# BHARAT HEAVY ELECTRICALS LIMITED
## UNIT: JHANSI
## (WORK. ENGG. & SERVICES DEPTT.)

| | | |
|---|---|---|
| **EQUIPMENT** | : | **Grit Blast Plant** |
| **LOCATION** | : | **Locomotive** |
| **ITEM No** | : | **ME-3/4/2595** |
| **QUANTITY** | : | **ONE NO.** |
| **SPEC. No** | : | **7113/R-2** |

## GRIT BLAST PLANT

The compressed air operated grit blasting system is meant to blast Railway's EMU coaches/ wagons (**having size- 25m Lg x 3.66 mW x 3m H)** & other fabrications after welding. Job movement in the blast chamber will be done through WINCH mechanism. The job will be brought inside the blast room and operators will carry out the blasting operation manually. Operator will have the control of winch mechanism to move the job as per their requirement. Both sides of the chamber will have rail tracks to take care the movement of job upto the length of **25m.**

The blasting will be done manually by using two nos pressure blast units. Used abrasive & heavy dust created during blasting falls into the hoppers from where it is conveyed by longitudinal screw conveyors and brought to the centre of the room. There will be a cross screw conveyor at one end of the blast room which delivers the abrasive media into the boot section of the bucket elevator. The bucket elevator lifts the media and pours into Rotary screen media separation from where the reusable abrasive from the abrasive separator unit is collected into the hopper and then to the abrasive blaster and abrasive is recycled through blasting nozzles. The unusable abrasive and dust from the separator is collected in a bin. The fine dust is sucked from room into the filter bags where dust is separated and clean air is discharged into the atmosphere keeping the environment clean and friendly.

## MAJOR COMPONENTS OF GRIT BLAST PLANT

### 1. GRIT BLAST CHAMBER

**Grit blasting room & vestibule section** walls will be formed of prefabricated MS sheets. Each wall panel is individual replaceable and the sections are bolted together on assembly with sealant applied between the bolted flanges to form an airtight joint. Wall panels and ceiling panels are fabricated from 3.15 mm & 2 mm thick steel sheet respectively.Size of blast room shall be 6000 mm (L)x 5000 mm (W)x 5000 mm (H).

### 2. OPERATOR DOORS- Hinge type ( for operator's entry)

Operator doors shall be provided inside blast room having opening .Size of the doors shall be 600 mm x 1800 mm.( 2 nos.)

### 3. OPERATOR DOORS- Hinge type ( for inspection in exit chamber)

Inspection doors shall be provided inside exit chamber having opening. Size of the doors shall be 600 mm x 1800 mm.( 2 nos.)

**4. MAIN DOOR ( duly rubber lined)**

Door in two halves with frame shall be provided on entry side of the vestibule section. The door shall be fabricated from 2.00 mm MS sheet suitably reinforced and constructed for rigidity. Each half of door shall be provided with vision window of size 200 mm X 200 mm X6 mm thick and provided with SS wire mesh protection. Air louvers shall be provided for adequate fresh air intake. The door is lined with 3 mm rubber sheet.

**5. RUBBER LINING OF CHAMBER**

The interiors of the sidewalls of the chamber ( not in vestibule section) will be provided with replaceable hanging **3mm thick** abrasive resistant rubber sheet having **60 durometer** hardness.

**6. ILLUMINATION OF CHAMBER**

**Metal Halide lamps fitted with** fixtures with SS wire reinforced glass covers shall be provided to provide illumination inside the blast chamber & vestibule section. . The cleaning & maintenance of these lights should be easy. Suitable illumination for the pit portion shall also be provided.

**7. GRIT BLASTING APPARATUS**

The blast apparatus shall be complete with pressure vessel, mushroomed valve, exhaust valve and an outlet with mixing valve and mixing tube to feed the nozzle via blasting hose. The apparatus will be in the form of pressure vessel, which houses mushroom valve in top portion of apparatus and is operated by air from the air system. The control of blast operation will be by a valve, controlled by operator. Pressure vessel will be fabricated from 6 mm MS plate as per IS-2825 & hydraulically tested at 250 psi. Air separator shall also be provided to drain moisture & any foreign material from incoming air system..

**8. CAPACITY OF PRESSURE VESSEL-**

10 cubic feet approx.

**9. PRODUCTION OUTPUT-**

Approx. 20 sq.mtrs per hour from each portable blasting machine, depending upon surface condition and finish required.

**10. REMOTE CONTROL-**

It places complete ON/OFF control of machine in the hand of operator at the blasting nozzle. Blasting starts just by pressing handle and stop by releasing it.

**11. OPERATORS SAFETY DRESS (2 SETs)**

The one set of safety dress kit shall consist of following-

| | | | |
|---|---|---|---|
| a. | Air fed helmet | - | 1 no |
| b. | Helmet hose | - | 11 mtrs |
| c. | Helmet air conditioner | - | 1 no. |
| d. | Hand gloves | - | 1 pair |
| e. | Gum boot | - | 1 pair |
| f. | Air breather | - | 1 no. |
| g. | Operator's suit & leggings | - | 1 set |

## 12. SCREW CONVEYOR HOPPER & GRATING ON HOPPER

Suitable screw conveyor hopper fabricated from 3 mm steel and trough of hopper from 5 mm thick steel sheet will be provided to facilitate conveying of abrasive media to screw conveyor. Suitable
floor grating for screw conveyor hopper will be provided to facilitate transfer of used abrasive into screw conveyor hopper. Suitable support on hopper shall be provided for strength and rigidity.
It is to be noted that the grating shall not bear the weight of the job or any material handling system/trolley/fork lifter etc. inside or outside the blast room.
The weight of the trolley with job will be on civil concrete RCC Beam & column, which will be constructed by BHEL as per foundation drawing of the supplier.

## 13. ABRASIVE RECOVERY SYSTEM

It consist of longitudinal screw conveyors and a cross screw conveyor system. Spent media falls through the floor grating into screw conveyor hoppers, which runs lengthwise and convey the media to cross screw. The cross conveyor delivers the abrasive to the boot of the bucket elevator.

## 14. ABRASIVE SEPARATION SYSTEM

The abrasive conveyed by the cross screw conveyor is elevated by the bucket elevator to the top where it enters the abrasive separation unit. The usable abrasive will be fed to the portable blasting machine and fine /unusable particles are collected in a separate bin( Bins shall be arranged by BHEL). Therefore, usable abrasive is recycled. The buckets will be of seamless type made of 3.15 mm thick steel sheet. Bucket elevator will be fabricated from MS material of 5 mm thick at boot section, 2.5 mm thick at top sections respectively. Size of bucket elevator will be 240 mm x 660 mm . The media separation unit will be a air wash separator which receives all media and debris from blasted work piece by the bucket elevator .Contaminants will be removed through screen. The finer contaminants and abrasive that passes through the baffles over the air wash where fine contaminants and small abrasive particles will be removed which are being sucked by the dust collector. Reusable abrasive falls into the integral storage hopper, located below the separator, from where clean abrasive is fed to the pressure blast unit through valve control.

## 15. SAFETY DEVICES

All doors shall be equipped with a switch which shall automatically shut-off the compressed air supply to pressure blast units, in case the doors remain open during the blasting operation. The switch shall also prevent starting of the pressure blast units unless the doors are in a fully closed position.

## 16. DUST COLLECTION SYSTEM WITH DUCTING ,

Dust laden air from blast room will be sucked into the dust collector due to vacuum created by exhaust fan. A baffle plate provided in the suction side of dust collector module inlet, distributes the air uniformly through out the housing .The fine dust will be collected in the fabric bags. The fabric bags are cleaned by the motorized shaker assembly which should be operated periodically. Suitable preset timer will be provided for bag shaking.
Dust collector housing will be fabricated from 2.0 mm MS sheets ,suitably supported by angles and channels. Mechanical gravity type flap value will be provided at the bottom of the

hopper for automatic discharge of dust. A manometer will be provided for reading pressure drop across bags. Access door will be provided for ease of maintenance.
Dust emission level to atmosphere through fabric bags shall be less than 150 mg/N cubic mtr.

## 17. DUCTING

Interconnecting ducts fabricated from **2 mm mild steel** sheets between blast room to dust collector and dust collector to exhaust fan inlet shall be supplied.

## 18. ELECTRICAL CONTROL PANAL & WIRING

The motor control panel shall be a centralized control panel housed with switchgear items. The motor control panel shall be mounted with 1 No. Suitable rating switch Fuse Unit for incoming supply. Individual MCB and thermal overload relay shall be mounted for motor below 12.5 HP however, for exhaust fan motor, star Delta Starter with MPCB shall be mounted.

## 19. WINCH SYSTEM

Mechanized winch system with **ACVD drive** break motors gear box, winch rope will be required. Winch system will be capable for hauling coaches / wagons. The operator will be able to control job movement with this system.

## 20. COLOUR / PAINTING:

Inside and outside surface of equipment will be brush cleaned and given two coats of Red Oxide Primer. Final coat on exterior of system is Enamel Air Drying Shade: Feroza Blue & Crystal white/ BHEL'S choice, which will be done at site.

## TECHNICAL SPECIFICATION & SCOPE OF SUPPLY

| S. NO | Description | Dimensions | Qty | Scope of supply |
|---|---|---|---|---|
| (A) | **BLASTING ROOM-** | | | |
| 1. | Grit blast chamber | 6000(L)x5000(W)x5000mm(H) | 1 Lot | SUPPLIER |
| 2 | Vestibule section ( Inlet side) | 3000(L)x4000(W)x4275 mm(H) | 1 Lot | SUPPLIER |
| 3 | Vestibule section ( Exit side) | 26000(L)x4000(W)x4275 mm(H) | 1 Lot | SUPPLIER |
| 4 | Total plant area ( Blast room plus vestibules) | 35000(L)x5000(W)x6000mm(H) | 1 Lot | SUPPLIER |
| 5 | Door frame size ( for vestibule section) | 3800 mm(W) x 3800 mm(H) | 1 No | SUPPLIER |
| 6 | Door opening | 3600 mm(W) x 3300 mm(H) | 1 No | SUPPLIER |
| 7 | Operator Door (blast chamber) | 600 mm x 1800 mm | 2 Nos. | SUPPLIER |
| 8 | Inspection Door (Exit vestibule) | 600 mm x 1800 mm | 2 Nos. | SUPPLIER |
| 9 | Rubber Lining ( Abrasive | 1.5 m x 2.6 m x 3 mm thick | 26 | SUPPLIER |

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| | resistant) ( for blasting room only) | | Nos. | |
| 10 | Rubber curtains (3 places) | | 3 lots | SUPPLIER |
| 11 | Illumination (for blast chamber, vestibules & pit) | 400 W Metal Halide Lamp | 22 Nos. | SUPPLIER |
| (B) PORATBLE BLASTING APPARATUS- | | | | |
| 12 | Grit blast apparatus | | 2 Sets | SUPPLIER |
| 13 | Blasting Nozzle | 10 mm T.C. lined | 2 Nos | SUPPLIER |
| 14 | Blasting Hose | 32 mm I D | 20 mtrs | SUPPLIER |
| 15 | Operator's safety dress | | 2 Sets | SUPPLIER |
| (C) AUTOMATIC ABRASIVE RECOVERY SYSTEM ( For Blasting Room Section)- | | | | |
| 16 | Abrasive recycling system with floor grating | | 1 Set | SUPPLIER |
| 17 | Longitudinal screw conveyor | 3 Rows | 3 Nos | SUPPLIER |
| 18 | Drive motor for longitudinal screw conveyor | 1.5 HP, 415V/3P/50 HZ geared motor | 3 Nos | SUPPLIER |
| 19 | Cross Screw conveyor | 1 No | 1 No | SUPPLIER |
| 20 | Drive motor for cross screw conveyor | 3.0 HP, 415V/3P/50 HZ Geared motor | 1 No | SUPPLIER |
| 21 | Drive motor for bucket elevator | 2.0 HP, 415V/3P 50 HZ. Geared motor | 1 No | SUPPLIER |
| 22 | Belt of bucket elevator | 100 mm x 10 mm thk. | 1 No | SUPPLIER |
| 23 | Size of bucket elevator | 660 mm x 240 mm | 1 No | SUPPLIER |
| 24 | Size of abrasive (mixture of shot and grit) | S-280 & G-40 | 3 MT Each | BHEL |
| 25 | Abrasive separation system | Air Wash Type | 1 No | SUPPLIER |
| (D) DUST COLLECTION SYSTEM: | | | | |
| 26 | Dust collection system | | 1 Set | SUPPLIER |
| 27 | Type of filter bags | Woven cotton satin | 240 Nos | SUPPLIER |
| 28 | Exhaust fan motor | 50 HP, 415V/3P/50 Hz | 1 No | SUPPLIER |
| 29 | Fan Capacity | 20,000 Cfm | | SUPPLIER |
| 30 | Filter bag area | 300 Sq. mtrs. Approx. | | SUPPLIER |
| 31 | Motorized shaking (Geared motor) | 1 HP, 415V/3P/50 Hz, | 2 No | SUPPLIER |
| 32 | Dust Emission Level | 150 mg/N cubic mtrs | | SUPPLIER |
| (E) CONTROL PANEL | | | | |
| 33 | Electrical items and control panel with operating desk | | 1 Set | SUPPLIER |
| (F) WINCH SYSTEM | | | | |
| 34 | Winch system with ACVD complete with wire rope and tensioning arrangement | | 1 Set | SUPPLIER |
| (G) OTHER REQUIREMENTS | | | | |

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| 35 | Colour/ painting | BHEL choice | - | SUPPLIER |
| 36 | Operational platforms with ladders from inside of blast room | | - | SUPPLIER |
| 37 | Training inspection & testing | | - | SUPPLIER |
| 38 | Erection & commissioning of the plant-including supervision, tools –tackles& workers/labours | | - | SUPPLIER |
| 39 | Civil work and modification of existing room and pit | | - | BHEL |
| 40 | Rail track | | 1 Set | BHEL |
| 41 | Electrical wiring from source of supply to control panel | | - | BHEL |
| 42 | Power consumption -60.5 HP | | | BHEL |
| 43 | Compressed air supply -250 CFM at 80 PSI (6.0 kg per sq. cm) | | - | BHEL |
| 44 | Piping for compressed air supply | | - | BHEL |
| 45 | Required abrasive ( steel shots /grits) | | - | BHEL |
| 46 | Job handling system with rails | | - | BHEL |

**NOTE:- Bidders are advised to visit BHEL's existing site/ shed before quoting. The required plant shall be installed in the existing shed with modification in existing shed and pit. Necessary foundation and modification drawings shall be submitted by the suppliers in advance for foundation and modification / civil works.**

**Details to be submitted with the offer:**

1. **Dimensioned outline general arrangement drawing**
2. **Details of safety devices / guards provided.**
3. **Electrical schematic diagram.**
4. **Total electrical load.**
5. **Quotation with item wise prices of spares for 2 years normal working.**
6. **Details of standard & optional accessories offered.**
7. **Necessary foundation and modification drawings**

**QUALIFYING CONDITIONS**

**Only those vender, who have supplied and commissioned 5 Nos. such machines in the past ten years and such machine is presently working satisfactorily for more than one**

1. Name of the customer/ company where similar machine/ crane is installed
2. Complete postal address of the customer
3. Year of commissioning
4. Name and designation of the contact person of the customer
5. Phone , Fax No. and e-mail address of the contact person of the customer
6. Performance certificate from the customer regarding satisfactory performance of the machine/ crane supplied to them

| Date | Prepared By | Checked By | Approved By | |
|---|---|---|---|---|
| | Dy. Mgr (WEX) | Mgr.(WEX) | DGM.(WEX) | AGM(WEX) |
| 06/10/07 | 06/10/07 | 6/10/07 | | 8.10.07 |