Ceramic-Lined Pipe

Dramatically extends the life of piping that is subject to severe erosion and corrosion.

Certified Welds
All welds are performed by certified weld operators, and conform to all applicable ASME specifications.

ASME Conformance
All flanged fittings meet or exceed ASME B16.5 requirements for pressure-temperature ratings, materials, dimensions, tolerances, marking, and testing.

Minimal Transition
The ceramic OD and flange ID are perfectly matched to minimize gaps and to keep epoxy exposure to an absolute minimum.

Perfect Matching
Our innovative manufacturing methods ensure a smooth, perfectly matched and level sealing surface without any length difference between the flange face and the ceramic lining.

Engineered Ceramics
Our engineers review every application and only recommend a ceramic material that is both cost-effective and will yield years of trouble-free service.

Full Pipe Diameter ID
Ceramic linings are never smaller than the ID of the mating piping system. Ceresist fittings will never constrict or choke flow, and will not protrude into the flow path.

Seamless Interior
All straight pipe spools up to a maximum length of 48" are manufactured out of a single-piece ceramic tube.

Exterior Protection
Carbon steel fittings are sandblasted, degreased, and coated with a corrosion and abrasion resistant finish for added protection and longevity in harsh environments.

Designed to Endure
Ceresist ceramic lined pipe spools are designed to outlast linings such as glass, rubber, basalt, hardfacings, coatings, trowelable linings, cure-in-place linings, and plastics that are commonly used to extend the life of piping systems. These materials are only a fraction of the hardness and wear resistance of our ceramics, and with the introduction of a corrosive into the process or high temperatures, most linings become severely incompatible and their use is extremely limited. Ceresist pipe spools feature ceramics that approach diamond in hardness, are chemically inert to almost all corrosives, and may be installed in services where temperatures exceed 1,100°F.

Where to Use
Ceramic-lined pipe spools are ideal for use downstream of control valves, flow-diverting fittings, or any other flow element that creates turbulent flow or causes cavitation. Ceresist pipe spools resist solids impingement and wear and are not affected by cavitation. They are an ideal solution where piping fails within 12 months or less, or where the location makes maintenance difficult or hazardous.

Ceramic Materials
Reaction-Bonded Silicon Carbide (RB SiC)
The most cost-effective ceramic we offer. RB SiC is nine times harder than carbon steel, and exhibits superior chemical resistance to acids and alkalies. RB SiC may be fabricated in lengths up to 48", allowing for cost-effective, long runs of piping. It is slightly porous, which limits its use in cavitating environments, but is an excellent material for basic wear applications.

Alumina
99.5% and 99.8% alumina ceramics are also nine times harder than carbon steel but are non-porous. Alumina exhibits a very high level of corrosion resistance — even at high temperatures — and is the ideal material for high wear applications where corrosive fluids are present. It is also a very cost-effective material, and standard sizes up to 12" in length may be manufactured from stock.

Sintered Silicon Carbide
Whether submerged in corrosive environments, subjected to extreme wear and abrasive conditions, or exposed to temperatures in excess of 1,400°C (2,552°F), sintered silicon carbide will outperform other commercially available ceramics or metal alloys, including high-alumina, RB SiC, and superalloys.

Sintered silicon carbide is one of the hardest high-performance materials available, second only to diamond. Additionally, it weighs less than half as much as most metal alloys, 40 percent as much as steel and about the same as aluminum. Ceresist stocks the most common sizes up to 12" in length for a very speedy delivery.

Housing Materials
In addition to our standard carbon steel housing, stainless steel 316 or 304, FRP, vinyl ester wrapping, and other custom housing materials may be supplied.
Technical Data and Options

Knoop Hardness Comparison Chart

Ceramic Comparison

<table>
<thead>
<tr>
<th>Property</th>
<th>Alumina</th>
<th>Sintered Silicon Carbide</th>
<th>Reaction Bonded Silicon Carbide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium Length (Solid Ceramic)</td>
<td>36&quot;</td>
<td>36&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>Maximum Length (Fitted Ceramics)</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Maximum Ceramic OD</td>
<td>15.00&quot;</td>
<td>15.00&quot;</td>
<td>24.00&quot;</td>
</tr>
<tr>
<td>Minimum Wall Thickness</td>
<td>0.10&quot;</td>
<td>0.10&quot;</td>
<td>0.20&quot;</td>
</tr>
<tr>
<td>Maximum Wall Thickness</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Wear Resistance</td>
<td>Very Good</td>
<td>Best</td>
<td>Very Good</td>
</tr>
<tr>
<td>Erosion Resistance</td>
<td>Very Good</td>
<td>Best</td>
<td>Good</td>
</tr>
<tr>
<td>Cavitation Resistance</td>
<td>Best</td>
<td>Best</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Pipe Spool Variations

- Straight Pipe Spool
- Different Flanges Each End
- One Flange Offset From End
- Nozzle-Type (One Flange)

Part Number Designation

CS 150 300 FF — 150 400 FF — 12.00 — FRP

- **Ceramic Spool**
  - Inlet Flange Rating
    - 150 100 lb
    - 200 200 lb
    - 300 300 lb
  - Inlet Flange Size
    - 050 1/2"
    - 075 3/4"
    - 100 1"
    - 125 1 1/4"
    - 150 1 1/2"
    - 200 2"
    - 250 2 1/2"
    - 300 3"
  - Inlet Flange Type
    - (Blank)
    - Raised Face
    - FF Flat-Face
  - Outlet Flange Rating
    - 050 1/2"
    - 075 3/4"
    - 100 1"
  - Outlet Flange Type
    - (Blank)
    - Raised Face
    - FF Flat-Face

- **Housing Material**
  - (Blank)
  - Carbon Steel
  - Stainless Steel 316
  - Stainless Steel 304
  - FRP
  - VE FRP Flanges, Vinyl Ester Wrap
  - SP Special Material

- **Length**
  - xx.xx Overall Length
  - xx.xx / Overall Length / 2nd Flange
  - xx xx Offset From Face of 1st Flange

- **Outlet Flange Type**
  - (Blank)
  - Raised Face
  - FF Flat-Face

- **Contact Flange Size**
  - 050 1/2"
  - 075 3/4"
  - 100 1"
  - 125 1 1/4"
  - 150 1 1/2"
  - 200 2"
  - 250 2 1/2"
  - 300 3"

- **Routing**
  - xx.xx Overall Length
  - xx.xx / Overall Length / 2 Flanges
  - xx xx Overall Length / 2 Flanges / 2nd Flange

- **Maximum Length (Solid Ceramic)**
  - 36"
  - 36"
  - 48"

- **Maximum Length (Fitted Ceramics)**
  - Unlimited
  - Unlimited
  - Unlimited

- **Maximum Ceramic OD**
  - 15.00"
  - 15.00"
  - 24.00"

- **Minimum Wall Thickness**
  - 0.10"
  - 0.10"
  - 0.20"

- **Maximum Wall Thickness**
  - Unlimited
  - Unlimited
  - Unlimited

- **Wear Resistance**
  - Very Good
  - Best
  - Very Good

- **Erosion Resistance**
  - Very Good
  - Best
  - Good

- **Cavitation Resistance**
  - Best
  - Best
  - Very Good

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