Pi_1 = \frac{4q_1^2(q_1-q_2)}{(4q_1-q_2)^2} \]

\[ \Pi_2 = \frac{q_1q_2(q_1-q_2)}{(4q_1-q_2)^2} \]

with \( q \) = product characteristics (=quality)

- Profit decreases within increasing product similarity \( q_1 \approx q_2 \)

Consequences for manufacturers:

- Increasing output \( \rightarrow \) economies of scale
- Applying differentiation strategies, e.g. “Mass Customization”
4: Summary

*Basic lessons learned from early release of CPR-based EN15534-5:*

- Since WPC still keeps its primary fire class D/E the additional effort from CPR is rather small (→ CE marking, DoP)
- However, CPR demands consistency of WPC product specifications (→ inflexibility)
- Early standardization makes WPC cladding products more similar (→ transparency)
- Market becomes more polypoly-like (→ demand increases, prices decrease)
- High potential for social welfare to increase
- Corporate profit potentially increases under mass-inducing product policy measures (→ economies of scale + differentiation profits)
- **Solution:** Mass-customization as variation of CPR-certified base-products under cascading principles
References


(4) DIN 18516-1:2010-06. Cladding for externals walls, ventilated at rear - Part 1:Requirements, principles of testing.


Thank you for your attention!

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