



BHARAT HEAVY ELECTRICALS LIMITED
(A Govt. of India Undertaking)
Boiler Auxiliaries Plant
Ranipet - 632406, INDIA

Ref: BAP:CAPEX: 2.0 Rev 02

Scope:-Design, Manufacture, Supply, Erection & Commissioning, Performance Prove-Out, Documentation and Performance Guarantee of Chemical process facility as per BHEL Specification.

Preamble:

A new integrated chemical process facility like chemical milling, anodising, SS pickling & passivation for making qualified surface treatments of various components.

List of Contents:

1 Pre-Qualification Requirments

2 Technical Details

Part A: Chemical Milling Facility

A1.Maskant Bath and accessories

- a. Masking Tank
- b. Drip & Dry Stand - 3 Nos.
- c. Working table - 2 Nos.
- d. Electrical Panel
- e. Loading Bar - 2 Nos.

	A2. Chemical milling tank line	
	a. Loading Platform b. Loading/Unloading stand c. Alkaline degreasing tank d. Cold swill tank e. Chemical milling tank f. Soft water rinsing tank g. Deoxidizer tank h. Hot water tank	
	A3. Accessories	
	a. Loading Bar - 2 Nos. b. Lip exhaust c. Working platform d. Support block e. Skid beam f. Water line h. Air line i. Drain Arrangement j. Exhaust ducting k. Scrubber – 3 Nos. l. Electrical cable m. Air filtering arrangement n. Thermic heating o. Electric control panel p. Acid proof tiling	

	Part B: Anodising Facility	
	B1. Tank Set up	
	a) Vapour Degreasing tank b) Alkaline degreasing tank c) Cold swill tank d) Soft water rinsing tank e) Deoxidizer tank f) DM water rinsing tank g) Sulphuric Acid Anodizing tank h) Cold swill tank i) Yellow Dye tank j) Cold swill tank k) Red Dye tank l) DM water rinsing tank m) Chromic acid Anodizing tank n) Hot DM water sealing tank o) Spare tank p) Loading/Unloading stand	

	B2. Accessories	
	a. Loading Bar - 2 Nos. b. Lip exhaust c. Working platform d. Support block e. Skid beam f. Water line g. Air line h. Drain Arrangement i. Exhaust ducting j. Scrubber – 2 Nos. k. Electrical cable l. Air filtering arrangement m. Thermic heating n. Transporter o. Rectifier - 2 Nos. p. Connecting cables q. Bus bar and cathodes r. Electrical control panel - tanks & starter s. Chiller t. Acid proof tiling	
3	Part C: SS Pickling and Passivation	
4	Part D: ETP, DM Plant & Heating System	
5	Part E: General Requirements	
6	Part F: Foundation	
7	Part G: Erection & Commissioning	
9	Part H: Prove out	

1	Pre-Qualification Requirement	Remarks
1.1	The Bidder offering the facility for Chemical milling , Anodising plant, DM water plant, ETP & other pollution control arrangements etc of quoted capacity or higher shall quote.	Vendor to confirm
1.2	Only those vendors who have supplied and commissioned atleast one similar type of each facility (Chemical milling process, Anodising process and SS Pickling & Passivation) in past 10 years (as on the date of Tender) to an Aerospace manufacturing industry should quote.	Vendor to confirm
1.3	Bidder should have an average annual financial turnover of minimum INR 2.65 crore or equivalent amount in the last three financial years ending 31.03.2020	Vendor to confirm
1.4	If such Chemical milling & Anodising plant. has/had been supplied, then such plant should be presently working satisfactorily for more than two years after commissioning and acceptance (on the date of offer) shall quote.	Vendor to confirm
1.5	As required above, the following information is to be submitted by the Bidders. This is required from all the Bidders for Qualification of their offer, failing which offers are liable for rejection.	Vendor to confirm
1.6	a.Name of the customer/ company where similar facility of Chemical milling Anodising,ETP, DM water plant, and other related pollution control arrangements like scrubbers with chimney is installed. b.Complete postal address of the customer. c.Month & Year of commissioning. d.Parameters of plant supplied & application for which the plant is supplied e.Name and designation of the contact person of the customer. f.Phone, fax no. and email address of the contact person of the customer. g.Performance certificate from the customer/s regarding satisfactory performance of Chemical milling & Anodising plant. h.BHEL reserves the right to verify the information provided by vendor, in case the information is found to be false /incorrect, the offer shall be rejected.	Vendor to Specify

1.7	If the bidder is from a foreign country, bidder shall have service center/service partner in India to provide service support. Please give complete details with documentary evidence.	Vendor to confirm
1.8	The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause. A mere 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO- DEVIATION' or similar words in the technical comparative statement without any supporting technical write ups, photos, datasheets may lead to disqualification of the technical offer.	Vendor to confirm
1.9	BHEL reserves the right to accept/reject the bids if any of the above details are not submitted.	Vendor to confirm
1.10	Bidder should submit the filled in form as per Annexure F (supplier details) attached.	Vendor to confirm
1.11	BHEL reserves the right to verify the information provided by the bidder for all the clauses mentioned above. In case if there is any suppression of facts or the information provided by the bidder is found to be false/incorrect, the offers shall be summarily rejected.	Vendor to confirm
1.12	All the information are to furnished in English only.	Vendor to confirm
2	Part A: Technical Details of Masking operation.	Remarks
2.1	Maskant Bath	
2.1.1	The tank should be made with inner dimensions of 8m x 1m x 2m (L x B x H).	Vendor to confirm
2.1.2	The tank should be made of minimum 5mm thick MS plate. Shall be suitably stiffened and supported on longitudinal beams. The stiffeneing should be adequate to prevent buckling.	Vendor to confirm
2.1.3	Shall be provided with the three sided working platform of 1.5m width x 1.5m height. Made of MS structural sections topped with aluminium checkered plate. Should have suitable steps and railings.	Vendor to confirm

2.1.4	The tank should have segment lid for covering the tank.	Vendor to specify
2.1.5	The tank should have suitable mechanical agitation system comprising minimum 5 hp agitator with flame proof motor for maintaining uniform agitation throughout solution.	Vendor to specify
2.1.6	Agitator should have traversing movement inside the tank from one end to other & vice versa. Traversing movement shall be provided with a 2hp drive with rack & pinion arrangement.	Vendor to specify & confirm
2.1.7	Maskant bath should have a provision for feeding protective gas cover of carbon dioxide. Gas manifold shall be provided.	Vendor to confirm
2.1.8	Maskant bath should be painted with epoxy primer.	Vendor to confirm
2.2	Drip & Dry station - 3 nos.	
2.2.1	This station will be made of mild steel fabricated stand with 1m wide x 8m base with 3m height and suitable support column on either end. Each support column shall have suitable V-blocks to load the loading bar with components. It can be altered based on mutual discussion.	Vendor to specify
2.3	Working Table - 2 Nos.	
2.3.1	The working table shall have top size of 3m x 7.5m.	Vendor to confirm
2.3.2	Shall be made of heavy duty tubular frame work with wooden top 50mm thick rippers. It shall be covered with aluminium plate.	Vendor to confirm
2.4	Electrical Control panel	
2.4.1	Suitable electrical control panel shall be provided for power supply to maskant tank operation, VFD motor, etc provided with emergency stop button.	Vendor to specify
2.5	Loading Bar - 2Nos.	
2.5.1	Shall provide a long bar with central lifting provision & end support to locate on maskant tank as well as on the stands. Suitable to the size of tank and loading station. It can be altered based on mutual discussion.	Vendor to specify
2.5.2	Shall be made of mild steel and it should have provision to attach the component using clamps	Vendor to confirm

2.5.3	Loading capacity of these bars should be atleast 600 kg	Vendor to confirm
3	Chemical milling tank line	
3.1	Loading Platform	
3.1.1	Shall be made of sturdy mild steel fabricated structure with heavy duty FRP grating on the top with removable polypropylene/PVC sheet. 4m length x 2m wide x 800mm height.	Vendor to specify
3.2	Loading/Unloading stand	
3.2.1	This station will be a mild steel fabricated stand with 1.5m x 8.5m base with 3m height and suitable support column on either end. Each support column will have suitable V-blocks to load the loading bar with components.	Vendor to specify
3.3	Alkaline Degreasing tank	
3.3.1	The tank should have effective working area of 8m x 2.5m x 2.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 125mm from each side and 200mm from bottom.	Vendor to confirm
3.3.2	The tank should be made of minimum 5mm thick SS 304 and supported with suitable channel section, stiffeners and support beams to ensure bowing/bending less than 10mm in fully filled condition.	Vendor to confirm
3.3.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to specify
3.3.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
3.3.5	The tank should have thermocouple like PT 100 with suitable covering, which should be chemically inert along with electrical control panel for temp indication & controlling. Solution inside the tank should be maintained at $55 \pm 5^{\circ}\text{C}$	Vendor to confirm
3.3.6	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber.	Vendor to confirm
3.3.7	The tank should be insulated with 50mm thick glass wool and covered with SS 304 sheets. Painted with epoxy paint of suitable colour.	Vendor to confirm
3.3.8	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm

3.3.9	The tank should have air agitation system with distribution pipes made of 25mm dia., SS 304 tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution.	Vendor to confirm
3.3.10	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used.	Vendor to specify
3.4	Cold swill tank	
3.4.1	The tank should have effective working area of 8m x 2.5m x 2.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 125mm from each side and 200mm from bottom.	Vendor to confirm
3.4.2	The tank should be made of PPH(Poly propylene homopolymer) material with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
3.4.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
3.4.4	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
3.4.5	The tank should have suitable spray system with distribution of pipes over the walls of the tank covering all sides. It can be made of 100mm dia inlet PP tube and holes of optimum dia at regular intervals for uniform cleaning of component along with pump capacity of 1200 LPM.	Vendor to specify
3.5	Chemical Milling Tank	
3.5.1	The tank should have effective working area of 8m x 2.5m x 2.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 125mm from each side and 200mm from bottom. Since it is located in 8m tank line, both height and front line should be uniform. It will have a rear loading bar support as with 8m tanks.	Vendor to confirm
3.5.2	The tank should be made of MS with thickness of minimum 6mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition.. Top 400mm of inner wall and the lip shall be lined with 3mm thick SS304 sheet.	Vendor to confirm
3.5.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm

3.5.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
3.5.5	The tank should have thermocouple like PT 100 with suitable protecting cover which should be chemically inert, along with electrical control panel for temp indication &controlling. The tank should have capacity to maintain the solution from 80 to 110 deg C.	Vendor to confirm
3.5.6	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber. Should be provided with exhaust hood located above the EOT crane level to entrap escaped caustic fumes.	Vendor to confirm
3.5.7	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
3.5.8	The tank should have air agitation system with distribution pipes made of 25mm dia SS 304 tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout the solution.	Vendor to confirm
3.5.9	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used.	Vendor to specify
3.5.10	Prove out has to be done with same material AA2219(Material for prove out will be supplied by BHEL)	Vendor to Confirm
3.6	Soft water rinsing tank	
3.6.1	The tank should have effective working area of 8m x 2.5m x 2.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 125mm from each side and 200mm from bottom.	Vendor to confirm
3.6.2	The tank should be made of PPH with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
3.6.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to specify
3.6.4	The tank should be provided with level indicator.	Vendor to confirm
3.6.5	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
3.6.6	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm

3.7	Deoxidiser Tank	
3.7.1	The tank should have effective working area of 8m x 2.5m x 2.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 125mm from each side and 200mm from bottom.	Vendor to confirm
3.7.2	The tank should be made of minimum 5mm SS316 thick sheet supported with suitable MS stiffeners and support beams to ensure bowing less than 10mm in fully filled condition.. All MS external stiffeners shall be lined with 2mm FRP and epoxy coated.	Vendor to confirm
3.7.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
3.7.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
3.7.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert for temp indication.Solution inside the tank should be at room temp.	Vendor to confirm
3.7.6	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber	Vendor to confirm
3.7.7	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
3.7.8	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution.	Vendor to confirm
3.8	Hot Water tank	
3.8.1	The tank should have effective working area of 8m x 2.5m x 2.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 125mm from each side and 200mm from bottom.	Vendor to confirm
3.8.2	The tank should be made of minimum 5mm thick SS 304 and supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
3.8.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
3.8.4	The tank should be provided with level indicator and Timer along with electrical control panel.	Vendor to confirm

3.8.5	The tank should have thermocouple like PT 100 of suitable covering material which should be chemically inert along with electrical control panel for temp indication & controlling. Solution inside the tank should be maintained at 80 ± 2 deg.C	Vendor to confirm
3.8.6	The tank should be insulated with 50mm thick glass wool and covered with SS 304 sheet. Painted with epoxy of suitable colour.	Vendor to confirm
3.8.7	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
3.8.8	The tank should have air agitation system with distribution pipes made of 25mm dia. SS 304 tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution.	Vendor to confirm
3.8.9	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used.	Vendor to specify
3.9	Accessories to be supplied along with chemical milling	
3.9.1	Loading Bar	
3.9.1.1	Shall be minimum 8.3 m long with central lifiting provision & end support to locate on maskant tank as well as on the stands.	Vendor to confirm
3.9.1.2	Shall be made of mild steel and have provision to attach component using clamps/hooks.	Vendor to specify
3.9.1.3	Loading capacity of these bars should be atleast 600 kg	Vendor to confirm
3.9.2	Support Block	
3.9.2.1	This will be in the form of concrete pedestal with acid proof tiling. Top surface should have an embedded MS plate for supporting the skid beam/support beam.	Vendor to specify
3.9.3	Skid beam/support beam	
3.9.3.1	This shall be of ISMB 200 covering the full length of the line. Shall be epoxy coated.	Vendor to confirm

3.9.4	Water line	
3.9.4.1	Made of 2" CPVC line connected to potable water system.	Vendor to confirm
3.9.5	Air Line	
3.9.5.1	Made of 1" CPVC line fitted with Non Return valve.	Vendor to confirm
3.9.6	Drain Arrangement.	
3.9.6.1	2" outlet from the tank to a 4" delivery line. Pipe should be made of SS304 to prevent leakage. For Acid, alkali and chromate (deoxidiser) separate lines are provided.	Vendor to confirm
3.9.7	Exhaust Ducting	
3.9.7.1	Lip exhaust shall be provided for three tanks in line namely viz., alkaline cleaning, deoxidiser & chemical milling tank.	Vendor to confirm
3.9.7.2	It should be connected to two independent scrubber one for chemical milling lip exhaust & top hood and second scrubber for alkaline cleaning & deoxidiser.	Vendor to confirm
3.9.7.3	Capacity of each scrubber should be minimum 27000m ³ /hr with diameter around 2200mm approx. No. of scrubber should be 3. Supplier should submit actual design calculations. Capacity of scrubber may be increased based on final calculation of the supplier however it should meet the minimum capacity of 27000m ³ /hr. Calculation for the same has to be submitted to BHEL for approval after PO, After approval only vendor to proceed for manufacturing.	Vendor to specify
3.9.7.4	Scrubber should come along with chimney setup	Vendor to confirm
3.9.8	Electrical panel	
3.9.8.1	Suitable electrical control panel shall be provided for power supply to accessories as and when required for future purpose. It should be provided with emergency stop button.	Vendor to specify
3.9.8.2	Suitable electrical cables to be provided for connection.	Vendor to specify
3.9.8.3	Separate electrical panel with starters shall be provided for the two scrubber blowers and their pumps.	Vendor to specify

3.9.9	Air Filtering arrangement	
3.9.9.1	Air used for agitation in tanks shall be filtered separately.	Vendor to confirm
3.9.9.2	A panel mounted two stage micron filtering with pressure regulator shall be provided. Cartridges should be replaceable.	Vendor to specify
3.9.10	Thermic fluid heating system	
3.9.10.1	The chemical milling line has three tanks need to heated namely viz., alkaline cleaning, chemical milling & hot water tank.	
3.9.10.2	Heating connection shall be provided with insulated mild steel manifold lines with control valves. The tank control shall be with electro pneumatic valves attached to individual tank panel.	Vendor to specify
3.9.11	Acid proof tiling	
3.9.11.1	Shall be with heavy duty high fired ceramic tiling.	Vendor to confirm
3.9.11.2	Shall cover an area of 10m x 10m approx(based on layout). Shall have slope flooring and drainage channel.	Vendor to confirm
3.9.11.3	Supplier is required to carry out the bottom flooring (brick/concrete) as required to suit the site.	Vendor to confirm
4	Part B: Anodising Facility	
4.1	Vapor Degreasing	
4.1.1	The effective working area should be of 4.5m x 1m x 1m (L x B x H) to accommodate the components. Supplier should consider additional height for free board zone, condensing zone and solvent collection at bottom, etc. However Maximum tank height should not exceed 2.5 m	Vendor to confirm
4.1.2	The tank should be made of SS 304/SS316 with thickness of minimum 4mm, supported with suitable channel section, stiffeners and support beams.	Vendor to confirm
4.1.3	Tank should be with supplied with an 25TR cooling tower system and a 2hp recirculation pump. It shall be supplied with a common base frame and installed outside the building.	Vendor to confirm

4.1.4	The tank should be provided with suitable heating system like electrical / thermic fluid/hot water.	Vendor to specify
4.1.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert along with electrical control panel for temp indication &controlling. Solvent at the bottom of the tank shall be suitably heated to generate vapour.	Vendor to confirm
4.1.6	It shall be provided with a 500kg JIB crane for loading of components.	Vendor to specify
4.1.7	It shall have an working platform of suitable height.	Vendor to specify
4.1.8		
4.2	Alkaline Cleaning tank	
4.2.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.2.2	The tank should be made of 5mm thick SS 304 and supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition. Tank should have suitable inner lining based on solution used.	Vendor to specify
4.2.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.2.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
4.2.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert along with electrical control panel for temp indication & controlling. Solution inside the tank should be maintained at 50 deg.C	Vendor to confirm
4.2.6	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber.	Vendor to confirm
4.2.7	The tank should be insulated with 50mm thick glass wool and covered with 5mm thick PPH sheet.	Vendor to confirm
4.2.8	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm

4.2.9	The tank should have air agitation system with distribution pipes made of 25mm dia SS 304 tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.2.10	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used. It should be able to generate heat within lesser time.	Vendor to specify
4.3	Cold swill tank	
4.3.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.3.2	The tank should be made of PPH(Poly propylene homopolymer) material with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
4.3.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.3.4	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
4.3.5	The tank should have suitable spray system with distribution of pipes over the walls of the tank covering all sides. It can be made of 100mm dia inlet PP tube and holes of optimum dia at regular intervals for uniform cleaning of component along with pump capacity of 1200 LPM.	Vendor to specify
4.4	Soft water rinsing tank	
4.4.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.4.2	The tank should be made of PPH with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
4.4.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.4.4	The tank should be provided with level indicator.	Vendor to specify

4.4.5	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
4.4.6	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.5	Deoxidiser Tank	
4.5.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.5.2	The tank should be made of minimum 10mm PVC with 6mm FRP supported with suitable MS stiffeners and support beams to ensure bowing less than 10mm in fully filled condition.. All MS external stiffeners shall be lined with 2mm FRP and epoxy coated.	Vendor to confirm
4.5.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.5.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
4.5.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert for temp indication. Water inside the tank should be maintained at room temp.	Vendor to confirm
4.5.6	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber	Vendor to confirm
4.5.7	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
4.5.8	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm

4.6	DM water rinsing tank	
4.6.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.6.2	The tank should be made of PPH with thickness of 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
4.6.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.6.4	The tank should be provided with level indicator.	Vendor to specify
4.6.5	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
4.6.6	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube having holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.7	Sulphuric Acid Anodising Tank	
4.7.1	The tank should have effective working area of 4m x 1m x 1.2m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.7.2	The tank should be made of PPH with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing/bending less than 10mm in fully filled condition. The tank should have suitable inner lining based on solution used.	Vendor to specify
4.7.3	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
4.7.4	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert along with electrical control panel for temp indication &controlling. Solution inside the tank should be maintained at 20 ± 2 deg.C	Vendor to confirm
4.7.5	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber.	Vendor to confirm

4.7.6	The tank should be insulated with 50mm thick glass wool and covered with 5mm thick PPH sheet.	Vendor to confirm
4.7.7	The tank should have brass V-Blocks for supporting loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
4.7.8	The tank should have air agitation system with distribution pipes made of 25mm dia PP/suitable material acceptable to BHEL and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.7.9	The tank should be provided with cooling system with STR chiller.	Vendor to confirm
4.7.10	The cooling water in the tank shall be circulated through a 4 turn 25mm dia titanium cooling coil acceptable to BHEL with flanged ends. It will have multi point support resting on the tank bottom surface and have a side clearance of 20mm.	Vendor to confirm
4.7.11	Two sets of copper cathode bars(10 mm x 60 mm x 4000 mm approx.) shall be located on two sides of the tank. It should be suitably positioned inside the tank so that components should have sufficient space. It should rest on PP support blocks.	Vendor to specify
4.7.12	It should have Lead cathode sheets of size 250mm x 1.5m and 4.5 mm thick, and Quantity (5 x2) 10 Nos., suspended from the cathode bar. Arrangement should be made properly so that component will have sufficient space for movement.	Vendor to confirm
4.7.13	Suitable PVC net provided in front of the cathode plates to prevent accidental elec. shorting.	Vendor to confirm
4.7.14	Pair of anode brass V-blocks shall be mounted on the tank lip	Vendor to confirm
4.7.15	Two cathode bars and the anode brass V-blocks shall be interconnected. Rectifier to tank connection shall be through insulated flexible copper cable which should be properly connected to the tank body/V-blocks.	Vendor to confirm
4.8 Cold swill tank		
4.8.1	The tank should have effective working area of 4m x 1m x 1.2m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.8.2	The tank should be made of PPH with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm

4.8.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.8.4	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
4.8.5	The tank should have suitable spray system with distribution of pipes over the walls of the tank covering all sides. It can be made of 100mm dia inlet PP tube and holes of optimum dia at regular intervals for uniform cleaning of component along with pump capacity of 1200 LPM.	Vendor to confirm
4.9	Dye Tank (Red)	
4.9.1	The tank should have effective working area of 4m x 1m x 1.2m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.9.2	The tank should be made of minimum 5mm thick SS 316 and supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition. The tank should have suitable inner lining based on solution used.	Vendor to specify
4.9.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.9.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
4.9.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert along with electrical control panel for temp indication & controlling. Solution inside the tank should be maintained at 60 deg.C	Vendor to confirm
4.9.6	The tank should be insulated with 50mm thick glass wool and covered with 5mm thick PPH sheet.	Vendor to confirm
4.9.7	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm

4.9.8	The tank should have air agitation system with distribution pipes made of 25mm dia SS 304 tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.9.9	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used.	Vendor to specify
4.9.10	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber.	Vendor to confirm
4.10	Cold swill tank	
4.10.1	The tank should have effective working area of 4m x 1m x 1.2m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.10.2	The tank should be made of PPH with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
4.10.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.10.4	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
4.10.5	The tank should have suitable spray system with distribution of pipes over the walls of the tank covering all sides. It can be made of 100mm dia inlet PP tube and holes of optimum dia at regular intervals for uniform cleaning of component along with pump capacity of 1200 LPM.	Vendor to specify
4.11	Dye Tank (Yellow)	
4.11.1	The tank should have effective working area of 4m x 1m x 1.2m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.11.2	The tank should be made of minimum 5mm thick SS 316 and supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition. The tank should have suitable inner lining based on solution used.	Vendor to specify
4.11.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm

4.11.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
4.11.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert along with electrical control panel for temp indication & controlling. Solution inside the tank should be maintained at 60 ±2 deg.C	Vendor to confirm
4.11.6	The tank should be insulated with 50mm thick glass wool and covered with 5mm thick PPH sheet.	Vendor to confirm
4.11.7	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
4.11.8	The tank should have air agitation system with distribution pipes made of 25mm dia SS 304 tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.11.9	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used.	Vendor to specify
4.11.10	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber.	Vendor to confirm
4.12	DM water rinsing tank	
4.12.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.12.2	The tank should be made of PPH with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
4.12.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.12.4	The tank should be provided with level indicator.	Vendor to confirm
4.12.5	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
4.12.6	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.12.7	The tank should have provision for controlling of the dye residue or free from dye residue.	Vendor to confirm

4.13	Chromic Acid Anodising Tank	
4.13.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.13.2	The tank should be made of MS with thickness of minimum 6mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition. Tank should be inner lined with 2mm thick SS304 or SS316 sheet fully.	Vendor to confirm
4.13.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.13.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
4.13.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert along with electrical control panel for temp indication & controlling. Solution inside the tank should be maintained at 40 ± 2 deg.C	Vendor to confirm
4.13.6	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber.	Vendor to confirm
4.13.7	The tank should be insulated with 50mm thick glass wool and covered with 5mm thick PPH sheet.	Vendor to confirm
4.13.8	The tank should have brass V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
4.13.9	The tank should have air agitation system with distribution pipes made of 25mm dia SS 304/SS 316 tube having holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.13.10	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used.	Vendor to specify
4.13.11	Heating should be provided with 4 turn 1" SS304/ SS316 coil	Vendor to confirm
4.13.12	The tank body shall be given cathode connection through a copper flat connected brazed to it. This anode shall be on two brass V-blocks which shall be interconnected.	Vendor to confirm
4.13.13	Recitifer to tank connection shall be through insulated flexible copper cable which should be properly connected to the tank body/V-blocks.	Vendor to confirm

4.14	Hot DM water Sealing Tank	
4.14.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.14.2	The tank should be made of minimum 5mm thick SS 304 and supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
4.14.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.14.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
4.14.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert along with electrical control panel for temp indication & controlling. Solution inside the tank should be maintained at 90 - 95 deg.C	Vendor to confirm
4.14.6	The tank should be insulated with 50mm thick glass wool and covered with 5mm thick PPH sheet.	Vendor to confirm
4.14.7	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
4.14.8	The tank should have air agitation system with distribution pipes made of 25mm dia SS 304 tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.14.9	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used.	Vendor to specify

4.15	Spare tank	
4.15.1	The tank should have effective working area of 4.5m x 1m x 1.5m (L x B x H) excluding the coils and agitator arrangements from inner dimensions. Maximum allowable space/clearance for arrangements of coils and agitators inside the tank should be 100mm from each side and 200mm from bottom.	Vendor to confirm
4.15.2	The tank should be made of PPH with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition. The tank should have suitable inner lining based on solution used.	Vendor to specify
4.15.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
4.15.4	The tank should be provided with level indicator.	Vendor to confirm
4.15.5	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
4.15.6	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
4.16	Loading/Unloading stand	
4.16.1	This station will be a mild steel fabricated stand with 1m x 4m base with minimum 1m height and suitable support column on either end. Each support column will have suitable V-blocks to load the loading bar with components.	Vendor to confirm
4.17	Accessories	
4.17.1	Loading Bar - 2Nos	
4.17.1.1	Shall be minimum 4.8m long with central lifting provision & end support to locate on tank as well as the stands.	Vendor to confirm
4.17.1.2	Shall be made of mild steel fabrication and provision to attach component(copper bus bar) using clamps	Vendor to specify
4.17.2	Support Block	
4.17.2.1	This will be in the form of concrete pedestal with acid proof tiling. Top surface should have an embedded MS plate for supporting the skid beam/support beam.	Vendor to specify

4.17.3	Skid beam/support beam	
4.17.3.1	This shall be of ISMB 200 covering the full length of the line. Shall be epoxy coated.	Vendor to confirm
4.17.4	Water line	
4.17.4.1	Made of 2" CPVC line connected to potable water system.	Vendor to confirm
4.17.5	Air Line	
4.17.5.1	Made of 1" CPVC line fitted with Non Return valve.	Vendor to confirm
4.17.6	Drain Arrangement.	
4.17.6.1	2" outlet from the tank to a 4" delivery line. Pipe should be made of SS to prevent leakage. Acid alkali and chromate (deoxidiser) separate lines are provided.	Vendor to confirm
4.17.7	Exhaust Ducting	
4.17.7.1	Lip exhaust shall be provided for three tanks in line namely viz., alkaline cleaning, deoxidiser & Anodising.	Vendor to confirm
4.17.7.2	It should be connected to two independent scrubber one for SAA, alkaline & top hood and second scrubber for CAA, sealing, dyes and pickling & passivation.	Vendor to confirm
4.17.7.3	Capacity of each scrubber should be minimum 28000m ³ /hr with diameter around 2200mm approx. No. of scrubber should be 2. Supplier should submit actual design calculations. Capacity of scrubber may be increased based on final calculation of the supplier however it should meet the minimum capacity of 28000m ³ /hr. It has to be submitted for BHEL approval after PO, and Vendor to start manufacturing after approval.	Vendor to specify
4.17.7.4	Scrubber should come along with chimney setup	Vendor to confirm
4.17.8	Electrical panel	
4.17.8.1	Suitable electrical control panel shall be provided for power supply to accessories as and when required for future purpose., provided with emergency stop button.	Vendor to specify
4.17.8.2	Suitable electrical cables are provided for connection.	Vendor to specify
4.17.8.3	Separate electrical panel with starters shall be provided for the two scrubber blowers and their pumps.	Vendor to specify

4.17.9	Air Filtering arrangement	
4.17.9.1	Air used for agitation in tanks shall be filtered separately	Vendor to confirm
4.17.9.2	A panel mounted two stage micron filtering with pressure regulator shall be provided. Cartridges should be replaceable.	Vendor to specify
4.17.10	Thermic fluid heating system	
4.17.10.1	The anodising line has tanks need to be heated namely viz., alkaline cleaning, anodising tanks, dye tanks, sealing & hot water tank.	
4.17.10.2	Heating connection shall be provided with insulated mild steel manifold lines with control valves. The tank control shall be with electro pneumatic valves attached to individual tank panel.	Vendor to confirm
4.17.11	Rectifier	
4.17.11.1	One each rectifier should be provided for Sulphuric Acid Anodising and Chromic Acid Anodising processes.	Vendor to specify
4.17.11.2	Chromic Acid Anodising rectifier shall be 60V/1000 amps capacity	Vendor to specify
4.17.11.3	Sulphuric Acid Anodising rectifier shall be 24V/1500 amps capacity.	Vendor to specify
4.17.11.4	Rectifier Ramp up Voltage programmer setup can be quoted as optional.	Vendor to specify
4.17.12	Transporter	
4.17.12.1	A PLC controlled transporter shall be installed for the anodising line. Length of traveling is 24m and span of 4.5m along with all supporting structures and accessories. It should have Manual control also.	Vendor to confirm
4.17.12.2	It shall have 18 columns and load capacity of 1000kg.	Vendor to confirm
4.17.12.3	HMI interface with 7" screen.	Vendor to confirm

4.17.14	Acid proof tile lining	
4.17.14.1	Shall be with heavy duty high fired ceramic tiling.	Vendor to confirm
4.17.14.2	Shall cover an area of 10m x 10m approx. Shall have slope flooring and drainage channel.	Vendor to confirm
4.17.14.3	Supplier is required to carry out the bottom flooring (brick/concrete) as required to suit the site.	Vendor to confirm
5	Part C: SS Pickling & Passivation tank line	
5.1	SS Pickling Tank	
5.1.1	The tank should be made with inner dimensions of 1m x 1m x 2m (L x B x H).	Vendor to confirm
5.1.2	The tank should be made of minimum 20mm PPH with 6mm FRP supported with suitable MS stiffeners and support beams. All MS external stiffeners shall be lined with 2mm FRP and epoxy coated.	Vendor to specify & confirm
5.1.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
5.1.4	Suitable chemical should be provided for handling SS304 components. (Nitric acid is preferred)	Vendor to specify
5.1.5	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
5.1.6	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert for temp indication. Solution inside the tank should be maintained at room temp.	Vendor to confirm
5.1.7	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber	Vendor to confirm
5.1.8	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
5.1.9	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to specify

5.2	Soft water rinsing tank	
5.2.1	The tank should be made with inner dimensions of 1m x 1m x 2m (L x B x H).	Vendor to confirm
5.2.2	The tank should be made of PPH with thickness of minimum 25mm supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition..	Vendor to confirm
5.2.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
5.2.4	The tank should be provided with level indicator.	Vendor to confirm
5.2.5	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
5.2.6	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
5.3	Alkaline Cleaning Tank	
5.3.1	The tank should be made with inner dimensions of 1m x 1m x 2m (L x B x H).	Vendor to confirm
5.3.2	The tank should be made of 5mm thick SS 304 and supported with suitable channel section, stiffeners and support beams to ensure bowing less than 10mm in fully filled condition. Tank should have suitable inner lining based on solution used.	Vendor to specify
5.3.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
5.3.4	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
5.3.5	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert along with electrical control panel for temp indication & controlling. Solution inside the tank should be maintained at 50 deg.C	Vendor to confirm
5.3.6	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber.	Vendor to confirm
5.3.7	The tank should be insulated with 50mm thick glass wool and covered with 5mm thick PPH sheet.	Vendor to confirm
5.3.8	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm

5.3.9	The tank should have air agitation system with distribution pipes made of 25mm dia SS 304 tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to confirm
5.3.10	The tank should be provided with thermic fluid heating system along with number of turns of coil of suitable material based on solution used. It should be able to generate heat within lesser time.	Vendor to specify
5.4	Cold Water tank	
5.4.1	The tank should be made with inner dimensions of 1m x 1m x 2m (L x B x H).	Vendor to confirm
5.4.2	The tank should be made of PPH with thickness of minimum 20mm supported with suitable channel section, stiffeners and support beams.	Vendor to confirm
5.4.3	The tank should have water inlet port, overflow port and drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
5.4.4	The tank should be provided with level indicator.	Vendor to confirm
5.4.5	The tank should have V-Blocks for supporting of loading bars.	Vendor to confirm
5.4.6	The tank should have spray system with distribution of pipes over the walls of the tank covering all sides. It can be made of 40mm dia PP tube and holes of optimum dia at regular intervals for uniform cleaning of component.	Vendor to confirm
5.5	SS Passivation Tank	
5.5.1	The tank should be made with inner dimensions of 1m x 1m x 2m (L x B x H).	Vendor to confirm
5.5.2	The tank should be made of minimum 10mm PVC with 6mm FRP supported with suitable MS stiffeners and support beams to ensure bowing less than 10mm in fully filled condition.. All MS external stiffeners shall be lined with 2mm FRP and epoxy coated.	Vendor to specify & confirm
5.5.3	The tank should have drain port of suitable material and size and facility to connect to effluent stream.	Vendor to confirm
5.5.4	Suitable chemical composition should be provided for handling SS304 components.	Vendor to specify

5.5.5	The tank should be provided with level indicator, Timer along with electrical control panel.	Vendor to confirm
5.5.6	The tank should have thermocouple like PT 100 of suitable covering which should be chemically inert for temp indication. Solution inside the tank should be maintained at room temp.	Vendor to confirm
5.5.7	The tank should have lip exhaust for fume controlling & provision for connecting to scrubber	Vendor to confirm
5.5.8	The tank should have V-Blocks for supporting of loading bars and moulded FRP lid that can be removed using the crane.	Vendor to confirm
5.5.9	The tank should have air agitation system with distribution pipes made of 40mm dia PP tube and holes of optimum dia at regular intervals for maintaining uniform agitation throughout solution	Vendor to specify
5.6	Spare Tank	
5.6.1	The tank should be made with inner dimensions of 1m x 1m x 2m (L x B x H).	Vendor to confirm
5.6.2	The tank should be made of minimum 10mm PVC with 6mm FRP supported with suitable MS stiffeners and support beams to ensure bowing less than 10mm in fully filled condition.. All MS external stiffeners shall be lined with 2mm FRP and epoxy coated.	Vendor to confirm
5.7	Accessories	
5.7.1	Loading Bar - 2Nos.	
5.7.1.1	Shall be minimum 1.2m long with central lifting provision & end support to locate on tank as well as the stands.	Vendor to confirm
5.7.1.2	Shall be made of mild steel fabrication and provision to attach component(copper bus bar) using clamps	Vendor to specify
5.7.2	Support Block	
5.7.2.1	This will be in the form of concrete pedestal with acid proof tiling. Top surface should have an embedded MS plate for supporting the skid beam/support beam.	Vendor to specify

5.7.3	Skid beam/support beam	
5.7.3.1	This shall be of ISMB 200 covering the full length of the line. Shall be epoxy coated.	Vendor to confirm
5.7.4	Water line	
5.7.4.1	Made of 2" CPVC line connected to potable water system.	Vendor to specify & confirm
5.7.5	Air Line	
5.7.5.1	Made of 1" CPVC line fitted with Non Return valve.	Vendor to specify & confirm
5.7.6	Drain Arrangement.	
5.7.6.1	2" outlet from the tank to a 4" delivery line. Pipe should be made of SS to prevent leakage. Acid alkali and chromate (deoxidiser) separate lines are provided.	Vendor to specify & confirm
5.7.7	Electrical panel	
5.7.7.1	Suitable electrical control panel shall be provided for power supply to accessories as and when required for future purpose., provided with emergency stop button.	Vendor to specify
5.7.7.2	Suitable electrical cables are provided for connection.	Vendor to specify
5.7.7.3	Separate electrical panel with starters shall be provided for the two scrubber blowers and their pumps.	Vendor to specify
5.7.8	Air Filtering arrangement	
5.7.8.1	Air used for agitation in tanks shall be filtered separately	Vendor to confirm
5.7.8.2	A panel mounted two stage micron filtering with pressure regulator shall be provided. Cartridges should be replaceable.	Vendor to specify

5.7.9	Thermic fluid heating system	
5.7.9.1	The pickling line has tanks need to be heated namely viz., alkaline cleaning	
5.7.9.2	Heating connection shall be provided with insulated mild steel manifold lines with control valves. The tank control shall be with electro pneumatic valves attached to individual tank panel.	Vendor to confirm
6	Part D: Effluent Treatment plant	
6.1	Based on the given tank details on a turnkey basis separate collection pits, treatment pits, chemical tanks for treatment, flocculating tanks and disposal arrangement shall be provided. Calculation shall be submitted for approval.	Vendor to specify & confirm
6.2	Connection for both anodising and chemical milling will be made up of 75mm dia SS304 pipe.	Vendor to specify
6.3	Electrical panel shall be provided.	Vendor to specify
6.4	Galvalume sheet structure/shed cover the ETP plant.	Vendor to confirm
6.5	ETP shall have average discharge of 6000 litres/day. However storage capacity shall be minimum 20000 litres for acid/alkali, minimum 15000 litres for chromate and others. Separate pit of storage capacity of minimum 1000 litres should be provided for discharge of Crack detection facility. The capacities are minimum and indicative, However same can be be revised later based on final calculated values after PO based on mutual understanding between BHEL and Vendor.	Vendor to specify & confirm
6.6	ETP discharge should meet Tamil Nadu pollution control board norms.	Vendor to confirm
7	DM Plant	
7.1	The DM water quality requirements as given : Specific conductivity at 20 deg.C : 0.5 micro Siemens/m pH value : 6 to 7.5 Chlorides (as Cl) : 0.5 ppm (max) Sulphates (as SO4) : 1 ppm Residue on evaporation @110 deg.C : 5 ppm	Vendor to confirm
7.2	Complete plant setup shall be provided with output capacity of 2500 litres/hour. DM plant should be placed nearer to process facility and separate area will be provided.	Vendor to specify & confirm
7.3	Overhead tank should be provided minimum capacity of 40KL.	Vendor to specify

7.4	Pumps of suitable capacity to be provided for feeding of DM water to and fro. to facility	Vendor to specify
7.5	The discharge of DM plant and the scrubber shall have provision for connecting to ETP	Vendor to confirm
8	Heating system	
8.1	Vendor to specify the capacity of heat generator system (In terms Kcal). Calculation should be submitted for approval and for clarification & further modification if needed.	Vendor to specify and confirm
8.2	Boiler with LPG/other suitable fired system should be provided by supplier along with all the statutory clearances & license to BHEL.	Vendor to specify & confirm
8.3	Distribution pipeline with 75mm MS to the anodising and chemical milling tanks. Should be insulated.	Vendor to confirm
8.4	The necessary structures, cover shed shall be provided by the supplier.	Vendor to specify
8.5	Initial heating time for all the tanks should be 4 - 5 hours.	Vendor to confirm
9	Part E: General Requirements	
9.1	First fill of all consumable chemicals excluding maskant shall be under the scope of supplier	Vendor to confirm
9.2	Process parameters & documents like list of chemicals, quantity, composition, temperature, Disposal parameters, refilling, testing parameters and relating data of the process shall be provided to BHEL.	Vendor to confirm
9.3	EOT crane for loading/unloading components in Maskant operation, Chemical milling operation will be under scope of BHEL.	Vendor to confirm
9.4	Laboratory for analysis of the solution shall be provided by the supplier.	Vendor to specify and confirm
9.5	ETP, DM water plant, scrubbers and all pollution control equipments should confirm to the Tamil nadu pollution control board norms(TNPCB)/CPCB.	Vendor to confirm

9.6	Necessary safety interlocks incorporated for the safe operation of the process plant shall be elaborated in the offer.	Vendor to confirm
9.7	Crack detection loading platform of 6m x 6m with drain ports/drainage facility should be provided. a. Crack detection platform should have SS 304 or SS 316 mesh grating of minimum 2.5 mm thickness, with spacing of maximum 25mm, supported by SS angle support of minimum 6 mm thickness. Above this 5 mm flexible perforated PVC sheet of size 5m x 5 m to be provided above which components are to be loaded of same size. b. Floor should be Tapered with anti-glare / matte finish ceramic flooring. Drain outlet to waste water collection pit of capacity 200 litres to be provided below the platform. c. Suitable capacity pump of SS to be provided to pump this exhaust to ETP plant for this discharge. d. Controlled air water spray system with 12m long duct tube connection. Combined control panel with water supply with filtering and control, Air filter limit (multi – stage, 0.01 u), Air blow system for drying. Developer spray system & Final pressure cleaning gun.	Vendor to specify and confirm
9.8	Chemical handling & processing training shall be provided.	Vendor to confirm
9.9	Drip shield shall be provided between tanks to prevent the dripping of chemicals on the floor.	Vendor to specify
9.10	Disposal procedure can be provided.	Vendor to specify & Confirm
9.11	Thermic fluid Heating coils:- a. All coils shall mandatorily made of seamless tube. b. To ensure longevity of coils, no. of weld joints should be minimised by using die bending at corners to the maximum possible extent and avoiding use of elbows at turns. c. All coils shall be flanged going over the tank lip, Except in case of Vapour Degreaser, where pipe entry shall be through welded joints at submerged liquid level.	Vendor to confirm

10	Part F: Foundation	
10.1	Vendor shall submit the preliminary layout drawing along with the offer. Vendor to submit Complete Foundation Design including details viz. static / dynamic load details etc. and Final Layout drawings shall be submitted by the supplier within 45 days after PO/LOI for BHEL approval. BHEL will approve the drawing within three weeks time from date of submission/clarification. The layout should consist of all requirements pertaining to complete facility of plant including space requirement for tank setup, ETP, DM plant, scrubber & any other accessories. BHEL shall construct complete foundation for the chemical process plant under supervision of supplier and at supplier's responsibility. Vendor should arrange equipments required for the testing of foundation, if required by the vendor. The vendor shall also indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the process plant. However this submission of drawing should not have any implication on delivery schedule of facility.	Vendor to confirm
10.2	Area available for installation of tank line & ETP will be around 20m wide x 85m length. Tentative layout is attached with this document in Annexure 1 (layout of facility). However, final layout can be changed based on mutual discussion with vendor and BHEL.	Vendor to specify & Confirm
11	Part G: Erection & Commissioning.	
11.1	Vendor should provide the Complete foundation layout & design calculations of chemical milling plant, anodising plant along with tank arrangements, tank supporting structures, Effluent treatment plant setup and scrubber with chimney system within 45 days from the date of L.O.I/P.O for BHEL approval. BHEL will take 3 weeks for approval from the date of submission/clarifications. However BHEL reserve right to change the layout with mutual consent of the supplier. However this submission of drawing should not have any implication on delivery schedule of facility.	Vendor to confirm

11.2	Supplier to take Full responsibility for carrying out the erection, start up, running of the plant and proving out. It's control system & all types of Other Supplied equipment, processing of test pieces, prove out of parts etc. Plant should be erected & commissioned at BHEL site by the bidder on turnkey basis. Arrangements of Unloading and storage of same at BHEL works will only be under BHEL scope. However Vendor has to depute their representative during unloading at BHEL works. Service requirement like power, air , water shall be provided by BHEL at only one point (to be indicated by supplier in their foundation/layout drawings). All other requirements shall be arranged by vendor.	Vendor to confirm
11.3	Drawings and details of the components for prove out at BHEL are enclosed with this Technical Specification.	Vendor to confirm
11.4	Basic civil works will only come under the scope of BHEL on basis of data provided by supplier. However acid proof tiling, ETP, Crack detection facility, DM water plant and tank installation, Chemical milling line, Anodising line, SS pickling and passivation line, Chimney, Maskant bath etc will comes under supplier scope. Ground preparation drawing shall be given by the supplier.	Vendor to confirm
12	Part H: Prove out	
12.1	Vendor should prove out by reducing the thickness of the given material (AA2219) as per Annexure 2 (Step milling diagram). Anodizing has to be proved on given material (AA6061) and Pickling & Passivation on components made of SS304.	Vendor to confirm
12.2	Tank along with all accessories working should be proved out.	Vendor to confirm
12.3	ETP, DM water and scrubbers should be proved out by meeting the given specifications or as per TNPCB/CPCB norms as applicable.	Vendor to confirm