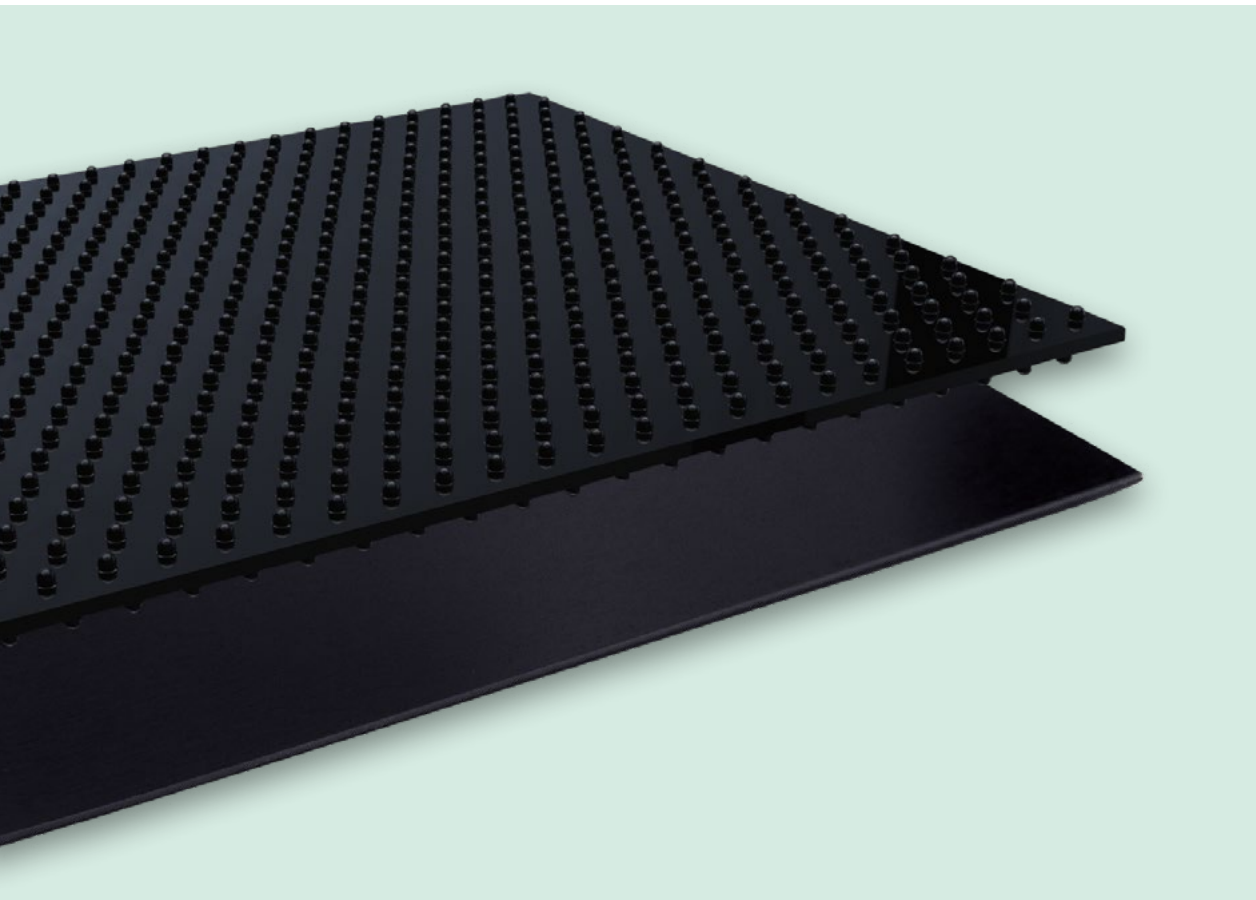


Carbofol®

Geomembranes

 Naue



naue.com

Building on sustainable ground.

Carbofol®

Carbofol® geomembranes are manufactured using high quality polyethylene resins. Carbofol® is manufactured in various thicknesses and up to 7.50m width. For sealing applications on slopes, Carbofol® is produced with an embossed structure.



- ✓ Versatile sealing applications possible
- ✓ Free from leaching plasticiser
- ✓ Excellent chemical resistance due to selected raw materials
- ✓ Extreme high elongation during uni-axial and multi-axial deformation
- ✓ High stress crack resistance
- ✓ Very high UV-resistance
- ✓ Isotropic shear stress transfer due to embossed structured surfaces
- ✓ Installation advantages with up to 7.50m wide liner
- ✓ High melt flow rate (MFR) allows an excellent welding performance
- ✓ Smooth edges with removable plastic tape for clean welding surface and overlap lines
- ✓ Durable product with more than 40 years of project experience
- ✓ Complete quality control from the resin to the final product
- ✓ Also available according to GM-13 and with BAM, ASQUAL and DIBt approval

Naue has more than 40 years experience in developing, manufacturing, installing and designing with high-grade geomembranes. Carbofol® geomembranes provide a seal against the most toxic substances. Carbofol® is typically used in sealing applications for landfill base seals as well as caps, in environmental sealing applications for the protection of groundwater from contamination and in water conveyance structures, canals, tunnels or ponds.

High durability

Functional waterproofing is an important criterion for a geomembrane. Aging and inadmissible stresses endanger this function. Carbofol® geomembranes have a high durability, because they are manufactured from well-chosen resins with a very low stress crack resistance. These resins consist on hexene or octene copolymer. Testing with the Notched Constant Tensile Load Test according to DIN EN 14576 or ASTM D5397 verifies the high stress crack resistance of Carbofol® geomembranes. Long-term tensile tests, especially on structured material, prove the durability as well.

Slope security

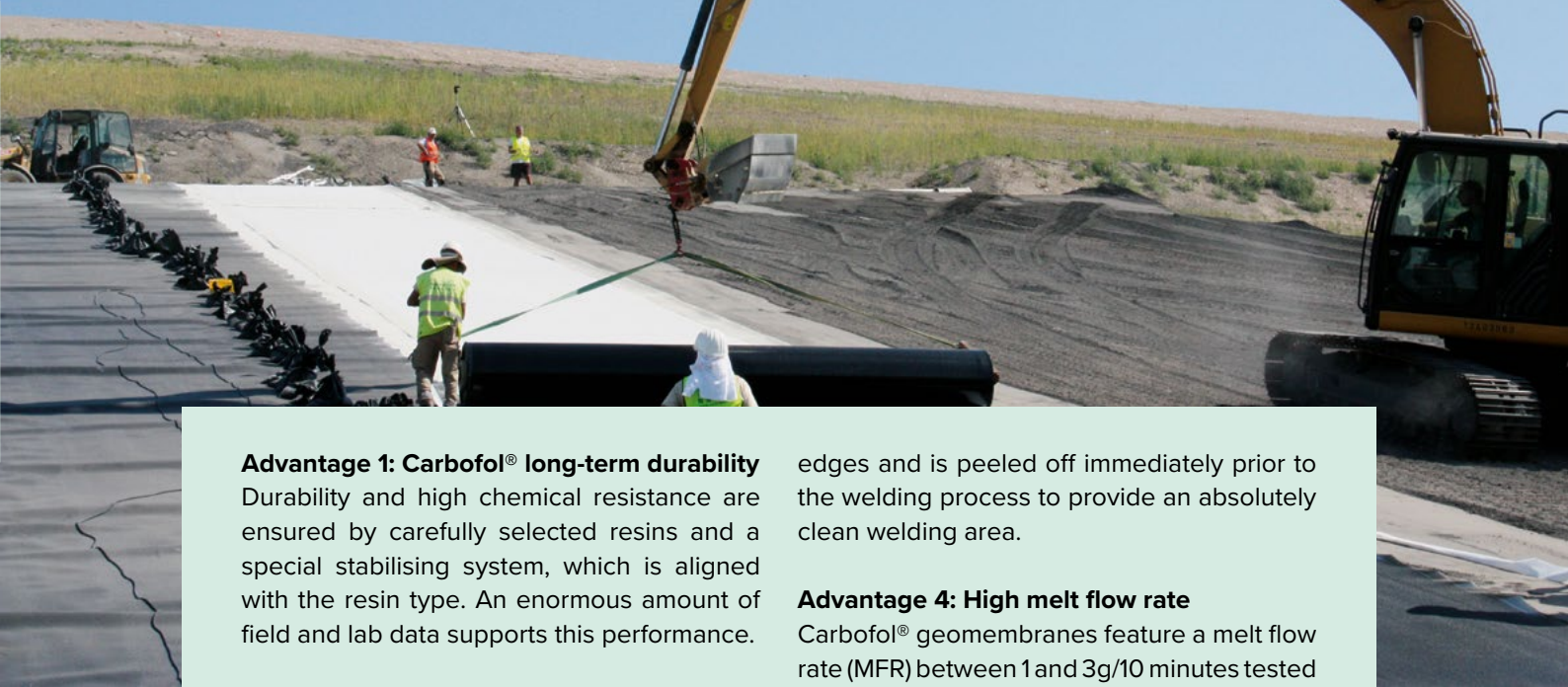
The surface structure of Carbofol® is responsible for the stability on slopes. The special manufacturing process with embossed and chrome-plated rollers make sure that the embossed profile of the geomembrane creates a homogeneous connection from the same resin between the liner and the structure. This is the basis for a safe and durable construction of a slope.

Optimised for installation

Decades of installation experience have also influenced product characteristics, which ensure efficient and precise installation: protection strips on the welding areas, lateral marking, meter scaling, and a high melt flow rate (MFR: 1-3g/10 minutes tested at 190°C/5kg).



Figure 1:
Welding on-site is improved by the high melt flow rate



Advantage 1: Carbofol® long-term durability

Durability and high chemical resistance are ensured by carefully selected resins and a special stabilising system, which is aligned with the resin type. An enormous amount of field and lab data supports this performance.

Advantage 2: Special embossed surface structure allows a safe construction on steep slopes

New optimised BF/TF (bottom friction/top friction) embossed surface structure has been developed to increase shear strength towards typical shearing partners.

Advantage 3: Weld protection strips and lateral marking

The Carbofol® geomembranes are provided with a white edge mark on both sides. These edge marks indicate the recommended areas of overlapping and are a visual aid during the installation. Furthermore, a thin protective sheet (~150mm wide) is attached to both

edges and is peeled off immediately prior to the welding process to provide an absolutely clean welding area.

Advantage 4: High melt flow rate

Carbofol® geomembranes feature a melt flow rate (MFR) between 1 and 3g/10 minutes tested at 190°C/5kg and thus have the advantage of a large welding window. This is a factor which makes the Carbofol® geomembranes flexible and easy to handle during on-site installation. The speed at which welding processes can be carried out on Carbofol® geomembranes is distinctly higher than that of other liners with an MFR less than 1g/10min. This gives Carbofol® yet another major benefit during on-site installation and welding.

Figure 2: Chemical resistance from Carbofol® HDPE geomembranes based on German DIBt regulations

| Liquids | Substance Group | |
|--|-----------------|-------------------------------------|
| Automotive petrols DIN EN 228 | 1, 1a | Resistant at high contact intensity |
| Aviation fuels | 2 | |
| - Heating oil grade EL DIN 51603-1 - unused internal combustion motor oils, unused automotive transmission fluids - mixtures of saturated and aromatic hydrocarbons with aromatic contents | 3 | |
| Diesel fuel DIN EN 590 containing a maximum of 5 vol % biodiesel DIN EN 14214 | 3b | |
| Hydrocarbons | 4 | |
| Benzene and mixtures containing benzene | 4a | |
| Crude oil | 4b | |
| Used internal-combustion motor oils and used automotive transmission fluids with flashpoint > 60°C | 4c | |
| All alcohols and glycolic ethers | 5, 5a, 5b | |
| Halogenated C ₁ hydrocarbons | 6a | |
| Aromatic halogenated hydrocarbons | 6b | |
| All organic esters and ketones | 7 | |
| Aliphatic aldehydes and their aqueous solutions | 8, 8a | |
| Organic acids (carbonic acids, except for formic acid in concentrations > 10%) and their aqueous solutions | 9 | |
| Mineral acids (carbonic acids, except for formic acid) | 9a | |
| Inorganic acids (mineral acids) | 10 | |
| Inorganic bases | 11 | |
| Aqueous solutions of inorganic non-oxidizing salts | 12 | |
| Amines | 13 | |
| Aqueous solutions of organic surfactants | 14 | |
| Cyclic and acyclic ethers | 15, 15a | |

Approvals for the Naue Group



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