epd-norge
Global program operatør

Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

Penguard Universal, Jotun Paints (Malaysia) Sdn. Bhd.



JOTUN

The Norwegian EPD Foundation

Owner of the declaration:
Jotun A/S

Product:
Penguard Universal, Jotun Paints (Malaysia) Sdn. Bhd.

Declared unit:
1 kg

This declaration is based on Product Category Rules:
CEN Standard EN 15804:2012+A2:2019 serves as core PCR
IBU PCR Part B for coatings with organic binders

Program operator:
The Norwegian EPD Foundation

Declaration number:

Registration number:

Issue date:

Valid to:

EPD software:
LCAno EPD generator ID: 326016

General information

Product

Penguard Universal, Jotun Paints (Malaysia) Sdn. Bhd.

Owner of the declaration:

Jotun A/S
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Program operator:

The Norwegian EPD Foundation
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Manufacturer:

Jotun Paints (Malaysia) Sdn. Bhd.

Declaration number:

Place of production:

Jotun Paints (Malaysia) Sdn. Bhd.
Lot 9143, PN 38500, Kawasan Perindustrian, Nilai
71800 Negeri Sembilan, Malaysia

This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR
IBU PCR Part B for coatings with organic binders

Management system:

ISO 9001:2015 Certificate nr: 0044915-00, ISO 14001:2015 Certificate nr 0044914-00, ISO 45001: 2018 Certificate nr: 0098139

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Organisation no:

923 248 579

Declared unit:

1 kg Penguard Universal, Jotun Paints (Malaysia) Sdn. Bhd.

Issue date:

Declared unit with option:

A1-A3,A4,C1,C2,C3,C4,D

Valid to:

Year of study:

2024

Functional unit:

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4. Verification of each EPD is made according to EPD-Norway's guidelines for verification and approval requiring that tools are i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPD-Norway, and iii) the process is reviewed annually by an independent third party verifier. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools.

Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2022.03, developed by LCA.no. The EPD tool is integrated in the company's management system, and has been approved by EPD Norway. Approval number: NEPDT07

Developer of EPD: Cleo Alves Otterbech

Reviewer of company-specific input data and EPD: Ragnhild Bjerkvik Alnes

Verification

Independent third party verifier:



Anne Rønning, Norsus AS

Approved:

Product

Product description:

Penguard Universal is a two component polyamine cured pure epoxy coating. It is a fast drying, abrasion resistant, high solids, high build product. The declared product provides excellent corrosion protection as part of a complete coating system. It can be used as primer, mid coat, finish coat or as single coat system in atmospheric and immersed environments. It is suitable for properly prepared carbon steel, galvanized steel, shop primed steel, stainless steel, aluminium and concrete substrates.

Penguard Universal is suitable as maintenance coating on a wide range of aged coating surfaces. It can be applied at sub zero surface temperatures. Recommended for offshore environments, including splash zones, refineries, power plants, bridges, buildings, mining equipment and general structural steel. Approved for PSPC cross over testing with a wide range of shop primers.

Product specification

For information on Green Building Standard credits, see subchapter "Additional technical information".

The material composition of the declared mixed product is given below:

Materials	Value	Unit
Binder	25 - 50	%
Filler	25 - 50	%
Solvent	10 - 25	%
Titanium dioxide	10 - 25	%
Additive	0.3 - 1	%
Pigment	<0.1	%

Technical data:

Product mixing ratio (by volume):
Penguard Universal Comp A: 3 parts.
Penguard Universal Comp B: 1 part.

Density: 1.4 g/cm^3
Solids by volume: 72 ± 2 volume%

Film thickness per coat:
Dry film thickness: 75 - 300 µm
Wet film thickness: 105 - 415 µm

Theoretical spreading rate: 9.6 - 2.4 m^2/l

The most representative and worst case formulation produced at the manufacturing site is chosen for this EPD. For products with a selection of colours, this will be the formulation with the highest content of titanium dioxide.

The product packaging is based on an average sized metal packaging, including secondary packaging such as pallets and plastic wrapping.

For safety, health and environmental conditions, see the Safety Data Sheet for the declared product on www.jotun.com.

For information on technical data, application and use of the product, see the Technical Data Sheet for the declared product on www.jotun.com.

Market:

It covers the regional markets where the product is produced.

Reference service life, product

The reference service life of the product is highly dependent on the conditions of use.

Estimated service life, object

The coated object is not declared.

LCA: Calculation rules

Declared unit:

1 kg Penguard Universal, Jotun Paints (Malaysia) Sdn. Bhd.

Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

Data quality:

Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

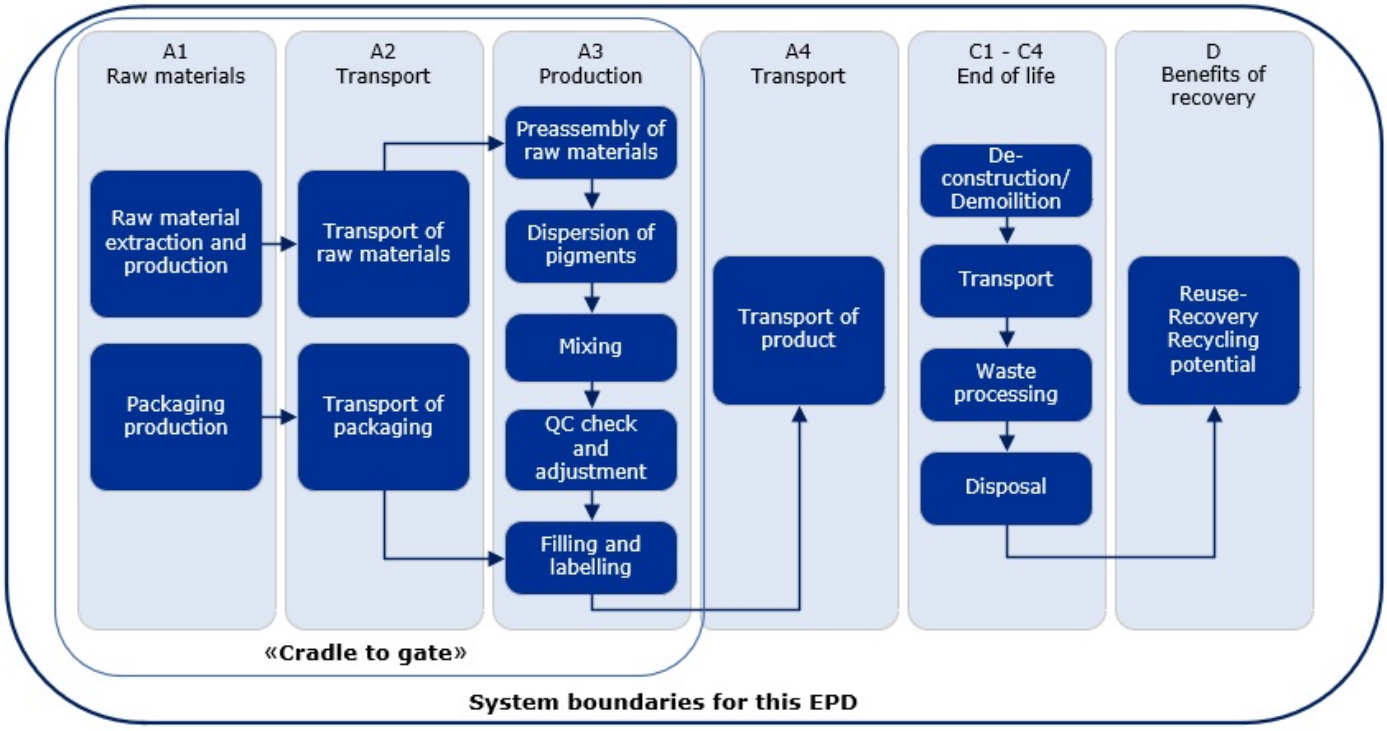
Materials	Source	Data quality	Year
Packaging	ecoinvent 3.6	Database	2019
Additives	ecoinvent 3.6	Database	2019
Additives	CEPE RM Database v3.0	Database	2016
Binders and Resins	CEPE RM Database v3.0	Database	2016
Binders and Resins	Supplier	LCI	2022
Others	CEPE RM Database v3.0	Database	2016
Pigments and Fillers	CEPE RM Database v3.0	Database	2016
Solvent	CEPE RM Database v3.0	Database	2016

System boundaries (X=included, MND=module not declared, MNR=module not relevant)

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

System boundary:

The flowchart in the figure below illustrates the system boundaries for the analysis, in accordance with the modular principle on EN 15804+A2. The analysis is a cradle-to-gate (A1-A3) study with options, in addition to module A4, transport to market, modules C1-C4 and module D are included.



Additional technical information:

The declared product contributes to Green Building Standard credits by meeting the following specific requirements:

LEED®v4.1 (2020)/LEED®v4 (2013)
MR credit: Building product disclosure and optimization
- Environmental Product Declarations: Product-specific Type III EPD (ISO 14025;21930, EN 15804+A2) for Jotun Paints (Malaysia) Sdn. Bhd.

BREEAM® International (2021)/BREEAM® International (2016)
- Mat 01: Product-specific Type III EPD (ISO 14025;21930, EN 15804+A2) for Jotun Paints (Malaysia) Sdn. Bhd.

Certified in accordance with IMO Res.215(82) – PSPC Water Ballast Tanks
Certified in accordance with IMO Res.288(87) – PSPC Crude Oil Tanks
Pre-qualified in accordance with NORSOK M-501, Edition 6, System 1
Pre-qualified in accordance with NORSOK M-501, Edition 6, System 7.

Additional certificates and approvals may be available on request.

LCA: Scenarios and additional technical information

The following information describe the scenarios in the different modules of the EPD.

This is a cradle to gate (A1-A3) study with options, modules C1-C4, module D and additional module A4 transport to market have been included, as described below.

Modules A1-A3 background information is based on CEPE and EcoInvent databases. Where A1 accounts for each raw material in the formulation per 1 kg of product including the packaging. A2 accounts for the transport of raw materials, distance and type(s) of transport are based on yearly averages collected from the manufacturing facility. A3 accounts for production data, the energy consumption and waste management are based on collection of data from the manufacturing site.

Module A4 includes the transport of 1 kg of the declared product with packaging from place of production to the market where the product is sold. The calculation is based on average distances to distribution centers in the local market. The declared product is assumed to be transported with the common type of truck used locally.

Module C considers the end-of-life of the construction material. The calculations for module C are based on dried/cured paint. Solvents and water are subtracted from the total coating mass due to the drying/curing processes occurring in modules A5 and B2. Similarly, packaging waste is generated in module A5 and B2, thus it is not accounted for in module C.

Module C1 is modelled with zero impact for the declared product. The coating is not removed from the substrate during decommissioning process, therefore the impact is allocated to the coated object.

Module C2 includes the transport of the paint waste to the closest disposal or waste treatment facility. It is assumed that the waste is transported by truck with characteristics listed in the Table. The transportation distance is set to 50 km.

Module C3 is modelled with no waste paint processing.

Module C4, paint waste is gathered as part of the substrate in construction materials. A typical disposal scenario for paint applied on that substrate is landfill, therefore it is assumed that 100% of the paint waste is sent to landfill facilities.

Module D. Recycling of applied paint is not a common practice, therefore the reuse, recovery and recycling potential is set to zero.

Transport from production place to user (A4)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck World, over 32 tonnes, EURO 4 (km)	55,0 %	604	0,023	l/tkm	13,89

De-construction demolition (C1)	Unit	Value			
Energy use during decommissioning	kWh/DU	0,00			

Transport to waste processing (C2)	Capacity utilisation (incl. return) %	Distance (km)	Fuel/Energy Consumption	Unit	Value (Liter/tonne)
Truck World, over 32 tonnes, EURO 4 (km)	55,0 %	50	0,023	l/tkm	1,15

Waste processing (C3)	Unit	Value			
Waste treatment per kg Paint, municipal incineration, World (kg)	kg/DU	0,00			

Disposal (C4)	Unit	Value			
Waste treatment per kg Paint, inert material landfill, World (kg)	kg/DU	0,81			

Benefits and loads beyond the system boundaries (D)	Unit	Value			
Substitution of raw materials (kg)	kg/DU	0,00			

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

Environmental impact									
	Indicator	**Unit**	A1-A3	A4	C1	C2	C3	C4	D
	GWP-total	kg CO_2 -eq	3,63E+00	6,04E-02	0,00E+00	3,78E-03	0,00E+00	1,58E-02	0,00E+00
	GWP-fossil	kg CO_2 -eq	3,61E+00	6,04E-02	0,00E+00	3,78E-03	0,00E+00	1,58E-02	0,00E+00
	GWP-biogenic	kg CO_2 -eq	8,72E-03	2,40E-05	0,00E+00	1,50E-06	0,00E+00	7,57E-06	0,00E+00
	GWP-luluc	kg CO_2 -eq	2,15E-03	1,82E-05	0,00E+00	1,14E-06	0,00E+00	5,22E-06	0,00E+00
	ODP	kg CFC11 -eq	5,39E-05	1,36E-08	0,00E+00	8,54E-10	0,00E+00	4,39E-09	0,00E+00
	AP	mol H+ -eq	2,22E-02	3,10E-04	0,00E+00	1,94E-05	0,00E+00	8,77E-05	0,00E+00
	EP-FreshWater	kg P -eq	4,03E-04	5,43E-07	0,00E+00	3,40E-08	0,00E+00	1,38E-07	0,00E+00
	EP-Marine	kg N -eq	5,12E-03	1,04E-04	0,00E+00	6,48E-06	0,00E+00	2,79E-05	0,00E+00
	EP-Terrestial	mol N -eq	4,17E-02	1,14E-03	0,00E+00	7,16E-05	0,00E+00	3,09E-04	0,00E+00
	POCP	kg NMVOC -eq	1,59E-02	3,40E-04	0,00E+00	2,13E-05	0,00E+00	9,20E-05	0,00E+00
	ADP-minerals&metals[1]	kg Sb-eq	4,16E-05	1,02E-06	0,00E+00	6,41E-08	0,00E+00	3,51E-07	0,00E+00
	ADP-fossil[1]	MJ	5,87E+01	9,30E-01	0,00E+00	5,82E-02	0,00E+00	2,93E-01	0,00E+00
	WDP[1]	m^3	5,43E+01	3,29E-01	0,00E+00	2,06E-02	0,00E+00	2,03E-01	0,00E+00

GWP-total = Global Warming Potential total; GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment: EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Remarks to environmental impacts

Additional environmental impact indicators

Indicator		Unit	A1-A3	A4	C1	C2	C3	C4	D
	PM	Disease incidence	2,56E-07	5,19E-09	0,00E+00	3,25E-10	0,00E+00	1,62E-09	0,00E+00
	IRP[2]	kgBq U235 -eq	3,68E+02	3,92E-03	0,00E+00	2,46E-04	0,00E+00	1,25E-03	0,00E+00
	ETP-fw[1]	CTUe	6,53E+01	7,27E-01	0,00E+00	4,55E-02	0,00E+00	1,99E-01	0,00E+00
	HTP-c[1]	CTUh	1,35E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,00E-12	0,00E+00
	HTP-nc[1]	CTUh	3,12E-07	6,49E-10	0,00E+00	4,10E-11	0,00E+00	1,92E-10	0,00E+00
	SQP[1]	dimensionless	4,51E+01	1,05E+00	0,00E+00	6,59E-02	0,00E+00	3,64E-01	0,00E+00

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

1. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator
2. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Resource use									
Indicator		Unit	A1-A3	A4	C1	C2	C3	C4	D
	PERE	MJ	6,28E+00	1,00E-02	0,00E+00	6,26E-04	0,00E+00	3,42E-03	0,00E+00
	PERM	MJ	7,22E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PERT	MJ	6,35E+00	1,00E-02	0,00E+00	6,26E-04	0,00E+00	3,42E-03	0,00E+00
	PENRE	MJ	6,25E+01	9,30E-01	0,00E+00	5,82E-02	0,00E+00	2,93E-01	0,00E+00
	PENRM	MJ	4,91E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	PENRT	MJ	6,26E+01	9,30E-01	0,00E+00	5,82E-02	0,00E+00	2,93E-01	0,00E+00
	SM	kg	2,19E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,24E-05	0,00E+00
	RSF	MJ	2,32E-02	2,32E-04	0,00E+00	1,45E-05	0,00E+00	1,10E-04	0,00E+00
	NRSF	MJ	7,18E-02	1,40E-03	0,00E+00	8,75E-05	0,00E+00	4,28E-04	0,00E+00
	FW	m^3	6,73E-01	1,13E-04	0,00E+00	7,09E-06	0,00E+00	1,46E-04	0,00E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = Total use of non renewable primary energy resources; SM = Use of secondary materials; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Waste

Indicator		Unit	A1-A3	A4	C1	C2	C3	C4	D
	HWD	kg	1,78E-02	7,10E-05	0,00E+00	4,45E-06	0,00E+00	1,81E-05	0,00E+00
	NHWD	kg	4,07E+00	8,00E-02	0,00E+00	5,01E-03	0,00E+00	8,21E-01	0,00E+00
	RWD	kg	9,31E-05	6,18E-06	0,00E+00	3,87E-07	0,00E+00	1,97E-06	0,00E+00

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

End of life - Output flow

Indicator		Unit	A1-A3	A4	C1	C2	C3	C4	D
	CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	MFR	kg	2,79E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,05E-05	0,00E+00
	MER	kg	3,29E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,46E-07	0,00E+00
	EEE	MJ	2,54E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,13E-06	0,00E+00
	EET	MJ	3,84E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,22E-05	0,00E+00

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

"Reading example: 9,0 E-03 = 9,0*10-3 = 0,009"
*INA Indicator Not Assessed

Biogenic Carbon Content

Indicator	Unit	At the factory gate
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	2,14E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO2

Additional requirements

Greenhouse gas emissions from the use of electricity in the manufacturing phase

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Electricity mix	Source	Amount	Unit
Electricity, Malaysia (kWh)	ecoinvent 3.6	896,51	g CO2-eq/kWh

Dangerous substances

The product contains dangerous substances, more than 0,1% by weight, given by the REACH Candidate List, see table:

Name	CASNo	Amount
Ethylendiamine	107-15-3	0.84% (in comp. B)

Indoor environment

Not applicable for externally applied products.

Additional Environmental Information

Additional environmental impact indicators required in NPCR Part A for construction products								
Indicator	**Unit**	A1-A3	A4	C1	C2	C3	C4	D
GWPIOBC	kg CO_2 -eq	3,62E+00	6,04E-02	0,00E+00	3,78E-03	0,00E+00	1,58E-02	0,00E+00

GWP-IOBC: Global warming potential calculated according to the principle of instantaneous oxidation. In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

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REACH (2006): Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006. REACH Authorization list – Annex XIV, the Restriction list – Annex XVII and the SVHC candidate list.
Resolution MSC.215(82) - Performance Standard for Protective Coatings for Dedicated Seawater Ballast Tanks in all Types of Ships and Double-Side Skin Spaces of Bulk Carriers.
Resolution MSC.288(87) - Performance Standard for Protective Coatings for Cargo Oil Tanks of Crude Oil Tankers.

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