BULLFLEX® Pile Sleeve Hoses
Introduction

BULLFLEX® pile sleeve hoses have been developed as a system solution for foundation engineering; the main application of this system are large diameter reinforced piles. Other applications are drainage piles or GEWI® micropiles.

The BULLFLEX® system consists of patented textile groutable hoses made of high-strength fabric, which are subsequently filled with a building material, featuring an excellent sealing and load-bearing capacity.

BULLFLEX® groutable hoses are available in different dimensions, allowing an optimum alignment to the excavation dimensions. All system components are light-weight as well as easy to transport and install.

DSI Underground has long-time experience in the application of BULLFLEX® pile sleeve hoses.

With the engineering and on-site support of DSI Underground, this system solution has been successfully used for various global infrastructure projects.
Fields of Application

- Large diameter reinforced bored piles
- Protection of existing infrastructure in the proximity of pile fields
- Vertical de-coupling of defined sections
- Piles in areas with high groundwater tables or karstic rock formations
- Grouting sleeves and protection against washout
- Drainage piles
- GEWI® micropiles: grout socks, packers, and borehole plugs

Main Advantages

- Customized and project-specific system solution
- Low transport weight and volume
- Fast, easy, and safe mounting due to prefabrication
- Pressure rating up to 4 [bar] (58 [psi])
- Flexible application under limited space conditions
- Easy compensation of eccentric and uneven excavation surfaces
- Corrosion-resistant, shrink-free, and UV-resistant material
- High resistance against tearing
- No additional corrosion protection system required
- Filling with various building materials possible
- Retaining of the building material while the water is drained through the special filter effect of the BULLFLEX® fabric

System Description

- Limitation or bridging of cavities
- No loss of building material due to uncontrolled leakage
- Boundary against ingress of soil material
- Improvement of bonding and load-bearing capacity
- Reduction of negative skin friction
- Optional de-coupling of load transfer in defined layers by using several layers of BULLFLEX® groutable hoses
- Surplus water in the grout fill is immediately drained, featuring an accelerated curing procedure
System Components

- **BULLFLEX®** groutable hoses made of polyamide 6.6
  - Patented, endless round woven textile
  - Installation into a pre-drilled borehole
  - Defined interface to the ground
  - Air and water permeable
  - Diameter: ≥ 230 [mm] (9 [in])
  - Off-size diameters and special designs available on request

- Special features pile sleeve hoses
  - Couplings for pile extension
  - Upward lift control grouting valves at the bottom of the pile
  - Circumferential straps to avoid overstetching
  - Optional integration of a BULLFLEX® sealing assembly

- Filling material
  - Concrete, sand/gravel, or cement grout in case of **GEWI®** micropiles

### Large Diameter Reinforced Piles

**BULLFLEX®** Pile Sleeve Hose

Cavities free of Concrete

Ground

### Specifications

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<th>Characteristics 1)</th>
<th>Unit</th>
<th>Value</th>
<th>Remarks</th>
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<tr>
<td>Material</td>
<td>[-]</td>
<td>Polyamide 6.6</td>
<td>Nylon</td>
</tr>
<tr>
<td>Weight</td>
<td>[g/m²] / [oz/yd²]</td>
<td>Approx. 660 / 19.5</td>
<td></td>
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<tr>
<td>Fabric thickness</td>
<td>[mm] / [in]</td>
<td>Approx. 1 / 0.04</td>
<td></td>
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<tr>
<td>Minimum tensile strength</td>
<td>L T</td>
<td>12,000 / 2,698 24,000 / 5,395 100 [mm] / 3.94 [in] width According to ISO 10319</td>
<td></td>
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<tr>
<td>Corresponding maximum elongation</td>
<td>L T</td>
<td>20 20</td>
<td>According to ISO 10319</td>
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<tr>
<td>Elastic elongation</td>
<td>L T</td>
<td>15 15</td>
<td>According to ISO 10319</td>
</tr>
<tr>
<td>Minimum seam strength</td>
<td>[kN/m] / [lb/fi]</td>
<td>155 / 113</td>
<td></td>
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<tr>
<td>Airflow through fabric at pressure [mbar] (psi)</td>
<td>10 (0.15) 20 (0.30) 30 (0.45) [l/min] / [gal/min]</td>
<td>6.5 / 1.7 13 / 3.4 19 / 5.0</td>
<td>At 100 [cm²] / 15.5 [in²]</td>
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<tr>
<td>Residual tensile strength</td>
<td>[%]</td>
<td>20 - 30</td>
<td>After 1 year and under light exposure in Florida</td>
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1) The indicated values are laboratory values and may deviate on-site
2) Longitudinal
3) Transversal
Installation Procedure

- Prefabrication reinforcing cage (mounting of the sleeve)
- Pile sleeves with or without base plate and valves for lowering

- Fixation of the pile sleeve onto the reinforcement cage
- Installation of the first pile segment

- Simple coupling of sleeves for longer piles
- Connection of reinforcement cages and sleeve hoses

- Reinforced sleeves in the area of anticipated cavities
- Filling with concrete or sand/gravel (drainage piles)

- Avoid contact with any sharp edges in order to prevent the fabric from being damaged
- During mounting and filling, all default and recommended personal protective equipment must be used
### BULLFLEX® in Underground Excavation

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<th>Structural Bulkheads</th>
<th>Stoppings</th>
<th>Structural Sealings</th>
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<th>Coal Mining</th>
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<td>Sealing against backfilling media</td>
<td>Ventilation walls, sealings, and face shuttering</td>
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<td>Secondary support in room &amp; pillar and longwall mining</td>
<td>Yielding support system – displacement minimization</td>
<td>Permanent sealing of roadways</td>
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<td>Repair works in overstressed or fault zone areas and rehabilitation of visitor mines</td>
<td>Re-establishment of the load-bearing capacity and yielding ability of destructed tunnel linings</td>
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<td>Temporary steel frame support for the construction of cross-cuts</td>
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**Support Pillars**
- [Image of support pillar]

**Roadway Packs and Dams**
- [Image of roadways]

**Roof Support Backfilling**
- [Image of roof support]

**Structural Bulkheads**
- [Image of bulkheads]

**Stoppings**
- [Image of stoppings]

**Structural Sealings**
- [Image of sealings]
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