



Bharat Heavy Electricals Limited, Rudrapur

Enquiry No. :	
Due Date :	
Supplier's Ref.:	
Date :	

Specification cum Compliance Certificate for PAINTING EQUIPMENT CHAMBER WITH PAINT DRYING OVEN

1. The 'Offered' Column and where applicable, the 'Deviations' & 'Remarks' Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous or unsustainable information against any of the clauses of the specifications / requirements shall be treated as non-compliance.

2. The offer and all documents enclosed with offer should be in English language only.

(a) Name of the Bidder:	(b) Address of the Bidder:
(c) Telephone No.:	(d) Fax No.:
(e) e-mail ID:	(f) Name of Contact person:
(g) Desig. of Contact person:	(h) Mobile No. of Contact Person:

Scope: Supply, Erection, Testing and commissioning of PAINTING EQUIPMENT CHAMBER WET TYPE ALONGWITH PAINT DRYING OVEN complying with the following specifications:

S No.	Description - BHEL's Requirement	Specification	Offered	Deviations	Remarks
1.0	PURPOSE				
1.1	<u>Painting Equipment with Paint drying oven for painting & drying of fabricated products</u>	Painting Booth- 1 set Material Handling System(Ground track)- 1set Electrically Operated monorail hoist(Ground trolley)- 2 No Flash-off Zone -1 No Paint Baking Oven-1 No Monorail hoist with support structure- 1 No			
2.0	TECHNICAL SPECIFICATIONS:				
2.1	PAINTING BOOTH	Designed to give the optimum utilisation of the installed equipment with respect to their power consumption and efficiency. Down draft booth arrest the over sprayed paint throughout the cross section of the booth to give a user friendly and pollution free environment at paint shop. The air velocity inside the booth will be kept in such a way to take over sprayed paint particles alongwith it. The paint would be arrested in entrapment duct at the back of Booth. Suction blower being joined through canopy connection gives the uniform suction throughout the cross section of the booth. The booth should be so designed to provide protection from health and fire hazards, improved operator comfort and efficient separation and disposal of hazardous over spray paint particles would be achieved.			
2.1.1	Type	Down Draft type spray booth			
2.1.2	No of Units	01			
2.1.3	Overall dimensions	9mx5mx3.5m			
2.1.4	Exhaust Blower				
2.1.4.1	Capacity	16,200 CMH			
2.1.4.2	Static pressure	100 mm WC			
2.1.4.3	Quantity	04 Nos			
2.1.4.3	Make	NADI/Ventilation			
2.1.4.4	Exhaust Damper	Manually operated, one each with each blower			
2.1.5	Blower Motor				
2.1.5.1	Motor Rating	7.5 KW			
2.1.5.2	Mounting	Direct to blower impeller			
2.1.5.3	RPM	1440 RPM			
2.1.5.4	Quantity	04 Nos.			
2.1.5.5	Make	Siemens/Bharat Bijlee/ABB/ Crompton			
2.1.6	Connections				
2.1.6.1	Blower to booth	Indirect, on separate supports			
2.1.6.2	Blower to exhaust duct	Indirect, through canvas connection			

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2.1.7	Bottom Pit	Civil construction work by BHEL as per drawing of vendor			
2.1.8	Grating on the Floor	To be provided			
2.1.8.1	Type	Graded element, fabricated out of MS section and bar			
2.1.8.2	Feature	Easily removable for maintenance purposes			
2.1.8.3	Load bearing	100 kg/sqm			
2.1.9	Fresh Air Inlet	Through ceiling filters			
2.1.9.1	Air Filters	50 micron, HDPE non woven			
2.1.9.2	Draft	Natural			
2.1.10	Air Velocity	0.4 m/sec.			
2.1.11	Floor	Wet			
2.1.12	Illumination level	800 Lux			
2.1.13	Booth Enclosure				
2.1.13.1	Panels	GI 1.25 mm thick			
2.1.13.2	Panel support	Fabricated structure, CR 2.5 thk			
2.1.13.3	Booth support	MS section ISMC, ISA, suitable			
2.1.14	Scrubber Section	MS 2 mm. thick			
2.1.15	Exhaust Duct	GI 1.0 mm thick			
2.1.16	Control Panel	Suitable control panel to be provided			
2.1.17	Trolley entry/exit	Sliding door having clear opening of 2400 mm W — 1800 mm H to be provided.			
2.1.18	Access door	One no. shall be provided for operator entry/exit. Size 900 — 1800 mm; Qty : 01 no.			
2.2	<u>MATERIAL HANDLING SYSTEM</u>	It shall consist of ground track and trolley for booth, FOZ and oven movement. Moreover one no. hoist for material lifting inside paint booth is also required			
2.2.1	Ground track				
2.2.1.1	Length	30 m			
2.2.1.2	MOC	ISA 50x6 mounted on 100 x 10 MS flat			
2.2.1.3	Distance between tracks	900 mm			
2.2.2	Trolley				
2.2.2.1	Qty	02 nos.			
2.2.2.2	MOC	MS section. ISMC 100x50x5, ISA 40x5			
2.2.2.3	Wheel	Made of MS, 150 mm dia.			
2.2.3	Hoist, as detailed below				
2.3	<u>ELECTRICALLY OPERATED MONORAIL HOIST</u>				
2.3.1	Construction Details	This system will be having two main parts which are: a. Wire rope electrical hoist b. 'I' beam for the movement of Hoist			
2.3.2	Capacity	1 MT			
2.3.3	Lift	3 Mtrs			
2.3.4	Vertical Movement	Having 3 HP Electric Motor. The maximum Hoisting speed will be 6 Mtr./min			
2.3.5	C. T. Movement	Having 0.5 HP Electric Motor. The maximum speed 6 mtr/min.			
2.3.6	Motors	415 Volt, 50 Hz, 3 PH, AC squirrel cage motor with 'B' class insulation and of standard make Crompton / ABB / Bharat Bijlee .			
2.3.7	Hook	Conforming to IS: 8610 free to rotate swivel.			
2.3.8	Wire rope	6 x 37 construction, FMC, beset plough steel tested wire rope as per IS: 2266 to be used.			
2.3.9	Control	From push button pendant station supported with Steel link chain / wire rope, operating at 110 V.			
2.3.10	Limit switch	Snap action limit switch to prevent over hoisting and overloading to be provided for maximum safety			

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2.3.11	Brake	"FAIL TO SAFE" electro magnetic auto manual DISC/SHOE brakes to be provided ensure maximum safety and reliability in operation.			
2.3.12	Support	The support structure for the hoist to be supplied and put inside the paint booth.			
2.4	<u>FLASH-OFF ZONE</u>	Flash-off zones shall be provided after liquid spraying operation to take care of any foreign dust particles to settle down on the articles and to let the solvent vapors evaporate while travelling. The flash-off zones should be having sealed enclosures with proper visibility. The suction of entire zone would be taken from various points and joined into one exhaust duct. Flash-off zones would be provided after Paint Booth.			
2.4.1	Quantity	One No.			
2.4.2	Size	4500 mm L x 4000 mm W x 3000 mm H			
2.4.3	Exhaust Blower	Two nos., each having capacity app. 4500 CMH connected with 3 HP electric motor, to be provided			
2.4.4	Exhaust Damper	Manual, Bush Type			
2.4.5	Air Changes	150 per hour.			
2.4.6	MOC	The enclosures to be made out of 1.2 mm thick GI sheets with suitable structure. Glass panels of app.800 mm height to be provided for visibility throughout the length. Maintenance doors (One no. in each zone) also to be provided.			
2.4.7	Illumination level	400 LUX			
2.4.8	Painting Scheme	Panels to be painted with one coat of Etch primer and two coats of synthetic enamel paint.			
2.5	<u>Electrically Heated Oven</u>	<p>Mainframe & Cabin:The oven will be constructed from a self-supporting fabricated angle iron frame, and the double walled, insulated sheet steel cassettes,which will slide fit into each other. The cassettes will be fixed into the iron frame. A silicon based heat resistant sealing compound will seal off the joints between the cassettes.This twin angle frame and cassettes construction shall minimise direct metal contact,in-turn ensuring low heat transfer to the oven surface and saving on energy.</p> <p>The air from the working chamber of the oven to be drawn by the circulating air blowers over the centralized heat source and this heated air will be then fed back in to the working chamber through the hot air ducts and the Adjustable Air Directional Blinds,which will maintain temperature uniformly over the entire oven cross section.</p> <p>The design and placement of air duct with louvers/grills should be in such a way to minimize the heat loss and to provide over all uniformity of temperature..The easy movement of articles at entry and exit point must be provided so that no damage should occur to painted surface of articles. Safety elements like temperature controller, safety thermostat, blower-heat source-interlock etc. shall also be provided.</p> <p>Heater Box: It will consist of electrical heater bank suitably placed inside the heat exchanger cabin. The blower will suck the air through the oven chamber and pass it over the heater box to gain loss heat.</p>			
2.5.1	Treatment process	Paint Curing			
2.5.2	Construction type	Ground Mounted			
2.5.3	Transfer of energy	Connective with air circulation			
2.5.4	Type of heating	Electrically heated			
2.5.5	Overall dimensions	6000 mm X 4000 mm X 2800 mm			
2.5.6	Thermal insulation	150 mm thick rock wool slabs (resin bonded) having 64- kg/cum density, duly fitted; silicon sealant applied between the panels' joints.			
2.5.7	Circulating air temp.	Max. 180 Deg. C			
2.5.8	Heating media	Electrical Heaters			
2.5.9	Heating Load	150KW			
2.5.10	Electrical Heaters	Indirect heating consisting of heat exchanger with combustion chamber mounted to automatic gas fired burner. Circulating air system for special ventilation through high performance circulating air fan.			
2.5.11	Type	Heating elements will be of tubular design on low watt dissipation to eliminate non-glowing behavior			

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2.5.12	Connections	Firm heater connections will be provided to avoid any loosening of the connection so that no over-heating takes place at these joints. Adequate measures will be taken to ensure proper spacing between the heating rods assembled in heater banks. One No. heater holding plate will be provided having suitable holes at regular and zig-zag pattern shall be provided to ensure proper spacing and maximum heat transfer across the heater bank.			
2.5.13	Placement	Heater bank will be designed for easy replacement of heating rod, if the situation demands.			
2.5.14	Blower for air circulation	One no. having capacity of app.13000 CMH coupled with 7.5 HP motor			
2.5.15	Blower impeller	Reverse blade type, V-belt driven duly protected with fan casing for proper directional flow of air.			
2.5.16	Movement of articles	On the ground mounted trolley manually pushed/pulled inside oven.			
2.5.17	Door	Double flap type, on hinges. Doors shall be provided on either side of oven. Max. opening shall be 3000 mm W x 2000 mm H. Door panels shall be duly insulated and suitable arrangement shall be made to prevent any leakage while closed.			
2.5.18	Heat Exchanger Cabin	Will contain heat exchanger and blower suitably placed to get the desired air at required temperature. Proper window cassettes will be given for easy maintenance.			
2.5.19	MOC of heat exchanger	Stainless steel grade SS-304,			
2.5.20	Heat exchanger cabin	Contains heat exchanger, burner and blower suitably placed to get the desired air at required temperature. Proper window cassettes are given for the easy maintenance.			
2.5.21	MOC of Oven	Outer frame — MS 2.5 mm, Cassettes panels — GI 1.2 mm			
2.5.22	Painting	The oven shall be painted with one coat of Heat resistant Aluminium paint from inside & two coats of synthetic enamel paint from outside.			
3.0	<u>Process Description</u>	<p>The material will be loaded on the ground trolley by EOT Crane(BHEL Scope)..</p> <p>-The trolley will be pushed manually inside the booth.</p> <p>- The booth door shall be closed manually.</p> <p>-The load shall be lifted by hoist inside booth.</p> <p>-Painting at the bottom of material done.</p> <p>-The booth will be down draft type having wet suction.</p> <p>-The operators will paint the complete load from all the sides of trolley.</p> <p>-After total painting, the trolley will be pushed outside the booth.</p> <p>-The trolley will stay in flash-off zone for 10 min.</p> <p>-The solvent vapours sucked in the flash-off zone.</p> <p>-The trolley containing material will be pushed inside the oven.</p> <p>-The oven will be electrically heated having indirect heating system.</p> <p>-The doors of the oven will be manually operated.</p> <p>-Paint baking shall take place inside oven for a stipulated time.</p> <p>-Trolley will be taken out from the oven.</p> <p>-Material will be unloaded from the trolley.</p> <p>Empty trolley will be taken back to the loading station.</p> <p>-A Tentative Layout of Painting Plant is enclosed.</p>			
4.0	<u>ELECTRICAL REQUIREMENT</u>				
4.1	Voltage = 415V +10% / -10% , Frequency= 50Hz +3 / -3 , No. of phases = 3 phase with neutral. Power Supply source, as above, will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. Requirement of grounding/earthling with required material details should be informed by vendor well in advance so that same could be incorporated during construction of foundation.	Vendor to confirm			
5.0	<u>ANCHORING MATERIAL</u>				
5.1	Complete set of anchoring materials including foundation bolts, nuts, washers and levelling shoes etc for fixing to the foundation should be supplied	Vendor to offer			
6.0	<u>SPARES</u>				

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6.1	Itemised breakup of (1) standard/essential mechanical, electrical and electronic accessories & spares (included in Basic machine cost), (2) Optional in sufficient quantity as per recommendation of Vendor for 5 years (After initial 24 month's Guarantee period) for trouble free operation should be offered by vendor. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required (Unit Price of each item of spare should be offered in the price bid)	Vendor to offer			
7.0	O & M MANUALS				
7.1	Three sets of Operation & Maintenance Manuals in English language should be supplied along with the equipment. Manuals should contain the following information in it.	Vendor to confirm			
7.1.1	Operating manuals	Vendor to confirm			
7.1.2	Catalogues, Operation & Maintenance Manuals of all bought out items including drawings, wherever applicable	Vendor to confirm			
8.0	PRE DESPATCH INSPECTION				
8.1	Pre-dispatch inspection may be carried out by BHEL representative at vendor's works. However it is at the discretion of BHEL and final acceptance will be done at BHEL, Rudrapur during the commissioning of the booth	Vendor to confirm			
9.0	FOUNDATION/CIVIL WORK				
9.1	Foundation plan drawing with loading data at various points is to be submitted by supplier within 4 weeks of placement of LOI/PO which ever is earlier. All civil work will be done by purchaser as per the drawings provided by the supplier	Vendor to accept			
9.2	BHEL shall carry-out the design and construction of foundation as per foundation plan drawing & loading data	Vendor to accept			
10.0	COMMISSIONING				
10.1	Supplier to take full responsibility for carrying out the start up, testing of machine, it's control & all types of other supplied equipment, etc. Service requirement like power, air & water shall be provided by BHEL. Other requirements like helping personnel shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Vendor to agree			
10.2	Successful working of full capacity of the machine by the supplier shall be considered as part of commissioning. All tests shall form part of the commissioning activity.	Vendor to agree			
10.3	Tools, Tackles, instruments and other necessary equipments required to carry out all above activities should be brought by the supplier.	Vendor to agree			
10.4	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to agree			
10.5	Schedule of Supply and Commissioning shall be submitted with the offer.	Vendor to agree			
10.6	Charges, duration, terms & conditions for E&C should be furnished in detail separately by vendor along with offer.	Vendor to confirm			
11.0	MACHINE ACCEPTANCE				
11.1	Tests/Activities should be carried out at supplier's works on the machine before dispatch :				

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11.1.1	The machine should be tested for full load test at supplier works before despatch.	Vendor to agree			
11.2	Tests/Activities should be carried out at BHEL works while commissioning the machine :				
11.2.1	Demonstration of all features of the booth, control system & accessories to the satisfaction of BHEL for efficient and effective use.	Vendor to agree			
11.2.2	Training of BHEL operators in operation of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works.	Vendor to agree			
11.2.3	Demonstration by actual use of all supplied attachments and accessories to their full capacity for actual jobs.	Vendor to agree			
12.0	PACKING				
12.1	Rigid packing for all items of complete panel with all Accessories and other supplied items to avoid any damage/loss in transit. When panel is despatched in containers, all small loose items shall be suitably packed in boxes.	Vendor to confirm			
13.0	GUARANTEE				
13.1	Guarantee for 24 months from the date of acceptance at BHEL works. During this Guarantee period at least 2 visits per year and/or whenever called by BHEL (within 24 hours of call) by the service engineer of the supplier to be made & the parts, items, spares etc. needing replacement to be replaced by the supplier free of cost. In support a Performance Bank Guarantee of 10% of Basic Value of P.O. valid for 24 months from the date of commissioning will have to be furnished by supplier	Vendor to agree			
14.0	GENERAL				
14.1	Total Space required (Length, Width, Height) for complete Painting booth & Oven etc. should be sent alongwith the offer	Vendor to confirm			
14.2	Total weight (With break-up of each item)	Vendor to confirm			
15.0	<u>The Bidder has to submit a clause wise deviation statement, if any, against each clause of this technical specification along with the offer</u>	Vendor to submit			

Signature & Seal of Tenderer