Statement of Verification

BREG EN EPD No.: 000367 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Kingspan Insulation Ltd

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

BRE Global Scheme Document SD207

This declaration is for:

1m^3 of Kingspan Kooltherm Pipe Insulation

Company Address

Kingspan Insulation Ltd
Pembridge
Herefordshire
HR6 9LA

Signed for BRE Global Ltd	Laura Critien Operator	02 November 2021 Date of this Issue
02 November 2021 Date of First Issue		01 November 2026 Expiry Date

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Environmental Product Declaration

EPD Number: **000367**

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Kingspan Insulation Ltd Pembridge Herefordshire HR6 9LA	Tom Proffitt, Kingspan Insulation Ltd / BRE LINA Tool
Declared Unit	**Applicability/Coverage**
1m^3 of Kingspan Kooltherm pipe insulation with a density of 58.52 kg/m^3	Product specific.
EPD Type	**Background database**
Cradle to Gate with options	Ecoinvent 3.2

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Nigel Jones
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☐	☑	☑	☑		☐

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

Kingspan Insulation Ltd
Glossop Brook Road
Glossop
Derbyshire
SK13 8GP

Construction Product

Product Description

Kingspan Kooltherm pipe insulation is a premium performance rigid thermoset fibre free phenolic insulation core faced on the outside with a low emissivity foil outer face.
Product information is available at www.kingspantechnicalinsulation.co.uk

Technical Information

Property	Value, Unit
Thermal Conductivity - EN 12667:2001	0.025 W/m.K
Nominal Density	37 - 120 kg/m^3
Closed Cell Content – EN ISO 4950 Method 1	≥ 90 %
Maximum Service Temperature	110 °C
Minimum Service Temperature	-50 °C
Reaction to fire – EN 13501-1	B/B$_L$ – s1, d0
Minimum Compressive Strength at +23°C (Parallel)– EN 826 / ASTM D 1621	150 – 1000 kPa
Minimum Compressive Strength at +23°C (Perpendicular)– EN 826 / ASTM D 1621	100 – 800 kPa
FM Approval – Class 4924	FM approval per Approval Standard 4924 where manufactured and installed in accordance with the details of the FM Approval. Please contact Kingspan Technical Insulation

Main Product Contents

Material/Chemical Input	%
Rigid thermoset fibre free phenolic insulation core	86.1%
Low emissivity foil facer	13.9%

**Average percentages applicable for 1m of insulation at thickness that gives a U-value of 0.025 m^2K/W*

Manufacturing Process

Kingspan Kooltherm Pipe Insulation is made through two different manufacturing process: CPL and CNC.

Kingspan Kooltherm Pipe Insulation manufactured through CPL process:

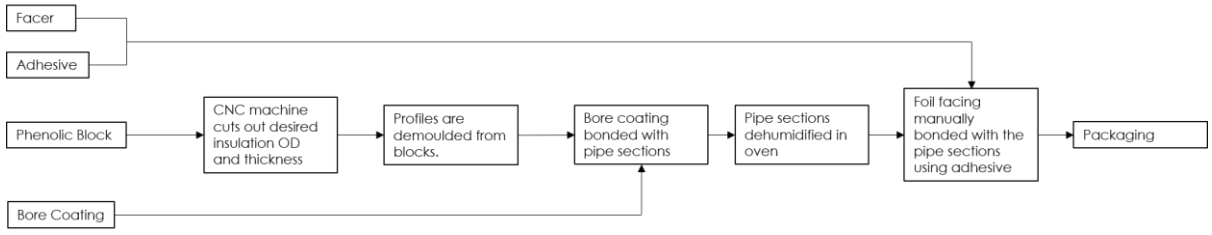
The foam forms an insulating core between two facing elements. At the start of the process a mix of chemicals is added directly to the outer layer (aluminum foil) of facing and then expands to meet the inner layer of facing (inner bore liner). As it cures, the foam becomes tacky and adheres itself to the facing, top and bottom. Once it has reached the necessary thickness the foam is cured under pressure. It is then cut to length, packed into boxes and moved onto a secondary oven finish curing process, becoming pink/red in colour. After final QC control the boxes are sealed and moved into warehouse for storage and later distribution to customers.

Kingspan Kooltherm Pipe Insulation manufactured through the CNC process:

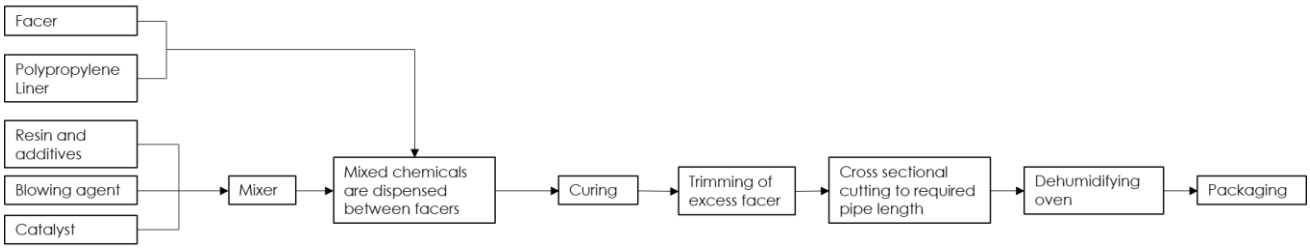
Blocks of phenolic foam are placed into a computerised cutting machine and programmed with the insulation OD and thickness requirements. The sections are then bore coated and then manually glued to the foil facing.

Process flow diagram

Kingspan Kooltherm Pipe Insulation CNC manufacturing process



Kingspan Kooltherm Pipe Insulation CPL manufacturing process



Construction Installation

The product will be installed on building services pipework and equipment applications using standard construction techniques.

Use Information

The product will be left alone after installations, and there are no known associated environmental impacts.

End of Life

The insulation will be removed for disposal when the building reaches the end of its life.

Life Cycle Assessment Calculation Rules

Declared unit description

1m^3 of Kingspan Kooltherm pipe insulation with a density of 58.52 kg/m^3. Corresponding conversion factors are listed in the table below

Name	Value	Unit
Declared unit	1	m^3
Gross density	58.25	Kg/m^3
Conversion factor to 1kg	1.718e^{-2}	-

Conversion factors to one linear meter of Kooltherm pipe insulation at specific OD and thicknesses please use the table found within the annex. To convert the EPD results please use the following calculation methodology:

Environmental indicator life cycle result x Conversion factor

E.g. The calculation for GWP of A1-3 for one linear meter of Kooltherm pipe insulation with a thickness of 15mm and an OD of 15mm would be as follows: 219 x 0.0013 = 0.2847 kg CO_2 eq

System boundary

Cradle to gate with options: Modules A1-3, A4, A5, C2, C3 and C4.
The following processes are included in the A1-A3 production stage of Kooltherm: Manufacture of preliminary products (resin, blowing agent, additives). Transportation of raw materials and preliminary products to the manufacturing site. Manufacturing process on the production site including, energy, disposal of residual materials, water consumption and VOC emissions to air.

The following process is included within the A4 construction stage: Transportation of the product to the construction site. Data has been allocated by using the average distance travelled for each delivery (240.36km).

The following processes are included in the A5 construction stage of Kooltherm: installation wastage rate, material wastes produced by installation. Installation of Kingspan Kooltherm Pipe Insulation is done by hand. There is almost no production of waste during installation of the product. An assumption that an installation wastage rate of 2% will be taken due to cutting of Kooltherm Pipe Insulation to for specific areas of pipework. This waste is also assumed to go to landfill.

The following processes and assumptions included within life cycle module C2: The product travels from the installation site back to either the manufacturing site or to a recycling / waste to energy site. The distance to the manufacturing site would be the furthest distance to travel so using the same assumptions as transport from manufacturing site to installation site.

The following processes and assumptions included within modules C3 and C4: Processing of Kingspan Kooltherm pipe insulation to allow energy recovery from waste is inclusive of the energy required to briquette the Kingspan Kooltherm pipe insulation. UK statistics on waste report that the recovery rate from non-hazardous construction and demolition waste is approximately 91% as of 2016. It is assumed that all of the 91% waste recovered will go to energy recovery from waste, the remaining 9% will go to landfill.

Data sources, quality and allocation

This covers all Kooltherm Pipe Insulation manufactured at the Glossop manufacturing site, representing 100% of production of these products in 2018 and the total m^3 production output of Kooltherm foam is 79% of the total site output at the Glossop.

In accordance with EN 15804, the most current available data was used to calculate the EPD. Manufacturer specific data from Kingspan Technical Insulation covers a production period of 12 months (01/01/2018 to 31/12/2018). The profile created within this document includes data for the following sections: ‘ancillary materials’, ‘packaging’, ‘fuel/energy’, ‘water’, ‘emissions to air, water and soil’, ‘production waste, ‘other waste’ and ‘water discharged’. Allocation of these factors to the product assessed within this document was achieved by using the proportion of the total site output (79%) used in manufacturing the Kooltherm Pipe Insulation.

Secondary data has been drawn from the BRE LINA database v2.0.82 and the background LCI datasets are based on ecoinvent v3.2.

Cut-off criteria

No inputs or outputs have been excluded. All raw materials, packaging materials, associated transport to the manufacturing site, and from the manufacturing site to the building site, process energy, water use, direct production waste, installations waste and emissions are included.

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2.19e+2	2.16e-5	1.29e+0	3.82e-1	1.71e-1	4.06e-3	5.34e+3
Construction process stage	Transport	A4	1.28e+0	2.44e-7	4.40e-3	1.16e-3	9.09e-4	2.15e-6	2.00e+1
	Construction	A5	4.43e+0	4.49e-7	2.60e-2	7.71e-3	3.46e-3	8.19e-5	1.08e+2
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND	MND	MND	MND
	Transport	C2	1.28e+0	2.44e-7	4.40e-3	1.16e-3	9.09e-4	2.15e-6	2.00e+1
	Waste processing	C3	4.41e-7	2.85e-14	2.39e-9	5.48e-10	1.36e-10	5.32e-13	6.79e-6
	Disposal	C4	5.34e-2	1.41e-8	3.74e-4	1.23e-4	6.21e-5	7.58e-8	1.31e+0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND	MND

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	5.85e+2	2.23e-2	5.85e+2	2.75e+3	2.59e+3	5.34e+3
Construction process stage	Transport	A4	3.02e-1	7.54e-7	3.02e-1	1.99e+1	0.00e+0	1.99e+1
	Construction	A5	1.18e+1	4.46e-1	1.18e+1	1.06e+2	0.00e+0	1.06e+2
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND	MND	MND
	Transport	C2	3.02e-1	7.54e-7	3.02e-1	1.99e+1	0.00e+0	1.99e+1
	Waste processing	C3	5.86e-7	1.06e-12	5.86e-7	9.04e-6	0.00e+0	9.04e-6
	Disposal	C4	4.00e-2	1.10e-7	4.00e-2	1.32e+0	0.00e+0	1.32e+0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND	MND	MND

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00e+0	0.00e+0	0.00e+0	6.19e+0
Construction process stage	Transport	A4	0.00e+0	0.00e+0	0.00e+0	4.64e-3
	Construction	A5	0.00e+0	0.00e+0	0.00e+0	1.25e-1
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND
	Transport	C2	0.00e+0	0.00e+0	0.00e+0	4.64e-3
	Waste processing	C3	0.00e+0	0.00e+0	0.00e+0	1.81e-9
	Disposal	C4	0.00e+0	0.00e+0	0.00e+0	1.48e-3
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	1.32e+1	1.72e+1	9.22e-3
Construction process stage	Transport	A4	7.51e-3	1.71e+0	1.39e-4
	Construction	A5	2.64e-1	1.55e+0	1.90e-4
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	MND	MND	MND
	Repair	B3	MND	MND	MND
	Replacement	B4	MND	MND	MND
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND
	Transport	C2	7.51e-3	1.71e+0	1.39e-4
	Waste processing	C3	1.03e-9	1.10e-8	4.98e-11
	Disposal	C4	9.87e-4	5.17e+0	8.11e-6
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND

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

LCA Results (continued)

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	7.24e-1	5.45e-1	1.93e+1	0.00e+0
Construction process stage	Transport	A4	0.00e+0	0.00e+0	0.00e+0	0.00e+0
	Construction	A5	1.45e-2	4.74e+0	3.86e-1	0.00e+0
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	MND	MND	MND	MND
	Transport	C2	0.00e+0	0.00e+0	0.00e+0	0.00e+0
	Waste processing	C3	0.00e+0	0.00e+0	5.22e+1	0.00e+0
	Disposal	C4	0.00e+0	0.00e+0	0.00e+0	0.00e+0
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	MND	MND	MND	MND

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Description of scenario		
	Fuel type / Vehicle type	Litre of fuel type per distance or vehicle type	Lorry >32 metric tons
	Distance:	km	240.36
	Bulk density of transported products	kg/m^3	58.52
	Capacity utilisation	%	89
A5 – Installation in the building	Description of scenario		
	Installation wastage rate	% of product	2
	Installation waste sent to landfill	kg	1.17
	Installation waste sent to recycling (packaging)	kg	4.485
C1 to C4 End of life,	Description of scenario		
	Transport type	Vehicle type	Lorry >32 metric tons
	Distance	km	240.36
	Crushing and compacting of waste into briquettes	MJ	2.64e-6
	Waste incinerated for energy recovery	kg	52.19
	Landfilled waste	kg	5.16

Annex

Conversion factor for 1m of Kingspan Kooltherm Pipe Insulation at differing OD and insulation thicknesses								
Pipe OD (mm)	Insulation thickness (mm)							
	15	20	25	30	35	40	45	50
15	0.0013	0.0019	0.0027	0.0036	0.0046	0.0057	0.0069	0.0083
17	0.0014	0.0020	0.0028	0.0037	0.0047	0.0059	0.0071	0.0085
18	0.0014	0.0021	0.0029	0.0038	0.0048	0.0060	0.0072	0.0086
21	0.0015	0.0022	0.0031	0.0040	0.0051	0.0063	0.0076	0.0090
25	0.0017	0.0025	0.0033	0.0043	0.0054	0.0067	0.0080	0.0095
27	0.0018	0.0026	0.0035	0.0045	0.0056	0.0069	0.0082	0.0097
28	0.0018	0.0026	0.0035	0.0046	0.0057	0.0070	0.0084	0.0099
34	0.0021	0.0029	0.0039	0.0050	0.0062	0.0076	0.0090	0.0106
42	0.0024	0.0033	0.0044	0.0056	0.0069	0.0084	0.0099	0.0116
48	0.0026	0.0037	0.0048	0.0061	0.0075	0.0090	0.0106	0.0123
54	0.0029	0.0040	0.0052	0.0065	0.0080	0.0096	0.0112	0.0131
60	0.0031	0.0043	0.0056	0.0070	0.0085	0.0102	0.0119	0.0138
67	0.0034	0.0046	0.0060	0.0075	0.0091	0.0109	0.0127	0.0147
70	0.0035	0.0048	0.0062	0.0077	0.0094	0.0112	0.0130	0.0150
76	0.0038	0.0051	0.0066	0.0082	0.0099	0.0117	0.0137	0.0158
80	0.0039	0.0053	0.0069	0.0085	0.0103	0.0121	0.0141	0.0163
84	0.0041	0.0055	0.0071	0.0088	0.0106	0.0125	0.0146	0.0168
89	0.0043	0.0058	0.0074	0.0092	0.0111	0.0130	0.0151	0.0174
93	0.0044	0.0060	0.0077	0.0095	0.0114	0.0134	0.0156	0.0179
102	0.0048	0.0065	0.0083	0.0102	0.0122	0.0143	0.0166	0.0190
108	0.0051	0.0068	0.0087	0.0106	0.0127	0.0149	0.0173	0.0197
114	0.0053	0.0071	0.0090	0.0111	0.0132	0.0155	0.0179	0.0204
127	0.0058	0.0078	0.0099	0.0121	0.0144	0.0168	0.0194	0.0221
129	0.0059	0.0079	0.0100	0.0122	0.0146	0.0170	0.0196	0.0223
133	0.0061	0.0081	0.0103	0.0125	0.0149	0.0174	0.0200	0.0228
139	0.0063	0.0084	0.0106	0.0130	0.0154	0.0180	0.0207	0.0235
154	0.0069	0.0092	0.0116	0.0141	0.0168	0.0195	0.0224	0.0254
159	0.0071	0.0095	0.0119	0.0145	0.0172	0.0200	0.0229	0.0260
168	0.0075	0.0099	0.0125	0.0152	0.0180	0.0209	0.0239	0.0271
194	0.0085	0.0113	0.0142	0.0172	0.0203	0.0235	0.0268	0.0303
204	0.0089	0.0118	0.0148	0.0179	0.0211	0.0245	0.0280	0.0315
219	0.0095	0.0126	0.0158	0.0191	0.0225	0.0260	0.0296	0.0334
245	0.0106	0.0140	0.0174	0.0210	0.0247	0.0286	0.0325	0.0366

255	0.0110	0.0145	0.0181	0.0218	0.0256	0.0296	0.0336	0.0378
273	0.0117	0.0154	0.0192	0.0232	0.0272	0.0314	0.0356	0.0400
298	0.0127	0.0167	0.0208	0.0250	0.0294	0.0338	0.0384	0.0431
324	0.0138	0.0181	0.0225	0.0270	0.0317	0.0364	0.0413	0.0463
356	0.0151	0.0198	0.0245	0.0295	0.0345	0.0396	0.0449	0.0503
406	0.0171	0.0224	0.0278	0.0332	0.0389	0.0446	0.0504	0.0564
457	0.0192	0.0250	0.0310	0.0371	0.0433	0.0497	0.0561	0.0627
508	0.0212	0.0277	0.0343	0.0410	0.0478	0.0547	0.0618	0.0690
610	0.0254	0.0330	0.0408	0.0487	0.0568	0.0649	0.0732	0.0815

Conversion factors have been calculated using the relevant finished pipe section weights using the following formula: Actual weight of specific pipe section (1 m) / weight of declared unit

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