

# Tubular Loading Procedure

January 2023



## **INSTRUCTION DESCRIPTION:**

The following instructions have been prepared by the HSEQT Manager to serve as a reference for users of various catalysts. They are submitted to assist the user in obtaining optimum performance and are written in a general tone to be compatible with the individual procedure preferred by a specific company.

## **SAFETY**

All personnel involved in the use of the catalyst must thoroughly review the catalyst safety documentation and loading procedures prior to proceeding with catalyst installation. Proper handling and special protection information as described in the Safety Data Sheet or Safety Data Sheet must be always followed. In addition, these personnel must comply with current applicable occupational health and safety standards.

## **CATALYST STORAGE AND HANDLING**

Tubular catalysts are generally shipped in sealed plastic lined metal drums or big bags (super sacks) Indoor storage is preferred. Catalysts should be stored in a clean and dry environment whenever possible. Freezing temperatures will not adversely affect the catalyst, provided it is kept free of moisture. Under normal conditions, the catalysts can be stored for years with no degradation of its performance or physical characteristics. If it is necessary to temporarily store the catalyst outdoors, it should be stacked on pallets at an elevated location to prevent contact with standing water and carefully covered to prevent wetting by precipitation. If the catalyst has been exposed to moisture or stored for long periods, a dry-out procedure is required prior to start-up. Rolling of the drums should be strictly avoided if possible.

## **PRE-LOADING REQUIREMENTS**

Prior to catalyst loading, the following items must be checked:

1. Confirm that loading personnel do not have any items on their person that could potentially be accidentally left in the reactor (e.g., tools, gum, lighters, ear plugs etc.). Thoroughly inspect the empty tubes to make sure that they are free of debris which could cause plugging or flow mal distribution. Inspect all reactor internals, manways, manway covers, bolts, nuts etc. and repair or replace parts if necessary. Inspect all vessel connections such as inlet and exit lines and thermowells to ensure that they are in good condition.
2. Inspect any screens/distribution trays/etc. that are to be installed (old and new) to ensure that they are clear and damage free.
3. Inspect all springs and/or clips to ensure that catalyst particles or bed support/support balls/inert material cannot pass around or through the support springs/clips.

4. Ensure that all flanges (if applicable) have been re-installed and tightened.
5. Inspect all catalyst and support balls when received. Although most catalysts have been screened prior to shipment and normally can be loaded directly into the reactor without further screening, rough handling during shipment could necessitate a light screening prior to loading. Therefore, be prepared by having equipment and facilities available to execute a catalyst screening if required.

**Important:** If it is necessary for personnel to enter the vessel during loading, the following additional precautions need to be taken:

6. Ensure that all vessel entrances not needed for the loading are blocked and blinded for personnel protection.
7. Supply all personnel entering the vessel with proper protective clothing to prevent contact between catalyst dust and skin. Carefully review the provided catalyst MSDS for any special exposure risks, handling precautions and proper protective equipment. Any personnel entering the vessel must also be provided with a dust mask respirator or, preferably, fresh air breathing apparatus if required by plant regulations. If fresh air masks are not used, air circulation should be provided by some type of air mover to reduce dust levels and maintain a fresh air environment.

## TUBULAR REACTOR LOADING

After pre-loading inspections have been completed, the following loading procedure is recommended:

1. It is important to verify the type of material being loaded before the drum or bag is emptied into the funnel/loading machine. Loading personnel should be familiar with the catalyst identification numbers and appearance. Catalyst should be loaded per the outages specified in the loading diagram. An accurate log of the drum or sack count should be kept enabling identification of any errors. Any deviations should be reported to the Technical Group.
2. All inert support balls must be loaded by funnel or load machine. If multiple layers of support balls are to be loaded, each layer should be measured prior to the addition of the next layer. Caution: The largest openings in the catalyst support spring or clip should not be greater than one half the smallest catalyst or support ball dimension. Record outages after each layer and confirm with the loading diagram. Care should be taken not to damage any reactor springs or clips present at the bottom of the reactor.
3. The most common method used for loading is to use a large funnel or loading machine located above the tube. The funnel is then filled with catalyst with flow regulated and distributed by a man or a machine that has been timed or set.



4. **Important:** The catalyst being loaded should be distributed evenly as the loading proceeds. Manage the dumping of catalyst in such a technique to minimize a high concentration of fines. Such a fines concentration could result in poor flow distribution of the reacting gas across the catalyst bed.
5. After the last drum or sack has been loaded, the catalyst should be carefully outage using gauging sticks.
6. Record the final catalyst outage prior to the installation of the top support balls.
7. Record the final outage.
8. Make sure that all debris and/or equipment used during the loading is removed from the reactor.
9. Notify the Technical Group for a final inspection and review of the loading data.
10. Re-install the inlet distributor/striker plate (If applicable) and loading manway cover.

# Revision History

Rev	Rev Date	Rev By	Approved By	Description
1.0	1.3.2022	Shayne Torrans	Shayne Torrans	Initial Procedure Document
1.1	11.23.2022	Shayne Torrans	Shayne Torrans	Format Revision

**Approvals:**

Procedure Owner

Print Name

Date

Signature

# Competency Assessment

No.	Questionnaire	C/NYC
Q1		
A1		
Q2		
A2		
Q3		
A3		
Q4		
A4		
Q5		
A5		

Enclosed Attachments	
Risk Assessment	<input checked="" type="checkbox"/>
Environmental Aspect and Impact	<input checked="" type="checkbox"/>
Training and Competency	<input checked="" type="checkbox"/>
Measure and Evaluation Tools	<input checked="" type="checkbox"/>



# Competency Checklist

To be filled out by Trainer and signed by Employee, Assessor and Supervisor before being returned to the HSEQT Manager for recording purposes.

Procedure	Competency	Date	Competent YES / NO	Employee Signature

(Please tick appropriate box)

This employee is competent in performing the job.

This employee has not attained the competency level.


\*

\* *If the employee has not attained all competency levels, the General Manager must assess the action to be taken, provide an extension of training or alternative action as listed below.*

Alternate action to be taken: \_\_\_\_\_

Signed By      Employee: \_\_\_\_\_ Date: \_\_\_\_\_

Trainer: \_\_\_\_\_ Date: \_\_\_\_\_

Assessor:

Date:

Regional Manager:

Date:

# Environmental Aspects and Impacts

## Identified Environmental Aspects and Impacts

The following table is a summary of the likely environmental aspects and impacts that may be identified during site inspections. The significance of each impact needs to be assessed using the Risk Assessment Model.

Activity	Aspect	Impact
<b>Purchasing &amp; Administrative Work</b>	Consumption of goods	Conservation of natural resources
	Consumption of energy (eg. Electrical equipment and facilities)	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of waste (eg. Paper)	Consumption of space for waste disposal; Habitat loss
<b>Climate Control</b>	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of noise	Disturbance to community; Habitat loss
<b>Cleaning of – offices / vehicles</b>	Storage, use and release of chemicals	Contamination of air, water or soil; Risk to human health
<b>Transport (Fleet vehicles / staff travel)</b>	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Loss of habitat at all stages of generation; Light pollution
	Consumption of goods (eg. Oil)	Consumption of natural resources; Generation of waste; Habitat loss; Biodiversity impacts
	Generation of waste (eg. Oil)	Consumption of space for waste disposal; Potential contamination of water or soil; Habitat loss
	Exhaust emission	Release of greenhouse gases and atmospheric pollution
	Use of dangerous goods (eg. Batteries)	Potential contamination of air, water or soil; Risk to human health
	Generation of noise	Disturbance to community; Habitat degradation
<b>Operations</b>		

Activity	Aspect	Impact

# Risk Assessment

Risk Assessment // insert name here

Step No: Logical sequence	Sequence of Basic Job Steps documented in the Procedure, Work Instruction and project plans. Break down Job into steps.  Each step should be logical and accomplish a major task.	Potential Safety & Environmental Hazards/Impacts at the site of the Job  Identify the actual and potential health and safety hazards and the environmental impacts associated with each step of the job.	Risk Rating  Refer to the risk matrix or HSEQT.PRO. Risk Mgt	Recommended Corrective Action or Procedure  <i>Determine the corrective actions necessary to reduce the risk to as low as reasonably practical (ALARP) refer to HSEQ.PRO.Risk Mgt. The risk must be reduced or controlled to ALARP before work commences.</i>  Document who is responsible for implementing the controls to manage each hazard identified.	Risk Rating refer to the risk matrix or HSEQT.PRO.Risk Mgt
1.					
2.					
3.					
4.					
5.					

# Audit

<b>Process:</b> insert// <b>Procedure:</b> Insert //			Date:	Audited by:
			Location of Audit:	Area Mgr/Supervisor:
Item	Question	Evidence Sited	Comments	Conformance Score 0,3,5
1.				
2.				
3.				
4.				
5.				
6.				
7.				
AUDITOR'S SIGNATURE:  SAFETY REP'S SIGNATURE:		CONFORMANCE SCORE:      / 25  CONFORMANCE %:		0 – Non-Conformance 3 – Continuous Improvement Opportunity 5 – Total Conformance