

Ceramic Liner Installation

Equipment:	Silos with round cones and round discharge openings.	Date Issued:	11-19-98
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A field procedure for installing ceramic liners in silos, that have been lined previously.

NOTE: The following instructions are intended as recommendations only. Every job has it's own special considerations, especially when the silos have been relined previously.

PARTS:

- The proper ceramic liner kit for the silo. The kit should include:
 - ◆ The steel band for around inside the cone, at the bottom of the tiles.
 - ◆ The steel band for around inside the spool, at the top of the ceramic liners.
 - ◆ Ceramic tiles
 - ◆ Ceramic buttons (to fill the holes in the tiles)
- Silicone sealant (Astec part number 040040)
- The assembly prints that give you the tile locations and how the bands should be positioned.

TOOLS:

- Diamond tip cut-off saw - preferably a masonry saw
- Scaffolding
- Welder – preferably a MIG welder
- Torch
- Grinder
- Sand blaster

Working inside of the silo is a Permit Required Confined Space (OSHA 1910. 146). See the Safety Appendix at the end of these instructions. Make sure you include:

- Chain the silo gates in the open position.
- Drain the airlines and seal the lines.
- Lockout and tag out power to the plant.
- Test the atmosphere inside the silo.
- Use fans at the gates and the silo vent to keep air flowing inside the silo.
- Plan your scaffolding, or what ever support system you are going to use.

PROCEDURE:

The following instructions are for the work to install ceramic liners. The Confined Space Permit will have to be written in accordance with your Permit Space Program to do the work.

Remove all bumps and blisters from the area to be lined. The area to be lined must be smooth.

If the silo is currently lined, you must plan ahead as to how you will make the transition between the cone and spool area. You may choose to remove the existing band lining this area, or run the ceramic liners over it. If you run the liners over the existing band, you can not run all the way to the top unless you plan for the transition. Don't forget the steel band that goes above the ceramic tiles. All tiles must be positioned and sealed so that asphalt can not get in behind them.

The entire area to be lined must be sand blasted. This area must be kept clean and dry. The silicone must stick to the steel. In wet or cold weather the work area may need to be heated. You may also may need to put a tarp over the silo. Rain can not be allowed to get into the silo, but the silo must breath. Remember you will be welding and using silicone in the silo, you must have adequate ventilation for personnel.

Start the installation by welding the band in place that goes at the bottom of the cone. This band has holes every 6 inches that are to be plug welded. Then weld the band 100% around the bottom, do not weld on the top of this band. The bottom band supports the first row(s) of tiles. It also determines how straight the tiles will be as you go up. The tiles must be set flat on top of the band.

Start putting in the tiles, by setting in the complete bottom row first. Find the tiles for the first row; by matching the part numbers, or dimensions, given on the assembly print. Please note that the liner kit supplies you typically with one extra tile per row. You may however end up with more tiles left over, because the existing liners reduce the diameter of the cone, and the kits are designed to go in a new silo.

Put a circular bead of silicone on the tile. Space the bead about half way between the center hole and the outside edge. Push the tile up against the silo firmly so that the steel ring in the center of the tile is against the silo, or at least close enough to weld. Use this procedure to install the entire first row. Note, you can "fudge" the tiles slightly to complete the row. Try not to leave a gap of over 1/8th inch between tiles. If the gap is too large to "fudge", you will have to cut a tile to fit. Do not have them so tight you have to force the last ones in, the tiles should stay in place with just the silicone.

For the second row of tiles run a bead of silicone around the top of the first row where they meet the silo. Run another bead around the silo that will be above half way up the next tile. You do not want silicone in the hole, where they are to be welded. You must have at least 1 inch between the weld hole and the silicone, to avoid weld contamination. It will not be necessary to put the circular bead of silicone on the tiles anymore. Center the first tile of the second row on the joint between two of the first row tiles. Install the second row of tiles. Continue using this technique until several rows are in. Remember to stagger the joints between rows. If all looks good, plug weld the tiles in place. Do not build the weld up any higher than necessary, or the buttons won't fit.

After the welds have cooled silicone the buttons into the center of the tiles. Be sure the buttons do not stick up past the tile.

After all the tiles are in place, weld in the top ring. Plug weld the bar at every hole. This ring seals the top of the tiles. There must be a 100% weld bead around the top of this ring. It is very important that it is sealed so that no asphalt can get in behind the ring, or any of the tiles.