

**BHARAT HEAVY ELECTRICALS LIMITED, JHANSI**

SPEC NO.- SP/MISC/7823, Rev-01	ITEM NO.- SP/MISC/1/1/7823
LOCATION - FBM	QTY - 01 NO.

**Note:**

1. Vendor must submit complete information against clause No. 24 (Qualifying criteria) and the offers meeting this clause would only be processed.
2. The "bidder offer" column and the "deviation/remark" column (if applicable) of this format shall be filled in by the vendor and submitted along with the offer. Technical details also need to be submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specification / requirements shall be treated as non - compliance.
3. The offer and all the documents enclosed with the offer shall be in English only.

**SPECIFICATION CUM COMPLIANCE CERTIFICATE OF PAINTING BOOTH**

S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
1	<b>PURPOSE:</b> To create an efficient, controlled environment for acid cleaning and spray painting of aluminium transformer tanks, their components and other items made of low-carbon steel, stainless steel, and alloy steel. The system integrates the following: <b>a) Acid Cleaning Chamber/Booth:</b> Designed for effective acid cleaning of surfaces, ensuring thorough preparation for painting. <b>b) Downdraught Close and Wet-Type Liquid Spray Painting Booth:</b> Utilized for manual spray painting, shall efficiently capture overspray, maintain air quality and minimize contaminants with smooth and defect-free paint finish for both the exterior and interior surfaces. <b>c) Effluent Treatment Plant (ETP):</b> An integrated ETP shall ensure the safe and environmentally compliant treatment of waste generated from the cleaning and painting processes. This comprehensive setup shall ensure optimized surface preparation, superior paint application, and adherence to environmental standards. <b>d) Drying Ovens:</b> The paint drying process shall be carried out in electrically heated ovens.	Vendor to Note		
2	<b>SCOPE OF SUPPLY:</b> The scope includes the design, manufacturing, supply, erection, and commissioning along with prove-out of the following components for BHEL Jhansi: <b>a) Downdraught Close and Wet-Type Liquid Spray Painting Booth.</b> <b>b) Acid cleaning chamber/booth.</b> <b>c) Effluent Treatment Plant (ETP).</b>	Vendor to Confirm		
2.1				
2.2	Drying process shall be done in existing Electrically heated ovens available at BHEL, Jhansi.	Vendor to Note		
3	<b>JOB AND PAINT COATING DETAILS:</b>			
3.1	Size of Job: 3100(L) mm X 2000(W) mm X 950(H) mm	Vendor to Note		
3.2	Weight of Job : Approximately 1000Kg	Vendor to Note		
3.3	Primer coating: Heat Resistant Zinc Phosphate/Chromate /Epoxy resin Paint etc.	Vendor to Note		
3.4	MIO (Micaceous Iron Oxide) coating: Epoxy HB MIO Paint etc.	Vendor to Note		
3.5	Finish coating: Paint: Heat Resistant enamel/epoxy/polyurethane resin Paint etc.	Vendor to Note		
3.6	Paint consumption: Including Primer and finish variants, the total paint consumption per day with 2 shift operation will be approximately 40-50 litres per day.	Vendor to Note		
4	<b>SEQUENCE OF OPERATIONS AND GENERAL LAYOUT:</b>			



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4.1	"Annexure 1-Sequence of operations" is enclosed herewith for ready reference to understand the painting process.	Vendor to Note		
4.2	"Annexure 2-General layout of painting booth complete" is enclosed for reference purpose only.	Vendor to Note		
5	<b>ACID CLEANING/WASHING BOOTH/CHAMBER:</b>			
5.1	<b>Purpose:</b>			
5.1.1	The cleaning chamber/booth will be used for air cleaning, acid pickling/cleaning and water rinsing of items specified in clause number 1.1 to remove impurities, oils, and oxides for desired surface preparation prior to painting.	Vendor to Confirm		
5.2	<b>Type:</b>			
5.2.1	Downdraught close and wet type having positive pressure to prevents dust and other contaminants from entering the booth, ensuring a clean environment for high-quality finishes.	Vendor to Confirm		
5.3	<b>Principle of operation:</b>			
5.3.1	The acid cleaning/washing booth shall be equipped with a chemical and water tank. The chemical tank shall contain a mixture (in the ratio of 1:5 maximum Acid to Water) of chemicals (hydrochloric acid / sulfuric acid (H2SO4) / nitric acid (HNO3) / other cleaning agents suitable for aluminium. Acid shall be sprayed onto the surface of the component using acid-resistant spray guns (made of PVDF or PTFE). After the acid cleaning process is completed, the metal parts are rinsed thoroughly with water to remove any remaining acid. The rinse water is collected in a pit and it is directed to the Effluent Treatment Plant (ETP) for neutralization and safe disposal using pumping system through corrosion resistant piping. Tanks for acid and water storage with Spray guns for acid spraying shall be provided by BHEL.	Vendor to Note		
5.4	<b>Construction:</b>			
5.4.1	Internal clear dimensions: 5500 (L) x 4500(W) x 3500(H) in mm	Vendor to Confirm		
5.4.2	Material of construction (MOC): Entire booth including walls, roof and floor should be made of plates, square pipes etc. of Stainless Steel (Grade - 304 or better). Material shall be suitable for acid pickling/cleaning and of excellent corrosion resistance properties. Booth sheet should be minimum 1.2 mm thickness with suitable reinforcement.	Vendor to Confirm		
5.4.3	The booth is constructed from Single-walled, double-folded, and fully reinforced fabricated sheet construction to withstand the corrosive environment of the acid cleaning process.	Vendor to Confirm		
5.4.4	Reinforcement: Steel reinforcement or support structure to handle the weight of the heavy workpieces shall be provided.	Vendor to Confirm		
5.4.5	Two outlets of compressed air line with blow off guns should be provided inside the cleaning booth to blow off dust etc.	Vendor to Confirm		
5.4.6	Hinged door (in two part) on the front side of the booth for the full height of the booth with proper air sealing to be provided for job entry / exit on trolley. Sufficiently large transparent glasses/ fibre sheet for allowing natural light inside the booth and for viewing job shall be on the door.	Vendor to Confirm		
5.4.7	SS (Grade - 304 or better) /acid-resistant material grating shall be provided on booth floor.	Vendor to Confirm		
5.4.8	In addition to the component entry/exit door, a hinged type door for personnel entry / exit should be provided in side wall of the booth.	Vendor to Confirm		

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S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
5.4.9	The vendor should provide 1 number manual driven ground trolley on rail with a minimum load-bearing capacity of 3 tons for acid cleaning booth. Trolley shall be rolling on rail track of suitable gauge to ensure static and dynamic stability under load. Rail (Square Bar 40 mm X 40 mm) and other anchoring material for rail laying shall be BHEL's scope. Vendor to design the trolley wheels accordingly. The vendor will provide foundation drawings, while BHEL will execute the civil work and laying of rails.	Vendor to Confirm		
5.4.10	Trolley dimension (LxBXH), the minimum required dimension is 3300mm (L) x 2200m (W) x (maximum 700 mm(H).	Vendor to Confirm		
5.4.11	Trolley Gauge: 1315 mm (Preferable to match with existing heating oven track available at BHEL Jhansi)	Vendor to Specify		
5.4.12	Material of construction of trolley: Trolley structure shall be of Mild steel with top surface plate of acid-resistant material. Suitable guards of acid-resistant material should be provided to prevent direct ingress of acid or acid fumes in trolley wheels assembly and other parts.	Vendor to Confirm		
5.4.13	Two flexible water lines, each equipped with a blow-off cleaning gun/nozzle in ready-to-use condition, should be provided inside the cleaning booth for cleaning components with water after the acid cleaning process.	Vendor to Confirm		
5.4.14	The acid cleaning booth shall have all the arrangements for fresh air entry and polluted air out.	Vendor to Confirm		
5.4.15	The acid cleaning booth should be equipped with all necessary safety features while ensuring optimal performance capability.	Vendor to Confirm		
5.5	<b>Fresh Air supply unit:</b>			
5.5.1	Centralised fresh air supply shall be taken from centralised fresh air supply unit specified in clause number 6.5 of specification.	Vendor to Confirm		
5.6	<b>Air exhaust system:</b>			
5.6.1	Centralised exhaust system (Exhaust blower, exhaust duct and chimney) shall be as specified in clause number 6.7 of specification.	Vendor to confirm		
5.7	<b>Control panel for acid cleaning booth:</b>			
5.7.1	Control of Fume extraction system, air circulation and illumination lights for acid cleaning booth shall be in centralised control system as per clause number 6.11 of specification.	Vendor to Confirm		
5.8	<b>Pit for acid and rinse water collection:</b>			
5.8.1	The pit shall be below the floor level and of civil construction (Civil work in BHEL's scope). The design for construction of pit shall be provided by the vendor.	Vendor to Confirm		
5.8.2	Pumping system to direct acid and rinse water collected in pit to effluent Treatment Plant (ETP) for neutralization and safe disposal shall be vendor's scope.	Vendor to Confirm		
5.9	<b>Standards compliance:</b>			
5.9.1	Acid cleaning and pickling Booth must comply with environmental and safety regulations, including Factories Act 1948, OHSAS, UPPCB, CPCB, ISO standards and The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 for handling acids and hazardous chemicals in industrial environments.	Vendor to Confirm		
6	<b>WET-TYPE DOWN DRAUGHT LIQUID SPRAY PAINTING BOOTH</b>			
6.1	<b>Purpose:</b>			
6.1.1	The painting booth will be used for primer application, including MIO (Micaceous Iron Oxide) coatings and painting of items specified in clause number 1.1.	Vendor to Confirm		
6.2	<b>Type:</b>			

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S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
6.2.1	Type of Painting Booth: Fully Downdraught, closed, wet-type booth that introduces fresh air from above and/or sideways, flowing downward across the painting area. It should maintain positive pressure to prevent dust and contaminants from entering the booth, ensuring a clean environment for achieving high-quality finishes.	Vendor to Confirm		
6.3	<b>Principle of operation:</b>			
6.3.1	The spray booth contains a suitable size water pit underneath with a water/alkali mixture that breaks down sticky overspray resins. The over sprayed paint particles are drawn into the water and undergo intense scrubbing in an area of high turbulence caused by sharp changes in the air/liquid flow. This process breaks down the resins, allowing pigments to settle at the bottom of the tank as non-sticky sludge, which can be easily removed for disposal.	Vendor to Confirm		
6.3.2	Airflow Management: Fresh, filtered air from centralised fresh air AHU is introduced from above and/or sideways and flows downward the painting area. This airflow direction helps to carry away paint overspray and contaminants.	Vendor to Confirm		
6.3.3	Wet Filtration: A wet scrubber (water curtain/sprinkler/ any other advance system) captures and neutralizes paint particles and fumes. The wet filtration system collects contaminants in water, which helps to clean the air before it is exhausted.	Vendor to Confirm		
6.3.4	It uses water to capture paint overspray particles. The downdraught airflow ensures fumes and overspray are directed downwards, preventing them from affecting the operator or the job.	Vendor to Confirm		
6.3.5	Exhaust and Recirculation: Contaminated air, now mixed with water droplets, is directed towards the floor where it is filtered and then exhausted outside and water is recirculated after treatment.	Vendor to Confirm		
6.4	<b>Construction:</b>			
6.4.1	Paint booth should be fully enclosed structure, erected on the foundation, allowing component placed on the trolley to entry/exit through the door opening.	Vendor to Confirm		
6.4.2	Internal clear dimensions: 5500 (L) x 4500(W) x 3500(H) in mm	Vendor to Confirm		
6.4.3	Material of construction (MOC):The booth is constructed as a single-walled, double-folded structure made from fabricated sheets, reinforced whenever necessary for strength. The wet areas are constructed using stainless steel (SS 304 or higher grade) to prevent corrosion, while the dry areas are made of mild steel sheets suitable for liquid spray painting should have excellent corrosion resistance properties. The entire unit is fully enclosed and isolated by the booth walls for optimal performance and protection. Booth sheet should be minimum 1.2 mm thickness.	Vendor to Confirm		
6.4.4	Reinforcement: Steel reinforcement or support structure to be provided to handle the weight of the heavy workpieces.	Vendor to Confirm		
6.4.5	Material of construction for pipelines used in the painting booth shall be of anti corrosive on a self-supporting construction consisting of sheets, angle, channel, I beam.	Vendor to Confirm		
6.4.6	Two number of flexible compressed air line with blow off cleaning gun in ready to use condition should be provided inside the paint booth to blow off dust etc.	Vendor to Confirm		
6.4.7	Mild steel Grating shall be provided on booth floor.	Vendor to Confirm		
6.4.8	Hinged door (in two part) on the front side of the booth for the full height of the booth with proper air sealing to be provided along with sufficiently large transparent glasses/ fibre sheet for allowing natural light inside the booth and for viewing job.	Vendor to Confirm		
6.4.9	In addition to the component entry/exit door, a hinged type door for personnel entry / exit should be provided in side wall of the booth.	Vendor to Confirm		

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6.4.10	The vendor should provide 1 number manual driven ground trolley on rail with a minimum load-bearing capacity of 3 tons for painting booth. Trolley shall be rolling on rail track of suitable gauge to ensure static and dynamic stability under load. Rail (Square Bar 40 mm X 40 mm) and other anchoring material for rail laying shall be BHEL's scope. Vendor to design the trolley wheels accordingly. The vendor will provide foundation drawings, while BHEL will execute the civil work and laying of rails.	Vendor to Confirm		
6.4.11	Trolley dimension (LxBXH), the minimum required dimension is 3300mm (L) x 2200m (W) x (maximum 700 mm(H)).	Vendor to Confirm		
6.4.12	Material of construction of trolley: Mild steel	Vendor to Confirm		
6.4.13	Trolley Gauge: 1315 mm (Preferable to match with existing heating oven track)	Vendor to Specify		
6.4.14	The painting booth shall have all the arrangements for fresh air in and polluted air out.	Vendor to Confirm		
6.5	<b>Centralised Fresh Air supply unit: For both painting booth and acid cleaning booth</b>			
6.5.1	Fresh air supply unit of suitable capacity shall be provided to ensure adequate velocity of fresh air at the operators breathing level in both paint booth and acid cleaning booth.	Vendor to Confirm		
6.5.2	Airflow Type: Fully down-draught design where clean air is introduced from the ceiling and /or side and exhausted through the floor, ensuring uniform distribution and efficient removal of fumes.	Vendor to Confirm		
6.5.3	Suitable safety provision to be provided to avoid over pressurisation of ducts.	Vendor to Confirm		
6.5.4	Suitable provision shall be provided to close the inlet to either of booth to avoid entry of air in the booth when not in use.	Vendor to Confirm		
6.5.5	<b>Blower/Fan:</b>			
6.5.5.1	Blower type: Centrifugal Blower to be provided for handling large airflow volumes and ensure even distribution of air. Blower shall be belt driven with suitable capacity motor.	Vendor to Confirm		
6.5.5.2	Total Air flow rate: 28000 CFM Minimum	Vendor to Confirm		
6.5.5.3	No. of fresh air handling blowers: 2 Nos. Max.	Vendor to Specify		
6.5.5.4	Pressure: Suitable for maintaining slightly positive pressure inside the booth	Vendor to Specify		
6.5.5.5	Blower Efficiency: Min. 70% efficiency to ensure adequate performance.	Vendor to Confirm		
6.5.6	<b>Airflow Control:</b>			
6.5.6.1	Air Velocity: 400-600 mm/sec to maintain optimal painting conditions and safety inside painting booth.	Vendor to Confirm		
6.5.6.2	Suitable provision to be provided for controlling air velocity inside booths as per requirement.	Vendor to Confirm		
6.5.6.3	Air changes per hour:	Vendor to Specify		
6.5.6.4	Airflow Regulation: Adjustable dampers to control airflow based on operational needs.	Vendor to Confirm		
6.5.6.5	All ducting shall be made of GI sheet of suitable thickness.	Vendor to Confirm		
6.5.7	<b>Filtration System:</b>			
6.5.7.1	Primary Filter: G4 efficiency filters or higher for dust and large particles.	Vendor to Confirm		
6.5.7.2	Primary Filter Filtration Efficiency: able to capture 60-90% of particles larger than 10 microns in size.	Vendor to Confirm		
6.5.7.3	Primary Filter Material: Made from pleated synthetic fibers etc., pre-filters offer a high dust-holding capacity with a low-pressure drop.	Vendor to Confirm		
6.5.7.4	Secondary Filter: F7 to F9 efficiency filters for fine particles, ensuring clean, particle-free air for the painting process.	Vendor to Confirm		
6.5.7.5	Secondary Filter Filtration Efficiency: Rated from F7 to F9, able to capture 85-95% of particles down to 10 microns size.	Vendor to Confirm		
6.5.7.6	Secondary Filter Material: Made from fine synthetic fibers etc., fine filters shall be often housed in rigid frames to maintain their shape under varying air pressure conditions.	Vendor to Confirm		

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S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
6.5.7.7	Filter Access: Easy-to-replace filters mounted in a cartridge system for quick maintenance and reusable.	Vendor to Confirm		
6.6	<b>Air Input Chamber (Plenum Chamber):</b>			
6.6.1	Plenum chamber of size 6000(L) X 3000(W) X 600(H) mm approximately to be provided to ensures that the air moves straight down over the workpiece, capturing overspray and contaminants as it moves toward the exhaust system. Vendor may provide alternative arrangement in line with design requirement.	Vendor to Specify		
6.7	<b>Centralised Air exhaust system:</b>			
6.7.1	Centralised/Common exhaust system (Exhaust blower, exhaust duct and chimney) for washing booth and painting booth with Stack / chimney fitted with weather cowl and bird mesh shall be provided. Suitable openings along with inspection covers to be provided for cleaning of ducts.	Vendor to confirm		
6.7.2	Height of stack / chimney : The height of chimney should meet relevant UP pollution control board environmental rules and regulation. Height of the building roof is 15 meters approximately.	Vendor to Note & Confirm		
6.7.3	Number of exhaust blower: 02 Numbers Max.	Vendor to Specify		
6.7.4	Exhaust Blower type: Centrifugal fan designed to handle corrosive fumes.	Vendor to Confirm		
6.7.5	Exhaust Air flow rate: As per vendor's design	Vendor to Specify		
6.7.6	Exhaust fan motor type : Suitable capacity belt driven	Vendor to Specify		
6.7.7	Exhaust fan motor capacity in kW:	Vendor to Specify		
6.7.8	Duct material: Corrosion-resistant ducting to handle acidic fumes to be provided.	Vendor to Confirm		
6.7.9	Duct design: Properly sized and insulated to minimize pressure loss and to ensure efficient airflow.	Vendor to Confirm		
6.7.10	Exhaust air quality should meet relevant UP pollution control board environmental rules and regulation requirement. Necessary provisions to ensure the same shall be provided by vendor.	Vendor to Confirm		
6.7.11	Suitable provision shall be provided to prevent entry of exhaust from one booth to another.	Vendor to Confirm		
6.8	<b>Eliminator / baffle plates:</b>			
6.8.1	Eliminator/baffle plates made of corrosion resistant material shall be provided.	Vendor to Confirm		
6.9	<b>Water filtration and circulation system:</b>			
6.9.1	There should be wet scrubber (water curtain/sprinkler/ any other advance system) at both sides of the painting booth ,through which the exhaust (paint mixed air) passes against downpouring water. The water shall be collected in the pit/sump constructed in the foundation throughout the length of the painting booth.	Vendor to Confirm		
6.9.2	The paint mixed water from pit/sump of paint booth to be taken out for treatment in the effluent treatment plant (for paint sludge separation, collection and treatment) using a suitable type pumping system and then recirculated back to painting booth.	Vendor to Confirm		
6.9.3	The wet scrubber wall shall be of SS304 or better material with minimum 1.2 mm thickness.	Vendor to Confirm		
6.9.4	Water Circulation Pump: High-capacity, corrosion-resistant pump with suitable suction strainer to ensure continuous water circulation for the filtration process shall be provided.	Vendor to Confirm		
6.9.5	Water Circulation Pump capacity in HP/kW:	Vendor to Specify		
6.9.6	A pit of suitable size shall be provided beneath the central part of the painting booth. This civil structure is in BHEL's scope. The design and specifications for the construction of the pit shall be provided by the bidder.	Vendor to Confirm		
6.9.7	Sufficient number of gratings should be provided over the pit of water filtration system. Suction air to the exhaust, placed at appropriate location shall pass through the opening of this gratings.	Vendor to Confirm		
6.10	<b>Lighting: For both Acid Cleaning Booth and Painting Booth</b>			
6.10.1	LED lights with a minimum illumination level of 1000 Lux must be installed inside the booths.	Vendor to Confirm		

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S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
6.10.2	The lighting inside the booth shall be designed to ensure that areas treated or untreated with chemicals and painted or unpainted are easily identifiable and distinguishable to the naked eye.	Vendor to Confirm		
6.10.3	Ensure even distribution to avoid shadows and dark spots, enhancing worker visibility and safety.	Vendor to Confirm		
6.10.4	All the lights should be fixed to the ceiling and side walls of the booth with switch control.	Vendor to Confirm		
6.10.5	Make of LED fitting & lighting: GE/PHILIPS/HAVELLS/CROMPTON GREAVES /BAJAJ/ OSRAM/ WIPRO / Any other make acceptable to BHEL.	Vendor to Confirm		
6.11	<b>Centralised control panel and control desk:</b>			
6.11.1	An electrical control panel and operator's desk should be provided outside the painting booth at convenient location and housed with reputed standard electrical make Siemens / BCH / L&T / Schneider, switch gears and MCB suitably interlocked for the sequence of operation.	Vendor to Confirm		
6.11.2	Operator desk shall consist of all the operation control for all system like lighting, blowers and pumps etc. for complete acid cleaning, painting booth and ETP system.	Vendor to Confirm		
6.11.3	All Electrical and Mechanical elements should have proper tags for easy identification.	Vendor to Confirm		
6.11.4	Both the control panel and operator desk should be located side by side and at a convenient location from where the operator can watch the movement of door component and operate the painting booth.	Vendor to Confirm		
6.11.5	The main control panel should consist of an interlocked main switch bus bar, fuses, MPCBs, MCBs, MCCB, contactor, relays, timers, etc. Make of switch gears like MPCBs, MCBs, MCCBs, Contractors, Relays, Timers, push buttons etc. should be of Siemens/L&T/BCH/Schneider/ABB/GE.	Vendor to Confirm		
6.11.6	The control panel and operation desk should be dust proof and vermin proof with IP54 / 55 degree of protection.	Vendor to Confirm		
6.11.7	Each motor should be provided with ON/OFF push buttons and indicating lamps of LED based.	Vendor to Confirm		
6.11.8	An emergency stop push button should be provided on the operators desk, electrical inter-locking should be provided in the control panel so that the complete operation can be started in either automatic or manual sequence.	Vendor to Confirm		
6.11.9	All electrical equipment shall be suitably earthed and shall be connected with centralised control panel through suitable rating of cables as per IS.	Vendor to Confirm		
6.11.10	Push buttons with switch indication shall be provided along with 3 Phase input supply indication.	Vendor to Confirm		
6.11.11	Centralised control panel shall have proper ventilation fan and suitable lighting.	Vendor to Confirm		
6.11.12	All cables shall be laid in cable tray (both sides of the cable to be fully closed).	Vendor to Confirm		
6.11.13	In the Electrical control panel all the components used should be certified by CE or equivalent IS standards.	Vendor to Confirm		
7	<b>EFFLUENT TREATMENT PLANT (ETP):</b>			
7.1	<b>Purpose:</b>			
7.1.1	Common Effluent Treatment Plant (ETP) for both acid cleaning booth and painting booth shall be provided to treat wastewater generated during the cleaning and painting processes by neutralizing acidic effluent, removing harmful chemicals, oils, and paint residues. The treated water shall meet environmental regulations for safe discharge or reuse in line with statutory requirement. To collect and reuse treated water within the plant, minimizing fresh water consumption and optimizing resource use.	Vendor to Confirm		
7.1.2	ETP shall be designed to handle the chemical pollutants from acid cleaning and the organic and particulate contaminants from the painting process.	Vendor to Confirm		
7.2	<b>Principle of operation:</b>			

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7.2.1	The process involves screening, oil separation, and pH neutralization. Coagulation, biological aeration, and clarification remove solids and pollutants, followed by filtration and disinfection.	Vendor to Confirm		
7.2.2	The water from the acid cleaning booth and paint booth should be recycled to maximum. Proper sludge collection system to be incorporated by which sludge is separated and collected. After recycling water to be taken back to the paint booth using suitable pumping and piping system. Necessary chemical dosing pump, transfer system and settling system should be incorporated.	Vendor to Confirm		
7.3	<b>Capacity and Design:</b>			
7.3.1	Capacity: 10,000 liters per day (10 KLD) minimum	Vendor to Confirm		
7.3.2	Design: The paint sludge collection cum water treatment plant (Effluent Treatment Plant) capacity shall be suitable to handle wastewater from acid cleaning and painting processes considering all the operating conditions of the paint booth complete and shall be installed near the paint booth but outside the shop.	Vendor to Confirm		
7.3.3	Wastewater generated from the acid cleaning process, rinsing and paint booth overspray collection shall be directed to the ETP inlet.	Vendor to Confirm		
7.3.4	ETP shall be suitable to handle acidic wastewater (water mix with nitric acid, sulfuric acid etc) from cleaning processes and wastewater from painting operations.	Vendor to Confirm		
7.4	The recirculation tank, pumping system, and all associated piping including valves and fittings shall be in vendor's scope, covering the supply and return between the acid cleaning, painting booth and effluent treatment plant (ETP).	Vendor to Confirm		
7.5	The treated water from the Effluent Treatment Plant (ETP) must adhere to the regulatory standards and requirements outlined by the relevant environmental laws and regulations in Uttar Pradesh and India. Specifically, the treated water should comply with: Environment (Protection) Act & Rules, 1986, The Water (Prevention and Control of Pollution) Act, 1974, The Water (Prevention and Control of Pollution) Cess Act, 1977, Central Pollution Control Board (CPCB) Guidelines, Uttar Pradesh Pollution Control Board (UPPCB) Regulations etc.	Vendor to Confirm		
7.6	Sludge Management: In line with Hazards waste management rules - 2016 and other applicable statutory compliance to be ensured by vendor.	Vendor to Confirm		
7.7	All chemicals and consumables required for trouble free operation for 6 months should be supplied along with machine.	Vendor to Confirm		
7.8	Complete details of the effluent treatment should be furnished in the offer.	Vendor to Confirm & Submit		
8	<b>ELECTRICAL REQUIREMENTS:</b>			
8.1	All electrical parts should be housed in a modular control panels dust and vermin proof, totally enclosed, folded metal frame with IP54 / 55 degree of protection. All the unused holes / cut outs should be closed properly. Electrical control panel should be provided with 3 phase, 4 wire digital energy meter. Make of digital energy meters: Schneider/ABB/L&T/ELMEASURE/ Any other make acceptable to BHEL.	Vendor to Confirm		
8.2	The panel wiring should be enclosed in PVC duct / channels with a neat appearance and safety should be taken care of, all cable entries should be from bottom side and glanded.	Vendor to Confirm		
8.3	All electrical devices, control and power circuits, cable terminals, lugs of ring type or pin type, should be of copper with insulating sleeve, ferruled / tagged for easy identification as per drawing.	Vendor to Confirm		
8.4	Illumination in the Panel should be LED type in accordance with IS / IEC standard. All the indication lamps should be LED based.	Vendor to Confirm		

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SPECIFICATION CUM COMPLIANCE CERTIFICATE OF PAINTING BOOTH				
S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
8.5	All limit switches make should be of BALLUFF / EUCHNER / SIEMENS/ BCH/ Any other make acceptable to BHEL.	Vendor to Confirm		
8.6	The electrical panel should have moulded case circuit breaker (MCCB) to control the whole power supply. ON / OFF knob should be available outside of control panel. Make of MCCB Siemens /L&T /BCH / Schneider /ABB/GE/ Any other make acceptable to BHEL.	Vendor to Confirm		
8.7	Emergency push button, lockable mushroom type, red colour, should be provided in front panel as well as in appropriate location. Make shall be Siemens / BCH / Schneider / Technic/ Any other make acceptable to BHEL.	Vendor to Confirm		
8.8	All induction motors make should be of Siemens / ABB / GEC / Kirloskar / Bharath bijilee / NGEF as per IEC standard easily available in India, should be provided with motor protection circuit breakers (MPCB) of suitable capacity. Safety devices, degree of protection should be in accordance with IEC standard.	Vendor to Confirm		
8.9	Overload & short circuit protection should be provided.	Vendor to Confirm		
8.10	The make of the instrument cooling Fan motors should be Siemens/Hi Cool/ Any other make acceptable to BHEL.	Vendor to Confirm		
8.11	Technical details of all electrical items should be provided at the time of supply of the Painting booth.	Vendor to Confirm		
8.12	All electrical switch gears, pole changeover switches, air break contactors, protection relays, miniature circuit breakers (MCB) etc. should be of SIEMENS / BCH / L&T / SCHNEIDER make only and should match equipment rating.	Vendor to Confirm		
8.13	Supply of self supporting, floor mounted, stand alone, indoor, dust and vermin proof LT power panel of suitable rated, 415 volts, 50 hertz to provide power supply to paint booth.	Vendor to Confirm		
8.14	The power panel compartment shall be adequately sized to accommodate both incoming and outgoing power cables as specified/as required.	Vendor to Confirm		
8.15	Ample space/termination height shall be provided in cable chamber so as to terminate incoming and outgoing XLPE/PVC power cable.	Vendor to Confirm		
8.16	The power panel equipped with required number of functional accessories as given below in accordance with the specification and standard stated.	Vendor to Confirm		
8.17	All required items for work is explicitly described in the specification, the contractor shall furnish all items necessary for the work to complete without any exception.	Vendor to Confirm		
8.18	In all electrical devices, metallic bodies should be properly earthed as per IS standards.	Vendor to Confirm		
8.19	Control voltage to operate contactor, relays, limit switches etc. should be 24V DC/AC.	Vendor to Confirm		
9	<b>MECHANICAL REQUIREMENTS:</b>			
9.1	Pumps should be CAPRARI / GRUNDFOS / DENNISON / SACEMI / SCHMALEN-BERGER/ CROMPTION GREAVES/KIRLOSKAR.	Vendor to Confirm		
9.2	The make of Pump motors should be RAJMANE / BONFIGLIOLI / PHOULSTON / SIEMENS / MITSUBISHI / GRUNDFOS / ABB / Bharat Bijilee as per IEC standard.	Vendor to Confirm		
9.3	FRL unit should be FESTO / JANATICS / AEROFLEX / SMC/CAMOZZI/AIRCOM	Vendor to Confirm		
9.4	All bearings used should be SKF / FAG / NSK / TIMKEN / NTN / INA / RHP.	Vendor to Confirm		
10	<b>CIVIL FOUNDATION AND CONSTRUCTION:</b>			
10.1	BHEL shall construct complete foundation and construction for the machine. However, vendor shall furnish the foundation and construction details and drawing within one month from the date of issuing of purchase order.	Vendor to Confirm		

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SPECIFICATION CUM COMPLIANCE CERTIFICATE OF PAINTING BOOTH				
S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
10.2	Levelling & anchoring system: Complete anchoring system including foundation bolts, anchoring materials, fixtures, levelling shoes etc. is vendor's scope.	Vendor to Confirm		
11	<b>SAFETY ARRANGEMENTS FOR COMPLETE ACID CLEANING, PAINT BOOTH AND ETP SYSTEM:</b>			
11.1	Fire alarm should be provided at booth.	Vendor to Confirm		
11.2	The painting booth as a complete system should confirm to all applicable safety standards.	Vendor to Confirm		
11.3	The painting booth complete should have adequate and reliable safety interlocks / devices to avoid damage to the operator, component and paint booth due to the malfunctioning or mistakes. Painting booth complete functions should be continuously monitored and alarm / warning indications through lights / alarm number should be available in respect of any abnormal conditions.	Vendor to Confirm		
11.4	All the pipes, cables etc. in the painting booth complete should be well supported and protected. These should not create any hindrance to operator movement for effective functioning. All motors, Gearboxes are to be thermally insulated / Isolated from the connecting mechanisms. All the rotating parts used on painting booth complete should be statically & dynamically balanced to avoid undue vibrations.	Vendor to Confirm		
11.5	Emergency Switches at suitable locations as per International Norms are to be provided. Oil, water or any pipe lines should not run with electrical cable in the same tray / trench wherever applicable. Power overload protection for all motors and driving mechanism should be provided.	Vendor to Confirm		
11.6	The booth must be properly earthed to avoid the possibility of a spark occurring.	Vendor to Confirm		
12	<b>ENVIRONMENTAL PERFORMANCE AND PAINTING OF PAINT BOOTH COMPLETE:</b>			
12.1	Maximum noise level shall be 80 dB at normal load condition, 1 m away from the plant with correction factor for back ground noise, if necessary.	Vendor to Confirm		
12.2	The plant shall be suitable for operation in tropical conditions with ambient temperature from 0 to 50 degree centigrade and relative humidity 90% approximately.	Vendor to Confirm		
12.3	Painting booth complete (Outside) shall be of Apple green colour code RAL 6011 (polyurethane).	Vendor to Confirm		
12.4	Painting booth complete (Inside) shall be of Bright white colour (polyurethane).	Vendor to Confirm		
12.5	Paint of the machine shall be oil resistant and shall not peel off. Note: Supplier will repair the painting with the original paint in case the same is damaged in transit.	Vendor to Confirm		
13	<b>PRE-DESPATCH INSPECTION AT VENDOR'S PREMISES:</b>			
13.1	Pre dispatch inspection shall be carried out by BHEL Engineers to check the Parts, sub-assemblies, spares and sub systems of the total equipment at vendor works up to their level of satisfaction.	Vendor to Confirm		
13.2	Verification and inspection of all major components/assemblies of the machine, control system, manuals & accessories as per technical specification.	Vendor to Confirm		
13.3	Inspection of pumps, motors, blowers, ducts, equipments, and gratings etc.	Vendor to Confirm		
13.4	PDI Clearance will be issued only after the equipment cleared in inspection.	Vendor to Confirm		
13.5	Travelling fare, boarding & lodging for the persons shall be borne by BHEL.	Vendor to Note		
14	<b>ERECTION &amp; COMMISSIONING:</b>			
14.1	A single-point supply for compressed air, water and electricity shall be provided by BHEL. Further distribution as per requirement shall be within the vendor's scope, including all necessary piping, fittings, valves and accessories.	Vendor to Confirm		
14.2	Supplier to take full responsibility for carrying out the erection, start up, testing of painting booth complete, it's control & all types of other supplied equipment etc. Service requirement like power, air & water will be provided by BHEL at only one point as indicated by supplier. Details of these requirements should be asked / indicated by supplier in advance.	Vendor to Confirm		

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SPECIFICATION CUM COMPLIANCE CERTIFICATE OF PAINTING BOOTH				
S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
14.3	Successful completion of Painting of the component at BHEL by the supplier using the supplied accessories and tools should be considered as part of commissioning.	Vendor to Confirm		
14.4	The supplier should be responsible for any breakage / damage to the painting assembly or its equipment / accessories/component etc.. during erection / commissioning. Firm should rectify / replace such damage parts free of cost at site with original parts.	Vendor to Confirm		
14.5	All Cover Plates / chequered plates required for the painting booth complete and for covering its peripherals including pits should be supplied and installed by the Supplier. Initial fill up of all consumables like oil, grease, etc., should be supplied by the firm along with the painting booth complete.	Vendor to Confirm		
14.6	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the Supplier. For this purpose, the Supplier should bring / supply sufficient quantity of touch-up paint of various colours of paint used.	Vendor to Confirm		
14.7	After unpacking the consignment, all the packing items, wastes generated during the erection & commissioning should be cleared and deposited at designated place is scope of the supplier.	Vendor to Confirm		
14.8	Duration for E&C after call of commissioning from BHEL - 3 Months Max.	Vendor to Confirm		
15	<b>TESTS &amp; ACTIVITIES TO BE CARRIED OUT AT BHEL DURING COMMISSIONING:</b>			
15.1	Demonstration of all features of the painting booth complete, control system & accessories to the satisfaction of BHEL for efficient and effective use of the painting booth complete.	Vendor to Confirm		
15.2	Painting booth complete trial run test by carrying out painting of the component. Component will be arranged by BHEL.	Vendor to Confirm		
15.3	Demonstration by actual use of all supplied equipments and accessories to its full capacity.	Vendor to Confirm		
16	<b>PROVING OUT OF THE PAINT BOOTH COMPLETE:</b>			
16.1	A minimum of three job cycles (Aluminium Tank as per attached procedure number HSTN 612012 / any other job) for acid cleaning, painting and ETP must be successfully completed at BHEL works, with proper functioning of all systems and subsystems of the equipment, to the satisfaction of BHEL officials.	Vendor to Confirm		
17	<b>FINAL ACCEPTANCE:</b>			
17.1	Final acceptance certificate shall be issued only after successful commissioning & prove-out of supplied system.	Vendor to Confirm		
18	<b>TRAINING:</b>			
18.1	Training in all aspects including Operation and Maintenance for BHEL Staff during Installation & Commissioning of the equipment to be provided by the vendor. Detailed PPT / videos w.r.t. machine operation and maintenance shall be submitted by vendor along with documents.	Vendor to Confirm		
19	<b>DOCUMENTS:</b>			
19.1	Catalogues & Data Sheets of all Bought-Out-Items with copies of Product Catalogue to be furnished by the vendor along with the equipment.	Vendor to Confirm		
19.2	3 hard copies and 1 soft copy in Pen Drive of the following documents in English are to be supplied along with the equipment.	Vendor to Confirm		
19.3	Operation and maintenance manual	Vendor to Confirm		
19.4	Electrical circuit drawing	Vendor to Confirm		
19.5	Water flow circuit drawing	Vendor to Confirm		
19.6	Spare parts manual	Vendor to Confirm		
19.7	Manual for accessories and Bought out items with source details.	Vendor to Confirm		

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SPECIFICATION CUM COMPLIANCE CERTIFICATE OF PAINTING BOOTH				
S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
19.8	Detailed catalogues, sketch / photographs of the equipment and accessories to be enclosed.	Vendor to Confirm		
19.9	Make & Specification for all bearings used in the equipment should be provided	Vendor to Confirm		
19.10	Civil foundation & construction drawings like water pit, tank etc.	Vendor to Confirm		
20	<b>CONDITIONS AT BHEL JHANSI SITE:</b>			
20.1	415V with fluctuation of $\pm 10\%$ , 50Hz $\pm 3\%$ , 3 Phase AC power supply will be provided by BHEL at a single point near the system, as per layout recommended by Vendor.	Vendor to Note		
20.2	Temperature : 0 to 50° Celsius	Vendor to Note		
20.3	Relative Humidity : 90% approximately	Vendor to Note		
20.4	Climatic conditions : Humid, dusty, tropical atmosphere	Vendor to Note		
20.5	Air pressure available : 5 Bar	Vendor to Note		
20.6	EOT Crane in the shop : Capacity 10 Tons, Lifting Height - 12 Metre	Vendor to Note		
20.7	Available shop floor area for complete painting booth: 18000(L) X 12000(W) X 7500(H) in mm approx.	Vendor to Note		
21	<b>GUARANTEE:</b>			
21.1	Guarantee for the entire equipment for a period of 24 months from the date of commissioning. During guarantee period, if any part / component found defective, the same shall be replaced free of cost.	Vendor to Confirm		
22	<b>PACKING:</b>			
22.1	Rigid packing for all items of complete machine, all accessories and other supplied items to avoid any damage/loss in transit.	Vendor to Confirm		
23	<b>GENERAL:</b>			
23.1	Model Number (if any)	Vendor to specify		
23.2	Total connected load (kW/HP)	Vendor to specify		
23.3	Dimensions of system (Length $\times$ Width $\times$ Height)	Vendor to specify		
23.4	Floor area required (Length $\times$ Width $\times$ Height) for complete system & accessories.	Vendor to specify		
23.5	Total weight of the system	Vendor to specify		
23.6	Weight of heaviest part of the system	Vendor to specify		
23.7	Dimensions of largest part/ sub-assembly/ assembly of the system	Vendor to specify		
23.8	Supply period: 4 months Max. from date of drawing approval by BHEL.	Vendor to Confirm		
23.9	General arrangement drawing of the offered acid cleaning booth, painting booth and ETP duly showing vital dimensions as per the configurations should be submitted with the offer.	Vendor to Submit		
23.10	In addition all other items, accessories or feature required to prove out job at BHEL shall be in vendor's scope without any extra cost.	Vendor to Confirm		
23.11	Vendor may visit BHEL Jhansi before quotation to analysis the space available for entire equipment, to measure exact ducting requirements and any other information/details require for this system.	Vendor to Note		
23.12	The vendor shall submit the finalized general layout drawing covering overall views detailing all components of the paint booth complete, for BHEL's approval within one month after PO placement prior to the commencement of manufacturing.	Vendor to Confirm		
24	<b>QUALIFYING CRITERIA:</b>			
24.1	Only OEM or OEM authorized dealer, who have supplied at least one number Wet type Painting Booth in the past 10 years from the date of tender opening should quote. If the bidder is OEM-authorized dealer, then bidder to submit valid authorization certificate from OEM.	Vendor to Confirm		

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SPECIFICATION CUM COMPLIANCE CERTIFICATE OF PAINTING BOOTH				
S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	ACTION BY VENDOR	BIDDER OFFER	DEVIATION / REMARK
24.2	An unpriced purchase order copy along with proof of supply (Tax invoice / GEM CRAC etc.) and proof of commissioning (Commissioning certificate / Commissioning MOM / Performance certificate etc.) for the painting booth (for which the PO copy has been submitted) shall be submitted. If the bidder is an OEM-authorized dealer, purchase order copy and other credentials in the name of the principal will also be accepted.	Vendor to Submit		
24.3	A satisfactory performance report from the customer or self-declaration by vendor of the painting booth (for which the PO copy has been submitted) shall be submitted for at least one year from the date of commissioning.	Vendor to Submit		
24.4	Name of the customer/company	Vendor to Submit		
24.5	Complete postal address of the customer	Vendor to Submit		
24.6	Date of supply	Vendor to Submit		
24.7	Date of commissioning	Vendor to Submit		
24.8	Name and designation of the contact person of the customer	Vendor to Submit		
24.9	Phone number & email address of the customer's contact person	Vendor to Submit		
25	BHEL reserves the right to verify information submitted by vendor. In case the information is found to be false / incorrect, the offer shall be rejected.	Vendor to Confirm		

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SENIOR MANAGER/FBM

*Sarmit*  
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(SARMIT KUMAR)  
MANAGER/CQX

*Ash*  
7-2-25  
(ASHIS KUMAR MONDAL)  
ENGINEER/WEX



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## ANNEXTURE-1

### SEQUENCE OF OPERATIONS

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#### 1. Acid Cleaning Booth/Chamber Operation

- **Step 1: Preparation**
    - Load the workpiece or components into the acid cleaning booth.
    - Ensure that all safety protocols are in place, including proper protective gear for operators and checking of emergency systems.
    - Ventilation and fume extraction systems are activated.
  - **Step 2: Degreasing and Acid Cleaning Process**
    - Spray of acid (such as nitric acid, hydrochloric or sulfuric acid etc.) on workpiece to remove impurities, oils, dirt and oxides prior to painting.
    - The cleaning time is monitored and controlled as per the material specifications.
  - **Step 3: Rinsing**
    - After the acid cleaning cycle, the workpiece is cleaned by spraying it with pressurized water.
    - Rinse the workpiece thoroughly to remove any acid residues, ensuring no corrosion or surface damage.
  - **Step 4: Drying**
    - Transfer the workpiece to oven a drying to remove excess water before painting.
    - Existing electric oven available in BHEL Jhansi will be used for drying the components.
  - **Step 5: Transfer to Painting Booth**
    - Once the acid cleaning is complete, move the workpiece from the acid cleaning booth to the painting booth for the next process.
- 

#### 2. Painting Booth Operation (Wet Type Fully Downdraught Booth)

- **Step 1: Preparation**
  - Load the cleaned and dried workpiece into the painting booth.
  - Ensure the painting materials are prepared and the spray systems are functional.
  - Verify that the water curtains/sprinkler, exhaust, and ventilation systems are operational.
- **Step 2: Airflow and Ventilation Activation**
  - Activate the downdraft airflow system, pulling fresh filtered air from the ceiling/sideways and removing overspray and contaminants through the floor exhaust.
  - Ensure balanced airflow to maintain a clean environment within the booth.
- **Step 3: Painting Process**
  - Use the spray gun to apply the paint evenly over the workpiece.

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## ANNEXTURE-1

### SEQUENCE OF OPERATIONS

- The downdraft system continuously removes overspray, and the water filtration system captures excess paint particles.
  - Multiple coats may be applied depending on the specification, allowing time for each layer to dry between applications.
  - **Step 4: Drying**
    - Transfer the workpiece to oven for drying purpose.
    - Existing electric oven available in BHEL Jhansi will be used for drying the components.
  - **Step 5: Inspection**
    - After the final coat and drying, inspect the workpiece for any defects or imperfections.
- 

### 3. Effluent Treatment Plant (ETP) Operation

- **Step 1: Collection of Wastewater**
    - Wastewater generated from the acid cleaning process, rinsing, and paint booth overspray collection is directed to the ETP inlet.
    - Ensure that all wastewater channels and collection systems are working efficiently to prevent contamination.
  - **Step 2: Water Treatment**
    - The wastewater will be treated in the Effluent Treatment Plant (ETP) according to the specific treatment processes required for proper purification.
  - **Step 3: Treated Water Disposal**
    - The final treated water is tested for compliance with UPPCB/CPCB standards (pH, BOD, COD, TSS, etc.).
    - If the treated water meets all regulatory requirements, it is either recirculated to booth, discharged into a designated drainage system, reused for non-potable purposes (such as cleaning), or stored.
  - **Step 4: Sludge Management**
    - The sludge generated from the treatment process is collected in a sludge thickener or filter press.
    - The dewatered sludge is either disposed of safely or further processed as per environmental regulations.
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This sequence ensures that all systems—acid cleaning, painting, and wastewater treatment—operate efficiently and meet regulatory standards for performance and environmental safety.

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<b>ABB</b>  Document ABB Sécheron Ltd	<b>Colour and treatment specifications for aluminium structures</b>	76														
<p><b><u>Painting of aluminium</u></b></p> <p><b>General:</b> Aluminium does not generally need a protective coating, as all aluminium reacts with oxygen to form a oxide layer which provides the necessary protection. However, aluminium structures which are exposed to aggressive corrosion from washing solutions, braking dust, etc., do require surface protection.</p> <p>Decorative painting can be used to blend a structure into its surroundings or to coordinate it with existing equipment and installations.</p> <p>The lifetime of an aluminium structure can be substantially extended by appropriate finishing.</p> <p>The paint must exhibit good bonding strength with minimum porosity. It should also be lightfast and elastic while being hard enough to withstand mechanical loading.</p> <p>Efficient protection demands a series of measures to prepare the aluminium surface.</p> <p><b>Post-welding operations</b></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">Pos. 1</td> <td>Pressure test</td> </tr> <tr> <td style="text-align: right;">2</td> <td>Leak test</td> </tr> <tr> <td style="text-align: right;">3</td> <td>Cleaning and degreasing</td> </tr> <tr> <td style="text-align: right;">4</td> <td>Rinsing and drying</td> </tr> <tr> <td style="text-align: right;">5</td> <td>Pickling and acidification</td> </tr> <tr> <td style="text-align: right;">6</td> <td>Primer</td> </tr> <tr> <td style="text-align: right;">7</td> <td>Top coat</td> </tr> </table> <p>1./ 2. Before cleaning and painting, the structure should be pressure-tested acc. to HSTN 612 010, item 2, and tested for leaks acc. to HSTN 612 010, item 1.</p> <p><b>3.- Cleaning and degreasing</b></p> <p>Cleaning and degreasing depends on the nature of the contamination and is of decisive importance for the bonding strength of the paint.</p> <p>Rough dirt should be removed mechanically with a Perlon or wire brush.</p> <p>Avoid sandblasting for structural parts subject to high stresses because it can lead to deformation of the material and adversely affect its mechanical strength.</p>			Pos. 1	Pressure test	2	Leak test	3	Cleaning and degreasing	4	Rinsing and drying	5	Pickling and acidification	6	Primer	7	Top coat
Pos. 1	Pressure test															
2	Leak test															
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5	Pickling and acidification															
6	Primer															
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Rev. : A. ★ 93.07.02 Benedict		<b>HSTN 612 012</b>														

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Organic solvents are preferred for cleaning and degreasing.

**Health warning:** indoors, solvents must only be handled in well ventilated rooms.  
Absolutely no smoking.  
Observe the toxicity class according to manufacturers' specifications.

**Cleaning agent:** N°7684 ADR 3.3b of the  
Silfa AG  
Lack und Farbenfabrik  
CH-4852 Rothrist

#### 4.- Rinsing and drying

After cleaning and degreasing, rinse the structure carefully with running water. Be sure to remove all cleaning fluid residues from angles, joints, pores, etc. This is the only way to prevent corrosion at these points.

After rinsing, rub the structure dry with clean absorbent rags. The use of a hot air jet is recommended to eliminate all traces of moisture from angles and joints.

#### 5.- Pickling and acidification

Alkali or acidic mordants should be used for pickling. A highly recommended product for this purpose is "Aluperi" made by  
Pag-Chemie, CH-8957 Spreitenbach, Switzerland.  
Aluperi should be diluted with water in a 1:10 mixture according to the degree of contamination.

Stubborn dirt requires several applications of Aluperi. Apply the product from bottom to top with a spray gun or brush. Leave it to act for about 10 minutes, then clean with a brush or sponge and finally rinse with plenty of water at maximum pressure as described under Point 4 above.

**Caution:** wear goggles, toxicity class 2

The primer should be applied as soon as possible after drying to avoid modification of the chemically treated surface by the atmosphere.

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ABB Sécheron Ltd

Colours and treatments for aluminium structures

26

## 6.- Primer

When the chemicals from the acidification process have been thoroughly rinsed off and the tank is completely dry, the priming coat can be applied.

Pretreatment	:	chem. pretreatment
Application	:	external only, acc. to drawing HSTN 422 179
Coats	:	1 priming coat (edges and corners: 2 coats)
Type of paint	:	2-component epoxy resin
Consumption	:	200 g/m <sup>2</sup>
Drying time	:	fast to handling in approx. 2 hours
Coat thickness	:	40 µm
Supplier	:	Walter Mäder AG, CH-8956 Killwangen, Switzerland
Commercial product name	:	Etokat Aktiv primer
Toxicity class	:	acc. to supplier specifications
Shade	:	yellow-green or yellow-brown
Finish	:	matt, maximum semi-matt
Grain size	:	less than 30 µm
Thinner	:	
Handling	:	see supplier specifications

Other paints with similar specifications are also acceptable.

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7.- Top coat

When the priming coat is completely dry, the 2-component top coat can be applied. Stir the paint well before use. Check the viscosity in a flow cup (e.g. acc. to DIN 53211).

Pretreatment	:	priming coat
Application	:	external only, acc. to drawing HSTN 422 179
Coats	:	2 top coats
Total coat thickness	:	100 µm
Type of paint	:	2-component lacquer, polyurethane resin
Consumption	:	160 g/m <sup>2</sup>
Drying time	:	fast to handling in approx. 4 hours
Coat thickness	:	30 µm (per coat)
Supplier	:	Walter Mäder AG, CH-8956 Killwangen, Switzerland
Commercial product name	:	Nuvovern ACR-571.7
Toxicity class	:	see supplier specifications
Shade	:	see order
Finish	:	see order
Grain size	:	> 25 µm
Thinner	:	Art. No. 990 000-152
Handling	:	see supplier specifications

Other paints with similar specifications are also acceptable.

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