

SPECAIL CONDITIONS OF CONTRACT (SCC)

SPECIAL CONDITIONS OF CONTRACT (SCC)

1. The terms and conditions enumerated herein shall supersede the terms and conditions mentioned elsewhere in the tender document.

2. SCOPE OF SUPPLY:

The Feed Purification System is an integral part of **LLDPE / HDPE swing unit** of **BCPL** for the treatment of process / utility feeds for removal of impurities. The following materials are required in the feed purification system to maintain the desired composition of the process / utility feeds:

- a) Molecular Sieves
- b) Adsorbents
- c) Catalysts
- d) Inert Balls

The LLDPE / HDPE Swing unit of BCPL has the following feeds which require purification before further processing:

Sl. No.	Process feed	Equipment Number	Equipment Name	Catalyst/Adsorbent/Molecular sieves Quantity (M ³)	Inert balls Quantity (M ³)	
					Top	Bottom
1	Ethylene	117-VV-933	Ethylene Sulfur Guard Treater	28.9	0.57	0.58
		117-VV-931 A/B	Ethylene C ₂ H ₂ / O ₂ / CO Treaters	16	0.68	0.68
		117-VV-932 A/B	Ethylene Oxygenates Treaters	81	2.26	2.54
2	Hydrogen	117-VV-971	Hydrogen Mercury Trap	0.05	0.003	0.004
		117-VV-972	Hydrogen O ₂ Treater	0.05	0.003	0.004
		117-VV-973	Hydrogen Dryer	0.224	0.028	0.028
3	Nitrogen	117-VV-570 A/B	Nitrogen O ₂ / CO removal Treaters	1.8	0.17	0.17
		117-VV-571 A/B	Nitrogen Oxygenates Treaters	3.8	0.35	0.40
4	Butene-1/ Hexene-1	117-VV-941 A/B	Butene-1/ Hexene-1 Treaters	6.48	0.18	0.18
5	Pentane	117-VV-944	Pentane Treater	0.4	0.03	0.03

- 2.1 The above mentioned quantity is tentative.
- 2.2 The bidder is required to supply Molecular Sieves / Catalysts / Adsorbents in quantity, sufficient to fill the required volume of equipment considering bulk density.
- 2.3 Bidders have to specify **shape / sizes (s) / quantity of molecular sieves** offered by them.
- 2.4 Similarly, bidder to supply **Inert Balls** in quantity / sizes (as per equipment drawing), sufficient to fill the required volume at the top and bottom of the molecular sieves. Bidders have to specify **shape / sizes (s) / quantity and bulk density** of Inert Balls offered by them.
- 2.5 Molecular Sieves / Catalysts / Adsorbents and Inert Balls for all the equipment of each process / utility feed shall be procured from the same vendor.
 - 2.5.1 For Ethylene Sulfur Guard Treater, Ethylene C₂H₂ / O₂ / CO Treaters & Ethylene Oxygenates Treaters the procurement shall be done from same manufacturer/vendor on overall lowest tender basis as per SOR Part # 1.
 - 2.5.2 Similarly for Hydrogen Mercury Trap, Hydrogen O₂ Treater & Hydrogen Dryer procurement shall be done from same manufacturer/vendor on overall lowest tender basis as per SOR Part # 2.

- 2.5.3 Similarly for Nitrogen O₂ / CO removal Treater & Nitrogen Oxygenates Treater procurement shall be done from same manufacturer/vendor on overall lowest tender basis as per SOR Part # 3.
- 2.5.4 Similarly for Butene-1 / Hexene-1 Treater procurement shall be done from same manufacturer/vendor on overall lowest tender basis as per SOR Part # 4.
- 2.5.5 Similarly for Pentane Treater procurement shall be done from same manufacturer/vendor on overall lowest tender basis as per SOR Part # 5.
- 2.6 However, bidder needs to provide rate of the Molecular Sieves / Catalysts / Adsorbents and Inert Balls separately as per the Schedule of Rate (SOR).
- 2.7 The bidder need to supply the Molecular Sieve / Catalysts / Adsorbents and Inert Balls as per **mesh size** provided in the **equipment drawing** (refer Annexure -1)
- 2.8 Technical specifications of all the equipment are provided at tabular form in clause no 3 of SCC with each equipment details.
- 2.9 Typical drawings & Process Data sheets of all the equipment are enclosed at **Annexure-I**.
- 2.10 Bidder has to ensure that Molecular Sieves / Catalysts / Adsorbents and Inert Balls supplied should be such that it does not entail any change in the vessel internals.
- 2.11 Bidder will run the simulation and provide best possible Molecular Sieve/ Catalysts / Adsorbents and Inert Balls set against BCPL's requirement while strictly adhering to Quality Assurance & Control.
- 2.12 **M/s BCPL shall evaluate the technical offer of all bids through the process licensor i.e. M/s INEOS Europe limited. Only those bids which are technically vetted and accepted by the process licensor shall be considered by BCPL for further evaluation.**
- 2.13 Bidder shall provide the **detail procedure for loading & unloading** of Molecular Sieves / Catalysts / Adsorbents and Inert Balls including required conditions for catalyst / adsorbent **preparation after loading and prior to unloading** and associated **utility flows** duly explained through **schematic drawings**.
- 2.14 **Utility** flow rates (N₂, compressed air, H₂ etc) requirement for each bed preparation to be provided by Bidder.
- 2.15 Bidder shall also provide the **detail procedure for regeneration** of the Molecular Sieves / Catalysts / Adsorbents, wherever required.
- 2.16 **Time required for regeneration**, wherever required for following steps shall be given by the bidder. However, the same should not be greater than that mentioned in the technical specification of the individual equipment.
- a) De-Pressurization
 - b) Heating,
 - c) Cooling
 - d) Pressurization
- 2.17 Technical assistance shall be provided for each process feed mentioned at clause 2 separately at site (by deputing their technical representative) by the bidder during **initial charging** as well as during the **initial regeneration** of the Molecular Sieves / Catalysts / Adsorbents after charging. This is to clarify that bidder may get services for all the process feed or any one of the process feed as per clause 2, Sl. No 1-5. Further bidder to note that initial charging & regeneration will be done in **two spell**. Bidder to quote per Diem rate for the same in each SOR (Sl. No 1-5) of price bid.

Sl. No.	Process feed	Equipment Number	Equipment Name	Man Days for Initial Charging & Initial Regeneration for each of the item (to be exercised in two spell for each item)
1	Ethylene	117-VV-933	Ethylene Sulfur Guard Treater	16
		117-VV-931 A/B	Ethylene C ₂ H ₂ / O ₂ / CO Treaters	
		117-VV-932 A/B	Ethylene Oxygenates Treaters	
2	Hydrogen	117-VV-971	Hydrogen Mercury Trap	3
		117-VV-972	Hydrogen O ₂ Treater	
		117-VV-973	Hydrogen Dryer	
3	Nitrogen	117-VV-570 A/B	Nitrogen O ₂ / CO removal Treaters	7
		117-VV-571 A/B	Nitrogen Oxygenates Treaters	
4	Butene-1 / Hexene-1	117-VV-941 A/B	Butene-1 / Hexene-1 Treaters	5
5	Pentane	117-VV-944	Pentane Treater	3

The No of days mentioned in the above table shall be considered for evaluation of Bids. However, the payment to vendor for technical assistance shall be done as per actual man days required at site and boarding / lodging / travelling etc expenditure to be borne by the vendors for providing technical assistance at site.

- 2.18 Technical assistance, if required, is to be provided by the bidder for any problem during operation from time to time. However, if the problem is due to the **non-performance** of the Molecular Sieves / Catalysts / Adsorbents, bidder shall provide the **technical assistance free of cost for rectification / replacement of the same**.

3.0 TECHNICAL SPECIFICATION OF THE EQUIPMENTS

3.1 ETHYLENE

The purpose of reducing **CO, Acetylene, Sulfur and Oxygen** content in the ethylene is to minimize their effects on the polymerization reaction, on the quality of the product and to prevent the reduction of polymerization catalyst activity.

3.1.1 117-VV-933:Ethylene Sulfur Guard Bed Treater

3.1.1.1 117-VV-933 is used to remove **sulfur** from the ethylene feed.

3.1.1.2 Technical specifications:

The conditions at the inlet of 117-VV-933 treater are as following:

	Minimum	Normal	Maximum	Design
Flow	Vendor Scope	33323 kg/h	-	37000 kg/h
Pressure	33.3 kg/cm ² g	34.8 kg/cm ² g	35.8 kg/cm ² g	56 kg/cm ² g
Temperature	-	40°C (Vendor to confirm)	-	130°C

3.1.2 117-VV-931 A/B: Ethylene C₂H₂ / O₂ / CO Treater

- 3.1.2.1 Treater 117-VV-931 A/B are located downstream of the Sulfur Guard Bed Treater 117-VV-933.
- 3.1.2.2 Treater 117-VV-931 A/B will remove **Carbon Monoxide** (CO) and **Oxygen** (O₂) contaminants to acceptable levels, without the co-adsorption of olefins.
- 3.1.2.3 For 117-VV-931 A/B, each treater is a full capacity treater with one in operation and the other in spare / regeneration. However, during normal operation the two treaters will be in series.
- 3.1.2.4 Between 117-VV-933 and 117-VV-931 A/B a steam heater 117-EE-931 is inserted to heat-up ethylene to 60 / 95°C if required in 117-VV-931 A/B. **(Vendor to advise)**
- 3.1.2.5 Support ball should be inert type. **Vendor** to select appropriate Inert Balls (T-162 or equivalent) to ensure the inert characteristic of the support balls.
- 3.1.2.6 **Technical specifications:**

The conditions at the inlet of the treaters 117-VV-931 A/B are as following:

	Minimum	Normal	Maximum	Design
Flow	Vendor Scope	33323 kg/h	-	37000 kg/h
Pressure	32.8 kg/cm ² g	33.6 kg/cm ² g	35.3 kg/cm ² g	56 kg/cm ² g
Temperature	-	95°C (Vendor to confirm)	-	135 °C

3.1.3 Treater Preparation / Regeneration

- 3.1.3.1 No regeneration is foreseen in 117-VV-933.
- 3.1.3.2 The adsorption duration and regeneration frequency in 117-VV-931 A/B will be based on a **30 days** cycle minimum at normal flow-rate.
- 3.1.3.3 **Nitrogen** is available in the following conditions:

Flow: *To be confirmed by Vendor*

Temperature: Operating 30 to 285°C

{Temperature controlled with upstream electrical heater. If higher temperature be required, vendor to advise}

Design: 325°C

Pressure at treater inlet: Operating up to 4.0 kg/cm²g

{Regeneration nitrogen pressure is controlled at treater outlet (control valve on line to flare/atmosphere). Vendor to give required set point}

Design: 10.5 kg/cm²g

Required nitrogen quality for regeneration/preparation is to be indicated by **Vendor** (N₂ purity, oxygen, water, carbon dioxide, carbon-monoxide, oil contents).

- 3.1.3.4 **Compressed air** is available for catalyst preparation.

Flow *To be decided by the vendor.*

3.1.4 Pressure Drop

The maximum pressure drop is **0.1 kg/cm²** max through each treater bed of 117-VV-933 and 117-VV-931 A/B.

- 3.1.5 **Table-I** gives the ethylene feed specification at the inlet of 117-VV-933 and at the outlet of 117-VV-931 A/B.

TABLE - I

Raw Material ETHYLENE		
Component	Required specification at outlet of 117-VV-931 A/B	Specification at 117-VV-933 inlet
Ethylene	99.90 % v min	99.90 % vol min
Methane	300 ppm v max	300 ppm mol max
Ethane	Balance	Balance
Hydrogen	(*)	2 ppm mol max
Propylene & Higher	10 ppm wt max	10 ppm wt max
Acetylene (incl MAc)	1 ppm v max	2 ppm wt max
Carbon Monoxide	0.1 ppm v max	2 ppm mol max
Carbon Dioxide	7 ppm max (**)	5 ppm mol max
Oxygen	0.1 ppm v max	2 ppm mol max
Total combined Sulphur (as H ₂ S)	1 ppm v max	2 ppm mol max
Water	5 (**) ppm wt max	5 ppm wt max
Alcohol (as Methanol)	Included in oxygenates	Included in oxygenates
Total combined Nitrogen (as NH ₃)	1 ppm mol max NH ₃	1 ppm mol max NH ₃
Total Oxygenated compounds (as acetone)	1 ppm mol max	1 ppm mol max

(*) Supplier to indicate H₂ make-up at inlet and residual H₂ at outlet of 117-VV-931 A/B.

(**) The supplier will confirm the H₂O / CO₂ content in the effluent.

3.1.6 The following information is to be provided by the **Vendor**:

S.No.	Information	Vendor's Confirmation
1	Recommended initial start-up conditions (oxygen content allowed to treat catalyst, required or recommended catalyst pretreatment),	
2	Consequence of introducing O₂/N₂ mixture in 117-VV-931 A/B at temperature up to 285°C	
3	Recommended normal inlet temperature (from initial to final bed lifetime),	
4	Required Nitrogen flow-rates for each operation	
5	Maximum time for no flow in 117-VV-933, 117-VV-931 A/B at 32.85 kg/cm ² g	

6	Recommended conditions for spare treater of 117-VV-931 A/B (site minimum temperature +0°C)	
7	CO₂ and H₂ content in the effluent, at normal and peak flow in 117-VV-931 A/B	
8	Reaction rate according to hydrogen concentration in 117-VV-931 A/B	
9	Recommended waste disposal procedure	
10	Conditions for treaters in case of 48 hours outage and for plant shut down	
11	Safety implications in the operation of these catalysts	
12	Minimum ethylene flow for product quality	
13	Minimum ethylene flow for safety	
14	Chemical safety data sheets for all catalysts and support balls	
15	Size and weight of supplied catalyst and support balls bags	
16	Detailed operating procedures description (from initial pretreatment and start-up to post treatment prior to removal)	
17	Recommended loading and unloading procedures for catalysts and Inert Balls	

3.1.7 For each individual Treater, the following table shall be filled in

STEP	N2 FLOW *	DURATION	TEMPERATURE	PRESSURE
Initial start-up from "under air conditions", heating step				
Bed Purging				
Bed Drying / heating				
Bed oxidation / reduction				
Bed Cooling				
Normal conditions				
Shut down prior to the discharging of bed				

* specify O₂ / H₂ content

3.1.8 The catalyst vendor shall guarantee the following performances:

- 3.1.8.1 Product purity at the outlet of the purification step based on the specified **design flow-rate** and **inlet concentrations** (removed components, by-products, contents shall be guaranteed) as per the specification of **Table - I**,
- 3.1.8.2 Nitrogen, air, hydrogen flow-rates used for **bed regeneration/preparation**,
- 3.1.8.3 **Maximum pressure drops** to be observed at any time of the bed life,
- 3.1.8.4 **Catalyst bed life time** (3 years minimum).

3.1.9 117-VV-932 A/B: Ethylene Oxygenates Treaters

The purpose of 117-VV-932 A/B is to remove **water, carbon dioxide, alcohol, total combined nitrogen, carbonyls and peroxides** from the ethylene feed as these are poison to the polymerization process

- 3.1.9.1 Upstream of this purification, the ethylene is treated to remove sulfur, acetylene, carbon monoxide and oxygen traces in 117-VV-933 & 117-VV-932 A/B.
- 3.1.9.2 The Treater 117-VV-932 A and B are identical and work in series, but each Treater has the capacity for treating the full Ethylene feed, while the other is off-line and being regenerated. For normal operation, however, the two Treater will work in series.
- 3.1.9.3 Upstream of 117-VV-932A/B an ethylene cooler 117-EE-932 is inserted to cool-down ethylene feed to the temperature as specified by molecular sieve / Adsorbent supplier.
- 3.1.9.4 Support ball should be inert type. **Vendor** to select appropriate Inert Balls to ensure the inert characteristic of the support balls.
- 3.1.9.5 **Technical specifications:** Ethylene Feed Pressure, Temperature and Flow-rate
The conditions at the inlet of the treaters 117-VV-932 A/B are the following:

	Minimum	Normal	Maximum	Design
Flow	Vendor Scope	33323 kg/h	-	37000 kg/h
Pressure	30.7 kg/cm ² g	32.2 kg/cm ² g	34.7 kg/cm ² g	56 kg/cm ² g
Temperature	-	43 °C	-	80 °C

3.1.9.6 **Cycle Length / Regeneration**

The adsorption duration and regeneration frequency will be based on a **28 day** cycle at normal flow-rate. Regeneration would be done by hot Nitrogen over **72 Hrs** in **up-flow** direction.

Flow-rate by vendor

Warm purge by vendor

Heat cycle by vendor

Cool cycle by vendor

Depressurization / Pressurization by vendor

3.1.9.7 **Pressure Drop**

The maximum pressure drop is 0.2 kg/cm² max for each vessel of 117-VV-932 A/B, i.e. 0.4 kg/cm² in total when the treaters are operating in series.

3.1.9.8 **Table-V** gives the ethylene feed specification at the inlet and the outlet of 117-VV-932 A/B.

Ethylene Composition

TABLE-V

The following table gives the ethylene feed specification before and after the purification process in 117-VV-932A/B.

Components to remove are Carbon Dioxide, Water, alcohols (as methanol) and total combined nitrogen.

Raw material		ETHYLENE
Component	Required specifications at 117-VV-932A/B outlet	Specifications at 117-VV-932A/B inlet (after upstream treatments)
Ethylene	99.90 %v min	99.90 %v min
Methane	*	300 ppm mol max
Ethane	*	Balance
Hydrogen	*	2 ppm mol max
Propylene & Higher	*	10 ppm wt max
Acetylene (incl methyl acetylene)	*	1 ppm v max
Carbon Monoxide	*	0.1 ppm v max
Carbon Dioxide	0.1 ppm v max	7 ppm mol max
Oxygen	*	0.1 ppm v max
Total combined Sulphur (as H ₂ S)	*	1 ppm wt max
Water	0.1 ppm v max	5 ppm wt
Alcohol (as methanol)	0.5 ppm v max	Included in oxygenates
Total combined Nitrogen (as NH ₃)	0.2 ppm v max	1 ppm mol max
Total oxygenated Compounds (as acetone)	0.5 ppm v max	1 ppm mol

Notes:

* The supplier will indicate the components content in the effluent.

3.2 HYDROGEN

This purification consists of removing **mercury compounds** and **oxygen compounds** from Hydrogen feed. The purpose of reducing the mercury and oxygen content in the hydrogen is to minimize their effects on the polymerization reaction, on the quality of the product and to prevent the polymerization catalyst activity to decrease.

3.2.1 117-VV-971 : Hydrogen Mercury Trap

3.2.2 117-VV-972 : Hydrogen O2 Treater

3.2.2.1 Each Treater is a full capacity Treater.

3.2.2.2 Treater 117-VV-972 is located downstream of Treater 117-VV-971.

3.2.2.3 **Table-II** gives the Hydrogen feed specification at the inlet of 117-VV-971 and outlet of 117-VV-972.

TABLE-II

Raw Material	HYDROGEN	
Component	Required specification at 117-VV-972 outlet	Specification at 117-VV-971 inlet
Hydrogen	99.99 mol % min	99.99 mol % min
Nitrogen	Balance	Balance
Hydrocarbons (C1-C3)	10 ppm wt max	10 ppm wt max
Acetylene	1 ppm v max	1 ppm v max
Carbon Monoxide	0.5 ppm v max	0.5 ppm v max
Carbon Dioxide	0.5 ppm v max	0.5 ppm v max
Oxygen	0.5 ppm v max	1 ppm v max
Mercury	(**)	1 ppm wt max
Total combined Sulphur	0.5 ppm wt max	0.5 ppm wt max
Water	(*)	2 ppm v max
Total combined Nitrogen (as NH ₃)	1 ppm v max NH ₃ + 1 ppm v max nitrogen oxides	1 ppm v max NH ₃ + 1 ppm v max nitrogen oxides

NB: Hydrogen feed contains Chlorine 3 ppm vol max.

(*) Supplier will confirm the water content in the effluent.

(**) Mercury to be removed. Supplier to indicate guaranteed outlet content using its technology.

3.2.2.4 Support ball should be inert type. **Vendor** to select appropriate Inert Balls (T-162 or equivalent) to ensure the inert characteristic of the support balls.

3.2.2.5 **Cycle Length / Regeneration**

No regeneration is foreseen for 117-VV-971 and 117-VV-972.

3.2.2.6 Pressure Drop

The allowable pressure drop at maximum flow-rate is **0.1 kg/cm²** max through each Treater bed.

3.2.2.7 Technical specifications: Hydrogen Feed Pressure, Temperature and Flow-rate

The conditions at the inlet of the Treater 117-VV-971 and 117-VV-972 are as following:

	Minimum	Normal	Maximum	Design
Flow	50 kg/h <i>(the vendor should indicate minimum acceptable flow-rate to achieve the required specification)</i>	-	-	100 kg/h
Pressure	39 kg/cm ² g	39.9 kg/cm ² g	41 kg/cm ² (g)	50 kg/cm ² g +Full Vaccum
Temperature	-	40 °C		80 °C

3.2.2.8 The following information is to be provided by the vendor:

S. No.	Information	Vendor's Confirmation
1	Recommended initial start-up conditions (oxygen content allowed to treat catalyst, any catalyst pretreatment required or recommended)	
2	Recommended normal inlet temperature (from initial to final bed lifetime)	
3	Maximum time for no flow in 117-VV-971 & 117-VV-972 at 39 kg/cm ² g	
4	Reaction Rate	
5	Recommended waste disposal procedure	
6	Conditions for treaters in case of 48 hours outage and for plant shut down	
7	Safety implications in the operation of these catalysts	
8	Minimum hydrogen flow for product quality	
9	Minimum hydrogen flow for safety	
10	Chemical safety data sheets for all catalysts and support balls	
11	Size and weight of supplied catalyst and support balls bags	
12	Detailed operating procedures description (from initial pretreatment and start-up to post treatment prior to removal)	
13	Recommended loading and unloading procedures for catalysts and Inert Balls	

3.2.2.9 The catalyst vendor shall guarantee the following performances:

3.2.2.9.1 Product purity at the outlet of the purification step based on the maximum flow-rate and inlet concentrations (removed components, by-products, contents shall be guaranteed) as per the specification Table - II,

3.2.2.9.2 Maximum pressure drops to be observed at any time of the bed life,

3.2.2.9.3 Catalyst bed life time: 3 years minimum.

3.2.3 117-VV-973: Hydrogen Dryer

The purpose of Water removal Treater in Hydrogen purification is to remove water from the Hydrogen feed.

3.2.3.1 The Treater will have the full capacity of treating the hydrogen stream.

3.2.3.2 This purification is downstream to a mercury trap, 117-VV-971 & an Oxygen Removal Treater, 117-VV-972 from Hydrogen feed.

3.2.3.3 Table-VIII gives the Hydrogen feed specification before and after 117-VV-973.

TABLE-VIII

Raw material		HYDROGEN
Component	Required specifications at package outlet	Specifications at package inlet
Hydrogen	99.99 mol % min	99.99 mol % min
Nitrogen	Balance	Balance
Methane	10 ppm wt max	10 ppm wt max
Other hydrocarbons	10 ppm v max	10 ppm wt max
Acetylene	1 ppm v max	1 ppm v max
Carbon Monoxide	0.5 ppm v max	0.5 ppm v max
Carbon Dioxide	0.5 ppm v max	0.5 ppm v max
Oxygen	0.5 ppm v max	0.5 ppm v max
Total Combined Suphur	0.5 ppm wt max	0.5 ppm wt max
Water	0.5 ppm v max	4 ppm v max
Total Combined Nitrogen	1 ppm v max	1 ppm v max NH3 + 1 ppm v max nitrogen oxides

NB: Hydrogen feed contains Chlorine 3 ppm vol max.

3.2.3.4 Support ball should be inert type. Vendor to select appropriate Inert Balls to ensure the inert characteristic of the support balls.

3.2.3.5 Cycle length / Regeneration

The adsorption duration and regeneration frequency will be based on a **30 day** cycle at **80 kg/h**.

Regeneration is performed by hot nitrogen in **up-flow** direction.

Flow-rate by vendor

Warm purge by vendor

Heat cycle by vendor

Cool cycle by vendor

Depressurization/pressurization by vendor

3.2.3.6 Pressure drop - The maximum pressure drop is **0.1 kg/cm²**.

3.2.3.7 Technical Specifications: Hydrogen Stream conditions

The conditions at the inlet of the treaters 117-VV-973 are the following:

	Minimum	Normal	Maximum	Design
Flow	50 kg/h <i>(the vendor should indicate minimum acceptable flow-rate to achieve the required specification)</i>	-	-	100 kg/h
Pressure	39 kg/cm ² g	39.5 kg/cm ² g	41 kg/cm ² g	50 kg/cm ² g + Full Vacuum
Temperature	-	40 °C		80 °C

3.3 NITROGEN

The purpose of reducing **Oxygen** and **carbon Monoxide** from Nitrogen feed is to minimize their effects on downstream polymerization reaction and / or on the quality of the product.

3.3.1 117-VV-570 A/B : Nitrogen O₂ / CO removal Treaters

3.3.1.1 Each Treater is a full capacity Treater with one in operation and the other in regeneration or in standby.

3.3.1.2 **Table-III** gives the nitrogen feed specification at the inlet and outlet of 117-VV-570 A/B.

TABLE-III

Component	Specification at outlet of 117-VV-570 A/B	Specification at inlet of 117-VV-570 A/B
Nitrogen	99.9 % v min	99.9 % v min
Hydrogen	1 ppm v max (1)	1 ppm v max
Hydrocarbons	1 ppm v max (1)	1 ppm v max
Carbon monoxide	0.1 ppm v max (1)	1 ppm v max
Carbon dioxide	4 ppm v max (1)	3 ppm v max
Oxygen	0.1 ppm v max	3 ppm v max
Water	1 ppm v max (1)	1 ppm v max

Notes:

(1) To be confirmed by Vendor.

- 3.3.1.3 Exchanger 117-EE-570 and heater 117-VV-571 are provided upstream of 117-VV-570 A/B to heat the nitrogen feed to the temperature as specified by **vendor**.
- 3.3.1.4 Support ball should be inert type. **Vendor** to select appropriate Inert Balls (**Denstone 57** or equivalent) to ensure the inert characteristic of the support balls.
- 3.3.1.5 **Technical specifications:** Nitrogen Feed Pressure, Temperature and Flow-rate
The conditions at the inlet of the Treater 117-VV-570 A/B are as following:

	Minimum	Normal	Maximum	Design
Flow	722 kg/h (the vendor should indicate minimum acceptable flow-rate to achieve the required specification)	1458 kg/h	-	5620 kg/h
Pressure	3.3 kg/cm ² g	5.3 kg/cm ² g	6.3 kg/cm ² g	10.5 kg/cm ² g+ Full Vacuum
Temperature	-	To be decided by the vendor (expected 120°C)		135 °C

3.3.1.6 Treater Preparation / Regeneration

30 days to be considered by the vendor for the adsorption duration and regeneration frequency at normal flow rate. Total regeneration duration to be less than **48 hours**.

Catalyst **Vendor** will size the 117-VV-570 A/B treaters for duty and stand-by on the basis of changing the catalyst beds every **3 years** (life time to be guaranteed by **Vendor**).

3.3.1.6.1 **Regeneration Nitrogen** is available in the following conditions:

Flow: *To be confirmed by Vendor*

Temperature: Operating 30 to 285°C
{Temperature controlled with upstream electrical heater. If higher temperature be required, **vendor** to advise}

Design 325 °C

Pressure at Treater inlet:

Operating up to 4.0 kg/cm²g

{Regeneration pressure is controlled at Treater outlet (control valve on line to atmosphere). **Vendor** to give required set point}

Design 10.5 kg/cm²g

Required nitrogen quality for regeneration/preparation is to be indicated by **Vendor** (N₂ purity, oxygen, water, carbon dioxide, carbon monoxide, oil contents, hydrogen and hydrocarbon).

However, proposed Nitrogen quality is given at **clause 3.6.3.3**.

3.3.1.6.2 **Hydrogen** for regeneration is available in the following conditions:

Flow *to be confirmed by Vendor*
Preliminary data is up to 5 % vol. of regeneration nitrogen.

Temperature Operating 60°C

Design 80°C

Pressure Operating by **Vendor**

{Regeneration nitrogen / hydrogen pressure is controlled at Treater outlet (control valve on line to atmosphere). **Vendor** to give required set point}

Design 10.5 kg/cm² (g)

However for proposed Hydrogen quality is given at Table -2 (VV – 971 inlet) clause no **3.2.2.3**.

It is assumed that initial preparation / start-up catalyst reduction is performed with hydrogen mixed with nitrogen. (Hydrogen and nitrogen available as described above).

3.3.1.6.3 **Vendor** to confirm that no additional facilities are required for this operation.

3.3.1.6.4 **Vendor** to advise if catalyst oxidation is required before disposal and if yes to indicate the operating procedure and the relevant required facilities.

3.3.1.6.5 **Compressed air** is available for catalyst preparation:

Flow *to be confirmed by vendor*

3.3.1.7 **Pressure Drop**

The allowable pressure drop at maximum flow-rate is **0.1 kg/cm²** max through each Treater bed.

3.3.1.8 The following information is to be provided by the vendor:

S. No	Information	Vendor's Confirmation
1	Recommended initial start-up conditions (oxygen content allowed to treat catalyst, any catalyst pretreatment required or recommended)	
2	Consequence of introducing O₂/N₂ mixture in 117-VV-570 A/B at temperature up to 285°C	
3	Recommended normal inlet temperature (from initial to final bed lifetime)	
4	Required nitrogen flow-rates for each operation	
5	Maximum time for no flow in 117-VV-570 A/B at operating pressure defined above	
6	Implications of standby Treater at minimum site temperature	
7	CO₂ and H₂O content at 117-VV-570 A/B outlet, at normal and peak flow	
8	Recommended waste disposal procedure	
9	Conditions for treaters in case of 48 hours outage and for plant shut down	
10	Safety implications in the operation of these catalysts	
11	Chemical safety data sheets for all catalysts and support balls	
12	Size and weight of supplied catalyst and support balls bags	
13	Detailed operating procedures description (from initial pretreatment and start-up to post treatment prior to removal)	
14	Recommended loading and unloading procedures for catalysts and Inert Balls	

3.3.1.9 The catalyst vendor shall guarantee the following performances:

- 3.3.1.9.1 Product purity at the outlet of the purification step based on the **maximum flow-rate and inlet concentrations** (removed components, by-products, contents shall be guaranteed) as per specification in **Table - III**,
- 3.3.1.9.2 **Nitrogen and hydrogen** flow-rates used for bed regeneration/preparation,
- 3.3.1.9.3 **Maximum pressure drops** to be observed on normal operation and on regeneration between Treater inlet and outlet flanges at any time of the bed life.
- 3.3.1.9.4 **Catalyst bed life time**: 3 years minimum.
- 3.3.1.9.5 **Cycle length**.

3.3.2 117-VV-571 A/B : Nitrogen Oxygenates Treaters

The purpose of reducing **Water and Carbon Dioxide** from Nitrogen feed is to minimize their effects on downstream polymerization reaction and / or on the quality of the product.

- 3.3.2.1 Upstream of this purification, the Nitrogen is treated to remove traces of Oxygen and Carbon Monoxide in 117-VV-570 A/B.
- 3.3.2.2 Each Treater is a full capacity Treater with one in operation and the other in regeneration or in standby.
- 3.3.2.3 Support ball should be inert type. **Vendor** to select appropriate Inert Balls (**Denstone 57** or equivalent) to ensure the inert characteristic of the support balls.
- 3.3.2.4 **Table-IV** gives the nitrogen feed specification at the inlet and outlet of 117-VV-571 A/B.

TABLE-IV

Component	Requirement at 117-VV-571 A/B outlet	Specification at 117-VV-571A/B inlet (after upstream treatments)
Nitrogen	99.9 % v min	99.9 % v min
Hydrogen	1 ppm v max	1 ppm v max
Hydrocarbons	1 ppm v max	1 ppm v max
Carbon monoxide	0.1 ppm v max	0.1 ppm v max (1)
Carbon dioxide	0.1 ppm v max	4 ppm v max (1)
Oxygen	0.1 ppm v max	0.1 ppm v max
Water	0.05 ppm v max (2)	1 ppm v max (1)

Note:

- (1) Maximum content to be checked during detailed engineering with 117-VV-571 A/B catalyst vendor.
- (2) Measurement by regular sampling.

3.3.2.5 Technical specifications: Nitrogen Feed Pressure, Temperature and Flow-rate

	Minimum	Normal	Maximum	Design
Flow	722 kg/h <i>(the vendor should indicate minimum acceptable flow-rate to achieve the required specification)</i>	1458 kg/h	-	5620 kg/h
Pressure	2.8 kg/cm ² g	4.7 kg/cm ² g	5.8 kg/cm ² g	10.5 kg/cm ² g +Full Vacuum
Temperature	30°C	40°C	50°C	80 °C

3.3.2.6 Treater Preparation / Regeneration

30 days to be considered by the vendor for the adsorption duration and regeneration frequency at normal flow rate. Total regeneration duration to be less than **48 hours**.

Adsorbent Vendor will size the 117-VV-571 A/B treaters for duty and stand-by on the basis of changing the catalyst beds every **3 years** (life time to be guaranteed by Vendor).

Nitrogen is available in the following conditions:

Flow: *To be confirmed by Vendor*

Temperature: Operating 30 to 285°C

{Temperature controlled with upstream electrical heater. If higher temperature be required, vendor to advise}

Design 325 °C

Pressure at Treater inlet: Operating up to 4.0 kg/cm²g

{Regeneration pressure is controlled at Treater outlet (control valve on line to atmosphere). Vendor to give required set point}

Design 10.5 kg/cm²g

Required nitrogen quality for regeneration/preparation is to be indicated by **Vendor** (N₂ purity, oxygen, water, carbon dioxide, carbon monoxide, oil contents, hydrogen and hydrocarbon).

However, proposed Nitrogen quality is given at clause 3.6.3.3.

3.3.2.7 **Pressure Drop**

The allowable pressure drop at maximum flow-rate is **0.1 kg/cm²** max through each Treater bed.

3.3.2.8 **The following information is to be provided by the vendor:**

S. No	Information	Vendor's Confirmation
1	Recommended normal inlet temperature (from initial to final bed lifetime)	
2	Required nitrogen flow-rates for each operation	
3	Maximum time for no flow in 117-VV-571 A/B at operating pressure defined above	
4	Implications of standby Treater at minimum site temperature	
5	Recommended waste disposal procedure	
6	Conditions for treaters in case of 48 hours outage and for plant shut down	
7	Chemical safety data sheets for all adsorbents and support balls	
8	Size and weight of supplied adsorbents and support balls bags	
9	Detailed operating procedures description (from initial pretreatment and start-up to post treatment prior to removal)	
10	Recommended loading and unloading procedures for adsorbents and Inert Balls	

3.3.2.9 The catalyst vendor shall guarantee the following performances:

- 3.3.2.9.1 Product purity at the outlet of the purification step based on the **maximum flow-rate and inlet concentrations** (removed components, by-products, contents shall be guaranteed) as per specification in **Table- IV**,
- 3.3.2.9.2 **Nitrogen flow-rates** used for bed regeneration/preparation,
- 3.3.2.9.3 **Maximum pressure drops** to be observed on normal operation and on regeneration between Treater inlet and outlet flanges at any time of the bed life,
- 3.3.2.9.4 **Adsorbents bed life time**: 3 years minimum.
- 3.3.2.9.5 **Cycle length**

3.4 BUTENE-1 / HEXENE-1

The purpose of Butene-1 / Hexene-1 Purification Treaters, 117-VV-941 A/B is to remove **Water, Carbon Dioxide, and Carbonyls & Peroxides for Butene-1 and water and carbonyls for Hexene-1** in order to meet INEOS specifications.

3.4.1 117-VV-941 A/B : Butene-1 / Hexene-1 Treater

- 3.4.1.1 Both the treaters are identical. Each individual Treater will have the full capacity of treating the Butene-1/ Hexene-1 stream while the other is off-line and being regenerated.
- 3.4.1.2 **Vendor** must select adsorbent to minimize loss of Butene-1/ Hexene-1 by side reaction. **Vendor** must indicate the fraction of Butene-1/ Hexene-1 loss through the bed.
- 3.4.1.3 Support ball should be inert type. **Vendor** to select appropriate Inert Balls (**Denstone 57** or equivalent) to ensure the inert characteristic of the support balls.
- 3.4.1.4 **Pressure drop** The maximum pressure drop is 0.1 kg/cm² per Treater bed.
- 3.4.1.5 **Cycle length / Regeneration**
The adsorption duration and regeneration frequency will be based on a **30 day** cycle at normal flow-rate.

Flow-rate	by vendor
Warm purge	by vendor
Heat cycle	by vendor
Cool cycle	by vendor
Depressurization/pressurization	by vendor
- 3.4.1.6 **Table-VI** gives the Butene-1 feed specification before and after 117-VV-941 A/B Treaters

TABLE-VI

The following table gives the butene-1 feed specification before and after the 117-VV-941A treaters.

Components to remove are Water, Carbon Dioxide, Carbonyls and Peroxides.

Raw material		BUTENE-1	
Component	Required specifications at 117-VV-941A/B outlet	Specifications at 117-VV-941A inlet	
Butene-1	99 %wt min	99	%wt min
Other Butenes	0.9 % max	0.9	% max
Butanes			
1,3 butadiene + propadiene	200 ppm v max	200	ppm v max
Total Acetylenes	10 ppm v max	10	ppm v max
Carbon Monoxide	1 ppm v max	1	ppm v max
Carbon Dioxide	2 ppm wt max	4	ppm wt max
Oxygen	1 ppm vt max	1	ppm vt max
Total combined Sulphur (as S)	1 ppm v max	1	ppm v max
Water	0.2 ppm wt max	2	ppm v max
Carbonyls (as C=O)	0.5 ppm wt max	5	ppm wt max
Chloride	1 ppm wt max	1	ppm wt max
Alcohol (as methanol)	1 ppm wt max	1	ppm wt max
MTBE	10 ppm wt max	10	ppm wt max
Peroxides	0.5 ppm wt max	0.5	ppm wt max
C5 and Heavier	50 ppm wt max	50	ppm wt max

Note:

Butene feed contains ethylene 1% wt max, ethane 600 ppm wt max, ether (as DME) 2 ppm v max.

3.4.1.7 Technical Specifications: Butene-1 Stream conditions

The conditions at the inlet of the treaters 117-VV-941 A/B are the following

	Minimum	Normal	Maximum	Design
Flow	Vendor to indicate minimum acceptable flow-rate, to achieve the required specification	3192 kg/h	-	4100 kg/h
Pressure	4 kg/cm ² g	4.5 kg/cm ² g	4.5 kg/cm ² g	17.2 kg/cm ² g +Full Vacuum
Temperature	1°C	30°C	40°C	80°C

- 3.4.1.8 **Table-IX** gives the Hexene-1 feed specification before and after 117-VV-941 A/B Treaters.

TABLE - IX

The following table gives the hexene-1 feed specification before and after the 117-VV-941B treater.

Components to remove are Water and Carbonyls.

Raw material	HEXENE-1	
Component	Required specifications at 117-VV-941B outlet	Specifications at 117-VV-941B inlet
Hexene-1	99 %wt min	99 %wt min
Lighter than C6	0.5 %wt max	0.5 %wt max
Heavier than C6	0.5 %wt max	0.5 %wt max
Other C6	1 %wt max	1 %wt max
Olefins (Internal & Branched) + Paraffins	2.0 %wt max	2.0 %wt max
Carbon Monoxide	1 ppm wt max	1 ppm wt max
Carbon Dioxide	1 ppm wt max	1 ppm wt max
Oxygen	0.5 ppm wt max	0.5 ppm wt max
Water	0.2 ppm wt max	25 ppm wt max
1,3 Hexadiene	10 ppm wt max	10 ppm wt max
Carbonyls (as C=O)	0.5 ppm wt max	2 ppm wt max
Peroxides (as active O)	1 ppm wt max	1 ppm wt max
Total Combined Suphur	1 ppm wt max	1 ppm wt max
Alcohol (as methanol)	1 ppm wt max	2.5 ppm wt max
Benzene	1 ppm wt max	1 ppm wt max
THF	5 ppm wt max	5 ppm wt max

3.4.1.9 **Technical Specifications: Hexene-1 Stream conditions**

The conditions at the inlet of the treaters 117-VV-941 A/B are the following

	Minimum	Normal	Maximum	Design
Flow	<i>Vendor to indicate minimum acceptable flow-rate, to achieve the required specification</i>	3300 kg/h	-	3300 kg/h
Pressure	0.5 kg/cm ² g	1.6 kg/cm ² g	1.6 kg/cm ² g	17.2 kg/cm ² g +Full Vaccum
Temperature	1°C	30°C	40°C	80°C

3.5 PENTANE

The pentane Treater, 117-VV-944 will remove **traces of water** and other contaminants from the Pentane feed

3.5.1 117-VV-944: Pentane Treater

- 3.5.1.1 The Treater will have the full capacity of treating the Pentane stream.
- 3.5.1.2 Treater will work in down-flow adsorption mode.
- 3.5.1.3 Support ball should be inert type. **Vendor** to select appropriate Inert Balls (**Denstone 57** or equivalent) to ensure the inert characteristic of the support balls.
- 3.5.1.4 **Pressure drop** The maximum pressure drop is **0.2 kg/cm²**.
- 3.5.1.5 **Table-VII** gives the Pentane feed specification before and after 117-VV-944.

TABLE-VII

The following table gives the pentane feed specification before and after the 117-VV-944 treater.

Components to remove are Water and oxygenated compounds.

Raw material		PENTANE	
Component	Required specifications at 117-VV-944 outlet	Specifications at 117-VV-944 inlet	
n-pentane	No specific requirement Licensee to advise	50	%wt (*)
i-pentane		50	%wt (*)
C5 content	99 %wt min	99	%wt min
Total Combined Sulphur	2 ppm wt max	2	ppm wt max
Water	0.2 ppm wt max	50	ppm wt max
Oxygen (in vapour phase)	100 ppm v max	100	ppm v max
Total oxygenated compound (as C=O)	0.5 ppm wt max	5	ppm wt max
Carbon Monoxide	1 ppm wt max	1	ppm wt max
Carbon Dioxide	1 ppm wt max	1	ppm wt max
Total aromatics (as Benzene)	20 ppm wt max	20	ppm wt max
Bromine index	50 mg Br/100g max	50	mg Br/100g max

(*) Other supplies acceptable in the range 60-80 % n-pentane and balance i-pentane

3.5.1.6

Technical Specifications: Pentane Stream conditions

The conditions at the inlet of the treaters 117-VV-944 are the following:

	Minimum	Normal	Maximum	Design
Flow	<i>Vendor to indicate minimum acceptable flow-rate, to achieve the required specification</i>	3030 kg/h	-	3400 kg/h
Pressure	4 kg/cm ² g	4.5 kg/cm ² g	4.5 kg/cm ² g	12 kg/cm ² g +Full Vacuum
Temperature	1°C	30°C	40°C	80°C

3.5.1.7 Cycle length / Regeneration

Treater will be discontinuously fed by Pentane from battery limit with a flow of **5 m³/h**. The Treater will be sized for the purification of **50 Tons** of Pentane, corresponding to **30 days** production minimum. Downstream storage will allow **48 hours** maximum for regeneration.

Regeneration is performed by hot nitrogen in **up-flow** direction.

Flow-rate	by vendor
Warm purge	by vendor
Heat cycle	by vendor
Cool cycle	by vendor
Depressurization/pressurization	by vendor

3.6 CONDITIONS AND PROCEDURES FOR REGENERATION OF ADSORBANT

The following conditions and procedures are valid for the following equipments:

1. 117-VV-932 A/B : Ethylene Oxygenates Treaters
2. 117-VV-941 A/B : Butene-1/Hexene-1 Treater
3. 117-VV-944 : Pentane Treater
4. 117-VV-973 : Hydrogen Dryer

3.6.1 Regeneration Conditions

Regeneration is done by hot nitrogen. **Vendor** will confirm the quality and indicate the flow-rate required.

- 3.6.2 The regeneration nitrogen is sent to atmosphere. The Treater is first drained either to the flare or to a collector, and then a low flow of nitrogen is used to purge trapped hydrocarbons to flare, and finally the warm or heat cycle as described above can start.

3.6.3 Conditions of Nitrogen used for Regeneration

3.6.3.1 Nitrogen Feed Composition

Required nitrogen quality for regeneration/preparation is to be indicated by **Vendor** (N2 purity, oxygen, water, carbon dioxide, carbon monoxide, oil contents, hydrogen and hydrocarbon).

3.6.3.2 Nitrogen Feed Pressure & Temperature

Regeneration nitrogen pressure is controlled at the Treater outlet. **Vendor** need to give required set point.

Available **pressure** at Treater inlet:

Nominal up to 4.0 kg/cm²g

*{Regeneration nitrogen pressure is controlled at Treater outlet (control valve on line to flare/atmosphere). **Vendor** to give required set point}*

Design 10.5 kg/cm²g.

Available **temperature** at Treater inlet, including heat losses.

Nominal 30 to 285°C

*{Temperature controlled with upstream electrical heater (by others). Should a higher temperature be required, **vendor** to advise}*

Max 285°C

Design 325°C

3.6.3.3 Nitrogen of following specification is available at OSBL:

Component	OSBL standard Quality
Nitrogen	99.9 % v min
Oxygen	3 ppm v max
Water	Dew point -100 °C @ atm
Carbon Dioxide	3 ppm v max
Carbon Monoxide	Traces
Oil	Nil

Variable	Normal	Max
Pressure	6 Kg/cm ²	7 Kg/cm ²
Temperature	30 °C	40 °C

3.6.4 The following information is to be provided by the vendor:

- 3.6.4.1 For each individual bed: normal regeneration temperature, minimum and maximum allowable regeneration temperature, temperature variation ramps of heating and cooling (Attach table to be filled by **Vendor**),
- 3.6.4.2 For each individual bed and Treater: expected **minimum temperature** reached during desorption prior to regeneration (Attach table to be filled by **Vendor**),
- 3.6.4.3 **Adsorption cycle** detailed description (normal regeneration flow-rate, heat cycle length, cool cycle length, temperature, etc.),
- 3.6.4.4 Recommended **initial start-up conditions** (oxygen content allowed to treat adsorbent, required or recommended adsorbent pretreatment),
- 3.6.4.5 Recommended normal **inlet temperature** (from initial to final bed lifetime),
- 3.6.4.6 Required **nitrogen flow-rates** for each operation,
- 3.6.4.7 **Maximum time for no flow** in 117-VV-944 & 117-VV-941 A/B,

- 3.6.4.8 Recommended conditions for spare Treater of 117-VV-941 A/B and 117-VV-932 A/B
 - 3.6.4.9 **Minimum flow** to assure desired outlet quality,
 - 3.6.4.10 Butene-1/Hexene-1 & Pentane **losses due to reactivity**,
 - 3.6.4.11 Recommended **waste disposal procedure**,
 - 3.6.4.12 Conditions for treaters in case of **48 hours** outage and for plant shut down,
 - 3.6.4.13 **Chemical safety data sheets** for all catalysts and support balls,
 - 3.6.4.14 **Size and weight** of supplied catalyst and support balls bags,
 - 3.6.4.15 Detailed operating procedures description (from initial pretreatment and start-up to post treatment prior to removal),
 - 3.6.4.16 Recommended **loading and unloading** procedures for catalyst and support balls,
- 3.6.5 For each individual Treater, the following table shall be filled in,

STEP	N2 FLOW	DURATION	TEMPERATURE	PRESSURE
Initial start-up from "under air conditions"				
Pressurization				
Normal Conditions				
Depressurization				
N2 Sweeping				
Regeneration				
Cooling				
Pressurization feed in				
Shut down prior to removal of the molecular sieve and adsorbent				

3.7 ADSORBENT PERFORMANCE

The adsorbent vendor shall guarantee the following performances for the equipments mentioned below:

- 1. 117-VV-932 A/B : Ethylene Oxygenates Treaters
 - 2. 117-VV-941 A/B : Butene-1/Hexene-1 Treater
 - 3. 117-VV-944 : Pentane Treater
 - 4. 117-VV-973 : Hydrogen Dryer
- 3.7.1 Product purity at the outlet of the purification step based on **the maximum flow-rate and inlet concentrations** (removed components, by-products, contents shall be guaranteed) as per the specification of **Table –I,V,II,VIII,III,IV,VI,IX & VII respectively**,
 - 3.7.2 **Maximum / minimum Nitrogen flow-rates** used for bed regeneration/preparation,
 - 3.7.3 **Maximum pressure drops** to be observed on normal operation and on regeneration between Treater inlet and outlet flanges at any time of the bed life,
 - 3.7.4 **Adsorbent bed life time:** 3 years minimum,
 - 3.7.5 **Cycle length**

4.0 DELIVERY SCHEDULE:

The entire material shall be dispatched in a single lot within 24 weeks from the issue of order. Date of B/L or L/R as applicable shall be deemed as date of delivery. Considering shipment in bulk, tolerance of $\pm 5\%$ on the ordered qty. is permissible. Payment shall be made based on qty. shipped at load point. However, if there is any change in the delivery schedule, 30 days advance intimation will be given.

5.0 APPROVAL AND ACCEPTANCE

Bidder shall dispatch the material only after getting approval from BCPL. The basis for acceptance shall be the inspection report & test results of bidder. In case the same is not found in conformity with the specified value, the whole lot is liable to be rejected.

6.0 DOCUMENTS REQUIRED

Technical offer of the bidder should contain the following documents in hard and soft copy.

- 6.1 Technical datasheet of supplied Molecular Sieves / Catalysts / Adsorbents and Inert Balls.
 - 6.2 Procedure for Molecular Sieves / Catalysts / Adsorbents and Inert Balls loading, unloading and start-up. Instruction manual for personnel safety precautions during loading and unloading of Molecular sieves / Catalysts / Adsorbents.
 - 6.3 Storage instruction and safe handling procedure & Material safety data sheet (MSDS).
- Reference list of users and names of contact persons

7.0 GUARANTEE & REPLACEMENT

- 7.1 The material supplied shall be **guaranteed** for satisfactory performance for a period of **03 years** from the **date of charging** of the material in respective equipments or **04 years** from the **date of receipt** of material at site, whichever is earlier. Satisfactory performance means each equipment loaded with Molecular Sieves / Catalysts / Adsorbents should be able to process the feed stream within the specified range of parameters as mentioned in Technical specification.
- 7.2 Performance of the Molecular Sieves / Catalysts / Adsorbents over the **service life** shall be measured based on the analysis at the downstream of the equipments. Provision for online as well as offline analysis is available. In case, the supplier wishes to cross-check the performance of the Molecular Sieves / Catalysts / Adsorbents, if required, they should arrange all necessary equipments on their own for the same at their risk & cost.
- 7.3 The molecular sieves / Catalysts / Adsorbents & Inert Balls must perform satisfactorily throughout the service life. In case of non-performance of the supplied Molecular Sieves / Catalysts / Adsorbents and Inert Balls during the initial period of 12 months, the bidder shall replace the entire charge of Molecular Sieves / Catalysts / Adsorbents and Inert Balls free of cost to BCPL.
- 7.4 However, if the Molecular Sieves / Catalysts / Adsorbents charge fails to perform after a period of 12 months from the date of charging but within the guaranteed period

specified above then the bidder shall supply to M/s BCPL, Molecular Sieves/ Catalysts / Adsorbents of the same specification as per the following formula:

$$Q = \frac{(Z - X) * Y}{Z}$$

Where,

- Q = Quantity of Molecular Sieves / Catalysts / Adsorbents to be supplied by the bidder as replacement, MT
- Z = Guaranteed life of Molecular Sieves / Catalysts / Adsorbents in months
- X = Actual life of Molecular Sieves/ Catalysts / Adsorbents in months to be reckoned from the date of intimation by BCPL regarding non-performance of Molecular Sieves / Catalysts / Adsorbents over e-mail/ phone/fax.
- Y = Total Quantity of Molecular Sieves / Catalysts / Adsorbents supplied as per purchase order (in MT)

The above formula is also valid for Inert Balls replacement.

- 7.5 The basis of delivery of such quantity of the Molecular Sieves / Catalysts / Adsorbents to be supplied as replacement shall be the same as mentioned in the Purchase order for delivery of the original quantity of molecular sieves / Catalysts / Adsorbents.
- 7.6 The cost of the difference in the quantity i.e. (full charge quantity – Calculated formula quantity) shall be borne by BCPL.

In case of **two successive failures**, BCPL shall purchase full charge of Molecular Sieves/ Catalysts / Adsorbents from other bidder and the cost of the same will be borne by the bidder as per the given formula above.

8.0 INSPECTION& TESTING:

Testing, Inspection & Submission of Test Results/Inspection Report to BCPL, before dispatch of the Molecular Sieves/ Catalysts / Adsorbents&Inert Balls, shall be in **vendor's** scope. BCPL reserves the right to depute its representative during testing. **Vendor** has to submit test certificate/Inspection certificate for each batch of Molecular Sieves/ Catalysts / Adsorbents and Inert Balls produced before the dispatch of material and only after getting clearance from BCPL the material shall be dispatched to BCPL site.

Material supplied shall be accompanied by 'Test & Inspection Certificate/Report' for each lot of Production/Manufacture for BCPL.

9.0 PACKING INSTRUCTION:

- 9.1 The material shall be supplied under prevalent standard international industrial practice.
- 9.2 The Molecular Sieves shall be screened carefully before packing. Bidder shall specify whether any subsequent screening is recommended just before loading.

- 9.3 Each container shall be adequate in strength and certified by the Molecular sieves manufacturer to be of proper material to protect the Molecular Sieves / Catalysts / Adsorbents / Inert balls from moisture, dirt and deterioration for a period of at least shelf life of material. Each packing should be marked with i.e. Name of material & code no., Manufacturer's name & batch number, Date of manufacture & net quantity etc.

10.0 PRICE BASIS & EVALUATION

Overseas bidder is required to quote both 'FOB' and 'CFR Kolkata' price of MOLECULAR SIEVES / INERT BALLS strictly as per the price schedule (SECTION VII) given in the tender document. However, BCPL may finalize the order on 'FOB' or 'CFR Kolkata' basis, at its sole discretion. In order to obtain clearance from the Ministry of Surface Transport (Govt. of India), bidder is required to keep the 'CFR Kolkata' prices valid for 45 days beyond the ordering date. Bids would be evaluated and comparison would be made on CFR basis.

11.0 FIRM & FIXED PRICES:

The quoted prices shall remain FIRM AND FIXED till contract period.

12.0 PAYMENT TERMS:

(For Foreign bidder)

100% payment (less Indian Agent's Commission, if any) shall be made through Irrevocable Unconfirmed Letter of Credit (LC) & LC confirmation charges outside India shall be borne by seller. If bidder insists on confirmed LC, the confirmation charges on both sides shall be borne by Seller. The letter of credit shall be opened on receipt of unconditional acceptance of purchase order. Indian Agent commission (IAC), if any, shall be released directly to Indian agent in non-convertible Indian Rupees after receipt and acceptance of items at site. TDS, if any, shall be deducted from the payment of IAC.

Banker's details of buyer's:

Account NO- 32034267038
Bank's Name : State Bank Of India
Address: Thana Charali, Dibrugarh, Assam - 786001
SWIFT code : SBININBB661
Branch Code: 00071
Ph. No. : 0373-2321048
Fax no. :0373 2324369
E-mail : sbi.00071@sbi.co.in

For Domestic Bidders:

100% payment with full taxes and duties and transportation charges against dispatch

documents shall be done within 30 days of receipt and acceptance of goods of last consignment at site.

No advance payment shall be made by BCPL.

NB: For Technical Assistance:

- a) Service Tax on Import Services will fall under reverse charges & is to be paid by BCPL.
- b) Income tax will be deducted as per the Indian income tax act on DTA (India's Double Taxation Avoidance Agreements) whichever is lower.

13.0 SECURITY DEPOSIT-CUM-CPBG:

- a) Within 15 days of the receipt of the notification of award/Fax of Intent from the PURCHASER the successful bidder shall furnish the performance guarantee for 10% of order value through DD/BG/LC. The amount towards performance guarantee shall be in the currency of the Contract.
- b) The performance guarantee shall be for an amount indicated in "Technical Specifications & Scope of Work" of the value of the contract towards faithful performance of the contractual obligations and performance of equipment. This Bank Guarantee shall be from any Indian scheduled bank or a branch of an International bank situated in India and registered with Reserve bank of India as scheduled foreign bank. However, in case of bank guarantees from banks other than the Nationalized Indian banks, the bank must be a commercial bank having net worth in excess of Rs. 100 Crores and a declaration to this effect should be made by such commercial bank either in the Bank Guarantee itself or separately on its letterhead.
- c) The performance guarantee shall be denominated in the currency of the contract
- d) The performance Guarantee shall be valid for the duration of 90 days beyond the expiry of /warranty/Guarantee period. The Bank Guarantee will be discharged by PURCHASER not later than 6 months from the date of expiration of the Seller's entire obligations, including any warranty obligations under the CONTRACT.

14.0 PRICE REDUCTION SCHEDULE (PRS):

The portion of supply completed in all respect, which can be used for commercial operation, shall not be considered for applying PRS, if delivered within contractual delivery period. In case of delay in delivery of each lot of materials beyond contractually agreed delivery schedule, price reduction schedule will be applicable @0.5% of the delayed delivery value (of the particular lot under consideration) per week of delay or part thereof. However, total deductions on account of PRS shall not exceed 5% (FIVE PERCENT) of the total order value. The PRS shall be applicable on basic order value excluding taxes and duties.

15.0 QUALITY ASSURANCE & CONTROL

- 15.1 Quality Assurance (QA) shall mean the organizational set up, procedures as well as test methods and facilities developed by Bidder in order to assure that Molecular Sieves, leaving contractor's shop is of highest possible quality, i.e. either equal to or better than the requirement specified.
- 15.2 Quality Control (QC), shall mean all the tests, measurements, checks and calibrations which are to be carried out in bidder shop in order to compare the actual characteristics of the Molecular Sieves/ Catalysts / Adsorbents with the

specified ones, along with furnishing of the relevant documentation (certificates / records) containing the data or result of these activities.

- 15.3 QA / QC systems to be adopted for this specification may be based on systems already developed and implemented by Bidder for similar plants elsewhere

15.0 REJECTION CRITERIA:

Bidders are advised to submit their bid strictly as per the terms and conditions of the bid document. In the event of deviation(s) stipulated by the bidder their bid shall be considered incomplete/non-responsive and the bid shall be liable for rejection. The following shall constitute REJECTION CRITERIA for this tender and bid may be summarily rejected if any deviation (s) to these conditions found in bid –

- i) Bid Validity lesser than specified period in tender
- ii) Non-acceptance of delivery period
- iii) Request for advance payment
- iv) Non-acceptance of Performance Guarantee
- v) Non acceptance of Guarantee /Warranty
- vi) Non-submission of Firm and Fixed Price
- vii) Non-submission of rate as per price schedule format (with all desired break-up i.e. FOB & CFR Rate for foreign bidders and Ex-works, taxes, duties, freight etc for Indian Bidder)
- viii) Non-acceptance of Resolution of Disputes/Arbitration Clause, applicable laws and force majeure etc.
- ix) Any deviation to scope of supply, specification etc.

16.0 EVALUATION OF OFFERS:

The evaluation of all the responsive bids for supplies shall be made as under to arrive at the lowest evaluated offer combining all items as per SOR and SCC and award shall be done accordingly:

- a) **Indigenous/Domestic Bidder:** The evaluated price of domestic bidder shall include the following:
- 1. Ex-works price quoted by the bidder (with customs duty on imported raw materials and component)
 - 2. Packing & Forwarding (if any)
 - 3. Excise Duty, Educational cess (if any)
 - 4. Sales tax with (against form C/3B) or without concessional Form / VAT
 - 5. Any other charges/taxes/duties mentioned by the bidder in price schedule format.
 - 6. Commercial/Technical loading/ Price Advantage, (if any)

In case of statutory change/revision, the rate of ED & Cess, CST/VAT considered for evaluation shall be prevailing rate as on final date of Un priced Bid opening.

Domestic bidders are required to provide cenvat invoice (to the extent possible) to enable BCPL to avail cenvat benefit.

(B) **Foreign Bidders:** The evaluated price of foreign bidder shall include the following:

1. CFR price quoted by bidder including Marine freight (i.e. freight from Port of Exit to Port of Entry at Kolkata) *[Both FOB & CFR prices to be indicated by the bidder separately in the price schedule]*.
2. Marine Insurance @ 1% of FOB price.
3. Landing charges @1% of CIF Kolkata price
4. Customs Duty and Educational cess (if any)
5. CVD and Educational cess (if any)
6. Any other special additional import duty (if any).
7. Any other charges/taxes/duties mentioned by the bidder in price schedule format.
8. Commercial/Technical loading/Price Advantage, (if any)

For the purpose of evaluation, the prevailing rates of taxes and duties (including Customs duty and other import duties) as applicable on date of final submission of technical bid (Part-I) shall be considered. However, order shall be issued based on the prevailing rates of taxes and duties as applicable as on date of issuance of order. For domestic bidders, in case of any statutory increase in rate of Excise duty and Sales Tax/VAT (except due to turnover of bidder) within the scheduled delivery period, shall be borne by BCPL.

(C) The evaluated price of all the domestic bidders and foreign bidders as above shall be compared together to arrive at the lowest offer as per given below:

i) WHERE INDIGENOUS & FOREIGN BIDS EXIST:

The comparison between indigenous & foreign offers shall be done as enumerated at (A) & (B) above. If lowest bidder happens to be Indian Bidder, all the Indian bidder(s) price will be evaluated as per (iii) below and final L-1 bidder will be considered for award.

ii) WHERE ONLY FOREIGN BIDS EXIST:

The comparison shall be done based on CFR rate quoted by bidders.

iii) WHERE ONLY INDIGENOUS BIDS EXIST:

F.O.T. site basis inclusive of all duties and taxes and freight up to Lepetkata site + Commercial/Technical loading, (if any).

The foreign bidders are required to quote FOB and CFR prices strictly as per the price schedule of tender document. However, BCPL may finalize the order on FOB or CFR basis, at the sole discretion of BCPL. In order to obtain clearance from the Ministry of Surface Transport, Govt. of India to convert the order from FOB to CFR basis (if required), the foreign bidders are required to keep the CFR prices valid for 45 days beyond the date of Order.

Note:

- (1) Bidder's prices will be converted to Indian Rupees at the Bills selling exchange rate declared by State Bank of India on the working day prior to Priced Bid Opening for the purpose of evaluation of prices.
- (2) In case of evaluated price found equal for 2 or more bidders (i.e. if there is more than one L1 bidders), then revised price /discount will be obtained from qualified bidder(s), Even after situation of tally of evaluated price arises , BCPL may finalize the order on single bidder, on it's sole discretion.

17.0 PRICE REDUCTION SCHEDULE:

As per GCC.

18.0 LOADING CRITERIA FOR BID EVALUATION

- 18.1 In the event of following specified deviations to the terms & conditions of the Bid Document, loading of the bidders prices shall be done as under:

(a) Price Reduction Schedule (PRS) for delayed delivery

- (i) If bidder accepts PRS clause of tender – No Loading
- (ii) If bidder quotes PRS @ 0.5% of total order value per week of delay or part thereof subject to maximum of X % (specified by bidder), then loading shall be done by (5-X) %
- (iii) Other than above, loading will be done by 5%.

Note: Loading factor shall be applied on the 'FOB/CFR' price quoted by Foreign bidders and 'Ex-works' price quoted by Domestic bidders.

19.0 COUNTRY OF ORIGIN OF GOODS:

A certificate to this effect issued/endorsed by concerned Chamber of Commerce shall form part of shipping documents.

20.0 SHIPPING DOCUMENTS:

The shipping documents shall comprise the following –

1. Commercial Invoice (Original)
2. Bill of Lading
3. Packing List
4. Test Certificate/Certificate of Analysis
5. 'Fall clause' Certificate(if applicable)
6. Certificate of Origin endorsed by relevant Chamber of Commerce
7. Copy of fax sent to BCPL's underwriters for arranging transit insurance
8. Warranty Certificate

For indigenous supplier the following documents shall be part of negotiable document:

1. Commercial Invoice (Original)/Excise invoice in triplicate.
2. Challan
3. LR/Consignee copy
4. Packing List
5. Test Certificate/Certificate of Analysis
6. Warranty certificate.

21.0 Transit Insurance:

Transit Insurance shall be arranged and paid by the Purchaser. The supplier shall send advance intimation of shipment for this purpose & detailed addresses of our underwriter as below:

Name of the officer concern: J. C. Ghosh
Sr.Divisional Manager
M/s National Insurance Co. Ltd.,
R.K.Bordoloi Path, Dibrugarh-786001,
State- Assam (India)
Tel. No.: 91+373-2326339/2324409(Fax)
Mobile No.: 91+9435331112
E-mail: JC.Ghosh@nic.co.in
(POLICY NO. 200300/44/09/5050000001)

22.0 Billing And Documentation:

Immediately after shipment, two sets of non-negotiable shipping documents is to be sent at following address:

Dy. Manager (C&P)
Central Ware House Building
Brahmaputra Cracker and Polymer Limited,
PO: Lepetkata,
District – Dibrugarh, Assam, India PIN – 786006
E-Mail: neeta.dutta@bcplindia.co.in
Ph no: +91 373-2914611
Mob: 08011117266

Note: The Bill of Lading, Invoice and Packing list specifically must show full details of the contents indicating country of origin, consignee name and all other particulars. The invoice must show item description, unit rate and total prices.

Before finalization of the invoice, vendor has to take approval of draft invoice from BCPL over mail to avoid discrepancy at the time of clearance of good.

Negotiation Of Shipping Documents

- a) In case of negotiation thru Bank, i) Overseas vendor shall negotiate the shipping documents thru Bank within 10 days of shipment for sea-shipment and 3 days of shipment for air-shipment. In case of direct documents, the vendor shall send the documents to BCPL immediately after shipment. (ii) Indigenous vendor shall send the documents to BCPL immediately.
- b) Vendor shall send non-negotiable documents thru e-mail/fax within 2 days of shipment to the concerned officials of BCPL, Lepetkata.
- c) Vendor shall intimate the courier details of the original shipping documents (i.e. docket no., name of courier, consignee details etc.) to the concerned purchase officer of BCPL and BCPL's Banker thru e-mail/fax immediately after dispatch of documents.

Original shipping documents should be sent directly to BCPL's Banker, details as under:

Account NO- 32034267038

Bank's Name : State Bank Of India

Address: Thana Charali, Dibrugarh, Assam - 786001

SWIFT code : SBININBB661

Branch Code: 00071

Ph. No. : 0373-2321048

Fax no. : 0373 2324369

E-mail : sbi.00071@sbi.co.in

Seller shall send FAX/TLX of all shipment details to BCPL, immediately after shipment is made. Simultaneously, two sets of non-negotiable shipping documents should be sent to BCPL.

Correspondence address of BCPL – Lepetkata is as follows:

Dy. Manager (C&P)

Central Ware House Building

Brahmaputra Cracker and Polymer Limited,
PO: Lepatkata,
District – Dibrugarh, Assam, India PIN – 786006
E-Mail: neeta.dutta@bcplindia.co.in ;
Ph no: +91 373-2914611
Mob:08011117266.

23.0 Import License (Applicable for overseas suppliers)

It may please be noted that the import is covered under the Export & Import Policy, 2009-2014. The item(s) does not/do not fall(s) under "RESTRICTED ITEMS" of the policy and hence no Import License is required.

The Seller shall advise booking offices of Indian Vessels abroad that:

"THE CONSIGNMENT(S) WAS/WERE BEING IMPORTED IN INDIA UNDER THE EXPORT & IMPORT POLICY 2009-2014".

24.0 Shipping Arrangement (Applicable for overseas suppliers)

Shipment shall be made as per General Purchase Condition as applicable and packing, marking, shipping and documentation enclosed as mentioned at SHIPPING INSTRUCTIONS/DETAILS

The Bill of Lading shall be 'Clean on Board' and shall indicate in favour of Purchaser or order of the bank (and not order of the shipper) and notify column should indicate BRAHMAPUTRA CRACKER & POLYMER LIMITED with address.

In case of shipment on FOB (Seaport) basis, two non-negotiable copies of the Bill of Lading should be forwarded to the Secretary, Shipping Coordination Committee, Ministry of Surface Transport, 1, Sansad Marg, New Delhi-110001, India after the shipment is made.

Bill of Lading shall, under no circumstances, be made "Order to the Shipper"

25.0 Shipping Instructions/Details(Applicable for overseas suppliers)

PACKING & MARKINGS

The material shall be supplied under prevalent standard international industrial practice.

- a) The Molecular Sieves / Catalysts / Adsorbents and Inert Balls shall be screened carefully before packing. Bidder shall specify whether any subsequent screening is recommended just before loading.
- b) All Molecular Sieves / Catalysts / Adsorbents and Inert Balls shall be supplied in LDPE bags lined drums (new MS or HDPE) fully sealed and each drum marked with:
 - i. Material code no.

- ii. Manufacturer's name.
 - iii. Manufacturer batch no.
 - iv. Date of manufacture.
 - v. Drum no. (for identification)
 - vi. Name of Molecular sieves / Catalysts / Adsorbents for material identification.
 - vii. Net quantity (M³ / MT) of Molecular sieves / Catalysts / Adsorbents for each drum.
- c) Each container shall be adequate in strength and certified by the Molecular sieves / Catalysts / Adsorbents manufacturer to be of proper material to protect the Molecular sieves / Catalysts / Adsorbents from moisture, dirt and deterioration for a period of at least four years.
- If any conditions of storage or handling could result in loss of activity of the Molecular sieves / Catalysts / Adsorbents, such limitations shall be marked on each container or notified as a separate storage instruction.
- Consignment shall be packed air worthy/sea worthy and following markings to appear on packing.

For BCPL

Port/Airport

Destination

Order No.

Item

Net Weight : Gross weight

Case No.

(No. Of total cases) : Dimensions

IMPORTANT

MOST APPROPRIATE AND SUITABLE PACKING FOR ECONOMICAL AIR/SEA FREIGHT APPLICABILITY AND PROPER DOCUMENTATION FLIGHT/SHIPMENT WISE INVOICE AND AWB/BILL OF LADING & OTHER DOCUMENTS AS PER NORMAL PRACTICE SHALL BE SNURED.

SHIPMENT AND ADVANCE NOTICES (Applicable for overseas suppliers)

Immediately after shipment, seller shall send advance information of Shipping/Dispatch particulars, by way of telex/fax message by giving following details For expeditious collection and clearance of material from Customs/Port authorities.

- ⇒ Vessel Name or Flight No. :
- ⇒ Bill of Lading No. or AWB No. & Date :
- ⇒ E.T.A. Kolkata :
- ⇒ Invoice Nos. & Date :

⇒	Invoice Value	:
⇒	No. of cases	:
⇒	Gross Weight	:
⇒	Other details, if any	:

PREPARATION OF SHIPPING DOCUMENTS (Applicable for overseas suppliers)

The Bill of Lading/AWB shall be made in favour of BCPL, Lepetkata, INDIA or order of the bank wherever applicable the AWB/Bill of Lading shall also be endorsed by shipper as per ordered terms.

The conditional or qualified bill of lading/AWB shall not be accepted.

All documents including bill of lading, packing-list etc. shall be in English language only.

The Bill of Lading/AWB, Invoice and packing list specifically must show, Mark & no. of contents, case wise, country of origin, consignee, Airport/Port of destination and all other particulars.

The packing list must show apart from other particulars, the actual contents in each case, net & gross weights and dimension with number of packages.

The invoice must show the unit rate and net total FOB price (C&F prices in case of order on C&F basis) and should indicate Kolkata as port consignee.

One Set of Shipping Documents should contain minimum following documents. Any additional documents as may be mentioned in P.O. and agreed between Seller/Purchaser in some specific case shall also be made available.

- i) Bill of Lading/AWB,
 - ii) Invoice,
 - iii) Packing List
 - iv) Certificate of Conformity or Manufacturer's Certificate towards product Warranty.
- Copy of Fax/Telex sent to BCPL, Dibrugarh, India and Insurance Company

DISPOSAL OF SHIPPING DOCUMENTS (Applicable for overseas suppliers)

SEA SHIPMENTS

The seller shall obtain the shipping documents complete in all respect including three original stamped copies of Bill Of Lading immediately after shipment is made and

courier the same as under:

- i) Two copies of original bill of lading with one non-negotiable copy of bill of lading along with three copies each of Invoice, Packing list, Freight Memo, all other documents as specified in L/C through bank to the purchaser.

- ii) In case of sea-shipment, two copies of non-negotiable shipping documents along with bill of lading to Shipping Co-ordination Officer, Ministry of Shipping and Transport, New Delhi - 110 001 Attention - Mr. Sanjay Sharma.

AIR SHIPMENTS

The vendor shall obtain shipping documents complete in all respect including original stamped copies of AWB immediately after shipment is made and send the same as under: -

- A. First original AWB along with one copy of non-negotiable AWB along with 3 copies of invoice, packing list, and other documents as specified in L/C to be routed through bank duly negotiated.
- B. Two sets of documents (as mentioned at (2) above to Sr. Manager (C&P), Central Ware House, P. O. Lepetkata – 786 006 District – Dibrugarh (ASSAM) INDIA.

26.0 SHIPMENT

BY SEA:-

a) **For FOB Contracts:-**

Shipping arrangement will be made by the shipping co-ordination officer, chartering Division, Ministry of surface Transport, New Delhi through their forwarding Agents/nominees as indicated to whom adequate notice of not less than six weeks about the readiness of the cargo for shipment, should be given by the seller for finalizing the shipping arrangement:

i) **FOR CONSIGNMENT FROM UK/CONTINENT PORTS:**

M/s. Panalpina World Transport
Panalpina Welttransport GmbH
Spalding Str-64, D 20097
Hamburg, Germany
Ph.: +4640-23771 – 133
Fax: +4640-23771-342 or 341

ii) **FOR CONSIGNMENT FROM USA, ATLANTIC:**

Gulf & West Ports
M/s. OPT OVERSEAS PROJECT
TRANSPORT INC.,
46, SELLERS STREET, KEARNY
NEW JERSEY 07032, USA

Ph.: + 1 201 998 7771

Fax.: + 1 201 998 7833,

iii) **FOR CONSIGNMENT FROM JAPANESE PORT:**

The Embassy of India, Tokyo, Japan

Ph.: + 81 3 32622391

Fax.: + 81 3 32344866

iv) **BLACK SEA PORTS OF BULGARIA & ROMANIA:**

The Secretary,
Indo-Soviet Shipping Service,
C/o. The shipping Corporation of India Ltd.,
'Shipping House' 245, Madam Cama Road,
Mumbai – 400021

Ph.: +9122-22026666/22026785

v) **POLISH PORTS:**

The Secretary,
Indo-Polish Shipping Service
C/o. Shipping Corporation of India Limited
'Shipping House' 245, Madam Cama Road
MUMBAI – 400 021

Cable: ShipIndia, Mumbai

FOR INDOPOL

vi) **FOR CONSIGNMENT FROM OTHER AREAS,**

The shipping Corporation of India Ltd.
'Shipping House' 245, Madam Cama Road,
Mumbai – 400021

Cable: Ship India, Mumbai

b) **FOR CFR/CIF CONTRACTS:-**

The seller shall arrange shipment of stores by vessels belonging to the members of the Conference Lines. If sellers finds the space on the conference Line vessels is not available in any specific shipment, he should inform the shipping Co-ordination Officer, Ministry of Surface Transport, 1, Sansad Marg, New Delhi – 110 001 (INDIA)(CABLE: TRANSCHART: NEW DELHI; FAX NO. +91 11 23718614/23352726)

c) All shipment of materials shall be made by First class direct vessels. All shipments shall be under deck unless carriage on deck is unavoidable.

TYPICAL DRAWING OF THE EQUIPMENTS

Annexure 1

**PROCESS DATA SHEET
&
TYPICAL DRAWING OF THE
EQUIPMENTS**

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Annexure 1

TYPICAL DRAWING & PROCESS DATA SHEET OF THE EQUIPMENTS

1. Name of the Equipment: _____
2. Location: _____
3. Drawing No.: _____
4. Process No.: _____
5. Date: _____
6. By: _____
7. Checked by: _____
8. Approved by: _____
9. Remarks: _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Subodh Kumar

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CLIENT BCPL		VESSEL		JOB N°	8692Y	Rev	
LOCATION LEPETKATA - INDIA				SECTION	FPU		
UNIT 220 kta LLDPE / HDPE				ITEM	117-VV-933		
				No. OFF	1		
		SERVICE	ETHYL. SULPHUR GUARD TREATER				
		PAGE	1 / 2				

OPERATING		PROCESS DESIGN	
	kg/cm ² (g)		kg/cm ² (g)
PRESSURE			
Normal Op	34.8		56
Predying (N2)	4		10.5
TEMPERATURE	°C		°C @ kg/cm ² (g)
Normal Op	40		80 @ 56
Predying (N2)	150		-45/325 (3)@10.5
SHELL			ENDS
MATERIALS	L.T.C.S.		L.T.C.S.
CORR. ALLOWANCE	3 mm		3 mm

Fluid: Ethylene

Density: 48.1 kg/m³ @ 40°C

Insulation: YES (heat conservation)

Lower TL elevation above ground: (4)

NOZZLE DATA			
REP	Nb	Dia. in	SERVICE
1	1	8	Inlet
2	1	8	Outlet
3	2	1 1/2	Temperature indicator (6)
4	1	4	Catalyst draw off
5	1	8	Handhole (1)
6	2	20	Manhole
7	1	2	Spare

(*) CYLINDRICAL SHELL LENGTH ONLY.

DRUM ORIENTATION		VERTICAL		BOOT		HEAD TYPE	
INTERNAL DIAMETER	in	2200		INTERNAL DIAMETER	mm		
HEIGHT OR LENGTH (*)	mm	8500		HEIGHT OR LENGTH (*)	mm		

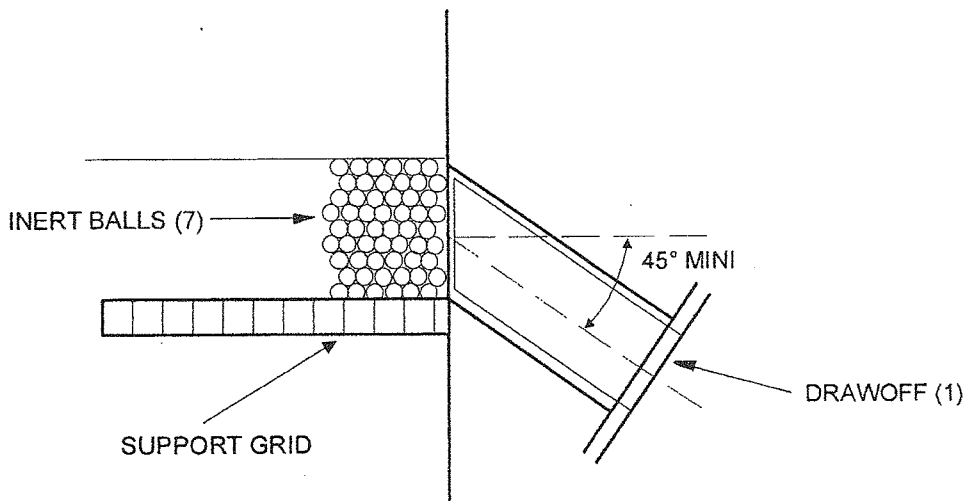
REV.	XA	0	1
DATE	Jan 09	Aug 09	Sept 09
BY	MG	MG	MG
CHECKED BY	FB	FB	FB

Surya Prakash Patel

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CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-933	
			No. OFF	1	
			SERVICE	ETHYL. SULPHUR GUARD TREATER	
			PAGE	2 / 2	

DETAIL 1 - CATALYST DRAWOFF



PROCESS NOTES

1. Complete with plug insert to ensure flush fitting with cylindrical shell.
2. Catalyst supply: BASF PURISTAR R3-12 (zinc oxide) or equivalent: 28.9 m³
3. DELETED.
4. Elevation to allow easy emptying of catalysts from bottom withdrawal nozzle.
5. S.S. 8 mesh grid.
6. Spaced 180° apart in plan view around circumference.
7. Inert balls T-162 or equivalent.
8. Detail Engineering to ensure that total pressure drop from flange to flange is lower than 0.1 kg/cm².

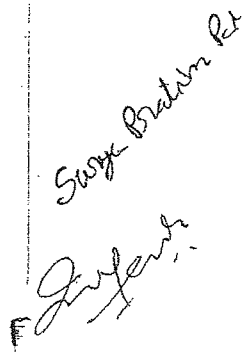
MECHANICAL NOTES

- A. Johnson screen type grid or equivalent (see note 8).

REV.	XA	0	1						
DATE	Jan 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

BLANK SHEET

Surge Protection



CLIENT BCPL	VESSEL	JOB N° 8692Y	Rev
LOCATION LEPETKATA - INDIA		SECTION FPU	
UNIT 220 kta LLDPE / HDPE		ITEM 117-VV-931 A/B	
		No. OFF 2	
		SERVICE ETHYLENE C2H2/CO/O2 TREATERS	
		PAGE 1 / 2	

OPERATING	PROCESS DESIGN	
PRESSURE	kg/cm ² (g)	kg/cm ² (g)
Normal Op	33.6	56
Regeneration (N2)	4	10.5
TEMPERATURE	°C	°C @ kg/cm ² (g)
Normal Op	95	120 @ 56
Regeneration (N2)	210	-45/325 (3) @ 10.5
SHELL	ENDS	
MATERIALS	L.T.C.S.	L.T.C.S.
CORR. ALLOWANCE	3 mm	3 mm

Fluid: Ethylene
Density: 32.4 kg/m³ at 95°C
Insulation: YES (heat conservation)
Lower TL elevation above ground: (4)

NOZZLE DATA			
REP	Nb	Dia. in	SERVICE
1	1	8	Inlet
2	1	8	Outlet
3	4	1 1/2	Temperature Indicator (6)
4	1	4	Catalyst draw off
5	1	8	Handhole (1)
6	2	20	Manhole
7	1	2	Spare

Impingement plate Ø 350

Inert balls 25mm(7)

Hold-down grid (optional)(5)

CO/O2/C2H2 removal catalyst (2)

Inert balls 6mm (7)

Inert balls 13mm (7)

See detail 1

MINI

Note A

1700

DRUM ORIENTATION			VERTICAL		BOOT	
INTERNAL DIAMETER	in	1700	INTERNAL DIAMETER	mm		
HEIGHT OR LENGTH (*)	mm	4450	HEIGHT OR LENGTH (*)	mm		

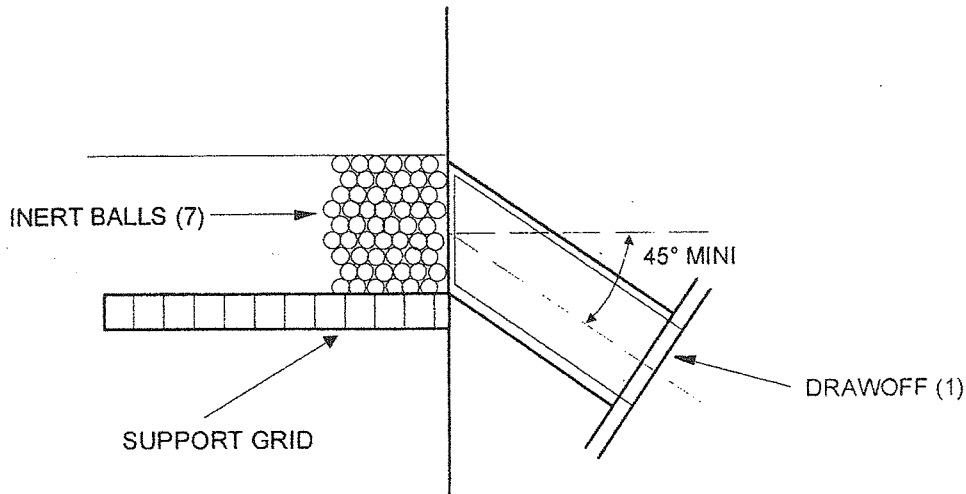
REV.	XA	0	1				
DATE	Jan 09	Aug 09	Sept 09				
BY	MG	MG	MG				
CHECKED BY	FB	FB	FB				

500g Plastic Pel

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CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-931 A/B	
			No. OFF	2	
			SERVICE	ETHYLENE C2H2/CO/O2 TREATERS	
			PAGE	2 / 2	

DETAIL 1 - CATALYST DRAWOFF



PROCESS NOTES

1. Complete with plug insert to ensure flush fitting with cylindrical shell.
2. Catalyst supply : BASF PURISTAR R3-16 or equivalent : 8 m³
3. DELETED.
4. Elevation to allow easy emptying of catalysts from bottom withdrawal nozzle.
5. SS304 8 mesh grid.
6. Temperature indicator is 90° apart in plan view around circumference.
7. Inert balls T-162 or equivalent.
8. Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.2 kg/cm².

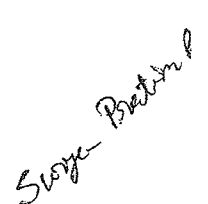
MECHANICAL NOTES

- A. Johnson screen type grid or equivalent (see note 8).

REV.	XA	0	1						
DATE	Jan 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

BLANK SHEET

Swaga Product Rev



[Signature]

CLIENT BCPL		VESSEL		JOB N°	8692Y	Rev	1/80
LOCATION LEPETKATA - INDIA				SECTION	FPU		
UNIT 220 kta LLDPE / HDPE				ITEM	117-VV-932 A/B		
				No. OFF	2		
		SERVICE	ETHYL. OXYGENATES TREATERS				
		PAGE	1/3				

OPERATING		PROCESS DESIGN	
kg/cm2(g)		kg/cm2(g)	
PRESSURE			
Normal Op.	32.2		56
Regeneration (N2)	4		10.5
TEMPERATURE	°C	°C @ kg/cm2(g)	
Normal Op.	43	80 @ 56 (6)	
Regeneration (N2)	270 (3)	-45 / 325 (3) @ 10.5	
SHELL	ENDS		
MATERIALS	L.T.C.S.		
CORR. ALLOWANCE	3 mm		

Fluid: Ethylene
Density: 39.01 kg/m3 @ 43°C
Insulation: YES (heat conservation)
Lower TL elevation above ground: (4)

NOZZLE DATA			
REP	Nb	Dia. In	SERVICE
1	1	8	Inlet
2	1	8	Outlet
3	5	1 1/2	Temperature indicator (9)
4	1	4	Absorbent draw off
5	1	8	Handhole (1)
6	2	24	Manhole
7	1	2	Spare

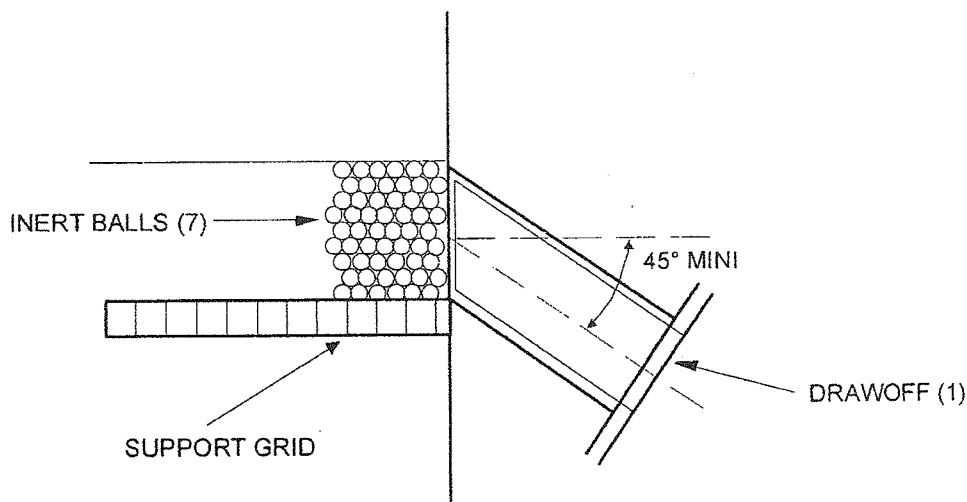
(*) CYLINDRICAL SHELL LENGTH ONLY.

DRUM ORIENTATION		VERTICAL		BOOT	
INTERNAL DIAMETER	mm	3000 (3)		INTERNAL DIAMETER	mm
HEIGHT OR LENGTH (*)	mm	6680 (3)		HEIGHT OR LENGTH (*)	mm
REV.	XA	0		1	
DATE	Jan 09	Aug 09		Sept 09	
BY	MG	MG		MG	
CHECKED BY	FB	FB		FB	

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CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-932 A/B	
			No. OFF	2	
			SERVICE	ETHYL. OXYGENATES TREATERS	
			PAGE	2/3	

DETAIL 1 - ADSORBENT DRAWOFF



PROCESS NOTES

- Complete with plug insert to ensure flush fitting with cylindrical shell.
- Adsorbent supply
Above adsorbents: 1.1 m³ of inert balls (Denstone D-57 1/2" or equivalent).
Adsorbents:
 - For H₂O removal: 3.5 m³ of UOP 3A-EPG 1/16" molecular sieve or equivalent.
 - For CH₃OH/NH₃/Acetone removal: 8.5 m³ of UOP AZ-300 7x14 mesh or equivalent.
 - For H₂S/CO₂ removal: 28.5 m³ of UOP CG-731 7x12 mesh or equivalent.
Below adsorbents: 1.2 m³ of inert balls (0.6 m³ of Denstone D-57 1/8" above 0.6 m³ of Denstone D-57 1/4" or equivalent)
- DELETED.
- Elevation to allow easy emptying of adsorbents from bottom withdrawal nozzle.
- S.S. 20 mesh grid (0.85 mm opening).

REV.	XA	0	1						
DATE	Jan 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

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Surge Protection

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CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-932 A/B	
			No. OFF	2	
			SERVICE	ETHYL. OXYGENATES TREATERS	
			PAGE	3/3	

6. -36°C after depressurisation at atmospheric pressure.
7. Denstone 57 or equivalent. Ball size to be given by adsorbent Vendor.
8. Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.2 kg/cm².
9. Equally spaced in plan view around circumference.

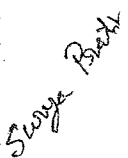
MECHANICAL NOTES

- A. Johnson screen grid type or equivalent (see note 8).

REV.	XA	0	1						
DATE	Jan 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

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Surge Protection Rx



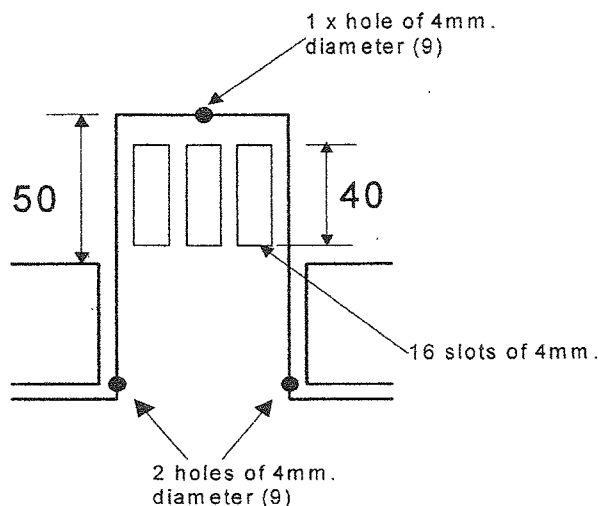
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VESSEL

175

CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-971	
			No. OFF	1	
			SERVICE	HYDROGEN MERCURY TRAP	
			PAGE	2/2	

DETAIL 1 - OUTLET INSERT



PROCESS NOTES

1. Complete with plug insert to ensure flush fitting with cylindrical shell.
2. Catalyst supply:
BASF SELEXSORB HG (6x8 mesh) or equivalent :0.05 m³
3. DELETED.
4. Elevation to allow easy emptying of catalysts from outlet nozzle.
5. SS304 8 mesh grid.
6. Spaced 180° in plan view around circumference.
7. Inert balls T-162 or equivalent.
8. Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.1 kg/cm².
9. Holes at low and high points of insert.

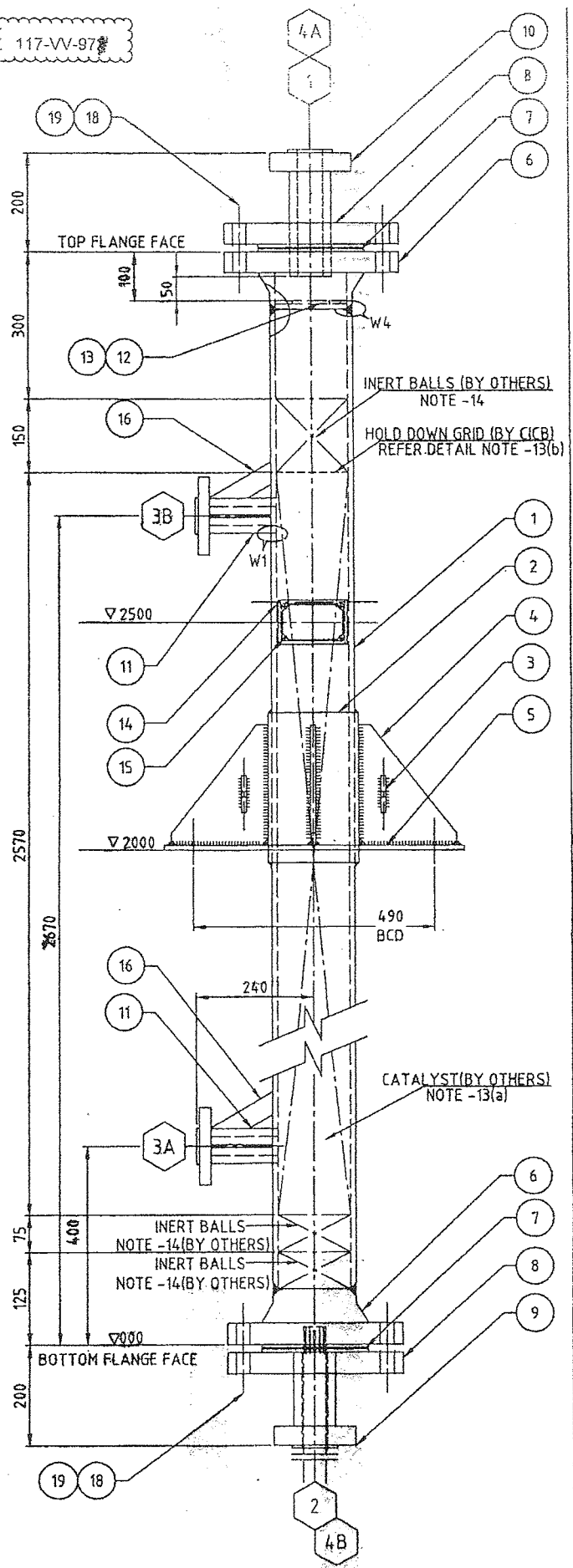
REV.	XA	0	1						
DATE	Feb 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

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Swagha Prakashan

117-VV-97

174



ELEVATION
(NOT VALID FOR NOZZLE ORIENTATION)

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123

CLIENT BCPL	VESSEL		JOB N° 8692Y	Rev
LOCATION LEPETKATA - INDIA			SECTION FPU	
UNIT 220 kta LLDPE / HDPE			ITEM 117-VV-972	
			No. OFF 1	
	SERVICE HYDROGEN O2 TREATER		PAGE 1/2	

PRESSURE	OPERATING	PROCESS DESIGN																				
Normal Op.	kg/cm ² (g) 39.7	kg/cm ² (g) 50 / FV																				
TEMPERATURE	°C	°C @ kg/cm ² (g)																				
Normal Op.	40	80 @ 50 / FV																				
SHELL		ENDS																				
MATERIALS	C.S.	C.S.																				
CORR. ALLOWANCE	3.0 mm	3.0 mm																				
Fluid: Hydrogen																						
Density: 3.1 kg/m ³ @ 40°C																						
Insulation: NO.																						
Lower TL elevation above ground: (4)																						
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="4">NOZZLE DATA</th> </tr> <tr> <th>REP</th> <th>Nb</th> <th>Dia. In</th> <th>SERVICE</th> </tr> <tr> <td>1</td> <td>1</td> <td>2</td> <td>Inlet</td> </tr> <tr> <td>2</td> <td>1</td> <td>2</td> <td>Outlet</td> </tr> <tr> <td>3</td> <td>4</td> <td>1 1/2</td> <td>Temperature indicator (6)</td> </tr> </table>			NOZZLE DATA				REP	Nb	Dia. In	SERVICE	1	1	2	Inlet	2	1	2	Outlet	3	4	1 1/2	Temperature indicator (6)
NOZZLE DATA																						
REP	Nb	Dia. In	SERVICE																			
1	1	2	Inlet																			
2	1	2	Outlet																			
3	4	1 1/2	Temperature indicator (6)																			

(*) CYLINDRICAL SHELL LENGTH ONLY.	
DRUM ORIENTATION	VERTICAL
INTERNAL DIAMETER	6 ND (3)
HEIGHT OR LENGTH (*)	3220 (3)
BOOT	
INTERNAL DIAMETER	
HEIGHT OR LENGTH (*)	
HEAD TYPE:	

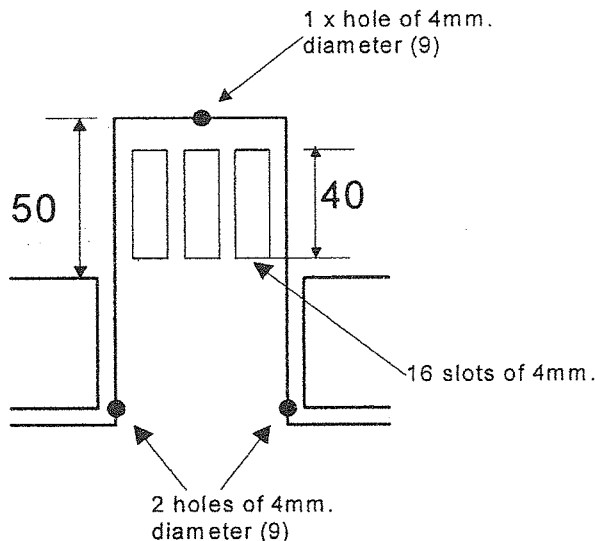
REV.	XA	0	1
DATE	Feb 09	Aug 09	Sept 09
BY	MG	MG	MG
CHECKED BY	FB	FB	FB

VESSEL

Surge Protection Pat

CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-972	
			No. OFF	1	
			SERVICE	HYDROGEN O2 TREATER	
			PAGE	2/2	

DETAIL 1 - OUTLET INSERT



PROCESS NOTES

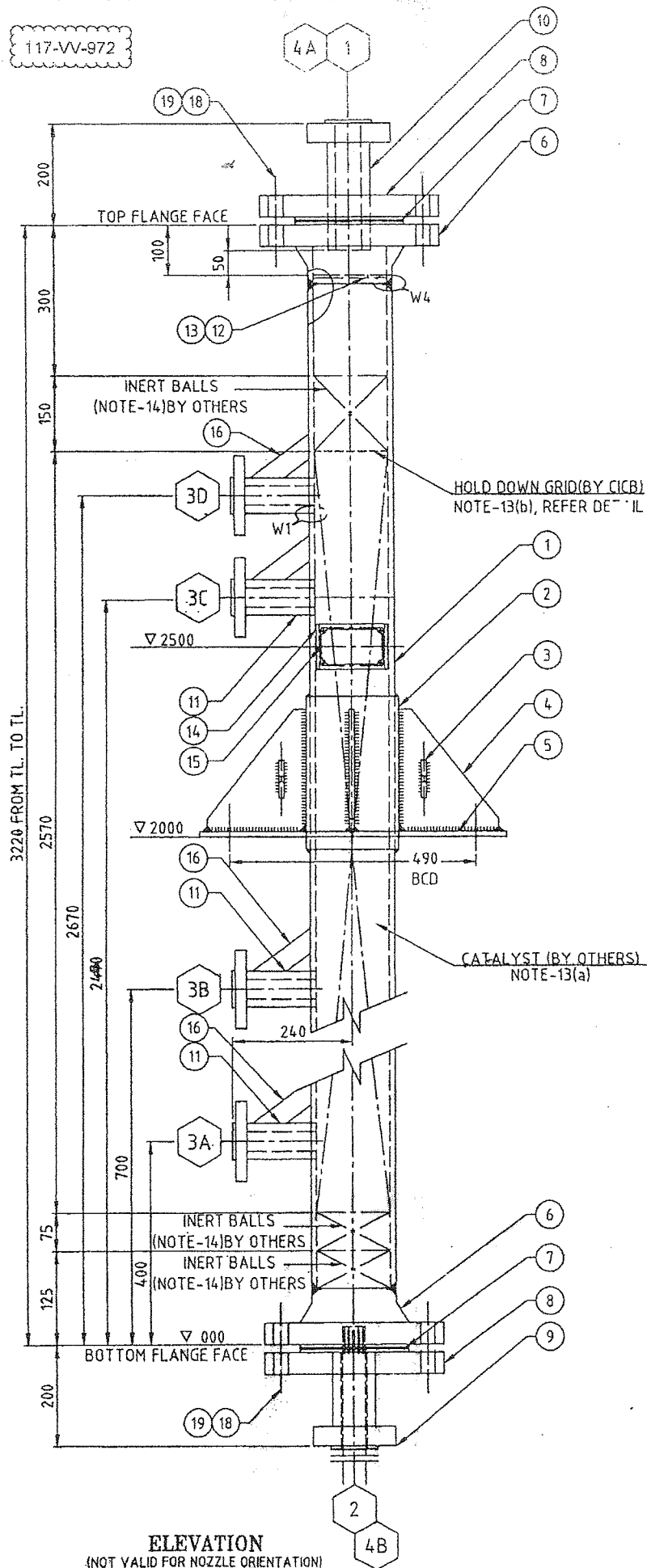
1. Complete with plug insert to ensure flush fitting with cylindrical shell.
2. Catalyst supply:
PURISTAR R0-20 BASF (spheres of 2-4 mm diameter) or equivalent:
0.05 m³
3. DELETED.
4. Elevation to allow easy emptying of catalysts from outlet nozzle.
5. SS304 8 mesh grid.
6. Equally spaced in plan view around circumference.
7. Inert balls T-162 or equivalent.
8. Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.1 kg/cm².
9. Holes at low and high points of insert.

REV.	XA	0	1						
DATE	Feb 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

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Surge Protection Pt

117-VV-972



ELEVATION
(NOT VALID FOR NOZZLE ORIENTATION)

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170

CLIENT BCPL	VESSEL	JOB N° 8692Y	Rev
LOCATION LEPETKATA - INDIA		SECTION FPU	
UNIT 220 kta LLDPE / HDPE		ITEM 117-VV-973	
		No. OFF 1	
		SERVICE HYDROGEN DRYER	
		PAGE 1/2	

OPERATING	PROCESS DESIGN
PRESSURE kg/cm ² (g)	kg/cm ² (g)
Normal Op. 39.5	50 / FV
Regeneration (N2) 4.0	10.5
TEMPERATURE °C	°C @ kg/cm ² (g)
Normal Op. 40	80 @ 50 / FV
Regeneration (N2) 270 (3)	325 @ 10.5
SHELL	ENDS
MATERIALS 1.25 Cr	1.25 Cr
CORR. ALLOWANCE 3.0 mm	3.0 mm

Fluid: Hydrogen
 Density: 3.1 kg/m³ @ 40°C
 Insulation: YES (heat conservation)
 Lower TL elevation above ground: (4)

NOZZLE DATA			
REP	Nb	Dia. In	SERVICE
1	1	2	Inlet
2	1	2	Outlet
3	2	1 1/2	Temperature Indicator (8)
4	1	4	Adsorbent draw off
5	1	8	Handhole (1)
6	2	18	Body flange
7	1	2	Spare

(*) CYLINDRICAL SHELL LENGTH ONLY.

DRUM ORIENTATION	VERTICAL	BOOT
INTERNAL DIAMETER	in 16 ND (3)	INTERNAL DIAMETER mm
HEIGHT OR LENGTH (*)	mm 3060 (3)	HEIGHT OR LENGTH (*) mm

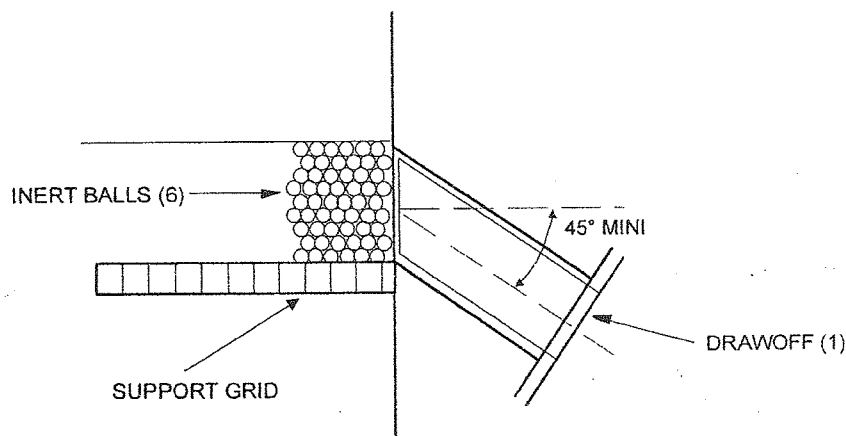
REV.	XA	0	1
DATE	Jan 09	Aug 09	Sept 09
BY	MG	MG	MG
CHECKED BY	FB	FB	FB

Survey Product Per

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CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-973	
			No. OFF	1	
			SERVICE	HYDROGEN TREATER	
			PAGE	2/2	

DETAIL 1 - ADSORBENT DRAWOFF



PROCESS NOTES

1. Complete with plug insert to ensure flush fitting with cylindrical shell.
2. Adsorbent supply:
Above adsorbent: 0.029 m³ of inert balls (Denstone D-57 1/2" or equivalent).
Adsorbent: 0.224 m³ UOP 13X-PG 1/16" molecular sieve or equivalent.
Below adsorbent: 0.028 m³ of inert balls (0.014 m³ of Denstone D-57 1/8" above 0.014 m³ of Denstone D-57 1/4" or equivalent)
3. DELETED.
4. Elevation to allow easy emptying of adsorbents from bottom withdrawal nozzle.
5. S.S. 20 mesh grid (0.85 mm opening).
6. Denstone 57 or equivalent. Ball size to be given by adsorbent Vendor.
7. Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.1 kg/cm².
8. Spaced 180° in plan view around circumference.

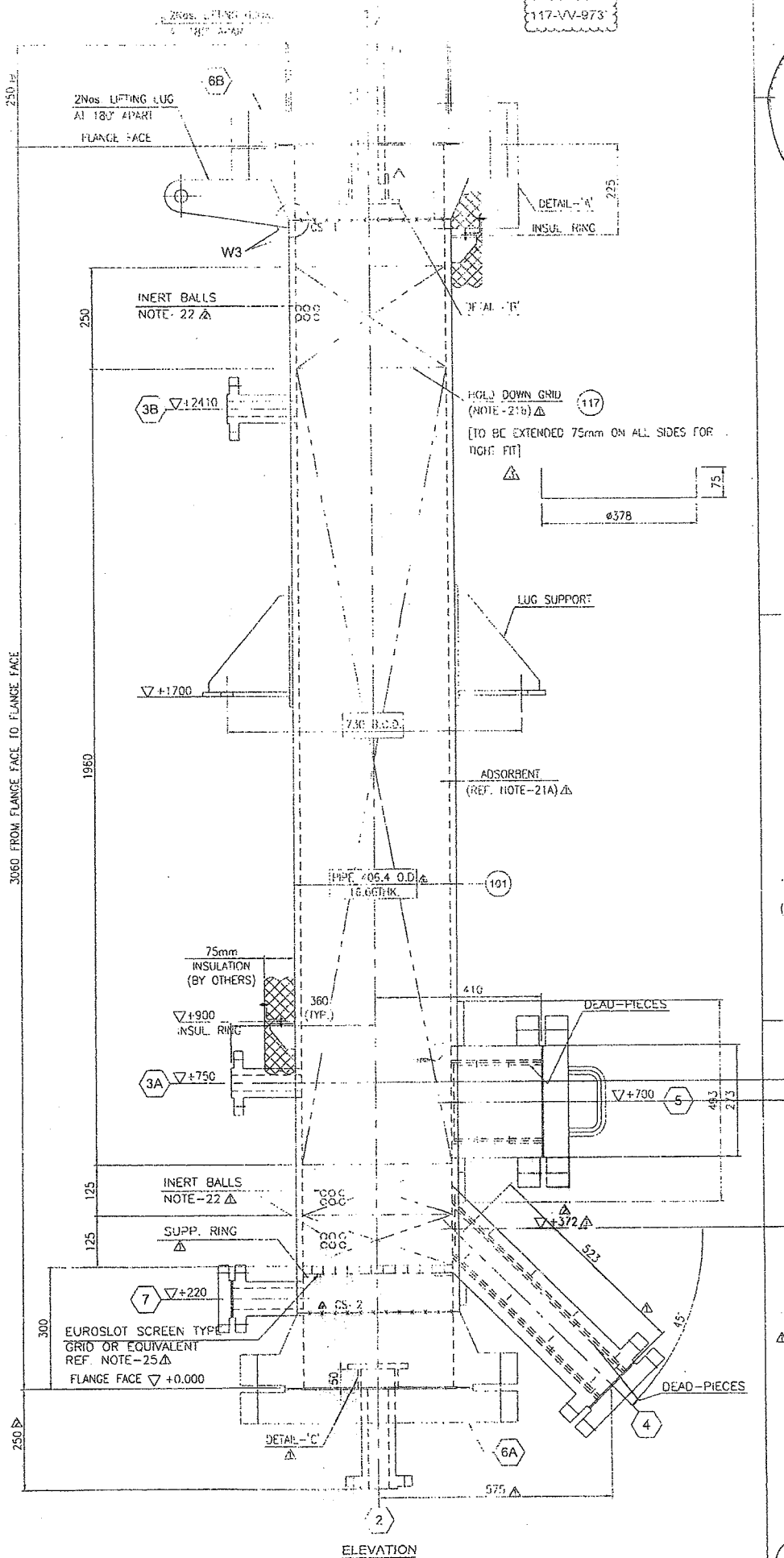
MECHANICAL NOTES

- A. Johnson screen grid type or equivalent (see note 7).

REV.	XA	0	1						
DATE	Jan 09	Aug 09	Sept 09						
BY	MG	MG	MG						
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Swage Precision Ball

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1/17

CLIENT BCPL	VESSEL	JOB N° 8692Y	Rev
LOCATION LEPETKATA - INDIA		SECTION RU	
UNIT 220 kta LLDPE / HDPE		ITEM 117-VV-570 A/B	
		No. OFF 2	
		SERVICE N2 O2 / CO REMOVAL TREATERS	
		PAGE 1/2	

OPERATING	PROCESS DESIGN
PRESSURE kg/cm ² (g)	kg/cm ² (g)
Normal Op 5.3	10.5
Regeneration 4.0	10.5
TEMPERATURE °C	°C @ kg/cm ² (g)
Normal Op 120	135 @ FV
Regeneration 30 to 285	325 @ 10.5
SHELL	ENDS
MATERIALS C.S.	C.S.
CORR. ALLOWANCE 3 mm	3 mm

Fluid: Normal Op: Nitrogen
 Regeneration: Nitrogen + hydrogen up to 5% vol (2)
 Density : 5.7 kg/m³ @ 120°C
 Insulation: YES (heat conservation)
 Lower TL elevation above ground: (4)

NOZZLE DATA			
REP	Nb	Dia. In	SERVICE
1	1	6	Inlet
2	1	6	Outlet
3	2	1 1/2	Temperature indicator
4	1	4	Catalyst draw off
5	1	8	Handhole
6	2	20	Manhole (1)

DRUM ORIENTATION		VERTICAL		BOOT		HEAD TYPE	
INTERNAL DIAMETER	mm	850	INTERNAL DIAMETER	mm			
HEIGHT OR LENGTH (*)	mm	2800	HEIGHT OR LENGTH (*)	mm			

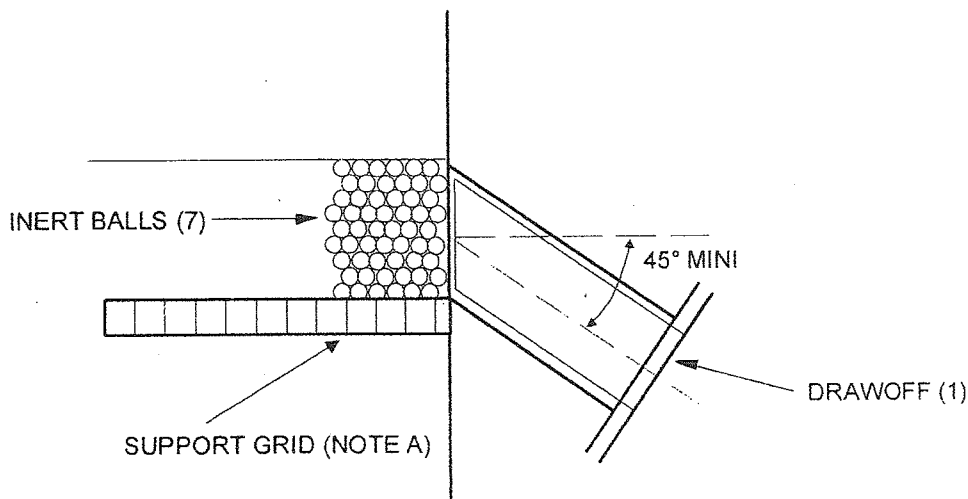
REV.	XA	0	1
DATE	MAR 09	AUG 09	SEPT 09
BY	MC	MG	MG
CHECKED BY	FB	FB	FB

George Proctor P2

166

CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	RU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-570 A/B	
			No. OFF	2	
			SERVICE	N2 O2 / CO REMOVAL TREATERS	
			PAGE	2/2	

DETAIL 1 - CATALYST DRAWOFF



PROCESS NOTES

- Complete with plug insert flush fitting cylindrical shell for lateral flange.
- Catalyst supply:
Catalyst Puristar R3-15 T5X3 or equivalent : 0.9 m³
Inert balls : 0.17 m³.
- Deleted.
- Elevation to allow easy emptying of adsorbents form bottom withdrawal nozzle.
- S.S. 20 mesh grid (0.85 mm opening).
- Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.2 kg/cm²(g).
- Denstone 57 or equivalent. All size to be given by catalyst Vendor.

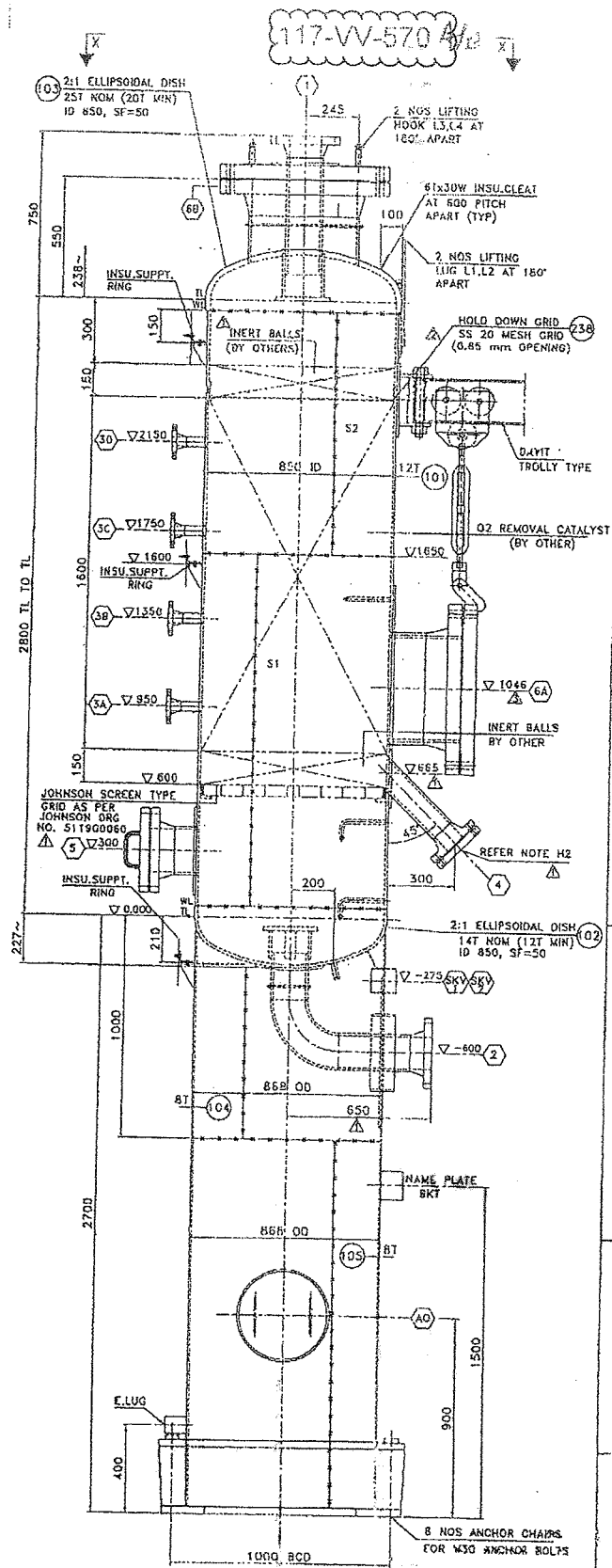
MECHANICAL NOTES

- A. Johnson screen type grid or equivalent (see note 6).

REV.	XA	0	1						
DATE	MAR 09	AUG 09	SEPT 09						
BY	MC	MG	MG						
CHECKED BY	FB	FB	FB						

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Signature

Swage Production Pct

CLIENT BCPL	VESSEL	JOB N° 8692V	Rev
LOCATION LEPETKATA - INDIA		SECTION RU	
UNIT 220 kta LLDPE / HDPE		ITEM 117-VV-671 A/B	
		No. OFF 2	
		SERVICE N ₂ oxygenates treaters (H ₂ O / CO ₂)	
		PAGE 1/2	

OPERATING	PROCESS DESIGN
PRESSURE kg/cm ² (g)	kg/cm ² (g)
Normal Op 4.7	10.5 / FV
Regeneration 4.0	
TEMPERATURE °C	°C @ kg/cm ² (g)
Normal Op 40	80 @ FV
Regeneration 30 to 270	325 @ 10.5
SHELL	ENDS
MATERIALS C.S.	C.S.
CORR. ALLOWANCE 3 mm	3 mm

Fluid: Nitrogen			
Density: 6.0 kg/m ³ (at operation conditions)			
Insulation: YES (heat conservation)			
Lower TL elevation above ground: (4)			

NOZZLE DATA			
REP	Nb	Dia. In	SERVICE
1	1	6	Inlet
2	1	6	Outlet
3	2	1 1/2	Temperature indicator
4	1	4	Adsorbent draw off
5	1	8	Handhole
6	2	20	Manhole (1)

(*) CYLINDRICAL SHELL LENGTH ONLY.

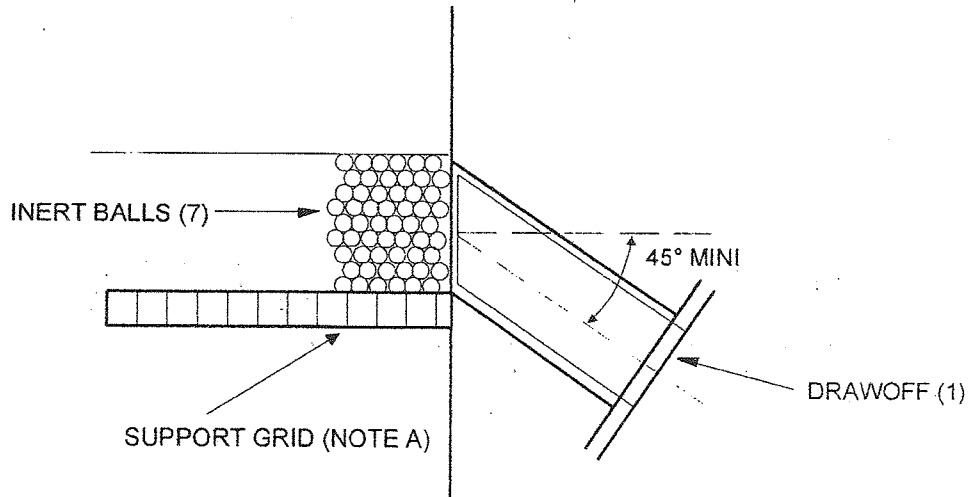
DRUM ORIENTATION		VERTICAL		BOOT	
INTERNAL DIAMETER	mm	1200		INTERNAL DIAMETER	mm
HEIGHT OR LENGTH (*)	mm	2900		HEIGHT OR LENGTH (*)	mm

REV.	XA	0	1
DATE	AUG 09	AUG 09	SEPT 09
BY	MC	MG	MG
CHECKED BY	FB	FB	FB

Sturge Proton Pat

CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	RU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-571 A/B	
			No. OFF	2	
			SERVICE	N ₂ oxygenates treaters (H ₂ O / CO ₂)	
			PAGE	2/2	

DETAIL 1 - ADSORBENT DRAWOFF



PROCESS NOTES

- Complete with plug insert flush fitting cylindrical shell for lateral flange.
- Adsorbent supply:
Adsorbent UOP or equivalent : 1.9 m³
Inert balls : 0.5 m³.
- Deleted.
- Elevation to allow easy emptying of adsorbents form bottom withdrawal nozzle.
- S.S. 20 mesh grid (0.85 mm opening).
- Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.1 kg/cm².
- Denstone 57 or equivalent. All size to be given by adsorbent Vendor.

MECHANICAL NOTES

- Johnson screen type grid or equivalent (see note 6).

REV.	XA	0	1						
DATE	AUG 09	AUG 09	SEPT 09						
BY	MC	MG	MG						
CHECKED BY	FB	FB	FB						

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Sanya Bhatia

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CLIENT BCPL	VESSEL	JOB N° 8692Y	Rev
LOCATION LEPETKATA - INDIA		SECTION FPU	
UNIT 220 kta LLDPE / HDPE		ITEM 117-VV-941 A/B	
		No. OFF 2	
		SERVICE BUTENE 1 / HEXENE 1 TREATERS	
		PAGE 1/3	

OPERATING	PROCESS DESIGN
PRESSURE kg/cm ² (g)	kg/cm ² (g)
Normal Op 5 / 2	17.2 / FV
Regeneration (N2) 4	10.5
TEMPERATURE °C	°C @ kg/cm ² (g)
Normal Op 1 to 40	80 @ 17.2 / FV
Regeneration (N2) 270 (3)	- 45 / 325 (3) @ 10.5
SHELL	ENDS
MATERIALS L.T.C.S.	L.T.C.S.
CORR. ALLOWANCE 3 mm	3 mm

Fluid: BUT1 / HEX1
 Density: 567 to 690 kg/m3
 Insulation: YES (heat conservation)
 Lower TL elevation above ground: (4)

NOZZLE DATA			
REP	Nb	Dia. In	SERVICE
1	1	3	Outlet
2	1	4	Inlet
3	2	1 1/2	Temperature indicator (8)
4	1	4	Absorbent draw off
5	1	8	Handhole (1)
6	1	2	Spare
7	1	32	Body flange

(*) CYLINDRICAL SHELL LENGTH ONLY.

DRUM ORIENTATION	VERTICAL	BOOT
INTERNAL DIAMETER	in 32 ND (3)	INTERNAL DIAMETER mm
HEIGHT OR LENGTH (*)	mm 7780 (3)	HEIGHT OR LENGTH (*) mm

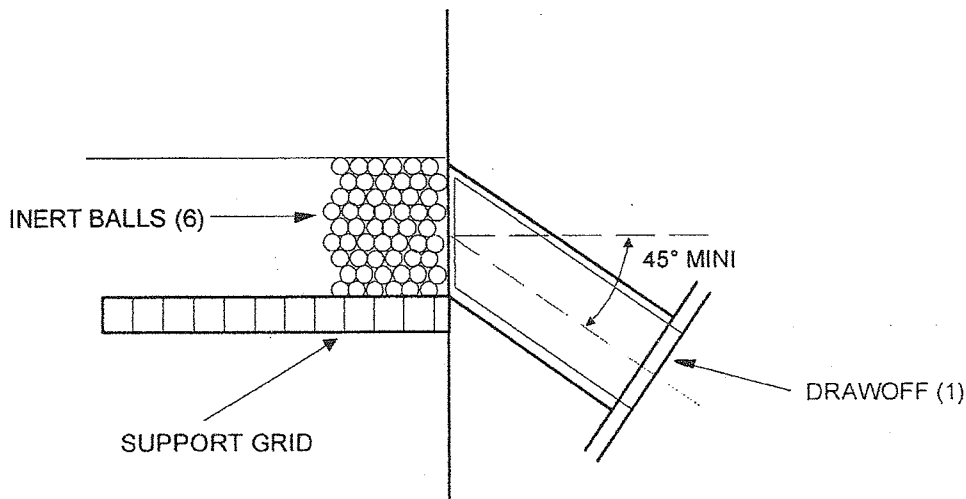
REV.	XA	0	1
DATE	Feb 09	Aug 09	Sept 09
BY	MG	MG	MG
CHECKED BY	FB	FB	FB

Surge Protection

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CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-941 A/B	
			No. OFF	2	
			SERVICE	BUTENE 1 / HEXENE 1 TREATERS	
			PAGE	2/3	

DETAIL 1 - ADSORBENT DRAWOFF



PROCESS NOTES

- Complete with plug insert to ensure flush fitting with cylindrical shell.
- Adsorbent supply:
Above adsorbent: 0.09 m³ of inert balls (Denstone D-57 1/2" or equivalent).
Adsorbent: 3.24 m³ AZ300 molecular sieve or equivalent.
Below adsorbent: 0.09 m³ of inert balls (0.06 m³ of Denstone D-57 1/8" above 0.03 m³ of Denstone D-57 1/4" or equivalent)
- DELETED.
- Elevation to allow easy emptying of adsorbents from bottom withdrawal nozzle.
- S.S. 20 mesh grid (0.85 mm opening).
- Denstone 57 or equivalent. Ball size to be given by adsorbent Vendor.
- Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.1 kg/cm².
- Spaced 180°C apart in plan view around circumference.

REV.	XA	0	1						
DATE	Feb 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

BLANK SHEET

Swaga
Bretton 201

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CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-941 A/B	
			No. OFF	2	
			SERVICE	BUTENE 1 / HEXENE 1 TREATERS	
			PAGE	3/3	

MECHANICAL NOTES

A. Johnson screen grid type or equivalent (see note 7).

B. Slotted distributor.

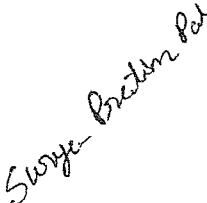
Distributor SS 304L Ø150 mm with 10 slots (6.5 mm width and 100 mm height) laterally and 5 holes (3 mm diameter) on bottom (arranged crosswise).

REV.	XA	0	1						
DATE	Feb 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

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Swire Prater Dr

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CLIENT BCPL	VESSEL	JOB N° 8692Y	Rev
LOCATION LEPETKATA - INDIA		SECTION FPU	
UNIT 220 kta LLDPE / HDPE		ITEM 117-VV-944	
		No. OFF 1	
		SERVICE PENTANE TREATER	
		PAGE 1/2	

OPERATING	PROCESS DESIGN	
PRESSURE	kg/cm ² (g)	
Normal Op.	4.5	
Regeneration (N2)	4.0	
TEMPERATURE	°C	
Normal Op.	1 to 40	
Regeneration (N2)	270 (3)	
	°C @ kg/cm ² (g)	
	80 @ 12 / FV	
	-45 / 325 @ 10.5	
	SHELL	ENDS
MATERIALS	L.T.C.S.	L.T.C.S.
CORR. ALLOWANCE	3.0 mm	3.0 mm

Fluid: Pentane
Density: 606 to 645 kg/m³
Insulation: YES (heat conservation)
Lower TL elevation above ground: (4)

NOZZLE DATA			
REP	Nb	Dia. in	SERVICE
1	1	3	Inlet
2	1	3	Outlet
3	2	1 1/2	Temperature indicator (8)
4	1	4	Absorbent draw off
5	1	8	Handhole (1)
6	2	18	Body flange
7	1	2	Spare
8	1	1 1/2	Vent

(*) CYLINDRICAL SHELL LENGTH ONLY.

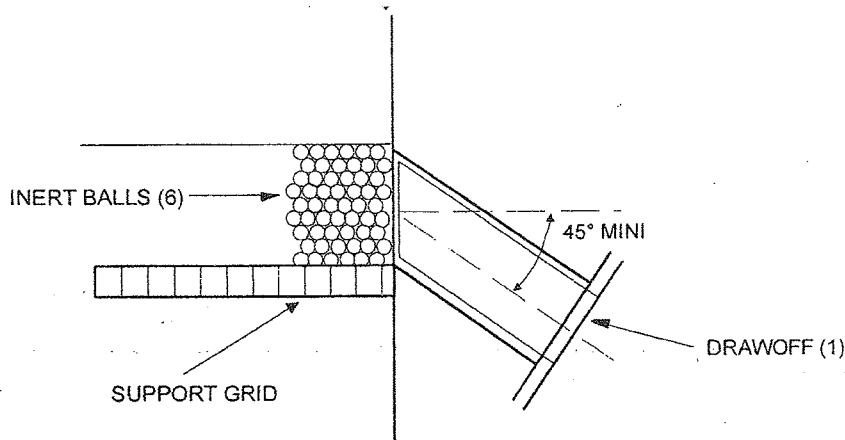
DRUM ORIENTATION		VERTICAL	BOOT
INTERNAL DIAMETER	in	18 ND (3)	INTERNAL DIAMETER mm
HEIGHT OR LENGTH (*)	mm	4030 (3)	HEIGHT OR LENGTH (*) mm

REV.	XA	0	1
DATE	Jan 09	Aug 09	Sept 09
BY	MG	MG	MG
CHECKED BY	FB	FB	FB

George Proctor P21

CLIENT	BCPL	VESSEL	JOB N°	8692Y	Rev
LOCATION	LEPETKATA - INDIA		SECTION	FPU	
UNIT	220 kta LLDPE / HDPE		ITEM	117-VV-944	
			No. OFF	1	
			SERVICE	PENTANE TREATER	
			PAGE	2/2	

DETAIL 1 - ADSORBENT DRAWOFF



PROCESS NOTES

- Complete with plug insert to ensure flush fitting with cylindrical shell.
- Adsorbent supply:
Above adsorbent: 0.029 m³ of inert balls (Denstone D-57 1/2" or equivalent).
Adsorbent: 0.4 m³ UOP AZ-300 molecular sieve or equivalent.
Below adsorbent: 0.058 m³ of inert balls (0.029 m³ of Denstone D-57 1/8" above 0.029 m³ of Denstone D-57 1/4" or equivalent)
- DELETED.
- Elevation to allow easy emptying of adsorbents from bottom withdrawal nozzle.
- S.S. 20 mesh grid (0.85 mm opening).
- Denstone 57 or equivalent. Ball size to be given by adsorbent Vendor.
- Detail Engineering to ensure that total ΔP from flange to flange is lower than 0.2 kg/cm².
- Spaced 180° apart in plan view around circumference.

MECHANICAL NOTES

- Johnson screen grid type or equivalent (see note 7).

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DATE	Jan 09	Aug 09	Sept 09						
BY	MG	MG	MG						
CHECKED BY	FB	FB	FB						

BLANK SHEET

Surge Protection

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George Pratt R.

Lyons

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Contact Details of the Licensor:

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Project & Proposal Manager Polyolefins Licensing

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