

Environmental Product Declarations (EPD) for Single-Ply Roofing Membranes in the Context Of European Standardization



By Hans-Rudolf Beer and Mark Schneider

NOTE: As agreed within CEN, the terms EPD and CPR will be used herein for both their singular and plural meanings.

EU STANDARDS FOR CONSTRUCTION PRODUCTS

With the foundation of the European Union (EU), an explicit goal was to remove trade barriers and therefore to ensure a free, unhindered exchange of goods among the member states. The numerous national standards were regarded as such barriers. Mandates were issued by the European Commission to the Comité Européen de Normalisation (CEN) or European Committee for Standardization and other standardization bodies to produce harmonized standards. Member states agreed to adopt these European standards into their standardization scheme and to withdraw conflicting national standards. CEN Technical Committee (TC) 254 was installed to produce standards for roofing membranes accordingly. TC 254 has since produced—among others—the products standards EN13707¹ for Bitumen Membranes and EN13956² for Plastic and Rubber Single-Ply Membranes, according to the European Construction Products Directive

(CPD).

The actual three main activities on the standardization of roofing membranes are:

- Transition from construction product directive (CPD) to construction products regulation (CPR)
- Inclusion of leaching of substances from roofing membranes
- Inclusion of environmental product declarations (EPD) into the product standards

TRANSITION FROM CPD TO CPR

Presently, the CPD issued in 1989 is the base for drafting European standards for construction products. The CPD has been adopted by all EU members and some other countries affiliated by bilateral treaties (e.g., Switzerland). The CPD is part of the national regulations on building materials in these countries. This directive will be replaced by the CPR as of July 1, 2013. The CPR concept is more binding, since it has a regulatory character. It provides for easier application for small and medium

enterprises (SMEs) compared to the CPD. One of its main objectives is the abolition of the national and regional quality labels still existing.

Manufacturers will have to submit a declaration of performance (DoP) to accompany their products. New product standards produced after July 1, 2013, will address seven basic fields of requirement in the CPR called basic requirements for construction works (BRCW):

1. Mechanical resistance and stability
2. Safety in case of fire
3. Hygiene, health, and the environment (enlarged)
4. Safety and accessibility in use (enlarged)
5. Protection against noise
6. Energy economy and heat retention
7. Sustainable use of natural resources (new)

Two of the key elements of the CPR are the requirements on sustainability, namely the sustainable use of natural resources

(BRCW 7), the reduction of life cycle impacts of greenhouse gases, and ensuring the environmental quality in general (BRCW 3). The implication of these new basic work requirements to the EU member states is the obligation to use the newly developed European standards to regulate the topics. Based on these enlarged basic work requirements, the European Commission is in charge of development of new mandates for amendments in the current construction product standards.

LEACHING OF SUBSTANCES

In the fall of 2012, the European Commission issued extended mandates to the technical committees of CEN. These new mandates require the inclusion of test methods and threshold values for the leaching of substances from building products. In addition to the Registration, Authorization, and Restriction of Chemicals (REACH) regulation, this adds up to a more severe assessment of the environmental impact of all building products. The amended mandate lists 39 specific substances to be tested and evaluated for single-ply, bituminous, and rubber roofing membranes, as well as reference to the additional inclusion of national European substance lists. Testing will be based on a leaching test currently under development by CEN/TC 351. This test method will describe the general leaching procedures. Determination of the product group specifics is up to CEN's technical committees and is subject to approval by regulatory bodies.

Environmental Product Declarations (EPD)

EPD for building materials have the general purpose of enhancing sustainability in construction, targeting various aspects, such as the following:

- Improvement of products during the full life cycle
- Integration of environmental criteria in the conception of buildings
- Provision of transparent and reliable information
- Stimulation of continuous environmental improvement
- Encouragement of the demand for environmentally friendly products
- Improvement of market position and image for specific products

As outlined above, the sustainable use of natural resources will have to be

addressed in the revision and drafting of future European standards for building products. Although there is actually no requirement to include EPD into the EN standards, actions are being undertaken to amend existing construction standards according to the new rules.

In the past years, CEN/TC 350 has developed horizontal standard methods for the assessment of environmental aspects of new and existing construction works (building level) and construction products and services (product level). The standards will be generally applicable (horizontal) and relevant for assessing the integrated performance of buildings over their life cycle.

The European Standard EN15804:2012, *Sustainability of Construction Works – Environmental Product Declarations – Core Rules for the Product Category of Construction Products*, is the major part of a suite of standards to assess the sustainability of construction and building products. EN15804:2012 provides core product category rules (PCR) for calculating and declaring the environmental performance of construction products, services, and processes to ensure that all EPD are derived, verified, and presented in a harmonized way. The standard describes the structure and content of an EPD by using a life-cycle approach based on life-cycle assessment (LCA) methodology to calculate the environmental attributes that will be declared in the EPD. The declared values at the product level are necessary requirements for the assessment scheme for sustainable construction.

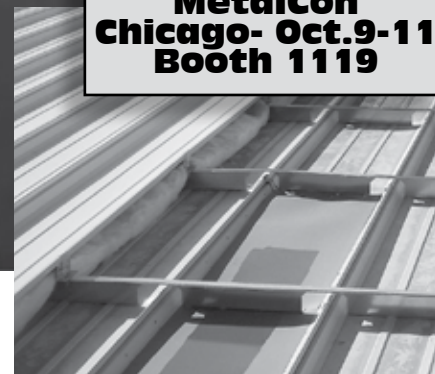
Among others, the key aspects described in the core PCR are the parameters to be declared (e.g., global warming potential) and the way in which they are calculated and reported, as well as the phases of a product's life cycle that are considered (e.g., cradle-to-gate or cradle-to-grave) and which processes are to be included in the life-cycle stages. The core PCR also define rules for the development of scenarios (e.g., use phase, maintenance, etc.) and include the rules for reporting predetermined, environmental, and health information that is not covered by LCA.

The information modules applied for describing the products are shown in *Figure 1*, defining the relevant life-cycle stages of a building product in a transparent way, namely product stage (modules A1-A3), construction stage (modules A4 and A5), use stage (modules B1-B7), and the end-of-

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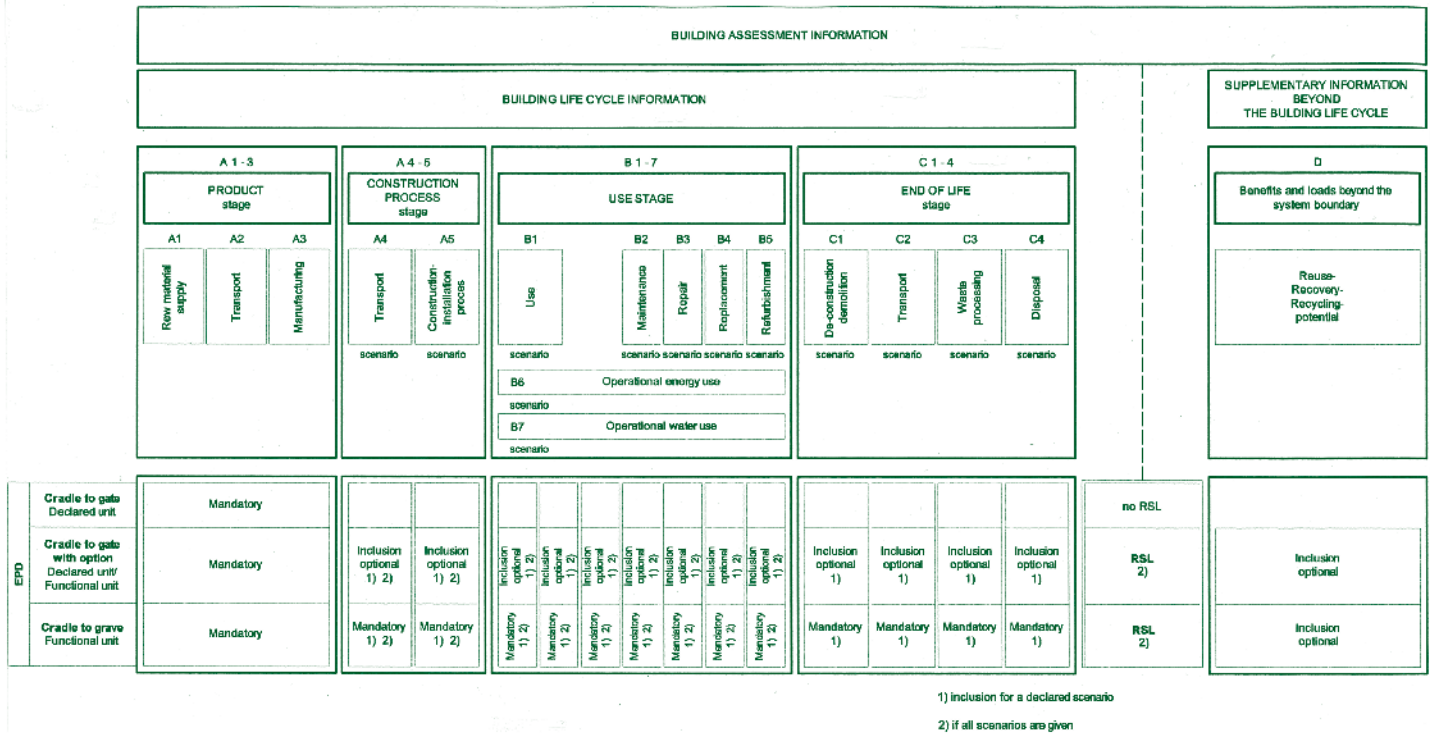


Figure 1 – Life-cycle stages and modules according to EN15804:2012.³



life stage (C1-C4).

Modules A1 to A3 describe the cradle-to-gate scenario, and modules A to C represent the cradle-to-grave scenario. Module D is the system expansion for all environmental impacts beyond the system boundary and includes environmental benefits and loads resulting from reusable products, recyclable materials, and/or useful energy carriers leaving the product system. For example, if a given material is incinerated at the end of its life, the system will be credited with power and thermal energy if the energy of combustion is used to produce them. The incinerated material “replaces” an energy source, and the system is thus credited with the avoided burdens to provide that amount of energy.

EPD have been used for construction products for more than 20 years, since the first environmental assessment schemes were developed. EPD are created and published by different program operators across Europe, such as IBU (Germany), EPD Norge (Norway), EPD (Sweden), BRE Global (United Kingdom), or FDES (France) in accordance with ISO 14025-compliant PCR for the different product groups. Until now, only EPD from the same EPD program could be used for direct comparisons and evaluations. Only within one EPD program are indications on scope, assumptions, boundaries, data quality, and indicators comparable for various products. Differences among EPD programs can therefore cause remarkably different results for the same product. As an example, there currently exist different PCR and EPD for thermoplastic roofing membranes in Europe created by IBU (Germany), NBI (Norway), SFEC (France), and BRE (UK). Given the national cir-

Figure 2 – Front page of EPD for mechanically attached thermoplastic roofing membranes according to the French EPD standard NF P 01-010.

MEMBRANE D'ETANCHEITE SYNTHETIQUE

2 - IMPACTS ENVIRONNEMENTAUX REPRESENTATIFS DES PRODUITS DE CONSTRUCTION SELON LE § 6 DE LA NORME NF P 01-010

Tous les impacts sont renseignés ou calculés conformément aux indications du § 6.1 de la norme NF P 01-010, à partir des données de la présente déclaration (chapitre 2) et pour l'unité fonctionnelle de référence par annuité définie au § 1.1 et 1.2 de cette même déclaration, ainsi que pour l'unité fonctionnelle rapportée à toute la DVT (Durée de Vie Typique).

N°	IMPACT ENVIRONNEMENTAL	UNITE	VALEUR DE L'INDICATEUR PAR ANNUITE	VALEUR DE L'INDICATEUR POUR LA DVT DE 30 ANS
1	Consommation de ressources énergétiques - Energie primaire totale - Energie renouvelable - Energie non renouvelable	MJ/UF	4,0	120
			0,1	3
			3,9	117
2	Épuisement de ressources (ADP)	kg équiv. antimoine (Sb)/UF	0,0018	0,054
3	Consommation d'eau totale	Litre/UF	1,7	51
4	Déchets solides : - Déchets valorisés (total) - Déchets éliminés : Déchets dangereux Déchets non dangereux Déchets inertes Déchets radioactifs	kg/UF	0,013	0,383
			0,001	0,029
			0,073	2,18
			0,011	0,33
			1,1 E-05	0,0003
5	Changement climatique	kg équiv. CO ₂ /UF	0,166	4,99
6	Acidification atmosphérique	kg équiv. SO ₂ /UF	0,001	0,03
7	Pollution de l'air	m ³ /UF	36	1 067
8	Pollution de l'eau	m ³ /UF	0,140	4,2
9	Destruction de la couche d'ozone stratosphérique	Kg CFC équiv. R11/UF	NC	NC
10	Formation d'ozone photochimique	kg équiv. éthylène/UF	8,0E-05	0,0024

Figure 3 – Environmental impact data in EPD for mechanically attached thermoplastic roofing membranes according to the French EPD standard NF P 01-010.

circumstances, these various EPD are specific to the countries and will not be accepted overall across Europe due to the above-described differences. In addition, the various EPD are different with regard to structure, format, and layout. More comprehensive introductions to the topic can be found in various papers.^{4,5}

The major European manufacturers of single-ply membranes are members of the European Single-Ply Waterproofing


Association (ESWA). A group of the ESWA manufacturers has produced a common generic EPD. This generic EPD was specifically prepared for the manufacturers' mechanically attached thermoplastic roofing membranes (Figure 2), drafted according to the French Standard NF P 01-010.⁶ It was finalized before the publication of EN15804:2012; and thus, the PCR used differs slightly from the EN standard's requirements. The EPD as shown in Figure

2 is mainly used in the French marketplace. Other manufacturers have specific national EPD in use.

With the publication of the new harmonized Standard EN15804:2012, the basis for EPD with validity in all EU and associated countries has been laid. For implementation, all European EPD programs have to adapt the existing PCR and EPD of the different product groups to ensure accordance with the requirements. The goal is thereby to harmonize the existing PCR across the different EPD programs by defining a European core EPD that is valid and accepted by all European program operators. This will have the benefit that manufacturers with offerings in different European market regions can use a single EPD to communicate the environmental attributes of their construction products. They will no longer be forced to produce separate EPD for each country, which will significantly reduce the costs and increase customer acceptance.

SUMMARY

The harmonization of European standards for building products is entering a new stage. The transition from CDP to CPR will provide more stringent regulations regarding the declaration of the performance of products. The focus is clearly pointing to sustainability in construction. Standard test methods and procedures for the leaching of substances are published or are under preparation and will have to be implemented in all European building products standards by mandate of the European Commission. The European Standard EN15804 on the core rules for product category of construction products has been published. This standard provides the basis for the preparation of harmonized EPD with Europe-wide validity. Harmonized EPD for single-ply roofing membranes are expected to appear in the near future.

U.S. and European standards for roofing membranes usually describe the same properties of the products. However, the test procedures are, in general, somewhat different. 

LITERATURE

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Hans-Rudolf Beer

Hans-Rudolf Beer is product technology director of roofing and waterproofing for Sika Technology AG in Sarnen, Switzerland. He has worked in the roofing and waterproofing industry for 25 years. Beer began his career with Sarnafil in research and development and marketing. With the acquisition of Sarnafil and Sucoflex by Sika in 2006, he was appointed product technology director of joint roofing and waterproofing activities. He is a contributing member in various technical committees (CEN, SIA, DIN, CIB/RILEM). Beer has published numerous technical papers and is a frequent speaker at international conferences. He is chairman of CEN Technical Committee 254, "Flexible Sheets for Waterproofing (Bitumen, Plastic and Rubber)" and holds a PhD in chemistry from the University of Zurich/Switzerland.



Mark Schneider



Mark Schneider is head of corporate product sustainability with Sika Services AG, the management company of Sika AG, in Zurich, Switzerland. He worked in the roofing industry for many years in different environmental and sustainability functions before joining Sika as global product sustainability manager. He has participated in numerous environmental committees and standard-writing bodies in Switzerland and other parts of Europe. He is a board member of the Swiss PVC association (PVCH); the Swiss representative on CEN

Technical Committee 350, "Sustainability of Construction Works"; and a member of the ESWA Technical Committee Working Group EPD. Schneider has a master's in environmental sciences from the Swiss Federal Institute of Technology Zurich (ETHZ), Zurich, Switzerland, and a master of business administration from the Lucerne University of Applied Sciences and Arts (HSW), Lucerne, Switzerland.

— PUBLIC SAFETY CANADA INVESTIGATES CONSTRUCTION CRIME —

Public Safety Canada commissioned a report in 2010 on the construction industries in Quebec and British Columbia, following stories of rampant corruption. The \$80,000 federal study into organized crime issued its report in February. The report, however, suggests that organizations asked to provide input refused, for the most part, due to fear of reprisals, and that some even believed the authors of the study were working with the police. Of 35 contractors, union representatives, provincial prosecutors, and law-enforcement agencies approached for input, only six agreed to take part and 17 individuals were ultimately interviewed. Investigation by *Roofing BC*, however, shows that many construction groups (the Roofing Contractors Association of BC, the Vancouver Regional Construction Association, and the Greater Vancouver Home Builders' Association included) were never even contacted for input into the survey.

Ordered during corruption controversies in Quebec, the inquiry was set to begin while the provincial police and the Canada Revenue Agency investigated construction firms.

The study, "Economic Sectors Vulnerable to Organized Crime: Commercial Construction," authored by several academics, concludes that the Canadian commercial construction sector is at a moderate to high risk of corruption and organized crime. It also notes that hard data—prosecutions that show the involvement of organized crime in the Canadian construction sector—"is virtually nonexistent." The study found two glaring points in the construction process that were most vulnerable to criminal infiltration: the procurement of contracts and project management.

"Our sources indicated that officials responsible for procurement were often uninformed with regard to the cost of construction projects," the study says. "The lack of accountability and transparency in procurement policies across Canada was also noted." In 2001, public agencies in British Columbia became responsible for their own procurement.

Premier Jean Charest announced plans for an inquiry headed by Superior Court Justice France Charbonneau.

— *The Canadian Press, Roofing BC, and other sources*