EPD®
THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 for

Nonset 50
Nonset 50 FF
Nonset 50 SR

Programme:	Programme operator:	EPD registration number:	Publication date:	Valid until:	Geographical scope:	Revision:
The International EPD® System; www.environdec.com	**EPD International AB**	**S-P-01011**	**2017-10-09**	**2022-10-08**	**International**	**2019-11-04**

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MAPEI®
ADHESIVES · SEALANTS · CHEMICAL PRODUCTS FOR BUILDING

1. COMPANY DESCRIPTION / GOAL & SCOPE

Founded in 1937 in Milan, Italy, Mapei produces adhesives and complementary products for laying all types of floor, wall and coating materials, and is also specialized in other chemical products used in the building industry, such as waterproofing products, special mortars, admixtures for concrete, products for underground constructions and for the restoration of concrete and historical buildings.

There are currently 81 subsidiaries in Mapei Group, with a total of 73 production facilities located around the world in 34 different countries and in 5 different continents. Mapei has also 18 central laboratories. Most locations are ISO 9001 and ISO 14001 or EMAS-certified.

Mapei's strategy of internationalization is based on two main objectives: being closer to local needs and the lowest transport costs possible. With the declared objective of being close to buyers and clients, the strength of Mapei in the five continents is to comply the requirements of each single country, and to use only locally-based managers and qualified personnel, without changing the approach of the Company.

Mapei invests 12% of its company's total work-force and 5% of its turnover in Research & Development; in particular, 70% of its R&D efforts are directed to develop eco-sustainable and environmentally friendly products which give important contribution to all main green rating for eco-sustainable buildings such as LEED and BREEAM.

Furthermore, Mapei has developed a sales and technical service network with offices all over the world and offers an efficient Technical Assistance Service that is valued by architects, engineers, contractors and owners.

The goal of the study is to provide necessary data and documentation to produce an EPD according to the requirements of PCR according to EN 15804:2014 and PCR Environdec, version 2.3, date 2018-11-15 and to have more comprehension about the environmental impacts related to **Nonset 50**, **Nonset 50 FF** and **Nonset 50 SR** manufactured in Mapei AS located in Sagstua (Norway), including packaging of the finished products.

Target audiences of the study are customers and other parties with an interest in the environmental impacts of **Nonset 50**, **Nonset 50 FF** and **Nonset 50 SR**.

This analysis shall not support comparative assertions intended to be disclosed to the public.

2. PRODUCT DESCRIPTION

Nonset 50, **Nonset 50 FF** and **Nonset 50 SR** are cement-based dry mortars, which expand 1 – 3 % before setting. The mortars are composed of cement, well-graded sand, expanding, stabilising and plasticizing substances. Nonset 50 FF contains also additives which ensure that the cement sets and will not crack even at surface and air temperatures down to -10°C. Nonset, Nonset 50 FF and Nonset 50 SR are used for all types of foundations and concrete repairs in thicknesses up to 150 mm.

The three products meet the requirements defined by EN 1504-9 “Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - General principles for the use of products and systems” and the minimum requirements claimed by EN 1504-6 “Anchoring reinforcement steel”.

They are supplied in 25 kg multiply bags or in bigbags (for Nonset 50 and Nonset 50 SR) with 1000 kg of finished product.

3. CONTENT DECLARATION

The main components and ancillary materials of **Nonset 50**, **Nonset 50 FF** and **Nonset 50 SR**, are the following:

Table 1: Composition

Materials	Percentage (%)
Binders	70 – 90
Fillers	10 – 20
Recycled content	< 8
Other (additives & packaging)	0 – 10

The products contain neither carcinogenic substances nor substances of very high concern (SVHC) on the REACH Candidate List published by the European Chemicals Agency, in a concentration higher than 0,1 % (by unit weight).

4. DECLARED UNIT AND REFERENCE SERVICE LIFE

The declared unit is 1 kg of powder (packaging included).
Packaging materials include:

- Wooden pallet
- Multiply bags (paper/PE/paper)
- LDPE used as wrapping material

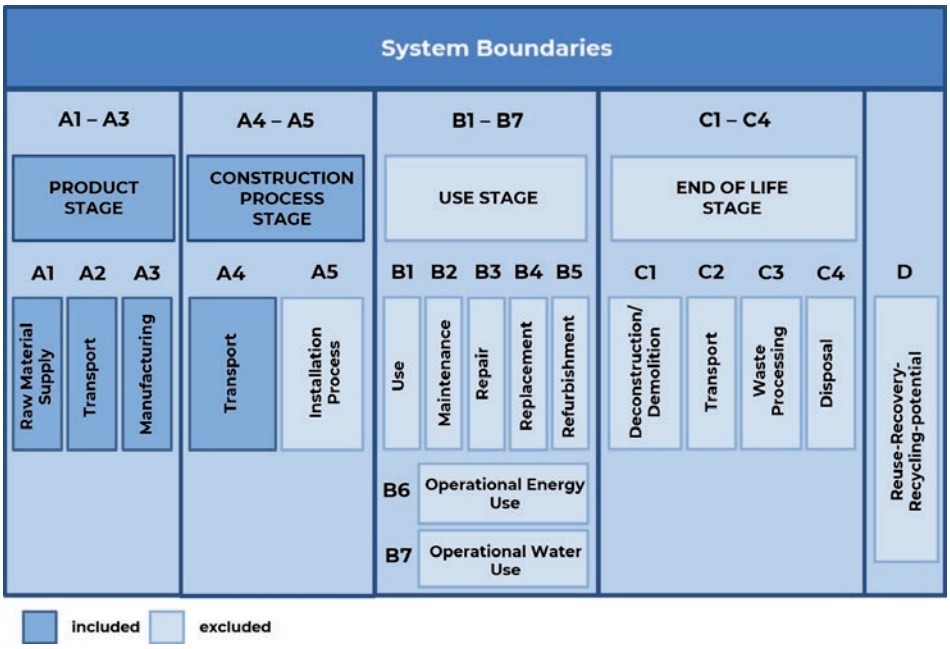
Due to the selected system boundary, the reference service life of the products is not specified.

5. SYSTEM BOUNDARIES AND ADDITIONAL TECHNICAL INFORMATION

The approach is “cradle to gate” with options. The following modules have been considered:

- A1-A3 (Product stage): extraction and transport of raw materials, packaging included, production process;
- A4 (Construction stage): transport of the finished product to final customers.

Table 2: System boundaries



A brief description of production process, is the following:

Figure 1: Production process detail - © Photo Halvor Gudim

The production process starts from raw materials, which are purchased from external and intercompany suppliers and stored in the plant. Bulk raw materials are stored in specific silos and added automatically in the production mixer, according to the formula of the product. Other raw materials, supplied in bags, big bags or tanks, are stored in the warehouse and added automatically or manually in the mixer. During the production of the powder, all the components are mechanically mixed in batches. The semi-finished product is then packaged, put on wooden pallets, covered by stretched hoods and stored in the finished products warehouse. The quality of final product is controlled before the sale.

Figure 2: Sagstua Plant

Table 3: Transport to the building site (A4)

Name	Value	Unit
Means of transport: truck euro 3 with 27 tons of payload		
Litres of fuel (truck)	~ 2E-03	l/DU*100km
Transport distance (weighted average)	300	km
Capacity utilisation (including empty runs)	85	%
Capacity utilisation volume factor	100	%

DU: declared unit

6. CUT-OFF RULES AND ALLOCATION

Criteria for the exclusion of inputs and outputs (cut-off rules) in the LCA, information modules and any additional information are intended to support an efficient calculation procedure. They are not applied in order to hide data.
The procedure of exclusion of inputs and outputs is the following:

- All inputs and outputs to a unit process, for which data are available, are included in the calculation
- Cut-off criteria, where applied, are described in Table 4.

Input flows are covered for the whole formula.

Table 4: Cut-off criteria

Process excluded from study	Cut-off criteria	Quantified contribution from process
A3: production (auxiliary materials)	less than 10^{-5} kg/kg of finished product	Sensibility study demonstrates a contribute lower than 0,5%
A3: waste and particle emission	less than 10^{-5} kg/kg of finished product	Sensibility study demonstrates a contribute lower than 0,5%

For the allocation procedure and principles, consider the following table (Table 5):

Table 5: Allocation procedure and principles

Module	Allocation Principle
A1	All data are referred to 1 kg of powder product • A1: electricity is allocated to the mortars plant
A3	All data are referred to 1 kg of powder packaged product • A3-wastes: all data are allocated to the mortars plant
A4	All data are referred to 1 kg of powder packaged product: • A4: a weighted average scenario has been used referred to the mortars plant)

7. ENVIRONMENTAL PERFORMANCE AND INTERPRETATION

GWP_{100}
Global Warming Potential refers to the emission/presence of GHGs (greenhouse gases) in the atmosphere (mainly CO_2, N_2O, CH_4) which contribute to the increase in the temperature of the planet.

AP
Acidification Potential refers to the emission of specific acidifying substances (i.e. NOx, SOx) in the air. These substances decrease the pH of the rainfall with predictable damages to the ecosystem.

EP
Eutrophication Potential refers to the nutrient enrichment of flowing water, which determines unbalance in aquatic ecosystems and causes the death of the aquatic fauna.

ODP
Ozone Depletion Potential refers to the degradation of the stratospheric layer of the ozone involved in blocking the UV component of sunrays. Depletion is due to particularly reactive components that originate from chlorofluorocarbon (CFC) or chlorofluoromethanes (CFM).

POCP
The Photochemical Ozone Creation Potential is the ozone formation in low atmosphere. This is quite common in the cities where a great amount of pollutants (like VOC and NOx) are emitted every day (industrial emissions and vehicles). It is mainly diffused during the summertime.

ADP_e (elements)
Abiotic Depletion Potential elements refers to the depletion of the mineral resources.

ADP_f (fossil fuel)
Abiotic Depletion Potential fossil fuel refers to the depletion of the fossil fuel resources.

Following tables show environmental impacts for the products considered according to CML methodology (CML2001 – Jan. 2016).

All the results are referred to the declared unit (see § 4) and the environmental impacts have differences of 5% (at most) between the two different packaging (multiply bag vs big bag).

Nonset 50

*Table 6: **Nonset 50** (packaged with multiply bags) – Environmental categories referred to the declared unit*

Environmental Category	Unit	A1 – A3	A4
GWP_{100}	(kg CO_2 eq.)	7,21E-01	1,61E-02
ADPe (element)	(kg Sb eq.)	1,12E-07	1,30E-09
ADPf (fossil)	(MJ)	4,03E+00	2,21E-01
AP	(kg SO_2 eq.)	1,34E-03	9,56E-05
EP	(kg $(PO_4)^{3-}$eq.)	3,98E-04	2,42E-05
ODP	(kg R-11 eq.)	4,15E-09	5,37E-15
POCP	(kg ethylene eq.)	8,58E-05	-4,22E-05

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

*Table 7: **Nonset 50** (packaged with multiply bags): other environmental indicators*

Environmental Indicator	Unit	A1-A3	A4
RPEE	MJ	8,06E-01	1,11E-02
RPEM	MJ	-	-
TPE	MJ	8,06E-01	1,11E-02
NRPE	MJ	4,29E+00	2,22E-01
NRPM	MJ	-	-
TRPE	MJ	4,29E+00	2,22E-01
SM	kg	7,45E-02	-
RSF	MJ	-	-
NRSF	MJ	-	-
W	m^3	1,16E-03	2,53E-04

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; N**RPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water

*Table 8: **Nonset 50** (packaged with multiply bags): waste production & other output flows*

Output flow	Unit	A1-A3	A4
NHW	kg	0,00E+00	-
HW	kg	6,60E-03	-
RW	kg	0,00E+00	-
Components for re-use	kg	-	-
Materials for recycling	kg	4,93E-04	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

Nonset 50 FF

Table 9: ***Nonset 50 FF*** *(packaged with multiply bags): Environmental categories*

Environmental Category	Unit	A1 – A3	A4
GWP_{100}	(kg CO_2 eq.)	7,58E-01	1,61E-02
ADPe (element)	(kg Sb eq.)	1,06E-06	1,30E-09
ADPf (fossil)	(MJ)	4,15E+00	2,21E-01
AP	(kg SO_2 eq.)	8,52E-04	9,56E-05
EP	(kg $(PO_4)^{3-}$eq.)	5,39E-04	2,42E-05
ODP	(kg R-11 eq.)	1,18E-08	5,37E-15
POCP	(kg ethylene eq.)	1,06E-04	-4,22E-05

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

*Table 10: **Nonset 50 FF** (packaged with multiply bags): other environmental indicators*

Environmental Indicator	Unit	A1-A3	A4
RPEE	MJ	1,35E+00	1,11E-02
RPEM	MJ	-	-
TPE	MJ	1,35E+00	1,11E-02
NRPE	MJ	4,55E+00	2,22E-01
NRPM	MJ	-	-
TRPE	MJ	4,55E+00	2,22E-01
SM	kg	-	-
RSF	MJ	-	-
NRSF	MJ	-	-
W	m^3	3,83E-01	2,53E-04

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; N**RPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water

*Table 11: **Nonset 50 FF** (packaged with multiply bags): waste production & other output flows*

Output flow	Unit	A1-A3	A4
NHW	kg	0,00E+00	-
HW	kg	6,60E-03	-
RW	kg	0,00E+00	-
Components for re-use	kg	-	-
Materials for recycling	kg	4,93E-04	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

Nonset 50 SR

Table 12: ***Nonset 50 SR*** *(packaged with multiply bags): Environmental categories*

Environmental Category	Unit	A1 – A3	A4
GWP_{100}	(kg CO_2 eq.)	7,62E-01	1,61E-02
ADPe (element)	(kg Sb eq.)	6,16E-07	1,30E-09
ADPf (fossil)	(MJ)	4,95E+00	2,21E-01
AP	(kg SO_2 eq.)	1,68E-03	9,56E-05
EP	(kg $(PO_4)^{3-}$eq.)	3,74E-04	2,42E-05
ODP	(kg R-11 eq.)	3,65E-09	5,37E-15
POCP	(kg ethylene eq.)	1,43E-04	-4,22E-05

GWP_{100}: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

Table 13: ***Nonset 50 SR*** *(packaged with multiply bags) – Other environmental indicators*

Environmental Indicator	Unit	A1-A3	A4
RPEE	MJ	1,32E+00	1,11E-02
RPEM	MJ	-	-
TPE	MJ	1,32E+00	1,11E-02
NRPE	MJ	5,32E+00	2,22E-01
NRPM	MJ	-	-
TRPE	MJ	5,32E+00	2,22E-01
SM	kg	-	-
RSF	MJ	-	-
NRSF	MJ	-	-
W	m^3	1,41E-03	2,53E-04

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; N**RPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water

Table 14: ***Nonset 50 SR*** *(packaged with multiply bags) – Waste production & other output flows*

Output flow	Unit	A1-A3	A4
NHW	kg	0,00E+00	-
HW	kg	6,60E-03	-
RW	kg	0,00E+00	-
Components for re-use	kg	-	-
Materials for recycling	kg	4,93E-04	-
Materials for energy recovery	kg	-	-
Exported energy	MJ	-	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

Tables from 6 to 14 show absolute results for all the environmental categories considered. Calculations point out that module **A1** has the highest contribution for most environmental indicators (i.e. relative contribution in GWP_{100} is more than 95%).

Raw materials extraction and processing show the most relevant environmental load considering the whole life cycle of the finished product. In particular, the hydraulic binder and the fillers have the strongest influence on the results.

Transportation modules (**A2**, **A4**) highlight a significant contribution for most environmental impact categories (ODP and ADPe excluded). In particular, for POCP they show a negative contribution due to NO and NO_2 emission factors as reported in the methodology used (HBEFA: Handbook Emission Factors for Road Transport).

The specific amount of **recycled material** in Nonset 50 is shown in Table 7 as **SM** (Secondary Material) indicator.

The following tables show the relative contributions of the modules **A1** – **A4**, and a detail on GWP_{100} representative for the three products included in this EPD (Table 23).

Table 15: Environmental Impact as percentage – Representative for all products

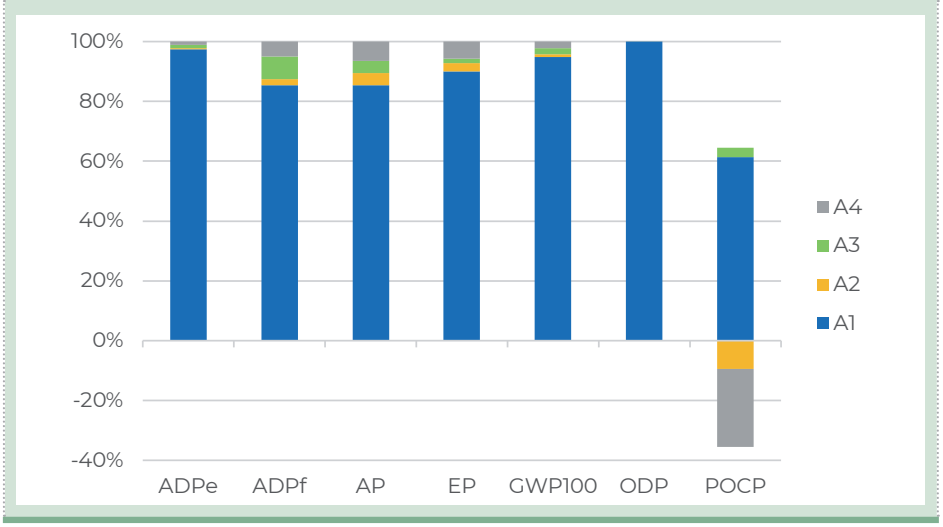
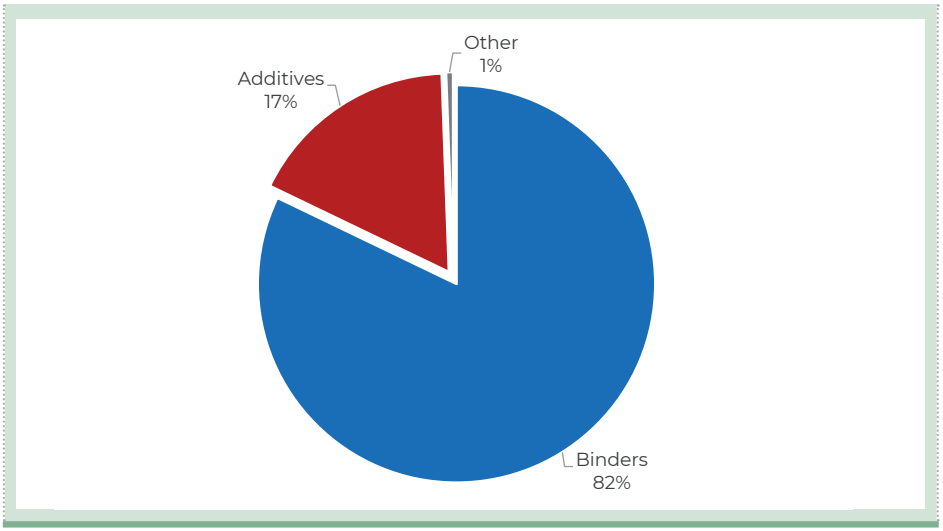


Table 16: Detail on GWP_{100}: raw materials contribution



More details about electrical mix used in this EPD (Norwegian grid mix – 2013), is shown below:

	Data source	Amount	Unit
Electricity grid mix (NO) – 2013	GaBi database	0,0356	kg CO_2-eqv/kWh

8. DATA QUALITY

Table 17: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1-A3		
Inorganic Binders	NEPD 00023N rev1 NEPD-1539-528-NO	2013 – 2018
Fillers (EU)	GaBi Database	2016
Additives (EU)	GaBi Database	2016
Electricity grid mix (NO)	GaBi Database	2013
Packaging components (EU)	GaBi Database, PlasticsEurope	2005 – 2016
A2-A4		
Truck transport (euro 3, 27t payload – GLO)	GaBi Database	2016
Oceanic ship (27500 DWT)	GaBi Database	2016
Light Train (Gross Ton Weight 500 Tons - GLO)	GaBi Database	2016
Electricity mix (EU)	GaBi Database	2013
Diesel for transport (EU)	GaBi Database	2013
Heavy Fuel Oil (EU)	GaBi Database	2013

All data included in the table above refer to a period between 2005 and 2018; the most relevant ones are specific from supplier, while the others (i.e. transport and minor contribution dataset), come from European and global databases.

All datasets are not more than 10 years old according to EN 15804 § 6.3.7 “Data quality requirements”. The only exception is represented by one raw material used for one packaging component production.

Primary data concern the year 2018 and represent the whole annual production.

9. REQUISITE EVIDENCE

9.1 Recycled content

Nonset 50 contains around 8% of recycled material.

10 SIGNIFICANT CHANGES FROM THE PREVIOUS VERSION

In this revision new content declaration, new primary data (referred to the reference year 2018) and new formulation have been adopted. The last update of the GPI (version 3.0) has been considered. This changes brought to an increase of more than +10% in EP and ODP indicators for **Nonset 50**.

11. VERIFICATION AND REGISTRATION

EPD of construction products may not be comparable if they do not comply with EN 15804.
Environmental product declarations within the same product category from different programs may not be comparable.

CEN standard EN15804 served as the core PCR	
PCR:	PCR 2012:01 Construction products and Construction services, Version 2.3, 2018-11-15
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via **info@environdec.com**
Independent verification of the declaration and data, according to ISO 14025	☒ EPD Process Certification (Internal) ☐ EPD Verification (external)
Third party verifier:	Certiquality S.r.l. Number of accreditation: 003H rev15
Accredited or approved by:	Accredia
Procedure for follow-up of data during EPD validity involves third-party verifier	☒ Yes ☐ No

12. REFERENCES

- EN 1504-9 “PRODUCTS AND SYSTEMS FOR THE PROTECTION AND REPAIR OF CONCRETE STRUCTURES - DEFINITIONS, REQUIREMENTS, QUALITY CONTROL AND EVALUATION OF CONFORMITY - GENERAL PRINCIPLES FOR THE USE OF PRODUCTS AND SYSTEMS”
- EN 1504-6 “ANCHORING REINFORCEMENT STEEL”.
- EN 15804: 2014 SUSTAINABILITY OF CONSTRUCTION WORKS - ENVIRONMENTAL PRODUCT DECLARATIONS - CORE RULES FOR THE PRODUCT CATEGORY OF CONSTRUCTION PRODUCTS
- GENERAL PROGRAMME INSTRUCTIONS OF THE INTERNATIONAL EPD® SYSTEM. VERSION 3.0
- HBEFA: HANDBOOK EMISSION FACTORS FOR ROAD TRANSPORT
- ISO 14025 ENVIRONMENTAL LABELS AND DECLARATIONS - TYPE III ENVIRONMENTAL DECLARATIONS - PRINCIPLES AND PROCEDURES
- ISO 14044 ENVIRONMENTAL MANAGEMENT -- LIFE CYCLE ASSESSMENT -- REQUIREMENTS AND GUIDELINES
- PCR 2012:01; “PRODUCT GROUP CLASSIFICATION: MULTIPLE UN CPC CODES CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES”; VERSION 2.3

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