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หน่วยงานเจ้าของเอกสาร AN Production Division
Department/Division

บันทึกการแก้ไขเอกสาร
Document Edition Records

ครั้งที่แก้ไข Revision no.	วัตถุประสงค์ Objective	บันทึกการแก้ไข Edition Record	
		หน้าที่ Page	รายละเอียด Details
1.	Revise the cover page	1	Update the provider, reviewer and approver
		2	Additional the Document Edition Records



Title : Reactor (AR-110) Internal Cleaning

Document No : WI-AN-1050

Revision No: 2

Effective date : 02-Jul-18

1. วัตถุประสงค์ (Purpose).

Operator will be able to conduct Reactor internal cleaning correctly and safely.

2. ขอบเขต (Scope).

AR-110A/B/C internal cleaning after shutdown.

3. คำจำกัดความ (Definition).

BM = Boardman

FO = Field Operator

B = Blind flange

A = Air Blower

4. เอกสารอ้างอิง (Reference).

No Reference document.

5. ผู้มีอำนาจดำเนินการดำเนินงาน (Manual/Instruction).

1. Preparation for reactor internal cleaning.

2. Perform Reactor internal cleaning.



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Point for Safety

Human	<ol style="list-style-type: none"> 1. Carry out the operation with "Pointing and Confirmation" as there is a lot of vessel isolation. 2. Must be working on strict confine space entry rule. 3. Ensure that air in vessel enough ventilation for working. 4. Ensure that a light in vessel enough for working.
Equipment	<ol style="list-style-type: none"> 1. Equipment such vacuum cleaner must be inspection label. 2. Brooms. 3. Rubber hammer. 4. Flashlight. 5. Goggle. 6. Dust mask or gas mask. 7. Chemical suit (thinly type). 8. Cotton groves. 9. Camera. 10. Lighting.
System	
Special instruction	<ol style="list-style-type: none"> 1. Closely contact between watch man and worker during on working. 2. Stand by air line on work place(if necessary) 3. Provide the gas detector for check %O₂ and Hydrocarbon.



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Specification of Main Equipment

Name	Reactor			Condition		
	Type	Capacity (m ³)	Main Dimension (mm)	Temp (°C)	Design Pres. (kg/cm ² G)	Operating Pres. (kg/cm ² G)
AR-110 A/B/C	Vertical Cylindrical	Shell ; 2,200	Shell; 11,300/10,000 ID ; 510 x18,800+20,100 TT	Shell ; 510	1.8	1
			Coil ; 2"x9,000Lx1 UxNo.28		Coil ; F.V./40	Coil ; 32
			2"x9,000Lx3 UxNo.64			
			4"x9,000Lx1 UxNo.20			
			4"x9,000Lx2 UxNo.64			
			4"x9,000Lx3 UxNo.44			

Cyclone

Cyclone		3 Stages x14 Sets
Designed Temp.		510 °C
Dip – Leg	No.1	12"
	No.2	8"
	No.3	8"
Dip – Leg purge		N ₂ purge



Gas Sparger

Nozzle Quantity	1120
Nozzle Density	14.1/m ²
Main Header Size	12"
Branch Pipe Size	2"
Sparger-Distributor distance	150 mm
The number of Branch pipe	76

Prior Confirmation

1. Criteria for reactor internal cleaning.

- 1. After Reactor is shut down, cleaning of Reactor inside is conducted as following:
 - 1.1 Catalyst that accumulated on distributor and under distributor is recovered.
 - 1.2 Catalyst that accumulated on cyclone hat and in death zone must be clean for prevent after burning or hot spot during Reactor start up.
 - 1.3 MO scales are removed from coils surface etc.

2. Confirming the relevance condition.

- 2.1 Make sure Reactor safety measurement is completed.



Operating procedure

1. Preparation for Reactor internal cleaning.

- 1.1 Check reactor isolation and ventilation is completed. (refer to Reactor safety measurement manual and drawing)
- 1.2 Make sure that the temperatures inside Reactor are equalize ambient temperature:
 - 1.2.1 Temperature of Dense Phase.
 - 1.2.2 Temperature of Dilute Phase.
 - 1.2.3 Reactor TOP Temperature.
- 1.3 Preparation authorize person for confine space entry work:
 - 1.3.1 Certificate for confine space entry training.
 - 1.3.2 Permit approver person.(Area owner)
 - 1.3.3 Job leader or Job supervisor.
 - 1.3.4 Stand by person.
 - 1.3.5 Worker or entering person.
 - 1.3.6 Certificate for healthy checking with doctor.
- 1.4 Check %O₂ = 21% and Hydrocarbon 0% before start working.
(Refer to standard of confine space working procedure)



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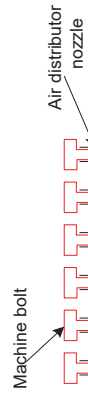
Effective date : 02-Jul-18

2. Perform Reactor internal cleaning.

- 2.1 Recover catalyst that accumulated on air distributor and under air distributor.
 - 2.1.1 Collect catalyst that accumulated on air distributor into dry container.
 - 2.1.2 Collect catalyst that accumulated under air distributor into dry container.
 - 2.1.3 Separate recovery catalyst from unwanted particle by sieve 250 meshes ($\sim 62 \mu$) to storage in dry catalyst drum respectively, prepare for unloading to catalyst hopper.
 - 2.1.4 Attach label by separate catalyst that accumulated on air distributor and catalyst that accumulated under air distributor.

- The recovery catalyst must be sampling and sent to analyze at AKC.
- Waiting for analysis result from AKC before unloading recovery catalyst to catalyst hopper.

- 2.1.5 Collect unwanted particle in container for send to dispose.
- 2.1.6 Plugging the air distributors by insert stud bolt into the air distributors slot for prevent fine catalyst or MoO_3 particle falling down to bottom of Reactor.



- Use the dust mask during recover catalyst that accumulated on air distributor and under air distributor for prevents catalyst dust inhalation.
- Avoid to make the Reactor internal equipment to quake for prevent degrade catalyst falling down to contaminated with recovery catalyst.

- 2.2 Catalyst that accumulated on cyclone hat and in death zone must be clean for prevents after burning or hot spot during Reactor start up.
 - 2.2.1 Use the rubber hammer knocking the cyclone dip leg to crack the catalyst that accumulated in the dip leg to falling down.
 - 2.2.2 Use the brass brush to clean catalyst that accumulated on the cyclone hat and all death zone inside the Reactor.
 - 2.2.3 Use the brass brush to clean catalyst and scale that accumulated on the Reactor's wall.
 - 2.2.4 Use the vacuum cleaner to suck the fine catalyst that accumulated on the Air distributor plate.

- Use the dust mask during internal cleaning period for prevents catalyst dust inhalation.

- 2.3 Remove MO scales from coil surface.
 - 2.3.1 Use the brass brush to remove MO scales that accumulated on the coil surface.
 - 2.3.2 Collect the fine catalyst and MO scales to bucket or plastic bag.
 - 2.3.3 Remove all cleaning equipment from Reactor and check after internal



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Revision No: 2

Effective date : 02-Jul-18

cleaning is finished.

- 2.3.4 Remove stud bolts that plugging air distributor nozzle.

- Spent catalyst is to be temporarily stored and waiting for returned to Asahi Kasei Chemicals.
- Working period is following the standard of confine space working.

6. เอกสารสนับสนุน (Supported document).

No support document.

7. แบบฟอร์ม/บันทึก (Form/Record).

No form and record document.

งานล้างทำความสะอาดถังปฏิบัติการ AR-110

