

MANUALLY OPERATED ANODIZING SYSTEM					
Brief Scope: Design, Fabrication, Supply, Installation & Commissioning of Degreasing, Anodizing and Alodine 1200 Treatment with prove-out of plant capacity for meeting the requirements. Pre-bid meeting: - Interested firms shall attend the pre-bid meeting as per scheduled date mentioned in the tender enquiry. - For any queries/clarifications firms may send mail in advance to vishwanatha.k@bemltd.in - Firms may visit to the site to understand where the manually operated anodizing system is installed and extent of civil work involved in system installation. Quantity: 01 Nos. (Manually Operated ANODIZING SYSTEM) Delivery: 09 Months - desirable. Final Acceptance: Inspection and clearance as per technical specifications and performance.					
Sl. No.	Equipment	Specifications	Offer/ Comments from Vendor	Remarks	
1	MANUALLY OPERATED ANODIZING SYSTEM	Ref. Appendix-A			
2	Scope Of Supply	Design, Fabrication, Supply, Installation & Commissioning of Degreasing, Anodizing and Alodine 1200 Treatment with prove-out of plant capacity for meeting the requirements.			
3	Acceptable Make & Model	NA			
4	Installation & Commissioning	Installation, Commissioning & Prove out shall be carried out by the supplier at BEML, ASMD-Mysore.			
5	Warranty	This comprehensive warranty shall remain valid for 24 months from the date of installation, commissioning, Prove out & Acceptance.			
6	Training	Firm shall provide training on operating of the system & maintenance of the system to BEML personnel as per Appendix-A			

MANUALY OPERATED ANODIZING SYSTEM		
7	Manuals	Firm shall provide hard copies of manuals (containing, Standard Operating Procedure, preventive maintenance...), and circuit diagrams- 02 nos, at the time of handing over the system.
8	Service	Firm shall indicate the name & address of the agency for after sales service facilities available for the machine in India

APPENDIX-A

PROCUREMENT TECHNICAL SPECIFICATION: MANUALLY OPERATED ANODIZING SYSTEM

Scope:	Design, Fabrication, Supply, Installation & Commissioning of Degreasing, Anodizing & Alodine 1200 Treatment System with prove-out of plant capacity for meeting the requirements.			
Purpose:	To perform degreasing, Anodizing and Alodine 1200 Treatment on aluminum alloy sheet metal parts of different shape and size.			
Sl. No.	Description of requirement		Firm Comment Acceptable/Rejected	Remarks
1	Components	Aluminum alloy sheet metal parts		
2	Component Size			
2(a)	Dimensions of largest component	As per attached drawing (500mm x 500mm x 1500mm - lbh). (Ref. Annexure-I) Approximate weight 10 kg		
2(b)	Dimensions of smallest component	As per attached drawing (45mm x 38mm x 24mm - lbh). (Ref. Annexure-I)		
3	Surface Area of smallest &largest component	As per attached drawing, (Ref. Annexure-I)		
4	Output Desired	5 batches of process cycles per day (All sizes)		
5	No. of parts per batch	01 to 30		
6	Individual tank working zone (in mm)	<ul style="list-style-type: none">The individual Tank inside working zone shall be 800mm x 800mm x 1800mm.Material used for Cathode and connectors shall be Aluminum.Complete System layout GA drawings shall be provided by the L1 firm for approval within 15days after the receipt of purchase order.L1 firm shall provide Bill of material for reference.		
6(a)	DM water plant shall be as per IS 13268. DM Plant complete with mixed-bed-5000 litres per day, TDS less than 1	Confirm		

6(b)	TCE (Trichloroethylene) Vapour Degreasing chamber inside working zone shall be 800mm x 800mm x 1800mm. The material used for fabrication of internal walls shall be SS316/316L of thickness 5mm. Cooling facility to be provided.	Confirm		
7	Available floor space	Ref. Annexure-II		
8	Method of Handling	Components jiggered, suspended on Transport Wagon with sliding cover (with GM 'V' Block and 03 Nos. flight bars) which is carried with the help of manually operated motorized mono-rail crane with ON/OFF switch, forward, reverse, up-down operation. Revised Annexure-III enclosed.		
9	Process Sequence & flow chart	Minimum 14 number of tanks (including vapour degreasing) shall be covered as per process sequence as per Annexure-III(excluding loading and unloading)		
10	Load /Unload stand with 'V' location saddle	Min. 1 set (on each tank)		
11	Process tanks made of SS316 and PPH (Polypropylene Homopolymer) complete with essential fittings such as thermal insulations, water inlet, drain outlet, overflow/scum chamber/ lip type exhaust ducting, 'V' location saddles, anode/cathode support bars, Rectifiers, chillers, agitation mechanism, heaters, thermocouples, Temperatures controllers, Temperature recorders, Temperature digital display, Digital Timers with cycle completion hooters. The thickness of the PPH tank wall shall be 15mm for water rinse and 20mm for process tanks.	1 Lot		

	The thickness of SS316 shall be 5mm where ever applicable.			
12	Reinforcement to avoid bulging of tanks: PPH& SS316 tanks shall be suitably reinforced using support ribs at suitable distance to overcome bulging of tanks. The tanks shall be supplied along with leak proof and water holding certificate.	Confirm with size and distance between reinforcement for each type of tanks. (Desirable) Self certification from the firm for leak proof and water holding tests.		
13	Suitable capacity chilling unit as per tank size (for cooling and maintaining the temperature of anodizing bath). The compressor unit shall have 02 years warranty and 03 year extended warranty.	1 set. Firm shall mention make of pump and capacity		
13(a)	Both heat exchangers & pump (Suitable to operation) is made of acid resistant material specifically SS316/316L			
13(b)	Piping for all connections from tank outlet to chiller unit shall be of UPVC(Unplasticized Polyvinyl Chloride) or better			
14	Rectifier: 02 Nos. of capacity 2000A, 24V Make: Kraft Powercon// MunkRectifier/Jindal/GE Tek/ <i>Elca</i> IGBT solid state rectifier with digital type ammeter, voltmeter & Amp-min/Amp-Hr meter, PLC communication air cooled design with AC cooling and remote operated pendant, with PLC hook up facility and voltage ramping profile programmer.	Confirm		
15	Filtration: PP (Polypropylene) body, plate type filtration units with seal-less magnetic	1 Set Firm to confirm capacity of in LPH		

	pump, complete with inlet/outlet hoses, pressure gauges, pressure switches for auto cut off, carbon treatment chamber, PP ball valve and PP strainer etc. Capacity: Suitable to system			
16	<p>COMMON Exhaust Lip Duct+Blower+Scrubber of V belt Driven, dynamically balanced impeller complete standard unit of capacity for 10000 CFM (min). Make: Crompton/Bharat Bijlee/Siemens/ Hindustan. PP/FRP (Polypropylene/Fiber Reinforced Plastic) water washed Fume Scrubber complete with water spray nozzles, circulation pump, pall Rings, misteliminator and centrifugal seal-less pump. The chimney height should be 15 meter from the ground. The scrubber water shall be connected to the ETP (Effluent Treatment Plant) line.</p>	1 set		
17	Material Handling System			
17(a)	Single work carrier bar. DC current with Cu Alloy, 'V' block and lifting arms suitable to operate with monorail	1 Set		
17(b)	Monorail operated crane of lifting 150kg capacity	1 No.		
17(c)	Floor mounted structure for above Crane	1 Lot		
17(d)	Centralized control panel (working temperature upto 50°C) to monitor and control accessories, such as heaters, digital temperature controllers, complete with overload contactors, relays, indicating lamps, ON/OFF switch, starters etc for all items of supply	1 No.		
17(e)	Work Platform with FRP gratings with MS	1 Lot		

18	strip of 25x5mm thick (mm)			
18	Post Coating cleaning		Confirm	
19	OTHER REQUIREMENTS			
19(a)	Electrical system: 415V, 3 Phase, 50 Hz supply.		Confirm	
19(b)	Protection level: IP 54 or better		Confirm	
19(c)	Complete system to be tropicalized for Indian conditions(up to 50°C and RH 100%)		Confirm	
19(d)	All civil work required for the existing building (ref. Annexure-II) shall be scope of Anodizing system supplier		Confirm	
19(e)	BEML will provide power supply till main panel of the work centre, rest all work will be in the scope of supplier (including panels and cabling for all processes). Firm shall mention total power required for the system in KW		Confirm	
19(f)	Chemical and consumables required for all processes for initial make-up and three month maintenance is firm scope		Chromium Trioxide conforming to IS 330 Sulphuric Acid conforming to IS 266	
19(g)	The suitable compressor for required air is under supplier scope.		Requirement to be specified	
20	ACCESSORIES USED IN THE SYSTEM			
20(a)	Turbine Blower (Min 3 HP, 3 Phase, energy efficient) for supply of dust & oil free air for agitation in all tanks.		1 Set	
20(b)	Oil skimmer (for removal of oil skim from Degreasing bath)		1 Set	
20(c)	Pneumatically/Motorized top cover lid shall be provided for all tanks.		Confirm	
20(d)	Hot Air Blower / Radiator (3 Phase, energy efficient) for Drying Tank.		1 Set	

20(e)	Pure Aluminium Jigs (for various components to be anodized) shall be provided.	Min 10 Nos. (Various components drawings will be provided by BEML)	
21	SERVICES LINE		
21(a)	UPVC piping for plain water supply	1 Lot	
21(b)	UPVC piping for DM water supply	1 Lot	
21(c)	UPVC piping for chilled water circulation	1 Lot	
21(d)	PPR piping for air supply	1 Lot	
21(e)	PPH piping for drains and overflows (min 50mm each connecting to 150 mm final drain pipe)	1 Lot	
21(f)	Cable track trolley for AC field cabling from Monorail Hoist.	1 Lot	
21(g)	AC field cabling / wiring from control panel to all electrical machines with cable tray & support structure.	1 Lot	
21(h)	Conductive Aluminium bus bar or cable connections with sleeves between rectifiers & process tanks with support structure.	1 Lot	
21(i)	PPH/FRP connecting ducts from lip ducts on tanks to Scrubber to Exhaust fans (with support structure).	1 Lot	
21(j)	PP/FRP chimney with weather cowl (with support Structure). Upto 3 meters height above the existing roof.	1 Lot	
21(k)	Erection & assembly of plant shall be carried out at identified location at ASMD, BEML Limited, Mysore.	Confirm	
21(m)	Vendor has to successfully prove out 5 cycles of Degreasing, Alodine, Anodizing & Primer application at BEML premises during	Confirm	

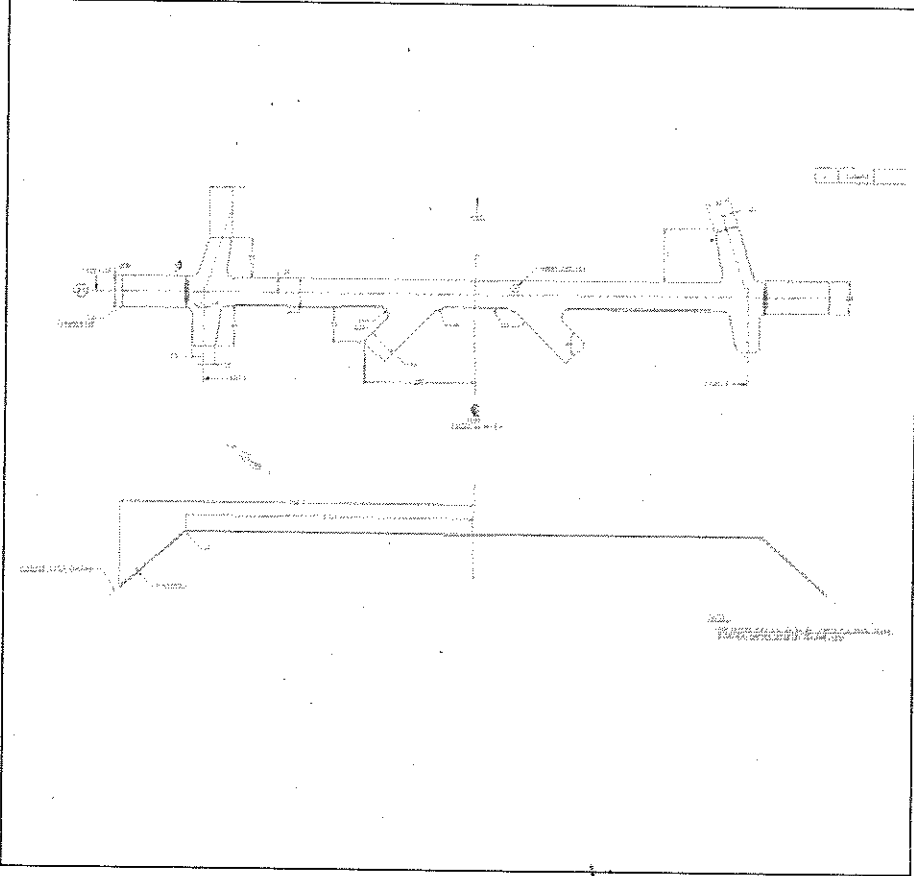
	prove- out.Same shall be verified by BEML.			
21(n)	Vendor has to involve BEML technicians during 5 cycles as part of training.	Confirm		
21(o)	Vendor has to train BEML Electrical and Mechanical maintenance technicians for trouble shooting, maintenance and repair.	Confirm		
21(p)	Anodized film electric breakdown test instrument as per BS6161 part 8 to be provided.	01 No.		
21(q)	Coating thickness measuring Instrument (Ref. Std. ASTM B244), based on eddy current method with LC 0.1micron and meter shall be capable of calculating average thickness of 8-10 location shall be provided. Make:Thermofischer/Olympus/Micro epsilon.	01 No.		
22	For Commissioning of the Plant (preparation of chemical baths & process trials), Vendor shall depute expert chemist to guide operators for min. 2 weeks.	Confirm		
23	Vendor shall supply all the necessary bath concentration measurement apparatus and Anodized layer production quality test instruments	Confirm		
24	Operation and Maintenance training at site, after successful installation and commissioning of plant.	Confirm		
25	Chemical / Consumables including PPE (for Initial makeup & 3 Months Maintenance)	Confirm and provide details of the chemicals and consumables.		
26	Critical Spares required during warranty period for complete system is supplier	Confirm		

	scope			
	List of critical spares and tools for maintenance and operation to be attached.		Confirm	
27	Service			
27(a)	The authorized Service Partner (Name & Address) must be certified by manufacturer and shown in the quotation		Confirm	
28	Vendor to include all items even if not mentioned above for necessary successful operation of plant on turnkey basis as per design.		Confirm	
29	Drawings of component (maximum & minimum size) are attached (Ref. Annexure-I).		Confirm	
30	Complete layout and all electrical diagram/drawing (03 sets) to be provided by the supplier		Confirm	
31	Experience: Firm shall have past experience in manufacturing, supply, installation & commissioning Anodizing or similar chemical conversion plant.	Essentially minimum TWO supply order copy and project completion certificate of supply & installation of Anodizing system/ similar chemical conversion system for past 5 years shall be attached.		
32	The delivery period including installation and commissioning of Anodizing System (System consists Degreasing, Anodizing and Primer application) at M/s BEMIL LIMITED, Mysore shall be 09 months from the date of placement of Purchase order/Work order		Confirm	
33	The entire plant inclusive of all system accessories should be covered under warranty for 24 months from the date of successful commissioning.		Confirm	
34	Breakdown calls to be attended within 48 Hrs.		Confirm	

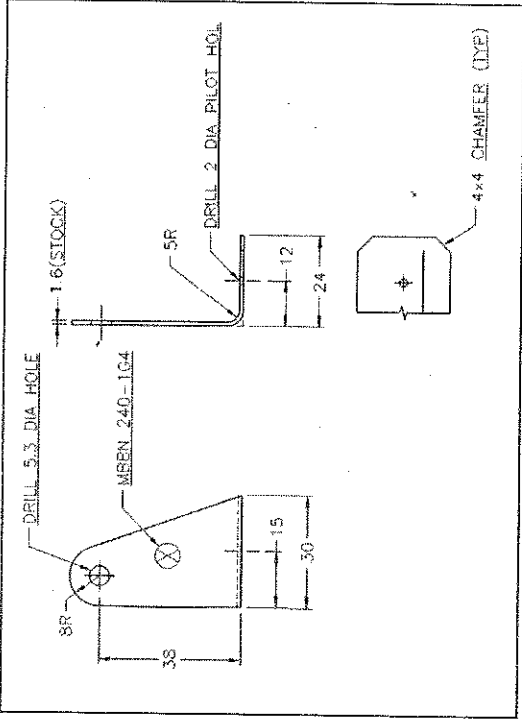
35	Total power consumption (in KW) to be provided by vendor.	Confirm	
36	Operator safety eye washer shall be provided at appropriate location.		
37	The firm shall provide waste liquid collection FRP tank of capacity 2000 liters fitted with 2 - 3 HP pump with automatic pumping system based on level and discharge shall be connected to existing ETP line. The oil collected by oil skimmer shall be collected in separate FRP tank of suitable size. (ETP connection pipe line distance approximately 350 meters, the pump discharge pipe shall be connected to ETP through under ground pipe laying)	Confirm with discharge pipe diameter and material.	
38	After sales service support for spares & service.	Minimum 10 years	

ANNEXURE-I

Largest Part:



Smallest Part:

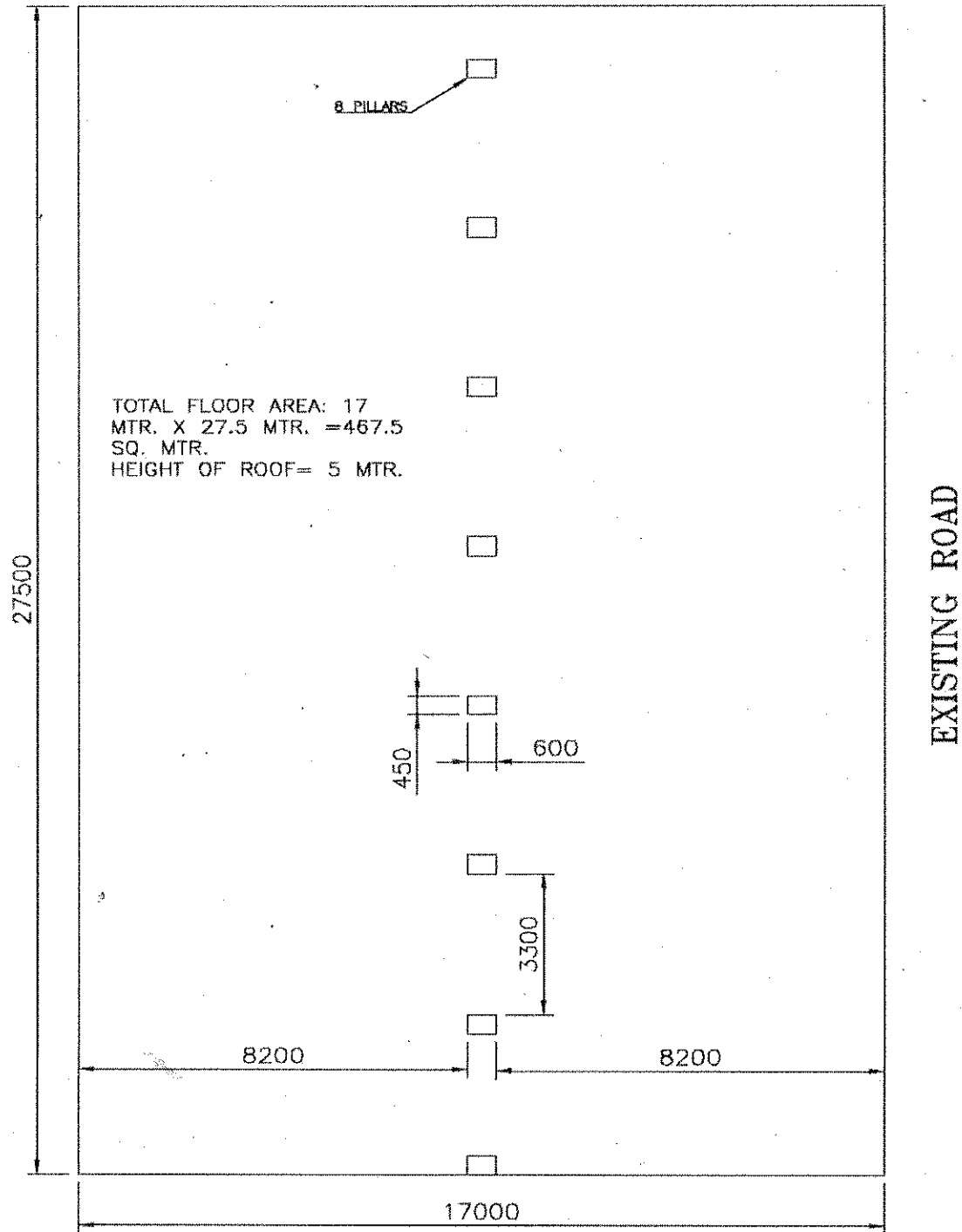


		L(mm)	B(mm)	H(mm)
Size	Smallest	42	24	38
	Largest	1500	500	500
Thickness (mm)	Smallest	1.6		
	Largest	2.5		
Material (Aluminum Alloy)		2024/2014/7075/6061		

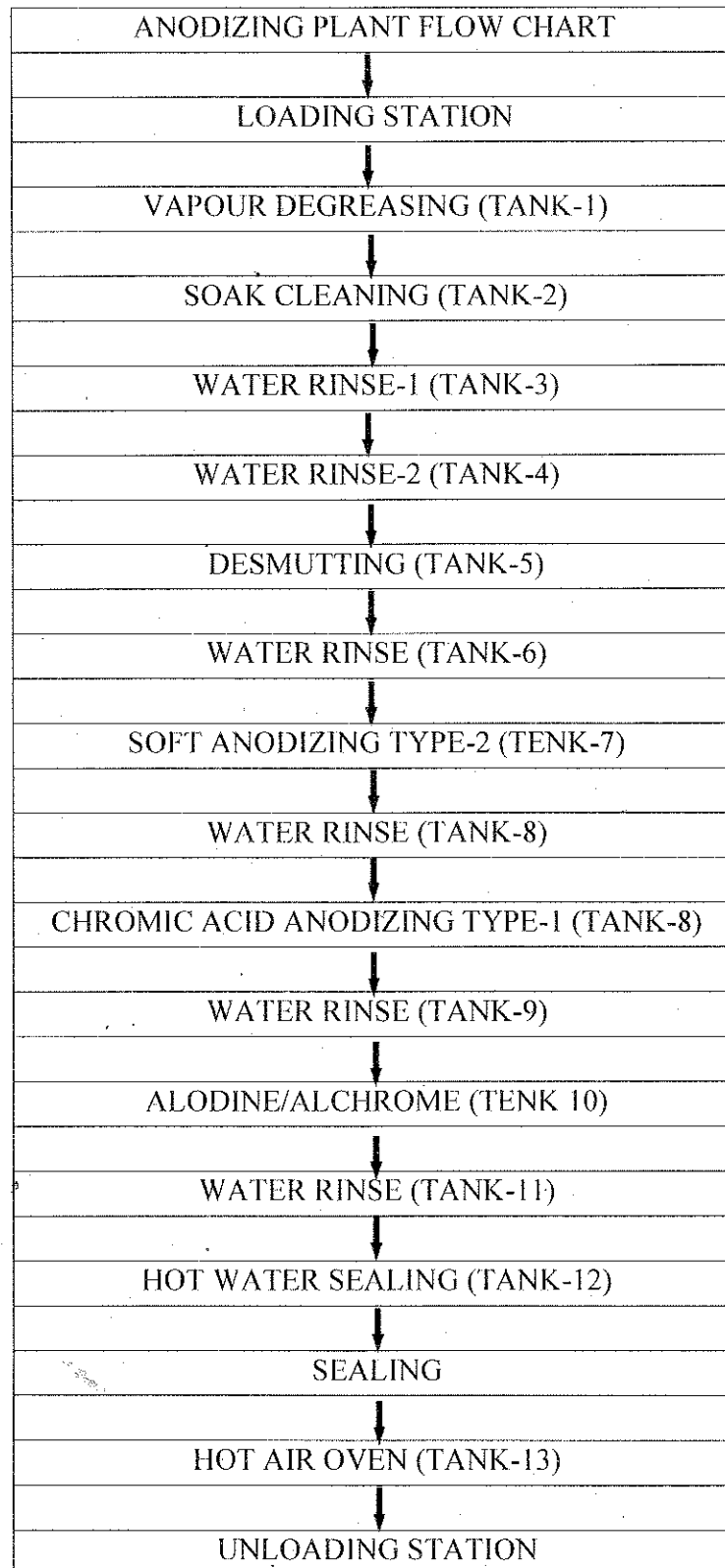
ANNEXURE-II

Floor Space:

EXISTING ROAD



ANNEXURE-III



Note: System shall be capable to carry out ANODIZING TYPE – I & II and ALODINE 1200

ANNEXURE-III PROCESS SEQUENCE

Sl. No.	STATIONS	PROCESS SEQUENCE	REMARK
01	Part visual inspection, manual cleaning and Jigging to part fixture		
02	Degreasing	Vapour degreasing – Component is exposed to TCE vapor, generated by heating TCE at 70°C	Degreasing tank shall be kept closed with sealed lid. The tank shall be fitted with TCE bath heating at controlled temperature.
03	De-scaling	Cleaning the parts using aqueous metal (alkaline cleaning bath)	50 to 55 g/l DCAL solution in DM water at 45 to 60° or Alternative alkaline degreaser.
04	Rinsing	Part cleaning using cold swill water	
05	De-smutting	Common tank for Anodizing and Alodine 1200	20 to 30% V/V Nitric Acid (1.42) in DM water at room temperature up to 5 minutes or Alternative de-smutting solution.
06	Rinsing	Part cleaning using cold swill water	
07	Anodizing		
	Type -I	Chromic acid process	Chromium Trioxide AR Grade (50±10 gm/l) at 40±2°C (When the chloride content ≥0.2 gm/l or sulphate content ≥0.5 gm/l, the solution shall be replaced/replenished). Film thickness 1 to 5 microns
	Type-II	Sulphuric acid process	Sulphuric Acid, AR Grade (96 – 98%) of concentration 10±1% by volume and Oxalic Acid, AR Grade 1% w/v at 20±2°C, the solution content exceeds ≥0.2 gm/l and / or the dissolved Aluminum content is ≥5.0 gm/l, the solution is replaced/ replenished. Film thickness up to 25 microns. Usually 8 to 13 microns
	Alodine/Alocrom solution		Immerse the parts in 8 to 15 g/l Alodine/Alocrom 1200 in DM water at room temperature for 1 to 3 minutes. (pH of the bath solution shall be maintained 1.5 to 2.0)
08	Rinsing Tank	Part cleaning using running water	
09	Hot water sealing tank	Rinsing in de-ionized water	Water temperature shall be >96°C
10	Drying tank	Drying the parts in dry air	At 70°C maximum
11	Inspection and protection coating		Application of tint of medium viscosity mineral oil, wax, grease or lanoline for additional protection.
12	Inspection, Part numbering & Packing		Packing & Parts to be numbering shall be done as per customer requirement.