

# Installation Guide

**Ceresist, Inc.**

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Ceresist ceramic-lined pipe, valves, and fittings have been designed and manufactured for use in the most severe duty systems involving the transport of extremely erosive and/or corrosive liquids. In order to ensure their integrity once installed, they must be handled with reasonable care prior to installation.

If you suspect any products have been damaged during transit, call us immediately at (800) 219-4945 or send us an email at [support@ceresist.com](mailto:support@ceresist.com).

## Ceramic Lined Piping Systems

### General

- When properly utilized a lined piping system is an effective means to protect metallic piping from wear caused by erosion & corrosion while maintaining system strength.
- Design factors that must be taken into account for the engineering of lined piping systems include: pressure, temperature & flow; liner selection, factors of permeation & stress cracking.
- Thermal expansion designed for ceramic lined piping systems can be handled similar to metallic piping. Expansion joints have been used to compensate for thermal expansion. However expansion joints are considered the weakest component & can be eliminated with sound designs.

### Receiving Inspection

- Upon delivery, carefully inspect the packaging to ensure no damage has occurred during transit.
- Remove flange or end protection, and inspect the ceramics and flange faces for chips, cracks, broken ceramics, or other flaws. If there is any doubt about the soundness of the materials, please contact us. It is extremely helpful for us to evaluate your concern with digital pictures, (sent to support@ceresist.com).
- If the products will not be installed immediately, return the fittings and piping to their original cartons to keep them free of dirt and reduce the potential for damage.

### Handling

- Care should be exercised to avoid rough handling of ceramic-lined components. They should not be dragged, dropped, nor have objects dropped upon them. Before use, the ceramics should be inspected for cracks or chipping resulting from such abuse. Whether pipe is transported by closed truck or open trailer, the plane of support must be level and continuous, and all sharp edges of the truck bed – which may come in contact with the pipe – must be padded.
- The ceramic lining may have sharp edges due to grinding. Never lift the ceramic components with bare hands – gloves must be worn to prevent injury. It is always best to avoid lifting or carrying the ceramic components from the openings.

## Installation

- Flange faces must be free of dirt, grease, and other substances. If clean surfaces cannot be achieved with a dry paper, cotton towel, or rag, try a solvent such as isopropyl alcohol or an ammonia-based cleaning solution. Use a light emery cloth for removal of paint splatters if the product has been painted on-site prior to installation. If reasonable attention has been given to storage and handling of the products, a light dusting is all that will be required.
- Gaskets can be used as per required by the service. Ceresist Inc. requests all relevant information regarding gaskets be documented & included in specifications provided. The ideal gasket sizing would be to match the ceramic I.D and this can help prevent flange scouring.
- It is important that the flanges and gasket be tightened uniformly to prevent ceramic damage and the possibility of leakage.
- Tighten flange bolts and nuts hand-tight initially. Alternating in a **star pattern**, tighten each bolt 30% of the final recommended torque value, repeating until all bolts have been tightened 100%. The final bolt tightening torque is as per the gasket manufacturer's recommendations or as per plant standards.

## Pipe Supports

- To prevent damage to the ceramic lining, correct supporting of a piping system is essential to prevent excessive bending stress and to limit pipe "sag" to an acceptable amount. We recommend installation of pipe supports every 6 feet for pipe sizes under and including 6", and every 12 feet for sizes larger than 6". However all designs will be studied for loads, stresses & will comply with the process prior to fabrication.
- Horizontal pipe should be supported on uniform centers. Point support must not be used and, in general, the wider the bearing surfaces of the support the better.
- Supports should not be clamped in such a way that will restrain the axial movement of pipe that will normally occur due to thermal expansion and contraction.
- Concentrated loads in a piping system, such as valves must be separately supported.
- Fittings and elbows are not required to be supported unless their weight requires support to prevent upstream or downstream pipe sagging or bending.

## Thermal Shock

The high temperature capabilities of advanced ceramics are a key performance benefit for many demanding engineering applications. In many of those applications, advanced ceramics will have to perform across a broad temperature range with exposure to sudden changes in temperature and heat flux. Thermal shock resistance of the ceramic material is a critical factor in determining the durability of the component under transient thermal conditions.

Our piping is designed based on design conditions given by our customers. Below is a list of ceramic materials & their thermal shock values based on ASTM C 1525 test.

Ceramics can withstand a sudden up-shock (e.g. sudden heating to 300-350°C/min) whereas a down-shock (rapid cooling) more than the values shown below can promote stress fractures which could change the material properties. Please note that these values are for test coupons and intricate shapes may have a lower value. Cylinders with machined holes will have lower down shock values due to stress concentration points in comparison to standard cylinders.

Material	Thermal Shock Resistance (°F)
Sintered Silicon Carbide	400
Reaction Bonded SiC	400
99.5% Alumina	350
90% Alumina	350

Ceramics suffer thermal shock because of the non-linear rapid change in temperature. The ideal rate to overcome stresses caused by thermal shock which exceed the shock resistance of the ceramics would be **<25°C/min (For reference only)**.

### **Technical Support**

Our Technical Service and Support Department is available to provide information and guidance on the suitability of Ceresist products for specific applications, or on any aspect of products you have purchased or are interested in purchasing.

Recommendations and assistance are also available to engineering and contracting firms for installation specifications and personnel training.

Tel: 800-219-4945 or 973-345-3231 Fax: 973-345-3066 Email: support@ceresist.com

### **Warranty**

Ceresist warrants each ceramic-lined pipe, valve, and fitting to be free from defects in materials and workmanship for a period of one (1) year from the date of purchase under normal use and service within limitations recommended by it. In the event any defect occurs which the owner believes is covered by this Warranty, the owner should immediately contact Ceresist. The owner will be instructed to return said product at the owner's expense to Ceresist or an authorized Ceresist representative for inspection. In the event said inspection discloses to Ceresist's satisfaction that said product is defective, appropriate action relating to credit or replacement shall be initiated.

THIS WARRANTY SPECIFICALLY EXCLUDES INCIDENTAL AND CONSEQUENTIAL DAMAGES OF EVERY TYPE AND DESCRIPTION RESULTING FROM ANY CLAIMED DEFECT IN MATERIAL OR WORKMANSHIP INCLUDING, BUT NOT LIMITED TO, PERSONAL INJURIES AND PROPERTY DAMAGES.

Some states do not allow the exclusion or limitations of incidental or consequential damages so these limitations may not apply to you.

TO THE EXTENT PERMITTED BY LAW, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO ONE (1) YEAR FROM THE TIME OF PURCHASE OF SAID VALVE OR FITTING. Some states do not allow limitations in how long an implied warranty lasts, so the above limitations may not apply to you. This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

To the best of our knowledge, the information contained in this publication is accurate. However Ceresist does not assume any liability whatsoever for the accuracy or completeness of such information. Final determination of the suitability of any information or product for the use to be contemplated is the sole responsibility of the user.