



BHARAT HEAVY ELECTRICALS LIMITED FABRICATION PLANT, JAGDISHPUR

TECHNICAL TERMS AND CONDITIONS

Fabrication and supply of Loose and Assembled Galvanised Handrails and Ladders with BHEL raw materials (Transportation from BHEL Jagdishpur to vendor's works is in their scope only) as per BHEL Engineering Drawings, quality documents and technical specifications and transportation of finished goods up to various project site across India.

1.0 QUANTUM OF WORK:

1.1 The quantum envisaged for ordering under this Enquiry is around 250 MT $\pm$ 10% of Loose and assembled Galvanized Handrails and Ladders with BHEL's materials for projects NTPC Telangana, and Yadradri.

1.2 The quantity indicated are tentative and may vary during the execution of the contract.

2.0 SCOPE OF WORK:

The broad scope of work includes:

FABRICATION:

2.1 Fabrication of components as per BHEL drawings/Quality Plan/Quality Work Instructions to be issued along with Purchase order. However, to understand the nature, type & quantum of work content, a set of representative drawings are attached. It is to be noted that the actual drawings and work content will be known at the time of execution of order and may contain work content, which may vary marginally. Sample documents attached.

2.2 Vendor to submit cutting plan for approval of BHEL for issuance of raw material. Based on approved cutting plan, vendor to collect free issue raw materials (Pipe, Tube, flats, plates, structural) in full length from BHEL Jagdishpur Store. The transportation of raw Materials from BHEL Jagdishpur works to vendor's works is in their scope.

2.3 Cutting of full length raw material shall be done by the vendor in suitable sizes as per drawing requirement by shearing, machining, saw cutting, flame or plasma cutting. Flame cut edges shall be cleaned to remove slag. Uneven edges shall be dressed by grinding. Gas cutting notches shall be filled up by grinding the notches smoothly for welding using compatible electrodes and ground before taking up for further fabrication.

2.4 Layout for size and shape shall be marked before cutting (for other than CNC applications). The tolerance for marking shall be maintained within + 2mm unless otherwise specified. The diagonal difference shall be within 3 mm.

2.5 The markings shall be punched at convenient intervals and bordered with white paint.


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2.6 The marking on machined components shall be in such a location, which will not be detrimental to the surface finish requirements of the component.

2.7 Notches above 3 mm or 20 % 'T' shall be thoroughly cleaned and welded by using a qualified WPS and examined visually and by LPI. The repaired surfaces are to be cleaned to bright metal surface.

2.8 Welding to be carried out by Qualified Welder and as per BHEL Approved Welding Procedure Specification. The welder qualification and welding procedure (as per relevant SIP) have to be done by Vendor with approval of QC / BHEL or by QC / BHEL authorized appointed agency. The cost of any approval on this account is in vendor's scope.

2.9 Unless specified otherwise in the WPS, basic coated electrodes E7018 shall be used for SMAW of all structural components involving materials of IS2062 E250 grade.

2.10 All the welding consumables are to be procured from BHEL approved sources only. List of approved sources are attached.

2.11 All low hydrogen electrodes shall be dried in the baking oven at 250-300 deg.C for 2 hours and the electrodes shall be held at 100-150 °C until they are used. Electrodes shall not be re-baked more than once and use of electrodes in wet condition is prohibited.

2.12 Welding shall be performed using qualified procedures and qualified personnel. Edge preparation and welding details shall be as per drawing.

2.13 Proper sequence of welding shall be adopted to minimise distortion. The distortion of the finished jobs, if any may be corrected by mechanical means / hot correction.

2.14 The surface of the welds shall be free from coarse ripples, overlaps, undercuts and abrupt ridges to avoid stress raisers.

2.15 Proper fit up shall be ensured before welding as per Drawing. Tack welding or mechanical clamping shall be used to maintain the fit up requirements before and during welding. Bridge pieces used during fit up shall be of ferritic for ferritic materials.

2.16 Vendor should refer drawing no.3-35-110-02828 for fabrication tolerance permitted.

2.17 Conducting MPI/LPI, other NDT & heat treatment wherever called for in the Drawings/QWIs/ Quality Plans of Projects is in the scope of vendor (cost is in the scope of vendor).

2.18 The requirement of NDE, extent and type of examination shall be as per respective product SQP and / or CQP.

2.19 Visual inspection shall be performed as per SIP:NP:06 latest revision.

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2.20 All handling charges till completion of fabrication & despatch up to destination is in Vendor's scope.

2.21 Ensure completeness of all final machining operations. Dimensional inspection shall be done with relevant drawings. Ensure use of calibrated instruments / gauges.

2.22 All costs towards testing & inspection including customer/BHEL/BHEL nominated agency as per BHEL's QP/PO /Drawings and customer CHP, till obtaining of MDCC (wherever applicable).

SURFACE PREPARATION & GALVANIZING:

2.23 The coating weight of galvanising shall be 610 g/m² (minimum) and to a coating thickness of 87 microns (minimum) or as specified in BHEL drawings/sketches/GMS, quality documents and technical specification at the time of ordering.

2.24 Recommended practice of Hot Dip Galvanizing for Iron & Steel as per IS:2629 (latest version).

2.25 Vendor should ensure an adherent, defect free and long lasting galvanized coating on the steel surface. The pre-treatment of surface is an important aspect in sequence of steps involved in galvanizing. Smooth and virgin surface having no trace of oxides acquires better coating. In all the galvanizing lines, whether batch or continuous, the pickling and rinsing of the surface is invariably carried out to remove oxides, mill scales and any trace of iron salts present there.

2.26 During pickling of steels, loose iron salts remain adhered to the surface. If these salts are not removed from the surface before dipping in the galvanizing bath, they get transferred to the bath and combine with molten Zn to form dross. In dross (which is a compound of zinc and iron) one part of iron can combine with 24 parts of zinc. Thus Vendor should ensure removal of salts before taking the articles into the galvanizing bath to reduce the dross formation.

2.27 Pickling is carried out normally in hydrochloric acid or sulphuric acid or in mixed acid solutions.

2.28 Vendor shall carry out rinsing operation to prevent iron carry over from pickling stage. Hot rinsing operation is relatively more efficient than room temperature rinsing of pickled product.

2.29 Vendor should avoid pickling defects such as under-pickling, Over-pickling, Hydrogen blistering and Smutty surface. Under-pickling, problem arises generally due to weak acid concentration or higher iron salt concentration in the bath. Since over-pickling problem arises due to inferior quality of inhibitors so Vendor should use proper pickling inhibitors in the acid bath.

2.30 Adherence and type of coating of zinc on steel surface is largely decided by the type of surface that reacts with molten zinc. An oxide free steel surface acquires an adherent and defect free galvanized coating. Vendor should ensure an oxide free steel surface before dipping the item in zinc bath.

2.31 To ensure an oxide free surface Vendor can adopt a Bathless process or Fluxing process.

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- 2.32 When dry galvanizing is adopted, the article shall be thoroughly dried after fluxing over a hot-plate or in an air-oven. The temperature should be about 120°C and should not exceed 150°C as the flux decomposes above this temperature.
- 2.33 In the wet process, a deep flux cover is used on the zinc bath and the work is immersed through the flux layer with or without fluxing. In this case drying is not essential.
- 2.34 The article that has been pre-fluxed and dried should be galvanized without delay, as the flux coating picks up moisture from the air and also tends to oxidize. The recommended time limit for galvanizing is within an hour of fluxing.
- 2.35 The specific gravity of the flux solution should be controlled by adding required quantities of flux crystals and water to make up for the drag-out losses.
- 2.36 Free acid content of the solution should also be checked, particularly if rinsing is not very thorough and pickle is carried over.
- 2.37 The molten metal in the galvanizing bath should contain not less than 98.5 percent by mass of zinc.
- 2.38 Aluminium may be added to the galvanizing bath in the dry process to the extent 'of about 0'005 percent (0.007 percent Max) (0'05-007 g/kg of zinc) to reduce the rate of oxidation of the molten metal and brighten the appearance of the article. In the continuous strip galvanizing process, addition of aluminium is made in the bath in the form of Zn-Al alloy to maintain aluminium between 0'12 to 0'20 percent to control alloy layer thickness and thereby imparting better adherence.
- 2.39 Vendor should control the bath temperature to ensure the quality of the product is consistent and the economic use of zinc. Articles should be galvanized at the optimum temperature to allow the free drainage of zinc from the work piece during withdrawal. An optimum temperature reduces the formation of ash and dross.
- 2.40 Depending the process adopted, Vendor to ensure the uniformity of zinc coating and to reduce the formation of dross optimum rate of immersion should be adopted.
- 2.41 Vendor should use special Jigs and carriers for dipping and withdrawing the work in batches. Rate of withdrawal should be controlled by Vendor so that excess Zinc drains freely from the surface.
- 2.42 Vendor should take necessary steps to prevent formation of white rust on articles/items after they are removed from the zinc bath.
- 2.43 Articles/items should not be stacked immediately after quenching to avoid flaking of coating.

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2.44 Zinc coating should be adherent, smooth, reasonably bright, continuous and free from ash, flux, dross, bare and black spots, pimples, lumpiness, rust stains, bulky white deposits and blisters.

2.45 Galvanized products shall be tested for uniformity in thickness of coating in accordance with BHEL/ Customer quality plan.

2.46 Adhesion test shall be carried out by Vendor in accordance with BHEL/Customer quality plan.

2.47 Sufficient care should be exercised while storing, packing and handling of galvanized products. While storing and transporting them, adequate ventilation should be provided as otherwise 'white rust' or 'wet storage stain' may result when galvanized coatings react with humidity and atmospheric gases.

2.48 In areas where there is a substantial variation in day and night temperatures and hence condensation, the storage area should be kept warm by provision of heaters. Vendor is advised to give a post-treatment like chromating to minimise the chances for formation of white rust.

2.49 Only Class 1 measuring tapes shall be used, which shall be calibrated at BHEL Lab or any NABL, approved Lab before use.

2.50 Handling equipment's for movement of finished goods, any other item/s required for safe dispatch is included in the scope of vendors. Assembly Items are to be dispatched with adequate bolt which is in the scope of the vendor.

2.51 Required equipment for handling of raw materials/WIP & finished goods should available at Vendor works.

2.52 Providing the necessary facilities, gauges, instruments, etc. for carrying out the testing & inspection by customer/BHEL/BHEL nominated agency as per BHEL's QP/PO /Drawings and customer CQP, till obtaining of MDCC is in Vendor scope.

2.53 The Project name, Work Order No., Number off, DU Number, Weight, and Vendor Code number shall be legibly stencilled for identification and despatch as may be advised.

2.54 After stencilling, suitable crating/packing should be made, according to the job size. Identification of Structures shall be hand punched and stencilled. Vendor Code number alone shall be punched using letter punch and bordered suitably for identification. Machined surfaces and wherever the contact surfaces for bolting are made shall be protected with rust preventive oil. Weldable areas are to be applied with weldable primer.

3.0 INSPECTION:

3.1 Inspection shall be by our Quality Control Department and / or by our customers and / or by an appointed agency or persons authorized by us. Vendor shall provide all facilities and equipment's, calibrated instruments and standard gauges required for inspection free of cost.

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3.2 The Zinc coating shall be adherent, smooth reasonable, bright, continuous and free from imperfections such as flux, ash, dross, bare, black spots, pimples, lumpiness, rust stains, bulky white deposits and blisters.

3.3 Uniformity in thickness of coating, Mass of coating and Adherence of the Zinc coating on finished item should be as per IS6745 (latest Version), IS 4759 (latest Version), IS 2629 (latest Version), IS 2633 (latest Version) by Vendor. For approximate measurement of thickness magnetic gauges may be used. Calibration gauges before use by Vendor should be done by Vendor.

3.4 The works are deemed to have been completed and accepted, only after the inspector / Agency/Agencies accept/approve the Inspection Report (IR). IR has to be raised as per BHEL form.

3.5 Nevertheless, inspection and acceptance of the component does not absolve the responsibility of the vendors against any manufacturing defects noticed later.

3.6 BHEL representative from unit or CQ is authorised to carry out audits along with TPIA at Vendor's works before clearing the items for despatch wherever required.

4.0 QUALITY / TECHNICAL REQUIREMENTS:

4.1 Supply of the components should strictly conform to dimensions and tolerances indicated in the Drawings, Quality Plan. Vendors must ensure that dimensional deviations, if any, are recorded properly in the Dimension Record books and the same shall be made available to BHEL Officials or their authorized agencies. All the Quality records are to be e-mailed to the concern BHEL official.

4.2 Only the right kind of electrodes shall be used as called for in the Drawings.

4.3 Any other work to be carried out other than the requirements of Drawings / QWIs shall have the prior approval of BHEL.

4.4 Adequate facilities like welding equipment's, baking oven, handling facilities and measuring instruments duly calibrated as called for by us must be available. All the above equipment's must be under working condition and the same is to be made available for verification by BHEL Officials or their authorized agents.

4.5 The instruments / gauges are to be calibrated at BHEL Lab (chargeable basis as per applicable rates) or any NABL, approved Lab periodically as follows:

- Measuring Instruments / Gauges - One Year
- Limit Gauges (E.g. Plug / Ring) - One Year
- Temperature, Pressure Gauges - 6 Months
- Measuring Steel Tapes – One Time

4.6 Calibration status shall be displayed at the Vendor's Works in a conspicuous location.


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5.0 RATE AND EVALUATION OF OFFERS:

- 5.1 The rate shall include all consumables/activities as specified in clause 1.0 to 4.0 above as well as the conditions indicated in the tender.
- 5.2 Offering the jobs for inspection to BHEL /Customer or its authorized inspection agency is in Sub-Contractors scope and the quoted rate shall include the same.
- 5.3 All the charges incurred for the testing (as applicable and called for by the inspection) of the items and the work to be done after testing is in vendors scope and the quoted rate shall include the same.
- 5.4 The rate includes transportation of free issue Raw Materials from BHEL-Jagdishpur stores to your works and finished goods after fabrication & galvanising from your works to BHEL project site NTPC Telangana & Yadradri. The rate also include transportation of balance material i.e. scrap/offcuts to BHEL Jagdishpur stores.
- 5.5 Protecting the material issued by BHEL under safe custody until completing the delivery as required. The rate
- 5.6 Evaluation of offers shall be done based on total cost to BHEL per Kg.
- 5.7 Price Variation clause is **not applicable** for this tender.

6.0 DELIVERY TERMS:

6.1 Timely delivery is the essence of the Contract. Vendor to deliver the job within **45 days** from the date of issue of material from BHEL Jagdishpur. The date of out gate pass of material shall be treated as start of delivery of items and delivery challan & LR date of dispatch from vendor's work shall be treated as completion of delivery of material.

6.2 Vendor to dispatch the finished goods after galvanizing to BHEL project site NTPC Telangana & Yadradri.

6.3 Vendors have to arrange for despatch of the finished goods either in Trucks or Trailer/ Hydraulic axles for safe delivery through their transport carriers. Safe delivery of the goods to respective project sites is in the scope of the vendor. In case of any Deviation/ discrepancy of the materials received at project site Vendor is responsible for correction or replacement activity. If the same is not rectified/replaced by the concerned vendor within reasonable time as instructed by BHEL, then the same will be rectified /replaced by BHEL at the cost and risk of default vendor.

6.4. Loading of finished goods on Truck / Trailer including packing, lashing wherever required for safe transportation is in the scope of the vendor.

6.5 Transit insurance is in the scope of BHEL. Vendors have to communicate in writing to the insurance agency or BHEL as indicated in the Despatch Instruction, the despatch details to enable them to cover the transit insurance. In case of any transit damage to materials, the vendor shall carry out the rectification, and the amount realized from the insurance company shall be paid to vendor. Vendor shall co-operate and provide all documents to claim the damage from the insurance company.

6.6 Vendor to E-mail scanned copy of Inspection Clearance, delivery challan and LR copy immediately after dispatch of material from their works for invoicing by BHEL. Original documents shall be submitted to BHEL later along with bill.

7.0 RAW MATERIAL ISSUE AND ACCOUNTAL:

7.1 The free issue raw material (Pipe, Tube, flats, plates, structural) required will be lifted from BHEL Jagdishpur stores to your works and finished goods after fabrication & galvanizing from your works to BHEL project site NTPC Telangana & Yadradri shall be in contractors scope.

7.2 Weights of GMS/Drawing will be the basis for accounting of materials issued and for billing of fabrication & galvanizing charges. The raw Material shall be issued in full lengths available with BHEL based on cutting plan submitted by vendor and approved by BHEL.

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7.3 The raw materials will be issued with a process allowance of 3% for Plates/sheets. This includes an invisible wastage of 2% for sheets and plates. For structural 1% is allowed towards process allowance and invisible wastage (beam, channel, angle, UC, UB, rods, pipes, tubes, flats etc.).

7.4 Complete free issue material shall be collected by the vendor within 7 days from date of approval of cutting plan without any fail. If BG limit becomes a constraint to issue the materials, vendor shall arrange for additional BG within 2 weeks' time.

7.5 The scrap norms are as follows:

For Plates/Sheets: Below 500 x 200 mm

For Structural other than tube/Pipe: Below 1000 mm

For Tube/Pipe: Below 500 mm

7.6 All balance material other than sizes specified above are called offcuts. All scrap and offcuts are to be returned to Stores, BHEL, Jagdishpur at Vendor's cost.

8.0 WARRANTY:

8.1 The vendor shall warrant that the supplied products comply fully with the drawings and other technical requirements for a warranty period of 18 Months, from the Project site acknowledgement date of last dispatch. If the supplies are found defective owing to faulty raw material / workmanship / incomplete work, within a period of eighteen months from the date of despatch, the vendor shall make good of it / replace the same free of cost.

8.2 In case if the vendor does not rectify in time, and if any re-work carried out by our Site on products supplied, the cost of the re-work will be deducted from any of the amount due to vendors, wherever necessary, replacement charges will be recovered.

9.0 LIQUIDATED DAMAGES:

Delayed execution beyond the delivery date stipulated in the addendum, will attract liquidated damages at the rate of half a percent of the value of the items delayed for each week or part thereof subject to a maximum of 10% value of the order in the addendum to the contract without prejudice to any other relief or compensation to the BHEL under any other conditions of the contract.

10.0 TECHNICAL PRE-QUALIFYING REQUIREMENT:

10.1 Vendor should have experience & past performance on Fabrication & galvanizing of jobs in last 2 years. Vendor to submit PO copies along with technical offer.

10.2 Vendor should have the required facilities for fabrication and galvanizing. List of facilities to be provided along with technical offer. Inspection of facilities may be done before price bid opening/RA.


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