An ISO 9001 Company

# Bharat Heavy Electricals Limited

**(**High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

| **ENQUIRY** | Phone: +91 431 257 79 38<br>Fax : +91 431 252 07 19<br>Email : tvenkat@bheltry.co.in<br>Web : www.bhel.com |
|---|---|

| | **Enquiry Number:** | **Enquiry Date:** | **Due date for submission of quotation:** |
|---|---|---|---|
| | **2620900071** | **09.03.2009** | **09.04.2009** |
| You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order | | | |

| **Item** | **Description** | **Quantity** | **Delivery (Item required at BHEL on)** |
|---|---|---|---|
| 10 | Submerged Arc Welding ( SAW ) Machine - Column and Boom type, as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in) | 1 No. | 31.01.2010 |

**BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats along with technical specifications can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference "2620900071".**

| | |
|---|---|
| Tenders should reach us before 14:00 hours on the due date<br>Tenders will be opened at 14:30 hours on the due date<br>Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present | Yours faithfully,<br>For BHARAT HEAVY ELECTRICALS LIMITED<br><br>Manager / Capital Equipment / MM |

## PART A

### QUALIFYING CRITERIA FOR THE SUPPLY OF TRAVELLING TYPE COLUMN & BOOM SUBMERGED ARC WELDING MACHINE

**SECTION – I : QUALIFYING CRITERIA**

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer for the SUBMERGED ARC WELDING MACHINE.

| S. No | REQUIREMENTS | VENDOR's RESPONSE |
|---|---|---|
| **1.0** | Only those vendors who have supplied and commissioned at least ONE COLUMN & BOOM TYPE SUBMERGED ARC WELDING MACHINE with Cladding head with 5mx5m travel or above in the past ten years (from the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (from the date of opening of Tender) should quote.<br>However, if such machine had already been supplied to BHEL, then that machine should be presently working satisfactorily for more than six months after its commissioning and acceptance (from the date of opening of Tender). | |
| **The vendor should submit following information where similar machine has been supplied for qualification of their offer.** | | |
| 1.1 | Name and postal address of the customer or company where similar machine is installed. | |
| 1.2 | Name and designation of the contact person of the customer. | |
| 1.3 | Phone, FAX no and email address of the contact person of the customer. | |
| 1.4 | Month and Year of commissioning of the machine. | |
| 1.5 | Application for which the machine is supplied | |
| 1.6 | Performance certificate from the customer regarding satisfactory performance of machine supplied to them. | |
| 1.7 | BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected. | |

**SECTION II : COMPANY PROFILE:**

| S.No | PARTICULARS | VENDOR's RESPONSE |
|---|---|---|
| 2.0 | Number of years of Experience of the Bidder/Vendor in the field of Design, Manufacture & supply of Heavy Duty Travelling Column & Boom Sub-merged Arc Welding Machines with cladding head and associated welding flux circulating/slag recovery unit. | |
| 3.0 | Details on the Codes/Standards of Machine Design and Manufacture. | |
| 4.0 | Details on Manufacturing Facilities available with the VENDOR for:<br>a) Heavy Structural Fabrication<br>b) Heat Treatment.<br>c) Machining & Grinding.<br>d) Machine Assembly & Testing. | |
| 5.0 | Details of Quality System (with Stages of Internal Inspection) followed for the Machine Building and Testing of Capacity. | |
| 6.0 | Any additional data to supplement the manufacturing capability of the BIDDER for the subject equipment. | |

**SECTION – III : BID / OFFER FORMATS**

| S.No. | PARICULARS | VENDOR's RESPONSE |
|---|---|---|
| 7.0 | The Bidder shall submit the offer in TWO PARTS – Technical (with **PART A & PART B**) & Commercial and Price Bid. | |
| 8.0 | The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each Clause. A just 'YES' or 'CONFIRMED' or 'NO-DEVIATION' or 'COMPLIES' or 'ACCEPTED' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer. | |
| 9.0 | The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue (if applicable). | |
| 10.0 | The Commercial Offer shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation of the inclusion of all the accessories, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements. | |
| 11.0 | Earlier performance /field experience (including service support) if any, with BHEL for the Vendor's Equipment Service, will be reckoning factor for the technical qualification of the Offer. | |

**PEERFORMANCE CERETIFICATE – (SAMPLE FORMAT)**
**(**On Customer's Letter Head)

| | | | |
|---|---|---|---|
| 1. | Supplier of the Equipment/Machine | : | |
| 2. | Make & Model of the Equipment | : | |
| 3. | Month & Year of Commissioning | : | |
| 4. | Application for which Machine is used | : | |
| 5. | a. Equipment Serial Number<br>b. Power Source Rating for AC/ DC<br>c. Column & Boom Dimensions<br>d. Other Specifications (optional) | :<br>:<br>:<br>: | |
| 6. | Performance of the Machine<br>(with reasons for recommendation) | : | Best in the market/<br>Satisfactory/<br>Good/<br>Average/<br>Not Satisfactory |
| 7. | Any other Remarks | : | |

Date :

Signature & Seal of the Authority
Issuing the Performance Certificate

## PART – B

## TECHNICAL SPECIFICATION for TRAVELLILNG TYPE COLUMN & BOOM SUBMERGED ARC WELDING MACHINE

### 01. APPLICATION

The proposed machine is intended for welding of longitudinal and circumferential seams, in the formation of cylindrical shaped pressure vessels and cladding of Stainless steel / Inconel on straight/curved surfaces. The weld edge preparation for the longitudinal weld seam and the circumferential weld seam are shown in ANNEXURE-1,2 &3. The machine shall also have an integral welding flux recovery and circulation system.

### 02. WORK-CENTRE CONFIGURATION

The work-centre will have one travelling type column & boom submerged arc welding machine with ± 180 Deg column rotation, moving on rails fixed on the ground. During cladding, the job is positioned by means of tilting positioners. 1 No. tilting Positioner is to be included in the supply.

### 03. JOB DETAILS:

| No. | Type of welding | Job | Shell dia in mm | Wall 't' (at weld joint) in mm | EP Detail |
|---|---|---|---|---|---|
| I | Cirseam | Job 1 | 3490 OD | 64 | Annexure 1 |
| | | Job 2 | 1651 OD | 97 | Annexure 2 |
| II | Long seam OD | Job 3 | 1150 OD | 35 | Annexure 3 |
| III | Long seam ID | Job 4 | 1000 ID | 35 | Annexure 3 |
| IV | ID Strip Cladding (straight) | Job 5 | 674 ID & cylindrical shell Length 1300 mm | | |
| V | ID strip cladding (curved) | Job 6A<br>Job 6B | R1200 spherical<br>Semi ellipsoidal ID 1465 | | |

**SAW:**

| | | |
|---|---|---|
| Cylindrical Shell Outer Diameter | : | 750 mm to 3490 mm |
| Length of Shell | : | 1000 -3000mm |
| Job Material | : | Quenched &Tempered Steel. |
| Weld Edge Preparation Process | : | By Machining or by Machine Grinding. |
| **CLADDING** | : | Stainless steel/ Inconel |

Changeover of SAW to Cladding and vice versa shall be done manually with easy to assemble / disassemble welding heads.

## 04. TECHNICAL SPECIFICATION

### 4.1.0 COLUMN & BOOM DESIGN

| S.No. | PARAMETERS | SPECIFICATIONS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|---|
| 4.1.1 | Type of Travel | Column & Boom with ± 180º rotation and travelling on rails fixed on the ground. | |
| 4.1.2 | Effective Traversing Length of Carriage on rails | 14000 mm | |
| 4.1.3 | Carriage travel speed | 100 to 2000 mm/min. | |
| 4.1.4 | Maximum Height under Welding Tip(Weld head in mid-stroke position) | 4500 mm | |
| 4.1.5 | Minimum Height under Welding Tip(Weld head in mid-stroke position) | 1200 mm | |
| 4.1.6 | Boom Effective Stroke in Horizontal Direction | 4000 mm (min) | |
| 4.1.7 | Maximum sag at the end of boom | 2 to 3 mm only.(for the full stroke in the horizontal direction) | |
| 4.1.8 | Boom Effective Stroke in Vertical Direction | Bidder to specify | |
| 4.1.9 | Boom vertical travel speed | | |
| 4.1.10 | Boom horizontal travel speed | 100 to 2000 mm/min | |
| 4.1.11 | Maximum Boom extension (from center of column) | Bidder to specify (to suit the stroke) | |
| 4.1.12 | Minimum Boom extension (from centre of column) | | |
| 4.1.13 | Weld head 'Horizontal& vertical traverse | 150 mm - By hand wheel | |
| 4.1.14 | Speed holding accuracy: Carriage | Bidder to specify (to ensure weld quality, as this will be one of the parameters of weld quality) | |
| 4.1.15 | Speed holding accuracy: Boom | | |
| 4.1.16 | Vibration Level | Maximum 1.0 mm during the traverses | |
| 4.1.17 | Rotation of Column (about the vertical axis) | Motorised rotation with mechanical limits/stoppers during rotation. Bidder to give details | |
| 4.1.18 | Clamps for Column | Bidder to give details | |

**4.2.0 WELDING POWER SOURCE& WIRE FEED CONTROLLER-1 No. each**

| S.No. | PARAMETERS | SPECIFICATIONS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|---|
| 4.2.1 | D.C .Power | 1000 Amps or higher | |
| 4.2.2 | D.C. Power source Duty Cycle | Continuous Duty. To suit the specified welding application without break. | |
| 4.2.3 | Welding Voltage | 0 to 60 V | |
| 4.2.4 | D.C. Power source Type | Latest version to be provided. | Vendor to specify the model, make and provide the complete literature along with the offer. |
| 4.2.5 | Power source Location | Power source is to be positioned in the Machine Carriage. | |
| 4.2.6 | Power source & Wire feed controller | ESAB/LINCOLN make. | Vendor to confirm |

**4.3.0 WIRE FEED UNIT & CLADDING HEAD-1 No.each**

| S.No | PARAMETERS | SPECIFICATIONS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|---|
| 4.3.1 | Wire feeding/Cladding | Wire/Strip feeding basic module to suit 3,4,5&6 mm Dia Single wire and 0.5x30 to 0.5x100 mm strip. Wire feed rate 0.2-4 m/min. | |
| 4.3.2 | Positioning | Hand operated slides which includes linear/circular slides Angular±180º and straightener ± 45º | |
| 4.3.3 | Cladding Strip (txw) | Head to suit 0.5x30& 0.5x60 mm stainless steel / Inconel | |
| 4.3.4 | Wire feeding unit & Strip cladding kit | To suit welding &cladding as per 4.3.1&4.3.3. Make: ESAB or any other reputed make acceptable to BHEL. | |
| 4.3.5 | Wire/Strip straightening | Head should have | Vendor to provide |

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| | mechanism | sufficient number of straightening rollers so that the wire/strip is fed without tilt/bend. | detailed description of the wire / strip feeding/ straightening mechanism with catalogue. |
| 4.3.6 | Wear Parts | Contact Tip, jaw, flux insert etc. to be quoted as optional | |

**4.4.0 TILTING POSITIONER FOR CLADDING -1 No.**

| S.No. | PARAMETERS | SPECIFICATIONS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|---|
| 4.4.1 | Table | To suit cladding on the inside of hemispherical dished end R 1200 mm and on flat surface of forging OD 2600 mm/Ht.600 mm. Job wt: 20 T. Running T-Slots for M36 bolts on the face of table to be provided. Step less variable speed control needed to achieve 50 mm/min to 500 mm/min welding speed. | . |
| 4.4.2 | Swivelling | Horizontal and Vertical planes to facilitate cladding inside dished ends. Tilt angle 0º-135º motorized where 0º corresponds to Horizontal position of table. | |
| 4.4.3 | Maximum load | Load 20,000 kg when table is in horizontal position.<br>Load 15,000 kg when table is in vertical position. | |
| 4.4.4 | Voltage | 415 v ± 10%,50 Hz,3Ø 3 wire, Control voltage 24 V | |
| 4.4.5 | Remote control | Rotation speed adjustment, forward/ reverse, push button tilting control | |

**4.5.0 OPERATOR CONTROLLER POSITIONED NEAR WELDING HEAD**

| S.No. | PARAMETERS | SPECIFICATIONS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|---|
| 4.5.1 | Controller Operations | a. Movement of all machine elements.<br>b. Pre-setting of all welding parameters.<br>c. Display of actual welding parameters.<br>d. Flux Feeding & Recovery. | |
| 4.5.2 | Machine Operations | a. To & fro Carriage Movement.<br>b. Column Rotation with limit | |

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| | | switches.<br>c. Boom Up & Down Movement.<br>d. Boom forward & reverse movements.<br>e. Column and Boom clamping action. | |
| 4.5.3 | Welding Process Parameters | a. Welding speed (either by carriage movement or boom movement)and wire selection<br>b. Welding Voltage/ Current<br>c. Weld ON/OFF<br>d. Auto-Stop for Carriage/ Boom stroke with limit switches.<br>e. Manual over-ride on pre-set parameters.<br>f. Flux on-off | Welding Current is representation of wire feed /speed. |
| 4.5.4 | Type of Controller | Bidder to specify with option for conventional type or micro-processor based | |

**4.6.0 FLUX FEEDING & RECYCLING UNIT-1 No.**

| S.No. | PARAMETERS | SPECIFICATIONS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|---|
| 4.6.1 | Capacity of the Flux Handling System | Bidder to Specify | To suit 5 to 6 welding /cladding cycle. |
| 4.6.2 | Type of flux | Agglomerated or Fused | |
| 4.6.3 | Flux Grain Size | 12 to 65 in Tyler Mesh | |
| 4.6.4 | Flux Bulk Density | 1.1 to 1.8 kgs./litre | |
| 4.6.5 | Air Displacement | Bidder to specify | To specify the size of the piping to suit the air flow requirement. |
| 4.6.6 | Measures of Vacuum | Bidder to Specify (in mm of water column), to suit the weld groove depth of 100 mm and length of hoses involved in the recovery and recycling system. | |
| 4.6.7 | Recovery/Feeding Hose | 40 mm ID, Synthetic Rubber or Metal Braided/Reinforced Hose to withstand 150 $^{o}$C. | |
| 4.6.8 | Flux handling Temp . | 150 $^{o}$C | |
| 4.6.9 | Filter Area | Bidder to specify | |
| 4.6.10 | Fine Dust Storage Capacity | Bidder to specify | |
| 4.6.11 | Flux Storage Capacity | Bidder to specify | |

## 05. BASIC CONSTRUCTIONAL FEATURES

| S.No. | DESCRIPTION /PARTICULARS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|
| 5.1 | The base frame, column & boom carriage shall be of fully welded construction and built in closed construction. | |
| 5.2 | If heat-treatment is required for the fabricated structure, proper heat-treatment shall be carried out prior to taking up machining or grinding works. Bidder to mention/give heat-treatment details. | |
| 5.3 | The carriage has to be filled with heavy material like concrete or cast-iron blocks to give self-weight for the column & boom structure to avoid toppling. | |
| 5.4 | The guide ways (sliding surface) shall be suitably hardened and ground to give a smooth traversing. | |
| 5.5 | The power source and welding flux handling system shall be positioned in the carriage itself. | |
| 5.6 | Suitable bellow covers with metallic/anti-tear materials are to be provided to protect the rotating/sliding parts from the dust, welding flux/slag, wastes, etc. | |
| 5.7 | Since the jobs are welded with preheating to a temperature of 250 $^{o}$ C, all the machine parts shall be suitable for this working environment, by providing suitable covering or coating. | |
| 5.8 | Wipers are to be fitted to machine parts to clean/remove the dist collected on guide-ways. | |
| 5.9 | Bidder to give complete technical details on the drive mechanism for the column/carriage travel, boom vertical and horizontal travel, arrangement of boom holding onto the machine column, etc. Metallic guards are to be provided for all rotating couplings. | |
| 5.10 | A lifting hook shall be provided at the top of the column, to lift the column & boom with carriage structure, by use of a crane in case of need. | |
| 5.11 | All gears used in the machine are to be hardened and ground. | |
| 5.12 | A portable control panel near welding head shall be provided with 10m long cable with metallic sheathing, with duplicated functions for all the machine operations, except welding & flux system in addition to the one provided near the weld head. | |

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| 5.13 | To design carriage travel with two double flanged &two plain wheels to suit machined guide racks and provided with suitable guide rollers with adjustable feature. | |
| 5.14 | An operator seat shall be provided near the welding head (fitted to the boom) so as to have a better access when carrying out circumferential weld seam joints (at this stage the column and boom structure will be stationary) | |
| 5.15 | Suitable clamping mechanism shall be provided for fixing the position of column/carriage on the rail and the boom on the column, at any desired position within the permitted traversing lengths. | |
| 5.16 | Wire feeder shall be capable to handle 25 Kg wire spool as a standard feature and from a 250 Kg pay off pack as an option feature. | |
| 5.17 | The wire spool shall have the facility for adjusting brake on wire coil. | |
| 5.18 | The welding wire conduit (welding torch made of copper) to which the contact tip is screwed on shall not be more than 20 mm in diameter, as it may foul with the side walls of the weld-groove during welding. | |
| 5.19 | The supply shall also include the return current (earth) cables of suitable rating DC power source. The length of cable set shall be suitable to connect the job of length around 15 Mtrs. at the maximum. | |
| 5.20 | Vacuum Unit : Primarily there shall be a multi-stage rotary turbine or regenerative blower coupled to an electric motor (of rating above 5.0 HP) for high vacuum generation. | |
| 5.21 | Dust Filter Unit : The turbine/regenerative blower shall be connected to a vacuum chamber, provided with a fabric filter bag assembly to separate fine dust and a dust collecting tank.<br>Suitable long life Filters are to be used in the Filter Unit. | |
| 5.22 | Primary Separator: The vacuum chamber shall be connected to a primary cyclone/baffle type separator through a flexible vacuum hose. The primary separator shall have a mesh for separating slag particles and a conical bottom (hopper) with a tapping facility to drain the collected flux. | |

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| 5.23 | Flux Pressure Feeding : The system shall have a pressure feeding system to carry the flux from the flux –chamber to the flux-hopper fitted near the welding head. Hoses with suitable diameter and material to be quoted. | |
| 5.24 | Flux Recovery: Scope to include the Flux Recovery Hose with End Fittings. For sucking the flux a flexible hose with recovery /collecting nozzles (suitable for grooves and flat surface) shall be connected to the primary separator. | |
| 5.25 | Flux Level Indicator: Flux level (in the pressure chamber) indicator has to be provided, to indicate the low level of flux. | |
| 5.26 | Automatic Dust Cleaning: The dust collected in the filters has to be cleaned automatically by pulse jet actuated by sensing the low vacuum level. | |
| 5.27 | The flux feeding conduit and recovery hoses shall ensure no clogging of flux at any junctions, bends, nozzles, etc. | |
| 5.28 | Suitable accessories like crevice nozzle, extension pieces, handles, filters etc., shall be offered in addition to the Flux Feeding Hopper near the Welding Head. | |
| 5.29 | The sucking and feeding hoses or tubing shall withstand the temperature of 150ºC in continuous duty application with reasonable long life. | |
| 5.30 | Both electrical and mechanical spares such as rubber gaskets, filter fabric, suction hoses, V-belt, pulleys, heating elements etc. shall be offered with unit rate. Complete set of spares shall be quoted and the Indian equivalent may be mentioned in the offer. | |
| 5.31 | Flux Sucking Rate: Bidder to specify the quantity (in litres) of un-fused flux, that can be sucked by the recovery unit without any interruption, when the vacuum unit is put on. | |
| 5.32 | Vendor to furnish details of material, hardness & constructional details including explanatory drawings of various components/assemblies like Machine Frame, VFDs/Transmission System, Electric Motors, PLC etc., employed in the machine. | |
| 5.33 | Video images on CD /Hard copy of literature with photographs & drawings explaining the technical features may be enclosed with the offer. | |

**06. MACHINE LIGHTING SYSTEM**

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| 6.1 | A fluorescent machine lamp with drip proof protective cover to be provided for the welding area visibility. | |

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| 6.2 | A spot light with sufficiently long cable should also be provided with 24V AC supply. | |
| 6.3 | Flashing/Rotary type machine lamp to denote Machine ON, Working, Alarm/Tripping Condition, etc. as per Industry Standards, to be provided. | |

## 07. IMPORTANT POINTS

| S.No. | DESCRIPTION /PARTICULARS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|
| 7.1 | 415V ± 10% 50 Hz , 3 Phase AC (3 wire system without neutral) Power Supply Source will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor.<br>All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor namely Input supply panel with MCCBs for power source & electrical control panel | |
| 7.2 | All electrical equipment shall be Tropicalized and shall have IP 54 degree of protection. | |
| 7.3 | All electrical control cabinets & panels should be dust and vermin proof. | |
| 7.4 | All electrical components in the cabinets should be mounted on DIN Rail. | |
| 7.5 | All electrical panels should be provided with CFL lamps for sufficient illumination and electric power receptacles of 220 Volts, 5/15Amp. AC. All adapters/receptacles should have compatibility with Indian equivalent. | |
| 7.6 | Motors shall be from M/s Siemens/ABB or other reputed make conforming to IES Standards and acceptable to BHEL. | |
| 7.7 | All electrics shall be of reputed make like Siemens, BCH, Tele-mechanique. | |
| 7.8 | Latest Electrical AC drives shall be of Siemens/ABB//Eurotherm. Supplier to mention the Model No. in the offer. | |
| 7.9 | All components/devices/terminals are to be incorporated with ferrules. | |
| 7.10 | Vendor should ensure the proper earthing for the machine and its accessories. | |
| 7.11 | Wiring: All electrical motors, limit switches etc, on the machine shall be wired using PVC sheathed copper cable running in conduits to common terminal block. | |

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| 7.12 | External wiring from/to control panel, control desk, external motors etc shall be by means of armoured multi-core cables. | |
| 7.13 | All cables/hoses moving with traversing axes should be installed in cabled drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer. Cable tray arrangement is to be shown. | |
| 7.14 | Pneumatics on machine, and associated equipment shall be connected by nylon and/or steel tube to common point on machine. Fitted at the common point would be a suitable FRL unit with shut off valve. Flexible hoses are to be minimized with introduction of steel piping wherever possible with proper threaded fittings. | |
| 7.15 | BHEL- supplied compressed air will be at a pressure of 60 PSI to 70 PSI. All pneumatic systems on the machine shall be designed to operate efficiently at this air pressure. A suitable refrigerant type air drier shall be included in the system by the vendor. Vendor to provide the inlet pipe size based on the air flow requirement. | |
| 7.16 | The control voltage for all applications shall be less than 110 V. | |
| 7.17 | All non-working surfaces and control panels shall be given a primer coat and two coats of paint as specified in Vendor's Painting Scheme. All unpainted surfaces shall be protected from rust during transit. | |
| 7.18 | GUARANTEE: The equipment has to be guaranteed for its performance and also of the sub-assemblies/bought-out items, for a minimum period of 24 months from the date of commissioning at BHEL works. | |
| 7.19 | Vendor to submit the GA drawing, Layout drawing and major Sub-assembly drawing with major/critical dimensions, weight and BOM giving specification and make of all components along with offer. | |
| 7.20 | Vendor to submit the detailed drawings as stated in Point 7.19 to BHEL for approval before manufacturing. | |

## 08. ENVIRONMENTAL PERFORMANCE OF THE MACHINE

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| 8.1 | Maximum noise level shall be 85dB(A) at normal load condition, 1 M away from the machine with correction factor for back ground noise, if necessary including flux vacuum unit. This will be measured as per international standards like DIN 4563516. Vendor to demonstrate compliance to noise level, if so required. | |
| 8.2 | The machine shall be suitable for an ambient temperature of + 45ºC and relative humidity of 95% respectively, but both do not occur simultaneously. | |
| 8.3 | If any safety/environment protection enclosure is required it shall be built in the machine by the vendor. | |
| 8.4 | The total machine, including attachments and accessories, shall be suitable for 24 hrs. continuous operation to its full capacity for 24hour a day and 7 days a week throughout. | |

## 09. SAFETY ARRANGEMENT

| S.No. | DESCRIPTION /PARTICULARS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|
| 9.1 | Machine shall have adequate and reliable safety interlocks/devices to avoid damage to the machine, work piece and the operator due to mistakes or the malfunctioning | |
| 9.2 | A detailed list of all alarms/indications provided on machine should be submitted by the Vendor. | |
| 9.3 | All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator, for effective use of machine. | |
| 9.4 | Emergency Switches at suitable locations as per International Norms should be provided. | |
| 9.5 | Enclosures or protective covers shall be provided for the moving parts (either linear or rotary), as a safety measure, as per industry standards. | |
| 9.6 | Maintenance platform with hand rails shall be provided in the carriage to support the sub-systems or maintenance staff during trouble shooting. | |
| 9.7 | Counter-balance and Safety device for holding the boom and the welding head against rope breakage. Offer details to be elaborated. | |

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| 9.8 | An access ladder& platform shall be provided for the maintenance staff to attend to fault in the boom vertical up and down movement mechanism/Counter balance& Pulley arrangement. Approach holes on the column to support the counter Wt, during maintenance. | |

**10.MACHINE SPARES**

| | | |
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| 10.1 | The list to include following, in addition to other essential spares like cladding head unit and Welding head unit. Unit Price of each item of spare shall be given.<br>Itemised break-up of mechanical, electrical, electronics and pneumatic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shift continuous running basis should be offered by vendor. | |
| 10.2 | Mechanical Spares: Bearings, clutches, gears, valves, pressure switches/transducers, filters, seals, O-rings, Pneumatic Hoses, Flux recovery system, flux recovery hoses and air drier spares. | |
| 10.3 | Electrical: All types of Relays, Contractors, Proximity Switches, Printed Circuit Boards, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, VFDs, etc. | |
| 10.4 | All types of spares for total machine and accessories shall be available for at least ten years after supply of the machine. 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 and Vendors to enable BHEL to procure these in advance, if required. | |
| 10.5 | Vendor to confirm that complete list of spares for machine and accessories, along with specification/type/model, and name and address of the spare Vendor shall be furnished along with documentation to be supplied with the machine. | |
| 10.6 | Standard gear boxes are to be used as far as possible with minimum variety possible. All Pneumatics shall be of FESTO/any reputed make acceptable to BHEL. | |

## 11. DOCUMENTATION

| S.No. | DESCRIPTION /PARTICULARS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|
| 11.1 | Three sets of following documents (Hard Copies) in English language shall be supplied along with machine. | |
| 11.2 | Operating Manuals of Machine, Control Panel and Other Accessories. | |
| 11.3 | Programming Manuals of Machine PLC(if applicable) | |
| 11.4 | Detailed Maintenance Manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical/Pneumatic circuit diagrams. All Assembly/Sub-Assembly drawings with major/critical dimensions & Wt. Shall be supplied with the part list . | |
| 11.5 | Complete Printed Circuit Board Schematics indicating check points (Test Points) for Electronic Controls. | |
| 11.6 | Maintenance, Interface & Commissioning Manuals for PLC System, if used. | |
| 11.7 | Manufacturing Drawings of wear components like bushes, worm-wheel, racks & pinions, nozzle-tips, wire-feed rolls etc. | |
| 11.8 | Catalogues, O&M Manuals of all bought-out-items including drawings, wherever applicable highlighting the specifications of used components to be provided. | |
| 11.9 | Specifications of all standard items like Bearings, Chains, Sprockets, Oil-Seals, 'O' Rings, Cam-Rollers, Belleville Springs. Linear Motion Bearings, Transmission belts, etc. available in the subject machine sub-assemblies viz., Hoist Drive Unit, Boom Drive Unit, Wire Feed Unit, Welding head, Flux Recovery System etc, to be provided. | |
| 11.10 | PLC (if any) program print-outs with comments in English. | |
| 11.11 | PLC (if any) program/ladder diagram and PLC data on CD / Pen drive. | |
| 11.12 | Complete Master List of parts used in the machine shall be submitted by the vendors. | |
| 11.13 | One additional set of all the above documents on CD ROM/Pen drive to be provided. | |

## 12. TRAINING OF BHEL PERSONNEL

| | | |
|---|---|---|
| 12.1 | Travel, boarding & lodging for the trainees shall be borne by BHEL. | |
| 12.2 | Complete English speaking experts shall be arranged by the vendor during training for satisfactory and effective training of BHEL personnel. | |
| 12.3 | BHEL Personnel shall be trained at Supplier's Works for mutually agreed period (10 days) in the area of<br>a. Mechanical, Electrical& Electronic Maintenance for machine & other accessories supplied.<br>b. Operation of the machine & other Accessories supplied. | |

## 13.INSPECTION & MACHINE ACCEPETANCE

| S.No. | DESCRIPTION /PARTICULARS | VENDOR's OFFER (WITH TECHNICAL DETAILS) |
|---|---|---|
| 13.1.0 | MACHINE ACCEPTANCE:<br>(Tests/Activities to be performed by Vendor at Vendor's works, on the machine, before despatch) | |
| 13.1.1 | Physical Inspection and Verification of Certificates or Records for Materials of Construction, Bought-out Items, Adherence of Machine Building Procedures etc. given by the Vendor. | |
| 13.1.2 | Demonstration of all features of the machine, control system & accessories. Checking of all interlock And machine parameters. Verification of complete documentation/O&M manual as specified in11.0 | |
| 13.1.3 | Welding / cladding of sample test plate and the sub-sequent testing for establishing the quality of weld, for performance rating of the machine. | |
| 13.2.0 | Tests/Activities to be carried out at BHEL works while commissioning the machine: | |
| 13.2.1 | Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine. | |
| 13.2.2 | Demonstration by actual use of all the supplied attachments and accessories to their full capacity. | |
| 13.2.3 | The details of prove-out trials shall be based on the mutually agreed job pattern (welding sample test plate and actual jobs) arrived at, during the technical discussions, to be held at BHEL works after the tender opening. | |
| 13.2.4 | Supervision by vendor of independent operation of machine by BHEL after job prove out during the training period of 5 working days. | |

## 14. MACHINE FOUNDATION

| | | |
|---|---|---|
| 14.1 | Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent(LOI). Vendor shall submit complete foundation details including static and dynamic loads within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for main machine, control panels and any other accessories. BHEL shall construct complete foundation for the machine as per the Vendor's recommendation**.** | |

## 15.MACHINE ERECTION& COMMISSIONING

| | | |
|---|---|---|
| 15.1 | Vendor to take full responsibility for supervision of the erection and commissioning, test the machine, its control and all types of other supplied equipment, carrying out welding / cladding of test pieces etc.<br>Service requirements like power & air shall be provided by BHEL at only one point to be indicated by the Vendor in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. | |
| 15.2 | Successful proving of BHEL components by the Vendor shall be considered as part of commissioning. All tests, as mentioned in clause 13.2.0 shall form part of the commissioning activity. | |
| 15.3 | Tools, tackles, Testing Instruments and other necessary equipment required to carry out all above activities shall be brought by the Vendor. | |
| 15.4 | Commissioning Spares required for commissioning of the machine within the stipulated time, shall be brought by the vendor on returnable basis. | |
| 15.5 | 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 Vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colours of paint used. | |
| 15.6 | Schedule of erection and commissioning shall be submitted with the offer. | |
| 15.7 | Charges, duration, terms & conditions for Erection& Commissioning should be furnished in detail separately by Vendor along with the technical offer. | |

| | | |
|---|---|---|
| 15.8 | LEVELLING & ANCHORING .Complete set of rails to be supplied. Anchoring system including foundation bolts, anchoring materials, fixtures, leveling shoes etc. should be supplied along with the machine. | |

**16.MACHINE PACKING:**

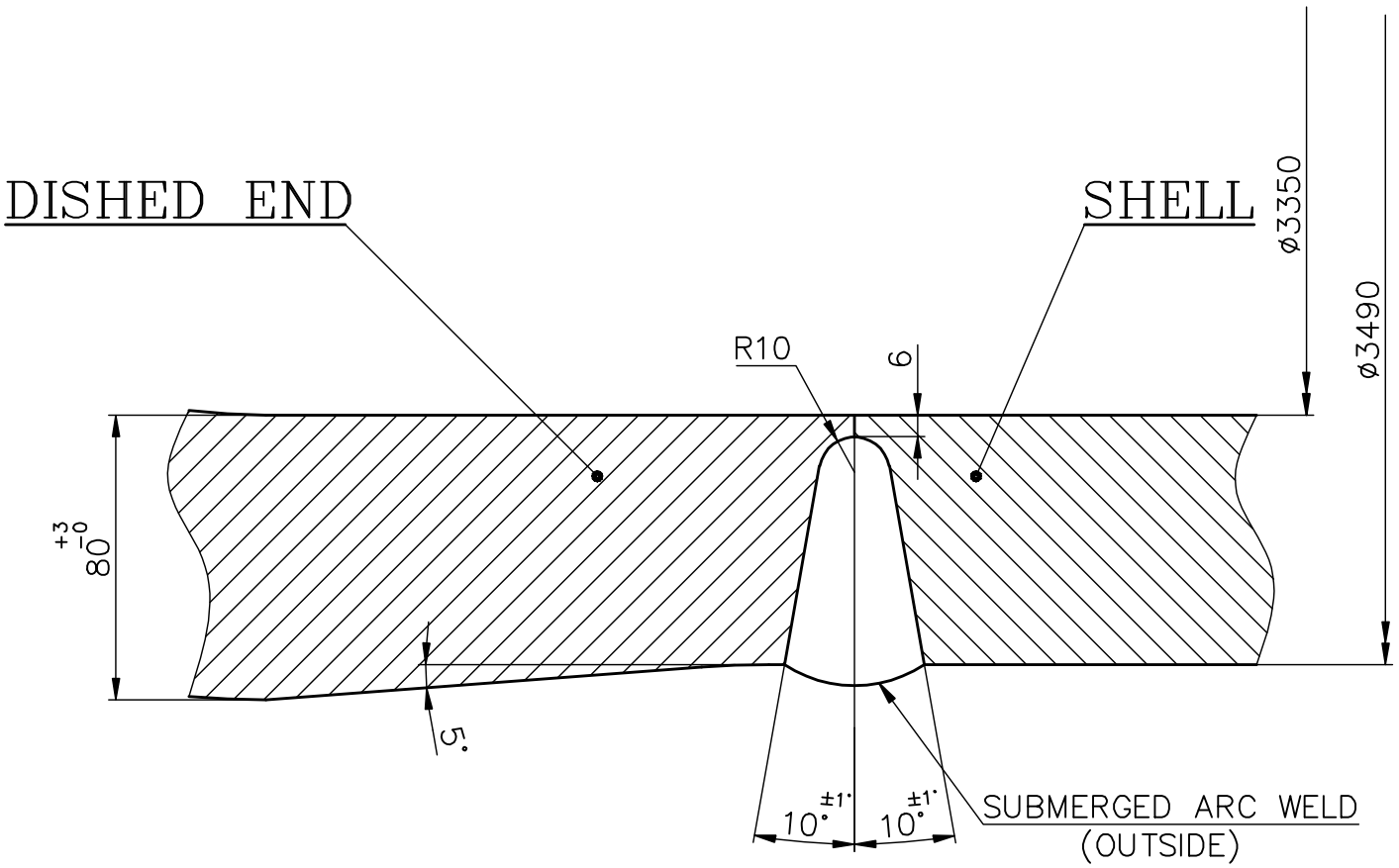
| S.No. | DESCRIPTION /PARTICULARS | VENDOR's COMPLIANCE |
|---|---|---|
| 16.1 | Seaworthy & rigid packing for all items of complete machine, control panels, all accessories and other supplied items to avoid any damage/loss in transit. When the machine is dispatched in containers, all small loose items shall be suitably packed in boxes. | |

**17.MACHINE DATA (GENERAL)**

| | | |
|---|---|---|
| 17.1 | Machine Model Number | |
| 17.2 | Total connected electrical Load in kVA | |
| 17.3 | Floor area required (Length, Width, Height) for Complete machine & Accessories. | |
| 17.4 | Painting of Machine/Electrical Panels: Apple green – IS-5/1994 (shade: ISC No. 281) | |
| 17.5 | Total Weight of the Machine | |
| 17.6 | Weight of heaviest part of the machine | |
| 17.7 | Weight of heaviest assembly/sub assembly of the machine. | |
| 17.8 | Dimensions of largest part/sub-assembly/assembly of the machine | |
| 17.9 | Earliest delivery period from the date of Letter of Intent. | |

**Enclosures: Annexure-1,2&3.**

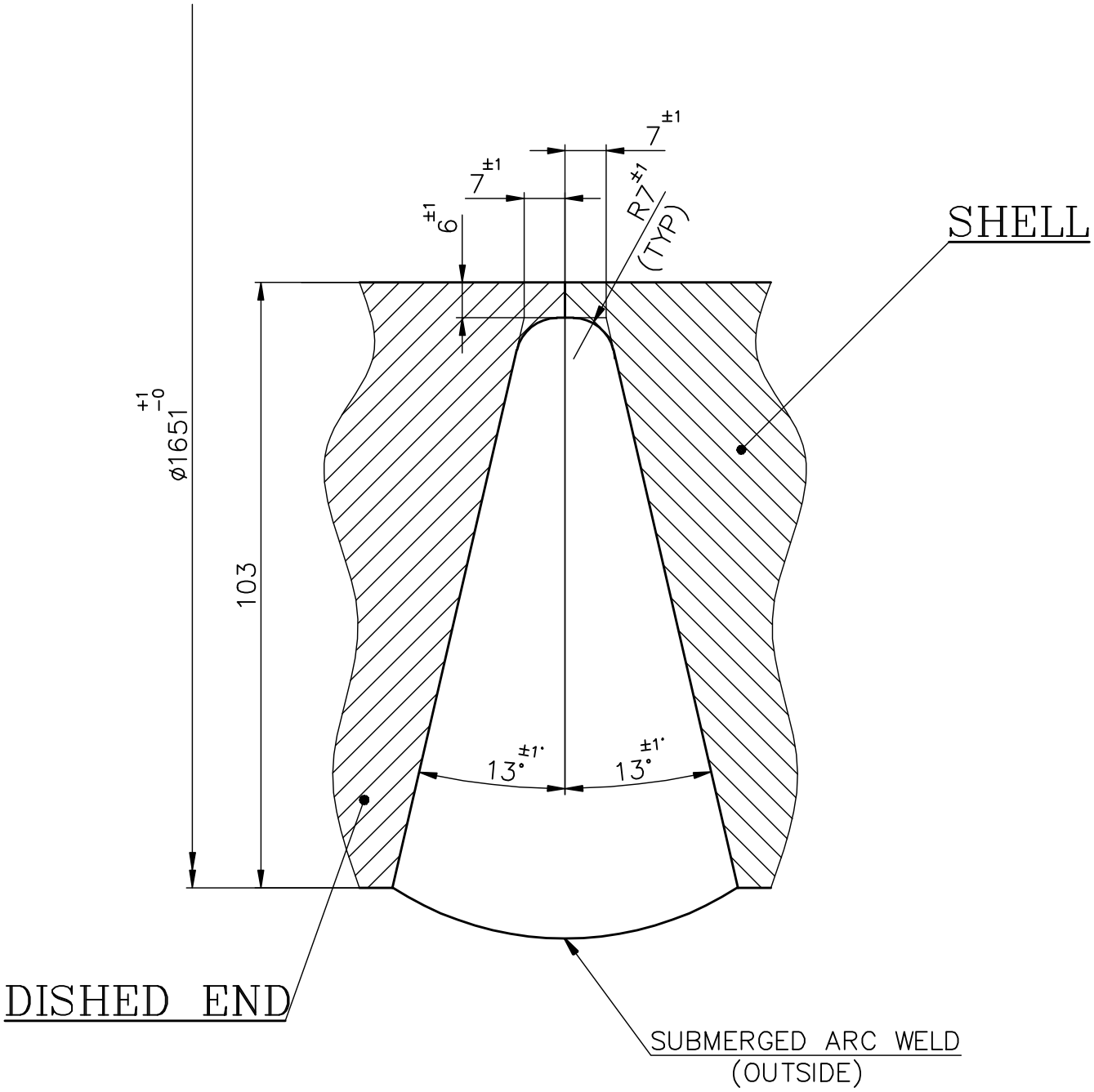
# ANNEXURE–1




TYPICAL CIRSEAM WELD JOINT EP STYLE

MATERIAL: Q&T STEEL

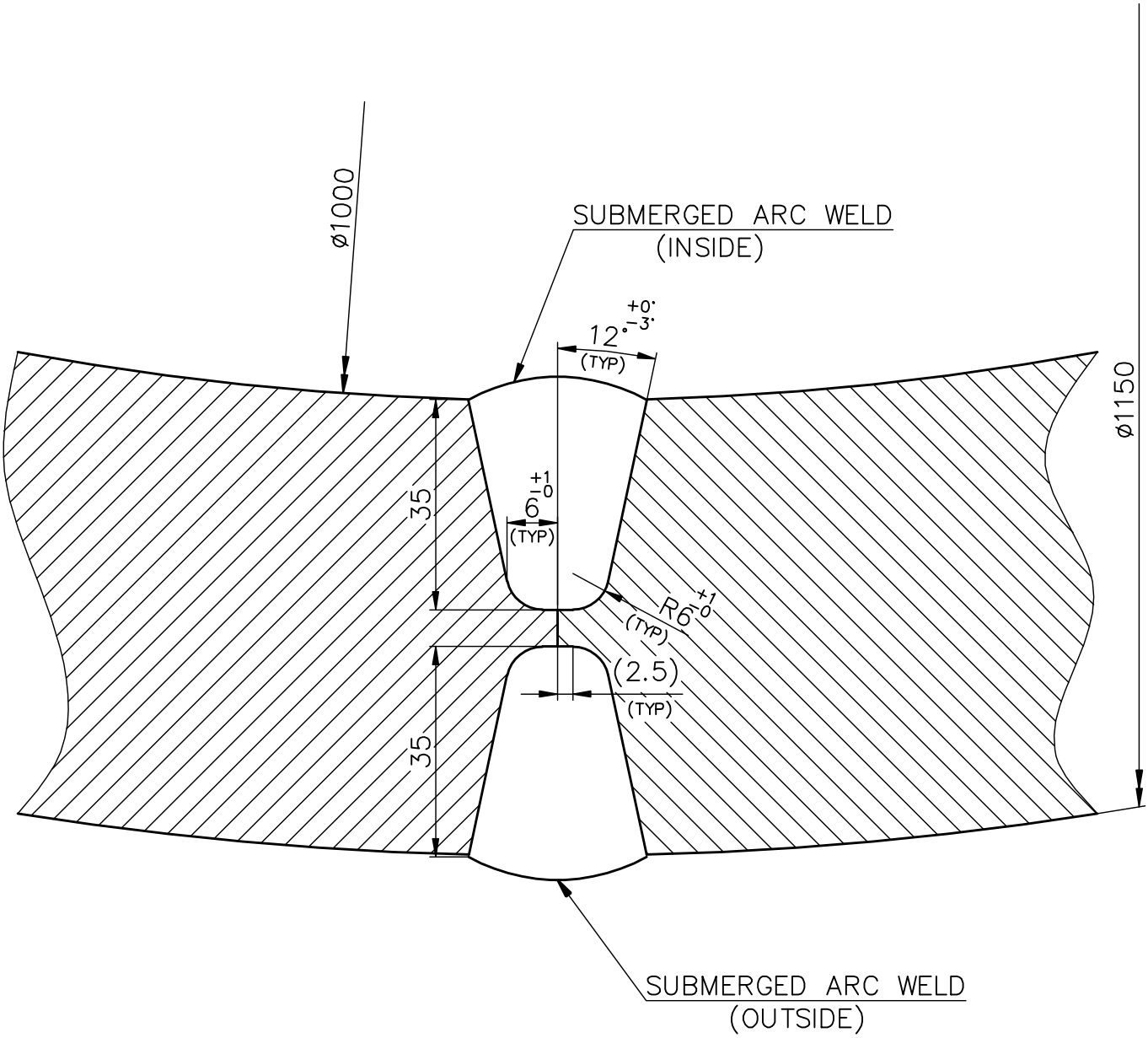
# ANNEXURE–2




TYPICAL CIRSEAM WELD JOINT EP STYLE

MATERIAL: Q&T STEEL

# ANNEXURE–3




CYLINDRICAL SHELL LENGTH=1700mm

TYPICAL LONGITUDINAL WELD JOINT EP STYLE

MATERIAL: Q&T STEEL