

Steaming and Unloading Procedure for High Freeze Point Alkylphenols in Railcars

The following is a suggested steaming and unloading procedure for high freeze point alkylphenols transported in a railcar. The intent of this steaming and unloading procedure is to give experienced material handlers, who are knowledgeable with their equipment, a general outline. The procedure should be modified to accommodate each plant's unique steaming and unloading system.

All personnel who work with high freeze point alkylphenols should read all of the information provided in the Safety Data Sheet (SDS). The proper Personal Protective Equipment (PPE) for unloading these materials includes, but is not limited to:

- Rubber gloves
- Hard hat
- Respirator
- Slicker suit
- Full face shield
- Safety glasses with side shields

Railcar Acceptance

When the railcar is received:

1. Check the shipping papers. (product name, quantity, container number, certificate of analysis)
2. The railcar should be spotted at the assigned unloading area or spot and wheels should be chocked and ground cable attached.

Preparing the Railcar for Steaming

1. Wearing full PPE, loosen the bolts on the man-way (using non-sparking tools). Lightly tap the outside of the man-way to remove frozen product around the inside of the man-way.
2. Using extreme caution (railcar may be under slight pressure) open the man-way. Make sure there is no less than 12 inches (30.5 cm) headspace in the railcar.
3. Place a stainless steel cover plate over the man-way to reduce vapor emissions. The stainless steel cover can be designed with a hinged door to allow inspection and sampling. If a cover is not available, the man-way may be lowered, but propped open to leave a small opening for venting during the steaming process.

Steaming the Railcar

1. Connect the nitrogen purge. If using a cylinder, it must be equipped with a regulator. Open the block valve to allow adequate nitrogen flow to blanket the product.
2. Hook up steam to the steam station and blow steam through the hose to insure that the steam hose is clear of any debris or product.
3. Connect the steam supply hose and steam trap to the railcar. Apply steam and heat the product to the proper temperature. Assure that the steam trap is working properly by observing the trap alternately discharging steam

- condensate and then a small burst of steam pressure.
- Discontinue the steaming process when the temperature reaches the desired value, listed below:

Product	Unloading Temperature	
	°C	°F
ISONOX® 133	55	130
Para-tert-butylphenol (PTBP)	110	230
Para-tert-amylphenol (PTAP)	110	230
Para-tert-octylphenol (PTOP)	105	220*
Para-cumylphenol (PCP)	95	205*
2,4-Di-cumylphenol (2,4-DCP)	85	185
2,4-Di-tert-butylphenol (2,4-DTBP)	80	175*
2,6-Di-tert-butylphenol (2,6-DTBP)	55	130*
2,4-Di-tert-amylphenol (2,4-DTAP)	45	115*

*Suggested temperature for unloading

Distances from shipping container to storage tank vary. For longer distances we suggest heating the container 5-8°C/10-15°F hotter. The dissolution time varies according to the container size, and seasonal conditions.

Unloading the Railcar

- Line up the appropriate piping and valves to the designated storage tank.
- Attach the appropriate jacketed unloading hose from the railcar outlet to the header leg or pump suction piping.
- Once all transfer valves and piping have been lined up and opened, hook up the nitrogen supply line. Nitrogen should be purged through the transfer piping to the storage tank to ensure that all valves and lines are correctly opened and free of product. Hook up nitrogen to the railcar and pressurize the vessel to the required pressure. Do not exceed pressure ranges for the railcar. The relief valve setting pressure is stenciled permanently on the side of each rail car but is most commonly 75 PSIG. To facilitate unloading railcars may be pressurized to 15-25 PSIG.
- Rail cars may be equipped for top or bottom unloading. Once the required pressure has been achieved for railcar unloading, slowly open the discharge valve off the railcar. With the valve open check to insure proper flow and that all connections are leak free and secure.
- While unloading continually monitor the nitrogen pressure to ensure that the required pressure is maintained throughout the unloading process.
- When the vessel has been completely emptied, secure the nitrogen supply to the vessel. Let the nitrogen pressure in the vessel depressurize through the unloading line to the storage tank. Secure the railcar discharge valves.
- Any remaining pressure in the railcar can be vented through the nitrogen fitting at the top of the railcar. When the purging and venting activities have been completed, secure all the transfer piping and railcar valves.
- Disconnect the transfer hose from the outlet of the railcar. Collect any product left in the hoses or fittings.
- When the railcar has been completely depressurized, carefully open the manway of the railcar and perform a visual inspection to ensure that the railcar is empty. If the railcar is not empty repeat steps 4-10.
- After completing all of the above steps, close and secure the man-way. If nitrogen pressure is to be left on the rail car attach a caution tag to the man-way bolts to indicate the potential hazard.

NOTE: If unloading or delivery of the railcar is delayed, and the product is molten, leaves an appropriate level of steam on the railcar to maintain the unloading temperature ($\pm 5^{\circ}\text{C}/\pm 9^{\circ}\text{F}$). The product quality (i.e., color) may be compromised if it cools and requires substantial re-steaming.