

<b>TÜRASAS</b> Regional Directorate of Eskişehir	TECHNICAL SPECIFICATION	Document No	230.982		
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<div>T.S. 230.982</div> <div>TECHNICAL SPECIFICATION OF WELDED MANUFACTURING</div>					
Giriş Kontrol Şube Müdürü		Şükrü Baha BAYDIR			
Kaynak Eğitim ve Laboratuvar Şube Müdürü		Serkan ÇÖKMEZ			
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Date of Prep.	23.11.2022				



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## 1. INTRODUCTION

### 1.1 Subject

This technical specification covers the minimum requirements and specifications, general considerations, control and inspection conditions and delivery conditions for the parts to be manufactured by welded joining to be used in railway vehicle manufacturing and repairs by TÜRASAS.

### 1.2 Definitions

**Administration:** TÜRASAS

**Work:** Welded manufacturing whose technical drawings are given in the tender documents

**Contractor:** The company that undertakes the work after the tender is finalized

**Bidder:** Companies bidding for the tender

**Welder:** Personnel certified according to TS EN ISO 9606

**Welding Operator:** Operator certified according to TS EN ISO 14732

## 2. REQUIREMENTS AND SPECIFICATIONS

**2.1.** The Contractor shall have technical equipment and quality requirements in accordance with TS EN ISO 3834 series standards.

### 2.2. Issues related to EN 15085-2 Certificate

**2.2.1.** Bidders; According to the certification level specified in the technical drawings of the products to be produced related to the work subject to the tender; It will have a CL1 or CL2 certificate depending on the current and valid TS EN 15085-2 standard as of the date of the tender from an organization authorized by ECWRV (European Committee for Welding of Railway Vehicles) or accredited by TÜRKAK (Turkish Accreditation Agency) (ISO / IEC 17065).

**2.2.2.** If the certification level according to TS EN 15085-2 standard is not defined in the technical drawings, the bidders shall request information from the Locomotive and Freight Vehicles Engineering Department before the tender date.

**2.2.3.** If the bidders have TS EN 15085-2 CL1 certificate, it covers other (CL2 and CL3) levels.

**2.2.4.** Bidders must be authorized according to the welding methods to be used within the scope of the work subject to the tender in the TS EN 15085-2 certificate to be submitted in their bids. (For example, for the workpiece to be used gas metal arc welding method; Gas metal arc welding method (135) will be included in the authorized certificate).

**2.2.5.** The TS EN 15085-2 certificate to be submitted by the bidders in their bids shall cover the following requirements for the products / products to be welded related to the work subject to the tender;

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- a) Material grade (For example; ISO/TR 15608-for example S235 and S275:1.1 / S355:1.2 / X2CrNi18-10:8.1 / EN AW 6061 :23.1, X120Mn12 etc.)
- b) Minimum and maximum material thickness
- c) Welding positions
- d) Butt welds (BW) and/or fillet welds (FW)

**2.2.6.** If this specification is to be used for the following tendered work and/or works, the following shall be included in the Bidders TS EN 15085-2 certificate;

- ‘D’ notation for calculation, design and documentation for the production and maintenance of welded rolling stock and components,
- ‘P’ notation for the manufacture, modification and testing (including replacement parts) of welded rolling stock and components,
- ‘M’ notation for maintenance and repair (including testing) of welded rolling stock and components by welding;
- ‘S’ notation for the purchase and supply of welded components for new manufacture or maintenance activities without welding operations.

These notations do not cover each other. Bidders with ‘S’ and/or ‘D’ notation in their TS EN 15085-2 documents shall not be asked for welder/welding operator certificates at the tender stage. However, bidders with ‘S’ notation in the TS EN 15085-2 certificate are responsible for all articles of this technical specification at the delivery of the Work.

### 2.3. Issues Related to Welder and Welding Operator Certificate

Bidders shall have certified the welder and/or welding operator according to the Work subject to tender as follows;

**2.3.1.** If there are steel parts (unalloyed steel, low alloy steel, stainless steel, high strength steel, cast steel, cast iron etc.) in the work subject to tender; Bidders shall have certified the welding personnel to be employed according to TS EN ISO 9606-1.

**2.3.2.** If there are parts containing aluminum and its alloys in the work subject to tender; Bidders shall have certified the welding personnel to be employed according to TS EN ISO 9606-2.

**2.3.3.** If there are parts other than materials containing steel and aluminum and its alloys in the work subject to tender; Bidders shall have certified the welding personnel to be employed according to other relevant parts of the TS EN ISO 9606 standard series.

**2.3.4.** If the Bidder will use fully mechanized and automatic fusion welding methods in the work subject to tender; welding operators will be certified according to TS EN ISO 14732 standard.

### 2.4. Validity of Welder and/or Welding Operator Certificate

**2.4.1.** The certificates shall be issued by a certification body accredited in accordance with ISO/IEC 17024 standard according to the standards mentioned in article 2.3 or by the Bidder's authorized Welding Engineer whose name is written in the TS EN 15085-2 certificate to conduct welder / welding operator exams and approve certificates according to the standards in article 2.3.

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**2.4.2.** The welder / welding operator certificate shall cover the welding types (butt welding-BW or fillet welding-FW) and material thicknesses\* to be welded in the Work subject to tender.

\*In the annex of the welding operator certificate (TS EN ISO 14732), there will be pWPS/WPS used in the exam or a document signed by the company showing that it covers the thickness range.

**2.4.3.** For the validity dates of welder/welding operator certificates, **TS EN ISO 9606-1** standard article **9.3 a** or **9.3.b** sections, for the validity dates of welding operators certificates, **TS EN ISO 14732** article **5.3 a** or **5.3 b** will be used.

**2.4.4.** Welder/welding operator documents shall contain at least the following information:

- Welding method
- Material thickness/thickness range
- Welding type (BW/FW)
- Material grade (e.g. ISO/TR 15608-for example S235 and S275:1.1 / S355:1.2 /X2CrNi18-10:8.1 / EN AW 6061:23.1, X120Mn12 etc.)

**2.5.** If preheating and/or final heat treatment applications are required for the materials to be welded, the Contractor shall indicate the heat treatment conditions in the welding procedure specification (WPS) to be used in welding operations.

**2.6.** If the materials to be welded (sheets, cast materials, etc.) will be given to the Contractor by the ADMINISTRATION; the Contractor shall keep the identification marks / traceability numbers of the materials given to him, store and use the materials in appropriate conditions (not to be damaged, not to be affected by the atmosphere, environmental conditions). The Contractor is responsible for the materials received from the ADMINISTRATION, in case of deterioration/damage of the material, the Contractor shall provide new material according to article 2.9 without any charge.

**2.7.** If the materials to be welded will be supplied by the Contractor, the materials will be supplied as 3.1 certified according to TS EN 10204.

**2.8.** The Contractor shall deliver the certificates of the materials and the identification labels on the material to the ADMINISTRATION.

**2.9.** All products belonging to that batch will be rejected in case of non-conformities between the certificate information and the labels on the material at the time of delivery.

**2.10.** In the rejected batch, all responsibility for the materials provided by the contractor and which cannot be separated without any thermal input or mechanical (grinding, milling, sawing, etc.) process will belong to the Contractor. The Contractor shall not claim any labor cost for the rejected batch.

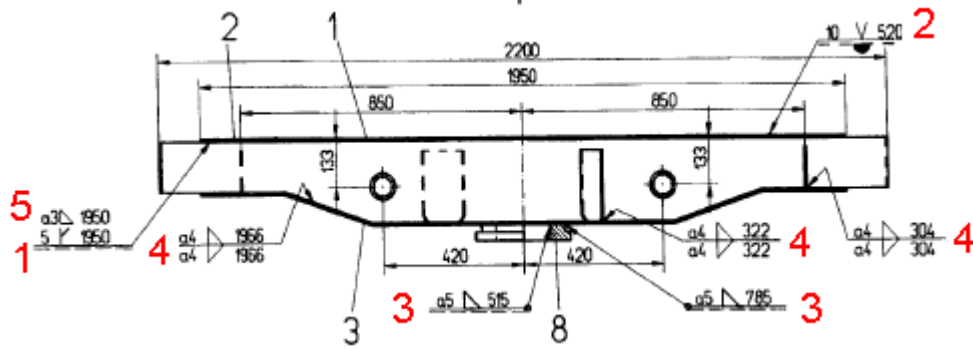
**2.11.** The Contractor shall have a traceability system to track each part. The traceability procedure shall be in writing. When the work subject to the tender is completed, all documents showing all parts, assembly, welding personnel, heat treatment and control operations that make up the product shall be delivered to the Administration in such a way that a product catalog is formed. A sample document for follow-up is given in Annex A.

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**2.12.** The Contractor shall have the following equipment if necessary during the welding process related to the work subject to tender;

- Construction jigs, fixtures, etc.
- Equipment for the transportation and rotation of parts
- Work platforms
- Straightening devices
- Equipment for fixing the parts to be welded, etc.

**2.13.** The Contractor shall prepare welding plans and welding control sheets similar to the sample given in Appendix B. In the prepared plans, the welds shall be rigid enough not to create internal/external notch effect, not to create discontinuity and to provide uniform stress distribution. (Sample weld numbering is shown in Figure 1).



**Figure 1** Welding enumeration

**2.14.** WPS (welding procedure specifications) to be prepared by the contractor for welded manufacturing according to the performance class specified in TS EN 15085- 4 article 4.1.4 shall comply with EN ISO 15609.

**2.14.1.** The Contractor shall provide the prepared WPSs to the ADMINISTRATION before starting the prototype manufacturing of the product.

**2.14.2.** For WPSs prepared according to TS EN ISO 15609-1 and TS EN ISO 15614, the Contractor shall provide the Welding Procedure Approval Record (WPQR) approved by accredited (ISO/IEC 17020) organizations according to TS EN ISO 15614 standard to the ADMINISTRATION before starting the prototype manufacturing of the product.

**2.15.** Unless otherwise specified in the technical drawings, welding performance classes shall be CP C2 and control class CT 3.

**2.16.** The ADMINISTRATION has the right to check the Contractor's facilities and working conditions for intermediate controls both during the production of the prototype and during the

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welding processes of the product. In order for the intermediate controls to be carried out properly, the Contractor shall inform the ADMINISTRATION before proceeding to the stages that will prevent the control of the details that create the component related to the work subject to the Tender.

**2.17.** The Contractor shall have appropriate and sufficient number of personnel for the welding and supervision of the Tendered Work.

**2.18.** The Contractor shall employ a welding engineer who is equipped with sufficient authority in welding related works, whose duties and responsibilities are defined and who complies with TS EN ISO 14731.

**2.19.** The documents specified in Article 2.3 of the personnel to be employed by the Contractor for the work subject to the tender shall be approved every six months by the responsible welding coordinator or responsible personnel to show that the welder and / or welding operator is working within the scope of the certificate. The Contractor shall submit the approval document to the ADMINISTRATION for works that will last longer than six months.

**2.20.** The Contractor shall comply with the technical documents given in the annex of the technical specification in the manufacture of the products.

**2.21.** The Contractor shall have the necessary equipment to protect the main material against corrosion or to keep away dust, burrs, gases and fumes that may reduce the quality of the weld during welding operations.

**2.22.** The contractor must make the production from the material / materials specified in the technical specifications and related drawings. If, for any reason, it is necessary to use a material other than the material / materials specified in the technical specifications and related drawings, the Contractor must submit this matter to TÜRASAS before manufacturing and obtain approval. Otherwise, products to be manufactured using a material other than the material / materials specified in the technical specifications and related drawings without the approval of TÜRASAS will be rejected.

**2.23.** Additional technical requirements, if any, for wagons and subcomponents are included in the “Special Considerations Form for Products to be Procured from the Market (ÜPMSK F-01)” of the Wagon Factory in Annex 3.

**2.24.** Bidders shall indicate clearly and understandably in their bid attachments that they have examined Annex-3 (ÜPMSK F-01) Wagon Factory's “Special Considerations Form for Products to be Procured from the Market” and that they will comply with the relevant requirements.

### 3. PROTOTYPE and PROTOTYPE TESTS

**3.1** The first manufacturing by the Contractor shall be welded as a prototype. This manufacturing shall be submitted as a prototype for inspection and control to ADMINISTRATION.

**3.2** Approved WPSs will be used during the manufacture of the prototype.

**3.3** The Contractor shall perform the following Non-Destructive inspections on all welds of the prototype, regardless of the performance class, stress and safety category of the product.

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- a) 100% visual inspection
- b) 100% dimensional and geometric inspection
- c) 100% MT or PT inspections

**3.4** The parts whose non-destructive testing is completed (if deemed necessary by the ADMINISTRATION) shall be cut and macro examinations of the welds shall be performed. In the macro examination, the penetration of all welds shall be examined and approved by the ADMINISTRATION.

**3.5** Prototype tests shall be carried out by the Contractor. The Administration shall have the right to supervise the tests if deemed necessary.

**3.6** The Contractor cannot make any claim for the labor of the parts damaged during inspection and control. In case the prototypes are not accepted, the Administration may request a second prototype with the detected defects eliminated.

**3.7** Acceptance of the prototype does not imply acceptance of all orders or batches.

## 4. INSPECTION AND TEST

### 4.1. General issues related to Inspection and Tests

**4.1.1.** The Contractor shall carry out the applicable inspections and tests at appropriate points in the manufacturing process to ensure compliance with the technical drawing requirements.

**4.1.2.** The Contractor shall indicate the inspection points and frequency in the welding plan to be prepared by taking into account the Welding Performance and Inspection Classes given in Appendix B.

**4.1.3.** All inspections will be reported by the Contractor.

**4.1.4.** The Contractor shall have a procedure defining the methods to be applied for the defective product during production. This procedure shall be submitted for the approval of the ADMINISTRATION in accordance with TS EN 15085-5 article 7.

**4.1.5.** The Contractor shall submit the intervention method to the ADMINISTRATION in writing and obtain approval before intervening in any errors that may occur in the weldings determined by the ADMINISTRATION as critical.

**4.1.6.** The Contractor shall have a written procedure for repair welding. The repair welding process steps shall be defined one by one in the procedure and the repaired area shall be rechecked and approved according to the control class.

### 4.2. Acceptance Inspections

**4.2.1.** The acceptance inspections shall be carried out in the manufacturing company or in a suitable accredited laboratory (authorized according to TS EN ISO / IEC 17025) together with the personnel of the Administration and the Contractor.

**4.2.2.** If the ADMINISTRATION wants, these inspections may be requested to be carried out in a place other than the Contractor.



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**4.2.3.** The entire batch with non-conforming inspection results is rejected.

**4.2.4.** All costs arising from the tests and examinations included in the acceptance inspections belong to the Contractor.

**4.2.5.** Inspections and tests shall be carried out at appropriate points in the manufacturing process.

**4.2.6.** The location and frequency of these inspection points shall be made according to TS EN 15085-3 Welding Performance and Inspection Classes.

Volumetric and superficial inspections specified as 10% in the inspection class shall be carried out 100%.

**4.2.7.** The documents showing the results of the Tests and Controls shall be given to the ADMINISTRATION during the delivery of the parts.

### 4.3. Visual Control

All welding of the product supplied for acceptance shall be subjected to 100% visual inspection according to TS EN ISO 17637. In this control, defects such as lack of penetration, defective shape, thickness, overlapping, faulty welding profile, parallelism disorder, etc. will be checked according to TS EN ISO 5817. Defects related to aluminum and its alloys shall be checked according to TS EN ISO 10042 standard.

### 4.4. Non-Destructive Tests

**4.4.1.** One of magnetic particle (TS EN ISO 23278) and ultrasonic (TS EN ISO 11666) / radiographic test (TS EN ISO 17636-1 Class A) methods which is present in table within TS EN 15085-3 will be selected as nondestructive test. Non-destructive test method related to aluminum, radiographic inspection should be performed according to TS ISO 2437 standard, penetrant inspection should be performed according to TS EN ISO 3452-1 standard.

**4.4.2.** Non-destructive tests shall be carried out along the weld seam after the welding operation when the part has cooled to room temperature.

### 4.5. Dimension and Geometric Control

**4.5.1.** The Contractor shall perform and report the dimension and geometric controls of the dimensions specified in the technical drawings.

**4.5.2.** The Contractor's Measurement Sheet must be defined in the quality management system, must have a controller and approval section, must contain information such as measuring equipment number, tolerances, etc.

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## 5. DOCUMENTS TO BE SUBMITTED WITH THE BID

**5.1** Bidders, according to the certification level determined in the technical drawings of the products to be produced related to the work subject to the tender; CL1 or CL2 certificate depending on the current and valid TS EN 15085-2 standard as of the date of the tender from an organization authorized by ECWRV (European Committee for Welding of Railway Vehicles) or accredited by TÜRKAK (Turkish Accreditation Agency) (ISO / IEC 17065) shall be submitted in the bid attachment.

**5.2** Bidders shall submit at least 2 (two) valid and appropriate documents regarding the welders and/or welding operators they will employ in the Work subject to the tender, as attachments to their bids. The documents submitted shall comply with clause 2.3 and clause 2.4. The welder/welding operator certificates submitted must belong to at least two different personnel. The certificates of each personnel must cover the type(s) of welding specified in the Work (Butt welding-BW and/or fillet welding-FW). Bids that do not provide appropriate certificates for the Work subject to tender will be deemed invalid.

**5.3** The currency of all documents (TS EN 15085-2 and welder/welding operator) to be submitted with the bid shall be ensured by the Bidder throughout the duration of the Work subject to tender. In case of any update, revision, etc. new documents shall be submitted to the Administration.

## 6. MARKING AND PACKAGING

Unless otherwise is specified in technical drawing, technical specification and annexes, tender document, issues which are mentioned in technical information no T.B. 2163 will be obeyed for marking and packaging.

## 7. GUARANTEE

**7.1.** Contractor will give warranty for material and workmanship failures for 2 years beginning from final acceptance of work.

## 8. DOCUMENTS TO BE DELIVERED WITH DELIVERY

**8.1.** The Contractor shall submit to the Administration documents describing a traceability system to track each part. (A sample document for tracking is given in Annex A).

**8.2.** When the work subject to the tender is completed, the documents showing all parts, assembly, welding personnel, heat treatment and control operations that make up the product will be delivered to the ADMINISTRATION in the form of a product catalog.

**8.3.** The Contractor shall deliver the WPS (welding procedure specifications) to the ADMINISTRATION to be prepared according to the performance class specified in TS EN 15085-4 article 4.1.4 for welded manufacturing. If preheating and/or final heat treatment applications are required for the materials to be welded, the welding procedure specification (WPS) to be used in welding processes shall indicate the heat treatment conditions.

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**8.4.** The Contractor shall indicate the heat treatment conditions in the welding procedure specification (WPS) to be used in the welding operations if preheating and/or final heat treatment applications are required for the materials to be welded.

**8.5.** If the materials to be welded will be supplied by the Contractor, the 3.1 certificates of the materials according to TS EN 10204 and the identification labels on the material shall be delivered to the ADMINISTRATION.

**8.6.** The Contractor shall deliver the certificates of the materials and the identification labels on the material to the ADMINISTRATION.

**8.7.** The Contractor shall prepare welding plans and welding control sheets similar to the sample given in Annex-C and submit them to the ADMINISTRATION.

**8.8.** The place of delivery of the parts is specified in the administrative specification. Delivery note and invoice will be delivered with the materials.

**8.9.** The Contractor shall deliver to the ADMINISTRATION the certificates, documents and documents showing the competence of all personnel employed for the welding and supervision of the work subject to the tender.

**8.10.** The Contractor shall submit all reports related to the “Inspections and Test” in Article 4 to the ADMINISTRATION.

## 9. ANNEXES

Annex A Sample part tracking form

Annex B List of Welded Joining

T.B. 2163 Marking and Packaging Technical Information

Other Documents