INSTRUCTIONS FOR INSTALLATION OF MECS® CATALYST FOR SULFURIC ACID

GENERAL

Shipping packages for MECS® Sulfuric Acid Catalyst are tightly sealed when shipped. The catalyst can be affected by moisture in the air or damaged by water; therefore, the packages (drums or supersaks) should not be opened until the converter is ready to be loaded.

Screening of catalyst (if required) and loading of the converter should be done as much as possible in dry weather, and the operation should be completed expeditiously so as to limit the duration of exposure to moist air.

Catalyst movement inside product packages during transport will create fine dust. Keep unnecessary personnel away from work area when emptying catalyst packages or when working with the catalyst. If enclosed handling cannot be guaranteed, ventilation, protective clothing, and other personal protective equipment (PPE) must be used.

Avoid contact with skin and eyes. Skin irritation occurs on contact with wet or moist skin. Avoid inhalation of dust. Catalyst dust is toxic due to its vanadium salt content. Crystalline silica (quartz and cristobalite) may be present in both new and used catalyst. Respirable crystalline silica (that can lodge deep in the lungs) is classified as a known or probable human carcinogen by various international authorities.

Observe good personal hygiene measures after handling this material such as removing contaminated clothing and PPE and washing before eating, drink and/or smoking.

The catalyst is sufficiently hard to withstand normal handling. Screening for dust removal after shipment usually will not be required. However, if the catalyst has been subjected to unusual shipping conditions, a small quantity of dust may be formed. If found necessary by inspection, the catalyst may be carefully screened before installation since excess dust will increase the pressure drop in the converter. This screening is best done by passing the catalyst gently over a screen as the packages are opened for converter loading. Rigorous screening prior to initial installation is not recommended since it will decrease the catalyst volume.

In preparation for installation of catalyst, the inside of the converter, the manway covers, and all of the miscellaneous fittings used inside the converter should be brushed clean of scale and dirt with a wire brush. Care should be taken that workers clean their shoes before entering the converter. All interior fittings should have been assembled in the converter before beginning the catalyst installation to ensure that once begun, the installation can proceed without undue delay.

Sometimes the converter shell is not truly cylindrical throughout or excessive openings occur between the bed supports. In such cases, the excessive opening must be corrected. Excessive openings around the shell may also need to be corrected. Depending on the detailed design of the converter, assurances need to be made to prevent gas bypassing.

The solid division plates must be carefully inspected between each pass of the converter. It is extremely important that no gas passes these solid division plates. Gas leaks through these solid division plates will cause bypassing, poor temperature control and result in loss of conversion efficiency.

It is helpful to make four chalk marks around the columns and around the wall of the converter at a uniform distance above the grid. The bottom chalk mark represents the level of the bottom support media. The second chalk mark represents the approximate top level of catalyst. The third chalk mark represents the anticipated level of the support media over the catalyst. The fourth mark is placed two inches (50 mm) above the third mark and serves as a reference if the third mark is covered by support media.

The catalyst supporting media in the top and bottom of each pass typically consists of ½-inch to 1-inch (13 to 25 mm) milled quartz pebbles or ceramic balls which should not crack or disintegrate at 1165°F (630°C). A minimum 2-inch (50 mm) deep layer is put on each set of slotted grids and, after being leveled carefully, is followed by the specified volume of catalyst. A piece of 2-inch (50 mm) thick plank of wood can be used as a depth guide for the bottom layer of support media.

INSTRUCTIONS FOR INSTALLATION OF MECS® CATALYST FOR SULFURIC ACID

Catalyst should be handled gently and not thrown recklessly or dumped from a great height. It is best handled in small containers or in the original packaging. After the specified amount of catalyst has been placed in a converter pass, the layer should be carefully leveled to ensure uniform thickness in the catalyst bed. Failure to level properly will cause excessive flow through "thin spots" and may result in poor conversion.

A minimum 2-inch (50 mm) deep layer of quartz pebbles or ceramic balls is placed on top of the catalyst in each converter pass. This top hold-down layer should be carefully leveled also.

Any of the converter passes may be packed through access nozzles on the converter shell, without disturbing the others. Wide boards or panels of plywood should be used as a working platform while leveling the catalyst and installing the top layer of support media to minimize catalyst breakage. Avoid stepping directly on the catalyst. Care must be taken at all times to prevent dirt, pieces of wood, cloth, etc., from contaminating the catalyst.

In cool, damp weather electric heat lamps or large size electric light bulbs can be used in the converter to aid in keeping it dry while installing catalyst. Some types of heat lamps will serve the dual purpose of supplying both heat and illumination.

Before sealing on the manway covers, inspect to confirm that all equipment has been removed and that all parts of the converter are clean. Remove any dust that may have fallen through the grids onto the division plates or into gas outlet vestibules while installing the catalyst.

THERMOCOUPLE PLACEMENT

Each catalyst pass should have a minimum of two thermocouples for measuring catalyst bed temperatures. Thermocouples should be located exactly at the dividing line between the catalyst and the support media at the inlet and outlet of each catalyst bed. The thermocouples should extend approximately 3 to 6 feet (1 to 2 meters) out from the wall of the converter. If feasible, multiple thermocouples at each inlet and outlet will assist in diagnosing gas mixing problems, identifying grid failures, etc. Approximately 6 inches (150 mm) of the tip end of the thermocouple should not be in direct contact with the catalyst, but should rest on a single layer of support media with another layer of support media above it.

A thermowell serves as an effective shield to insure good gas temperature measurement and are recommended. Thermowells are a tube that fully enclose the theromocouple, are slightly larger in diameter than the thermocouple and in general are made of 304 stainless steel.

CONVERTERS IN SULFUR BURNING PLANTS

Sulfur burning plants with waste heat boilers sometimes have superheater tubes in the converter. In smaller plants, the tubes of one of the boiler sections may also be inside the converter. There are usually only a few inches of clearance between the baffle plate under the tubes and the catalyst. When installing catalyst in the layers containing the tubes, it is best to use the manways on each side of the converter. This will facilitate the final leveling of the catalyst and the covering layer of support media.

INSTALLATION IN EXISTING PLANTS

If existing catalyst will be re-used, it should be screened (see Catalyst Manual Screening or Vacuum Screening Document) and installed in the lower portion of the bed first. New, fresh catalyst is then installed on top of the older catalyst. This approach should be used for all passes of the converter. If existing catalyst is still active but will not be used in the current pass, it can be moved from a low-temperature zone to a higher temperature zone. Because all sulfuric catalyst has a "temperature memory", catalyst should not be relocated to a pass or a layer that operates at a lower temperature. Generally catalyst is moved from a higher numbered pass to a lower numbered pass, i.e. pass 3 catalyst could be moved to pass 2.

INSTRUCTIONS FOR INSTALLATION OF MECS® CATALYST FOR SULFURIC ACID

MECS® CATALYST FOR SULFURIC ACID

MECS® Catalyst products can be used as follows:

Catalyst Type	Converter Passes	Shape	Diameter
GR-330	All Passes	Hexa-Lobed Ring	1/2” (12.7 mm)
GR-310	All Passes	Hexa-Lobed Ring	7/16” (11.1 mm)
XLP-110	All Passes	Ribbed Ring	7/16” (11.1 mm)
LP-310	All Passes	Ring	3/8” (9.5 mm)
LP-110	All Passes	Ring	3/8” (9.5 mm)
T-11	All Passes	Pellet	7/32” (5.6 mm)
XCs-120	All Passes	Ribbed Ring	7/16” (11.1 mm)
SCX-2000	4 and 5	Ribbed Ring	7/16” (11.1 mm)
Cs-110	All Passes	Ring	3/8” (9.5 mm)
Retired Products			
XLP-220	1 and 2	Ribbed Ring	7/16” (11.1 mm)
LP-120	1 and 2	Ring	1/2” (12.7 mm)
LP-220	1 and 2	Ring	3/8” (9.5 mm)
T-210	1 and 2	Pellet	7/32” (5.6 mm)
Cs-120	1 and 2	Ring	1/2” (12.7 mm)
Cs-210	All Passes	Pellet	7/32” (5.6 mm)