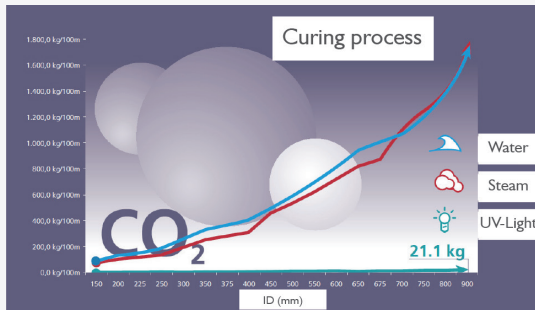




FEATURES AND BENEFITS

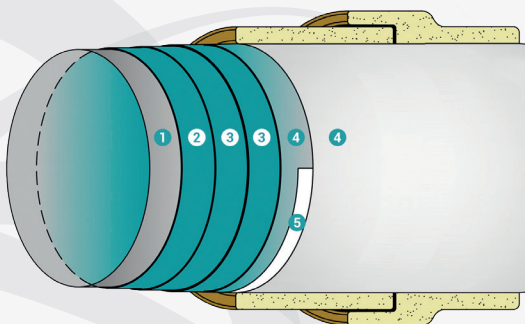
- Glass fiber liner allows for high strength, thinner walls
- Pre-impregnated, installation ready up to 1,640 ft. (500m)
- At least 5-month shelf life in climate controlled environment
- Smooth surface improves flow capacity, minimizes abrasion
- Bridging of low cross-section shape and size changes
- Flexible liner properties allow for dimpling at service connections for easy locating

UV CIPP CURING REDUCES EMISSIONS



Berolina-Liner is cured using UV light and is temperature-independent with lower CO₂ emissions. This advantage is, in turn, multiplied by shorter installation times.

ANATOMY OF A BEROLINA-LINER



1) Inner film, 2) Anti-abrasion layer, 3) Different layers of glass, 4) Outer film with UV protective film, 5) Optional integrated enhanced security (IES)

Berolina-Liner: For Gravity Sewers

DESCRIPTION

Designed for gravity sewers, Berolina-Liner is a proprietary resin-impregnated, glass fiber CIPP liner cured via ultra-violet light (UV). Its laminated, multi-layer, longitudinal construction creates a seamless, overlapping, liner system for maximum strength and flexibility.

Berolina-Liner is delivered to the jobsite pre-impregnated with resin and installation ready. This feature, combined with a faster and more efficient UV curing process, leads to improved QA/QC, lower job costs and reduced CO₂ emissions during installation.

TYPICAL APPLICATIONS

Berolina-Liner

- Round: 6 in. - 63 in. (150mm-1,600mm)
- Oval: 8-1/2 in. / 12 in. (200mm/300mm) | 48 in. / 72 in. (1,200mm/1,800mm)

Berolina-Liner IES (Integrated Enhanced Security)

- Round: 6 in. - 24 in. (150mm-600mm)

Berolina-HF-Liner

- Round: 16 in. - 63 in. (400mm-1,600mm)
- Oval: 14 in. / 20 in. (350mm/525mm) | 48 in. / 72 in. (1,200mm/1,800mm)

Berolina-HF-Liner (IES)

- Round: 16 in. - 24 in. (400mm-600mm)



MATERIAL PERFORMANCE & TYPICAL PHYSICAL PROPERTIES

REGULATED ACCORDING TO: DIBT-APPROVAL Z-42.3-336	
BEROLINA-LINER	BEROLINA-HF-LINER
APPLICATION TYPES	
GRAVITY PIPE & CULVERTS	
Round: 6 in. - 63 in. (150mm-1,600mm)	Round: 16 in. - 63 in. (400mm-1,600mm)
Oval: 8 in. (200mm) / 12 in. (300mm) – 48 in. (1,200mm) / 72 in. (1,800mm)	Oval: 14 in. (350mm) / 21 in. (525mm) – 48 in. (1,200mm) / 72 in. (1,800mm)
REINFORCEMENT MATERIAL	
Woven glass complex E-CR according to DIN EN 14020-1, DIN EN 14020-2 and DIN EN 14020-3	Non-crimp complex E-CR according to DIN EN 14020-1, DIN EN 14020-2 and DIN EN 14020-3
RESINS	
Unsaturated Polyester resins (UP-resins) acc. to Type 1140 according to DIN 16946-2, Group 3 according to DIN 18820-1, Group 4 according to EN 13121-1	Unsaturated Polyester resins (UP-resins) acc. to Type 1140 according to DIN 16946-2, Group 3 according to DIN 18820-1, Group 4 according to EN 13121-1
Vinylester resins (VE-resins) acc. to Type 1310 according to DIN 16946-2, Group 5 according to DIN 18820-1, Group 7 B according to EN 13121-1	Vinylester resins (VE-resins) acc. to Type 1310 according to DIN 16946-2, Group 5 according to DIN 18820-1, Group 7 B according to EN 13121-1
DENSITY AFTER CURING ACC. TO DIN EN ISO 1183-2	
1.5 g/cm ³ (± 0.5 g/cm ³)	1.59 g/cm ³ (± 0.5 g/cm ³)
0.867 oz/in ³ (± 0.289 oz/in ³)	0.919 oz/in ³ (± 0.289 oz/in ³)
GLASS FIBRE CONTENT ACC. TO DIN EN ISO 1172 (MASS RELATED)	
46% (±8%)	53% (±8%)
GLASS WEIGHT PER UNIT AREA (EACH MM STRUCTURAL WALL THICKNESS/LAMINATE)	
650 g/m ² (+150/-100 g/m ²)	900 g/m ² (+150/-100 g/m ²)
0.133 lbf/ft ² (+0.031/-0.021 lbf/ft ²)	0.184 lbf/ft ² (+0.031/-0.021 lbf/ft ²)
SHORT TERM MODULUS OF ELASTICITY (E-MODULUS) ACC. TO DIN EN 1228 (e_m ACC.TO ISO 11296-4 2010-06)	
≥ 1,450,000 psi (≥ 10,000 N/mm ²)	≥ 2,465,640 psi (≥ 17,000 N/mm ²)
SHORT TERM FLEXURAL E-MODULUS ACC. TO DIN EN ISO 178 (e_m ACC.TO ISO 11296-4 2010-06)	
≥ 1,261,800 psi (≥ 8,700 N/mm ²)	≥ 2,465,640 psi (≥ 17,000 N/mm ²)
SHORT TERM FLEXURAL STRENGTH ACC. TO DIN EN ISO 178 (e_m ACC.TO ISO 11296-4 2010-06)	
≥ 21,750 psi (≥ 150 N/mm ²)	≥ 40,610 psi (≥ 280 N/mm ²)
REDUCTION FACTOR FOR LONG TERM VALUES ACC. TO DIN EN 761	
A = 1.45	A = 1.19
LONG TERM MODULUS OF ELASTICITY (E-MODULUS) ACC. TO DIN EN 1228 (e_m ACC.TO ISO 11296-4 2010-06)	
≥ 986,000 psi (≥ 6,800 N/mm ²)	≥ 2,059,530 psi (≥ 14,200 N/mm ²)
LONG TERM FLEXURAL STRENGTH ACC. TO DIN EN ISO 178 (e_m ACC.TO ISO 11296-4 2010-06):	
≥ 15,230 psi (≥ 105 N/mm ²)	≥ 34,080 psi (≥ 235 N/mm ²)
LAMINATE DESIGN	
Multilayer, seamless and axially overlapping. Overlaps being arranged with offset.	Multilayer, seamless and axially overlapping. Overlaps being arranged with offset.
LINEAR EXPANSION DURING CALIBRATION	
0.0%	0.0%
ALLOWABLE VARIATION OF HOST PIPES DIAMETER	
Diameter: ≤ 32 in. (800mm) ± 5%	Diameter: ≤ 32 in. (800mm) ± 5%
Diameter: ≤ 32 in. (800mm) ± 2%	Diameter: ≤ 32 in. (800mm) ± 2%