

Plastykote®

Three Layer Polyethylene Coating (3LPE) TECHNICAL DATA

HIGH DENSITY POLYETHYLENE PHYSICAL PROPERTIES

Typical Properties ¹	Standard ²	Unit	Value ³
Density	ASTM D 792 Method B ISO 1183 Method A	g/cm ³	0.95 to 0.96
Melting Point	ASTM D 3418	°C	≥ 125
Melt Flow Index	CSA Z 245.21	g/10 min	0.4 to 0.7

3LPE COATING MECHANICAL PROPERTIES

Adhesion Resistance @ 20 ± 3 °C	CSA Z 245.21	N/mm	≥ 20
Impact Resistance @ -30 ± 3 °C	CSA Z 245.21	J/mm	≥ 7
Indentation	DIN 30670	mm	≤ 0.2 at 23 °C ≤ 0.3 at 70 °C
Flexibility @ -30 ± 3	CSA Z 245.21	-	No cracking of polyethylene
Hardness @ 20 ± 2 °C	ASTM D 2240	Shore D	≥ 60
Tensile Strength at Yield @ 20 ±	ASTM D 638	MPa	≥ 17
Elongation at Break @ 20 ± 2 °C	ASTM D 638	%	≥ 400
Heat Ageing Aged @ 100 ± 3 °C / 2,400 ± 24 h Tested @ 20 ± 2 °C	CSA Z 245.21	%	Tensile at yield after heating ≥ 65% of the original value. Elongation at break ≥ 150%
Light Ageing Total radiant exposure of 7 GJ/m ²	DIN 30670	%	Melt flow rate after heating shall not deviate more than 35% of the original value.
Cathodic Disbondment @ 48 hours / 65 ± 3 °C / -1.5V / NaCl (3%)	CSA Z 245.21	mm	≤ 3
Cathodic Disbondment @ 28 days / 20 ± 3 °C / -1.5V / NaCl (3%)	CSA Z 245.21	mm	≤ 5
Cathodic Disbonding @ 28 days / 65 ± 3 °C / -1.5V / NaCl (3%)	CSA Z 245.21	mm	≤ 12
Coating Resistivity Exposed @ 23 ± 2 °C / 100 days	DIN 30670	Ωm ²	≥ 10 ⁸

(1): Typical properties are listed in this document. Please advice if additional properties are requested.

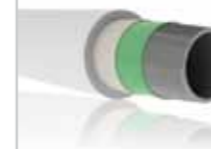
(2): Each test is performed in accordance to internal procedures which are based on the standards listed in this column.

(3): These are nominal values. They have not to be considered as specification limits.



Tubing Protection

3LPP is also typically used as anti-corrosive coating in Water Injection Tubings. With a 8.0 mm coating thickness, it also acts as mechanical protection for couplings (coated with FBE) due to the 3LPP greater OD than couplings. With this, no damage on FBE coated couplings is guaranteed during installation.



Main Characteristics:

- Impermeability to gases and liquids.
- Excellent bonding to steel.
- High resistance to mechanical stresses (impact, indentation, peeling, bending and abrasion)
- Maximum operation temperature: 110 °C.
- Great resistance to chemical agents associated to oil exploration.

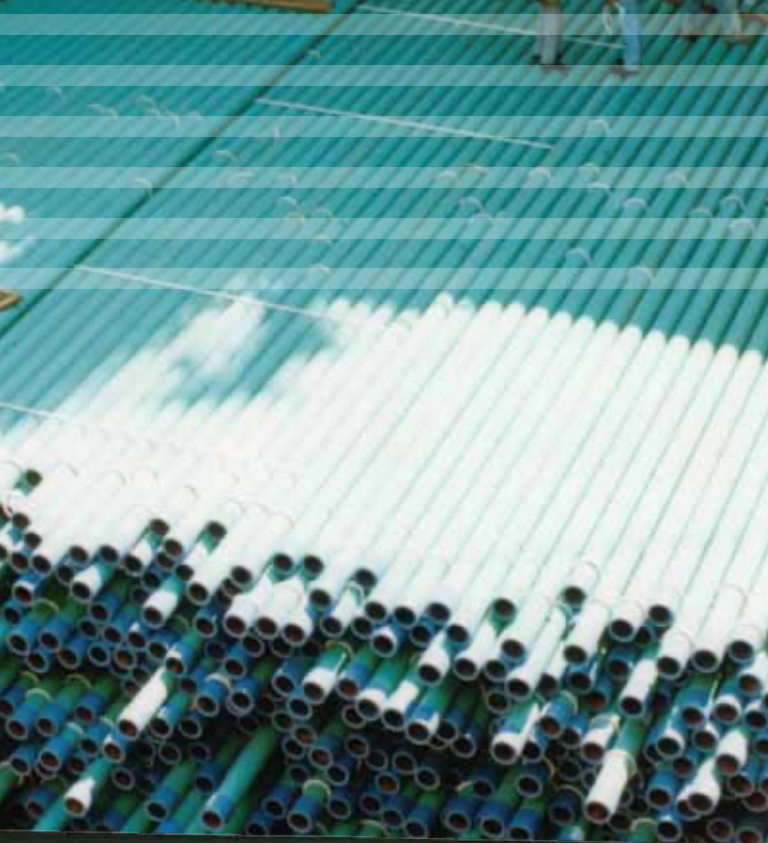
Three Layer Polypropylene Coating (3LPP) TECHNICAL DATA

POLYPROPYLENE PHYSICAL PROPERTIES

Typical Properties ¹	Standard ²	Unit	Value ³
Density	ISO 1183/A	g/cm ³	0.89 – 0.91
Melting Point	ASTM E 794	°C	≥ 160
Melt Flow Index	ASTM D 1238 / ISO 1133	g/10 min	0.8 to 1.1
Water Absorption (PP @ 250 bar / 120 °C / 125 days)	ASTM D 570	%	≤ 0.5

3LPP COATING MECHANICAL PROPERTIES

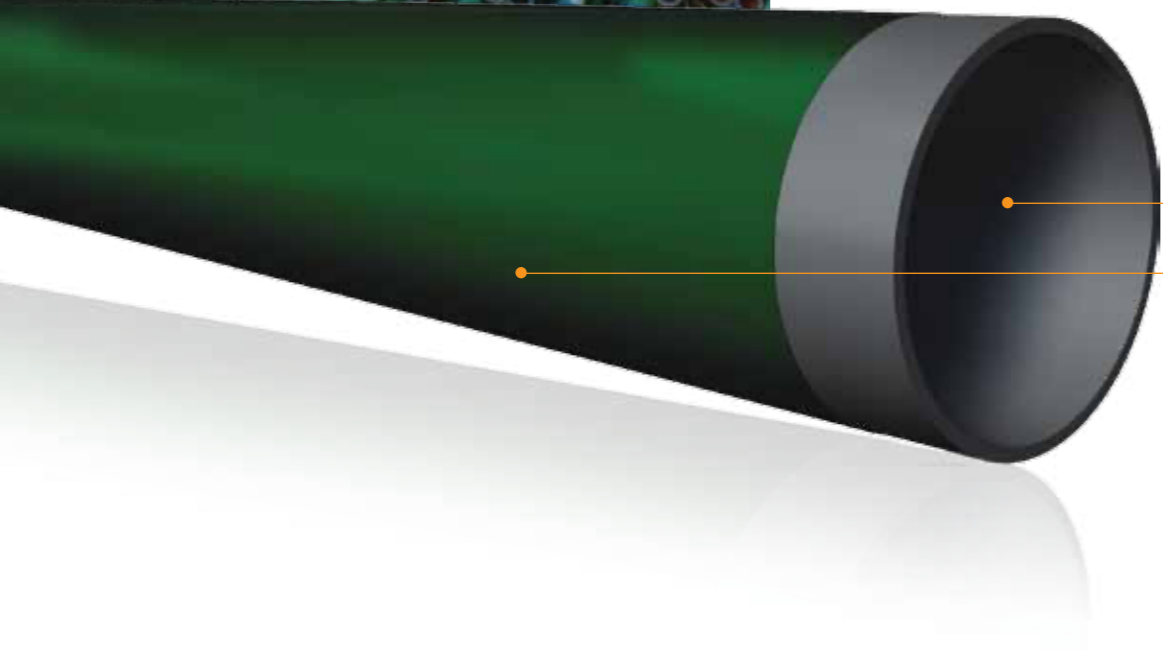
Adhesion Resistance	DIN 30678 NFA 49-71 I	N/mm	≥ 20 at 23 °C ≥ 4 at 110 °C
Impact Resistance 15 - 25 °C	NFA 49-71 I	J/mm	≥ 10
Indentation @ 15 - 25 °C	NFA 49-71 I	mm	≤ 0.1 at 20 °C ≤ 0.4 at 110 °C
Flexibility	NFA 49-71 I	-	No cracking of polypropylene
Hardness @ 20 ± 2 °C	ASTM D 2240	Shore D	≥ 60
Tensile Strength at Break @ 20 ± 2 °C	ASTM D 638	MPa	≥ 17
Elongation at Break @ 20 ± 2 °C	ASTM D 638	%	≥ 400
Compressive Strength @ 10 % strain	ASTM D 695	MPa	≥ 20
Heat Ageing For 2,400 ± 24 h	DIN 30678	%	Δ MFI ≤ 35 %
Light Ageing For 800 hrs	NFA 49-71 I	%	Δ Elongation at Break ≤ 25
Cathodic Disbondment @ 48 hours / 65 ± 2 °C / -1.5V / NaCl (3%)	NFA 49-71 I	mm	≤ 3
Cathodic Disbondment @ 28 days / 23 ± 3 °C / -1.5V / NaCl (3%)	NFA 49-71 I	mm	≤ 5
Cathodic Disbonding @ 28 days / max. operating temp. / -1.5V / NaCl (3%)	NFA 49-71 I	mm	≤ 12
Coating Resistivity Exposed @ 23 ± 2 °C for 100 days	DIN 30678	Ωm ²	≥ 10 ⁸
Abrasion (CS 17 Wheel / 1,000 cycles)	ASTM D 4060-95	mg	≤ 25



Powderkote®

Fusion bonded epoxy powder anti-corrosion coating.

Powderkote® is an anti-corrosive coating of thermo adhering epoxy powder which is electrostatically applied on steel pipes.



Steel pipe

FBE (Fusion bonded epoxy powder)



PRODUCTION PROCESS

The epoxy powder is sprayed on the previously blasted and heated pipe using electrostatic guns, thus obtaining a uniform anti-corrosive layer. Its usual thickness is between 300 µm and 600 µm and is fit for service temperatures of up to 94 °C.

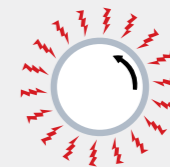
Application processes



Preheating



External cleaning



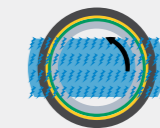
Induction heating



Primer application



Cooling



Holiday detection

Powderkote®

Fusion Bonded Epoxy Coating (FBE - External Coating)

TECHNICAL DATA

FBE PHYSICAL PROPERTIES

Typical Properties ¹	Standard ²	Unit	Value ³
Applied Density	D 792 Method B ISO 1183 Method A	g/cm ³	1.32 to 1.40
Degree of Cure & Residual Enthalpy of the FBE	NACE RP0394-02, Appendix D	°C	Δ T _g < 3
Porosity (cross section & interface porosity)	NACE RP0394-02, Appendix G	Rating	1 to 3 inclusive

FBE MECHANICAL PROPERTIES

Flexibility @ 0 °C / 1.5 °P D	NACE RP0394-02, Appendix H	-	No cracking
Hardness @ 23 ± 2 °C	DIN 53153	Buchholz	≥ 90
Penetration Resistance @ 60 ± 3 °C	ASTM G17	%	≤ 10
Impact Resistance @ 23 ± 2 °C	NACE RP0394-02, Appendix I	Joule	≥ 1.5
Water Soak @ 95 ± 3 °C / 24 hs	AWWA C-213-01, Clause	Adhesion Rating	1 to 3 inclusive
Abrasion CS17 / 1,000 g wgt / 5,000 cycles	ASTM D 1044	g	≤ 0.108
Cathodic Disbondment @ 48 hours / 65 ± 2 °C / -1,55V / NaCl (0,5 ml/l)	DIN 30671-92	mm	≤ 5
Cathodic Disbondment @ 30 days / 23 ± 2 °C / -1,55V / NaCl (0,5 ml/l)	DIN 30671-92	mm	≤ 7
Coating Resistivity @ 23 ± 2 °C / 100 days	DIN 30671-92, Normal duty	Ωm ²	≥ 10 ⁹

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