



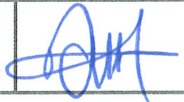
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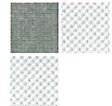
Gaziray Commuter Train Project Driver External and Internal Door Technical Specification

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III. LIST OF ACRONYMS & ABBREVIATIONS

TÜRASAŞ	Turkish Railway Vehicle Industry Inc.
ADMINISTRATION	TÜRASAŞ
CLIENT	Institution to use the train set
BIDDER	The company that will bid for this specification
EMU	Electrical Multiple Unit
TSI	Technical Specification for Interoperability
EN	European Norm
IEC	International Electrotechnical Commission
NoBo	Notified Body
RAMS	Reliability, Availability, Maintainability, Safety
LCC	Life Cycle Cost
PRM	Persons with Reduced Mobility
LRU	Line Replaceable Unit
FAI	First Article Inspection
N/A	Not Applicable
MTBF	Mean Time Between Failures
MTBSF	Mean Time Between Service Failure
TBD	To be Defined
UIC	Union International Chemin de Fer
EN	European Norm
I/F	Interfaces
ISO	International Organization of Standardization
DeBo	Designated Body

1 INTRODUCTION

1.1 SUBJECT

This document describes the technical requirements for the procurement of the **Driver Cab Internal and External Doors** to be installed on the Electrical Multiple Units (hereafter called EMU) produced by Turkish Railway Vehicles Industry Inc. (hereafter called TÜRASAŞ).

The Bidder shall offer a solution totally compliant with the requirements of this specification.

After signing the contract, possible deviations from this specification or from other specifications and norms mentioned in this document, shall be validated by written agreements between TÜRASAŞ and the Supplier.

The Bidder shall make clause by clause comment into present technical specification together with their offer.

IMPORTANT NOTE:

The present document shall be examined by the Bidder, together with following document:
TS-01.139 –General Technical Specification
in order to know general applicable requirements established at train level.

This Technical specification and its annexes already prepared in Turkish and English language. The Turkish language shall be prevailing in case of any discrepancy among them.

1.2 DEFINITIONS

Within this Technical System Specification, the following definitions are applied to the words reported below:

- “the End Client” means the Gaziantep Metropolitan Municipality (GAZİRAY)
- “the Administration” means the Turkish Railway Vehicle Industry Inc. (hereafter called TÜRASAŞ)
- “the Designer” means BLUE Engineering that is the company responsible for the design EMU set
- “the Supplier” means the company who wins the tender to supply the good object of this specification
- “documentation” means all or any specifications, drawings, reports, networks, operating and maintenance manuals and all other information whether on paper or on magnetic or other format which is prepared by the Supplier in the course of the contract

- “the Bidder” means the company who want to join to the tender to supply the good object of this specification

1.3 DOCUMENTS AND STANDARDS

The EMU shall be designed, assembled and tested according to the following international reference standards:

European Standards: TSI, EN;
International standards: UIC; ISO; IEC;
System of units shall be SI.

Table 1 reports the Applicable Standards for the Scope of Supply.

Standard	Title
EN 12663-1:2010	Railway -applications - Structural requirements of railway vehicle bodies Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)
EN 45545 1-3-4-5-6:2013	Railway applications - Fire protection on railway vehicles
EN 45545-2:2020	Railway applications - Fire protection on railway vehicles - Part 2: Requirements for fire behavior of materials and components
EN 50125-1:2014	Railway applications - Environmental conditions for equipment Part 1: Rolling stock and on-board equipment
EN 50126:2017	Railway applications - The specification and demonstration of Reliability, Availability, Maintainability and Safety
EN ISO 14040:2006/A1:2020	Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006)
UIC 345:2006	Environmental specifications for new rolling stocks
UIC 566:1990 Ed. 3	Loading of coach bodies and their components
ISO 2041:2018	Mechanical vibration, shock and condition monitoring - Vocabulary
UIC 567:2004 Ed. 2	General provision for coaches
EN 15892:2011	Railway applications - Noise Emission - Measurement of noise inside driver's cabs
EN 14752:2019	Railway applications - Body side entrance systems for rolling stock
UIC 651:2002	Layout of driver's cabs in locomotives, railcars, multiple units trains and driving trailers
TSI n. 1302/2014/EU +AR 2019/776 and 2020/387	Commission Regulation (EU)concerning a technical specification for interoperability relating to the ‘rolling stock — locomotives and passenger rolling stock’ subsystem of the rail system in the European Union
TSI NOI 1304:2014 +AR 2019/774	TSI NOI concerning the technical specifications of interoperability relating to the subsystem ‘rolling stock – noise’
IEC 60529:1991 +A1:2000, +A2:2013, +AC:2016, +AC:2019	Degrees of protection provided by enclosures (IP Code)

EN 12217:2015	Doors. Operating forces. requirements and classification
2002/44/EC	DIRECTIVE THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) (sixteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)
TSI PRM 1300:2014 +AR 2019/772	Commission Regulation (EU) on the technical specification for interoperability relating to accessibility of the Union's rail system for person with disabilities and person with reduced mobility

Table 1 – Applicable Standards

If it is not differently specified, the applicable version of the standards mentioned in the text of the document is the one specified in Annex 1 of “TS-01.139 –General Technical Specification” or in the above table.

The Bidder shall review and confirm compliancy to the above list of applicable norms, any deviation shall be submitted to TÜRASAŞ for approval.

The Bidder shall declare if its system/equipment is compliant with other national/international or railroad administration standards not mentioned in the above list.

1.4 EMU TRAIN-SET CONFIGURATION

EMU is composed by:

- 4 cars: SKA car, OA car, OA car: SKA car

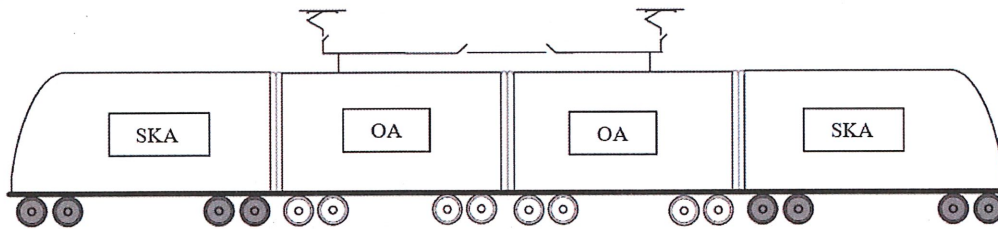


Figure 1 – EMU train-set

The types of car are hereafter:

- SKA = Leading car with driver cab
OA = Intermediate car

1.5 EMU TRAIN-SET MULTIPLE CONFIGURATION

The configurations foreseen for the multiple unit operation are the following:

- 4 cars + 4 cars
- 4 cars + 4 cars + 4 cars (as to comply with GBB requirements)

2 SCOPE OF SUPPLY

2.1 HARDWARE

The Supplier shall provide all relevant components related to the manufacturing and assembly of the Driver Cab Internal and External Doors according to this technical specification including the fixing elements.

The scope of supply of the supplier for the Doors includes, but is not limited to, the following:

Part Name	Per Car				Per 4 Car Train Set
	SKA	OA	OA	SKA	
External Door (Left)	1	-	-	1	2
External Door (Right)	1	-	-	1	2
Internal Door	1	-	-	1	2

Table 2 – Material quantity

The bidder shall include in the offer a separate price list for the spare parts listed in the below table.

The bidder shall accept and guarantee to deliver the pieces /parts in this list to TÜRASAŞ if it is so required by the administration for a period of 10 (ten) years in return of due unit prices that are escalated according to the escalation formula given below:

$$P1= P_0 \times (C1 / C_0) \times (0,10+0,35 \times (M1/M_0)+ 0,55 \times (L1/L_0))$$

Where:

P1: Escalation unit price (in the currency of Turkish Lira or Euro or USD)

P₀: unit price specified in the final lists (in the currency of Turkish Lira or Euro or USD)

M₀, L₀: material (M₀) and labour (l₀) indexes applicable in the industry in the country of the bidder at the date 30 (thirty) days prior to signature date of the contract.

M₁,L₁: material (M₁) and labour (L₁) indexes applicable in the industry in the country of the bidder at the date 30 (thirty) days prior to placement of the purchase order.

If the currency indicated by P₀ is different than the currency of the country of origin where labour, and material indexes belonged, correction factor shall be used in calculation of escalated unit prices. Cor-rection factor shall correspond to the foreign currency exchange rate applied by the Central Bank of the Republic of Turkey at the date indexes are applied.

C₀: the rate of exchange of foreign currency applied by the Central Bank of Turkey at the date 30 (thir-ty) days prior to the signing of the contract.

C1: the rate of exchange of foreign currency applied by the Central Bank of Turkey at the date 30 (thir-ty) days prior to placement of purchase order.

Name of the part	Unit	Qty
Driver cabin door - complete (external door , RH, LH and internal door)	Set	2

Table 3 – Spare Parts

External doors:

- Perimeter Door Frame
- Door complete with latch - handles (included side handles) - gaskets - opening window
- Threshold
- Hinge
- Lock
- Fixing elements

Internal door

- Door leaf: aluminum frame + aluminium covering panels + glass material (interior door leafs gap will be filled with aluminum honeycomb (AW 3000 series).)
- Handles on both sides of the door leaf
- Emergency handle (Panic bar) only on internal side
- Hinges for the door outwards opening
- Locking device and square key to prevent unauthorized passengers' access
- Mounting components including bolts, nuts and fasteners needed for the installation of door system to vehicle body.

The Supplier shall provide all the components related with the manufacturing of the Driver Cab Doors and their installation.

2.2 SOFTWARE

N/A

2.3 SPECIAL TOOLS AND EQUIPMENT

Generally, the usage of special tools shall be avoided to perform preventive and corrective maintenance. If this is not possible, the Supplier shall provide a list of tools and 2 complete sets of special tools free of charge.

2.4 CONFORMITY TO THE PROJECT REQUIREMENTS

The EMU train set shall be certified according to current version TSI PAS/LOC, TSI NOI, TSI PRM, TSI SRT and TSI CCS by Notified Body (NoBo) / Designated Body (DeBo). The Supplier shall provide whole calculations, drawings, analysis, test reports and other kind of documentation which is requested by TSIs for the present Scope of Supply.

The Bidder shall provide the declaration of conformity of its Scope of Supply to the relevant technical specifications and applicable norms.

The declaration of conformity shall be in accordance to the EN17050 Norm and shall include also the following documents:

- Conformity declaration (The bidder shall submit it at Stage 1)
- Conformity report with all conformity evidences (The Supplier shall submit it at Stage 3)
- Type test reports (The supplier shall submit them at Stage 3)

The documentation presented by the Supplier relevant to the Conformity report with all conformity evidences and test reports will be examined for approval by the Notified Body / Designated Body (DeBo) in charge of TSI certification of the EMU nominated by the Company.

2.5 EC CERTIFICATION OF CONFORMITY AS INTEROPERABILITY CONSTITUENT

N/A

2.6 SCOPE OF SUPPLY PROJECT MANAGEMENT

2.6.1 Introduction to Project Management

The Suppliers and their Sub-suppliers shall be responsible for the components and systems delivered. TÜRASAS reserves itself a right to request different solutions and/or modifications of a system or components in case they are necessary for reasons related to installation, operation, interfacing or other equivalent reasons. Such written requests shall be transmitted in direct contact with suppliers.

In case of direct contacts the minutes shall be drawn up and countersigned by the representatives of the parts participating the meeting.

Present document is a part of the contract between the Supplier and TÜRASAS. The Supplier is not entitled to deal this document or part of it to a third party.

All generic information requests and answers shall be communicated in written form or through e-mail, if an official form is required, and in the case the exchanged communication preludes to any kind of action.

2.6.2 Project Management and Planning

The Supplier shall submit a Project Plan within one month of contract award.

This Project Plan reports the schedule for all main activities and key events, including submission of all information identified in this specification and delivery of all parts and documentation. The Plan shall be subject to approval of TÜRASAS, every time it is issued.



The Supplier shall attend regularly to the Project Progress Meetings according to the established schedule proposed by TÜRASAŞ. The Project Plan shall be updated by the Supplier for each of these meetings.

2.6.3 Modifications

All engineering changes made prior to FAI (First Article Inspection) shall be controlled by the Supplier's Quality Management System.

Any engineering change made after FAI shall be supported by all relevant documentation and subject to written approval by TÜRASAŞ.

Engineering changes shall be subject to all requirements of this specification and any supporting specifications.

The Supplier shall agree with TÜRASAŞ a Modification Implementation Plan detailing timescales and locations where the work shall be carried out. This shall include modifications to any relevant spare parts.

The Supplier shall, on the day of completing any modification, provide TÜRASAŞ with the date of modification, serial number of components modified, new modification level of component and location of component. In addition, the status of the modification level on the component shall be updated.

Modifications made to improve the product or production without any effect on performance or spare part exchange can be decided by the Supplier. Traceability of modifications shall be given by the Supplier to TÜRASAŞ.

In case of modifications due to Supplier design inaccuracy or whatever cause under its responsibility, the subsequent recovering modifications and whatever consequent actions shall be done by the Supplier free of charge.

2.6.4 Authorisation to start manufacturing

TÜRASAŞ will release to the Supplier the authorisation to start the manufacturing according to the following steps.

2.6.4.1 Design Freezing

After signing the contract, a dedicated meeting shall be held for freezing the design of the scope of supply between the End Client, the Administration, the Designer and the Supplier. The date and place of the meetings shall be agreed mutually.

2.6.4.2 Authorisation to start manufacturing

According to final design criterias which have been already decided in design freezing, TÜRASAŞ shall give 1 production authorization for each type of door. These products shall be used for type tests (according to item 4.4.1.1).

2.6.4.3 Authorisation to start serial production

After successful completion of tests in accordance with clause 4.4.1.1 and 4.4.1.3, TÜRASAŞ will release to the Supplier the authorization to start the serial production.

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3 TECHNICAL REQUIREMENTS

3.1 INTRODUCTION

3.1.1 External doors introduction

The cabin shall be equipped with 2 external doors (one on each side) for direct access to the cabin exclusively by staff, with inward opening.

The minimum dimensions of each door shall comply with the regulations indicated in this technical specification.

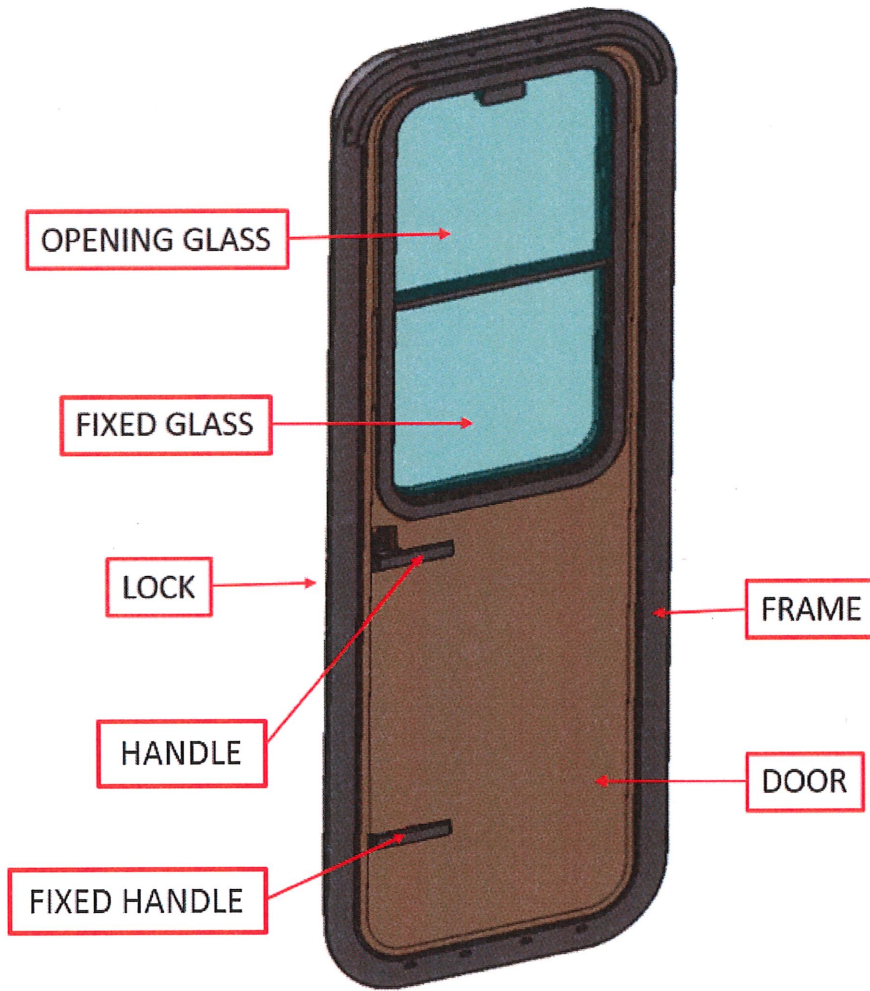


Figure 2 – External Door, example (external view)

The doors shall comply with the water and air impermeability requirements.

There shall be a window, opening from the top of each side door, that guarantees the exit of the driver's head and shall be made of safety glass. It shall be possible to adjust the extent of the opening of the window to any position and fix it at this position. When the window is closed, it shall be completely sealed and prevent air flow and water from entering the cabin.

Shape and appearance of the driver access doors in the cabin shall be congruent with those of the convoy. Each of the driver access doors shall consist of a manually operated door.

The door shall be supplied complete with gaskets, glass, locks and hinges, and will be mounted on a special perimeter frame (within scope of supply) which will previously be fixed to the door compartment suitably prepared by the supplier of the car body.

The gap between the door leafs shall be filled with aluminum honeycomb (AW 3000 series).

The door shall comply with the following characteristics:

- Door hinged to the perimeter door frame;
- Opening window: minimum opening 400 mm;
- Minimum dimensions of the door: 1700x550 mm, thickness 50 mm;
- Minimum free passage space: 500 x 1675 mm;
- Structure compartment: minimum dimensions 1750 x 600 mm.

All parts of the supply shall:

- be supplied with the mounting components and finishing materials necessary to set up the driver access doors so that they are ready for commissioning;
- be free of sharp edges and areas that are difficult to access;
- prevent water accumulation (stagnation) on and around the door;
- facilitate cleaning and maintenance operations;
- avoid visible fastening elements;
- satisfy the specific function for which they are intended and maintain their functional and aesthetic characteristics over time;
- comply with fire regulations.

The supplier can propose improvements in order to simplify the installation on the carbody.

The main frame and in general all the metal parts of the door will be grounded, therefore, as part of the supply, a braid must be provided for each door to ensure electrical continuity, of adequate section and length, complete with cable lugs at the ends, and including screws. The supplier will have to identify the most suitable area for its positioning.

The glasses of the side windows of the driver external door shall be colored as in the passenger compartment. All driver external door windows shall comply with UIC 651 or a certified equivalent.

Colour of glass shall be defined during design phase.

3.1.2 Internal door introduction

The driver cab internal door shall be lockable and shall be suitable for observing the passenger compartment from the driver cab.

When this door is locked by the driver, it shall be such that it does not allow entry from the direction of the passenger compartment. It shall only be possible to open this door from the passenger compartment side by means of a special key. This key shall be the standard square-type key held by the driver.

The driver cab internal door shall be designed in order to not obstruct the evacuation and shall be able to be opened by the staff without the need to use keys.

The following figure illustrates the main features installed on the door.

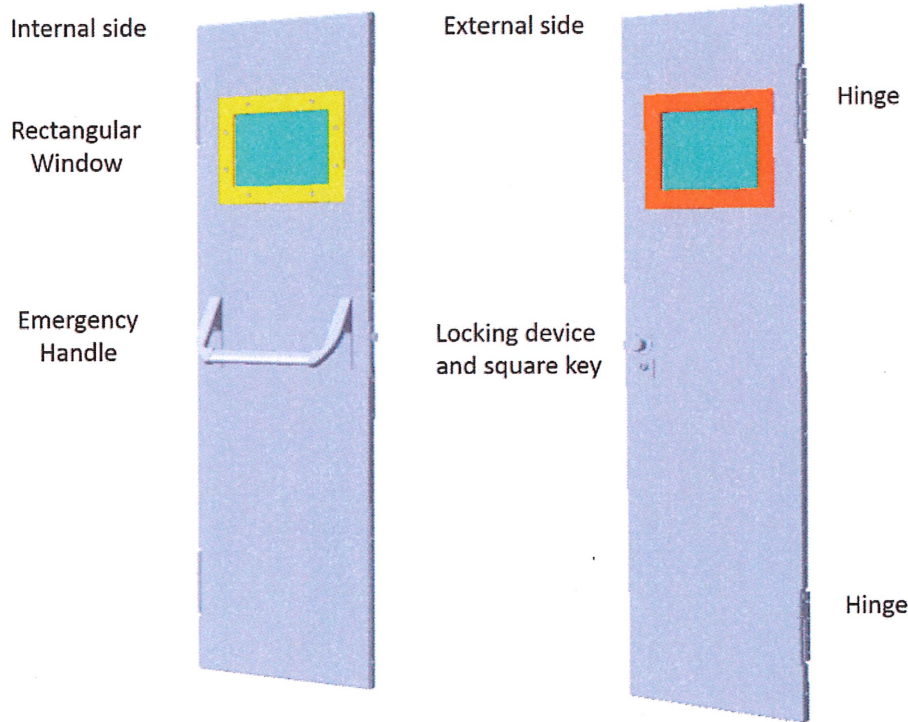


Figure 3 – Cab internal door main features (draft)

3.2 PRODUCT DEFINITION

3.2.1 External doors product definition

3.2.1.1 Doors

The doors shall be made of light alloy. The tempered glass shall be fixed by means of a special gasket. The internal and external cladding panels will be made of 1 mm thick aluminum alloy sheet.

Self-extinguishing and low toxicity gaskets will complete the doors.

The door correctly mounted on the appropriate frame and closed correctly shall comply with the waterproofing requirements as required by EN14752: 2019 Annex B, it shall be protected against water infiltration by sealing rings on the operating pins. In the event that condensation forms inside the lock compartment or door structure, drainage holes shall be provided so that it can drain.

The doors shall be supplied painted with a monochromatic color on the inside and a different, equally monochromatic color on the outside, the crystals will be tempered. The glass thickness of the exterior door will be at least 5 mm, while the glass thickness of the interior door will be 8 mm.

3.2.1.2 Handles and Door Lock

The door shall be equipped at least with three handles; one inside and two outside. The two external handles shall be placed at right heights in order to be accessible from platform and ballast level respectively. The inside handle shall be located at about 830 mm from the threshold. The upper opening / closing handles can be operated by a movement / rotation of 60 ° and the lower handle shall be fixed.

The door lock shall be inserted by means of the square key from the external side and latch from internal side of the cabin.

Two side handles shall also be provided (see following figure).

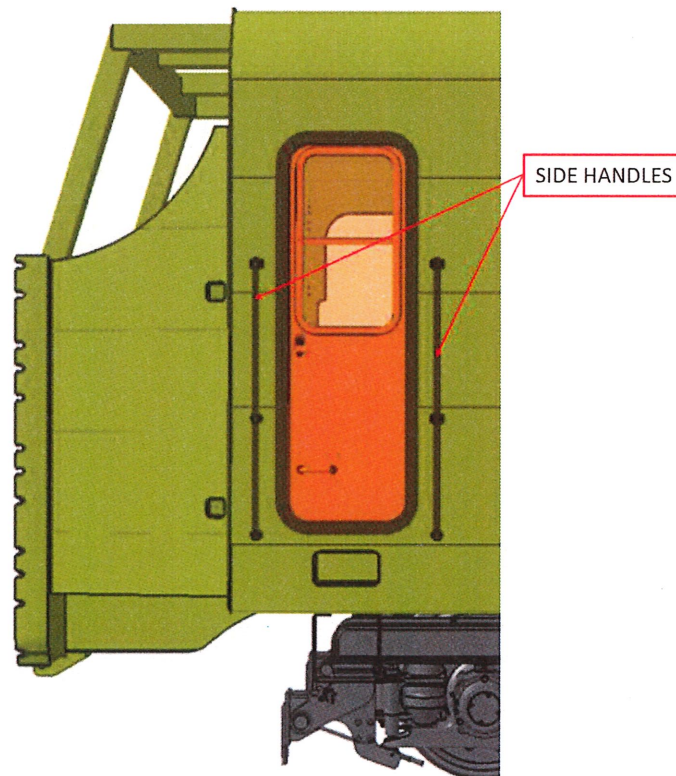


Figure 4 – Side handles (draft)

3.2.1.3 Perimeter Door Frame

It is an aluminum alloy frame that interfaces with the door compartment, the door will be housed inside of it. The connection between the door and the door frame will take place by means of hinges. The frame shall be supplied painted and, in the lower part, complete with a satin stainless steel threshold, in the lower part there must be holes for water drainage.

A draft section of the perimeter door frame is shown in the following figure.

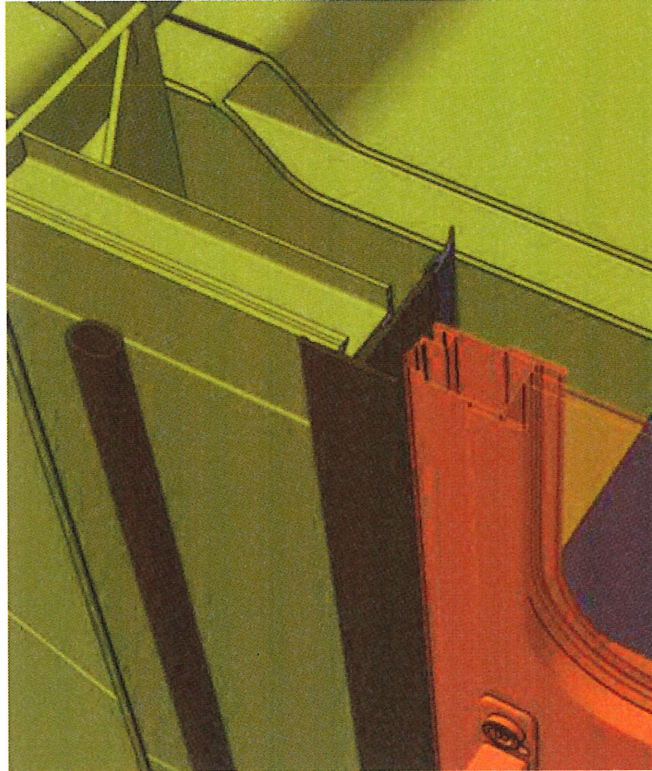


Figure 5 – Perimeter door frame section (draft)

3.2.2 Internal door product definition

3.2.2.1 Cab door dimensions

The driver cab internal door shall be of hinged type and shall open outwards (according to UIC 651) as shown in the figure below.

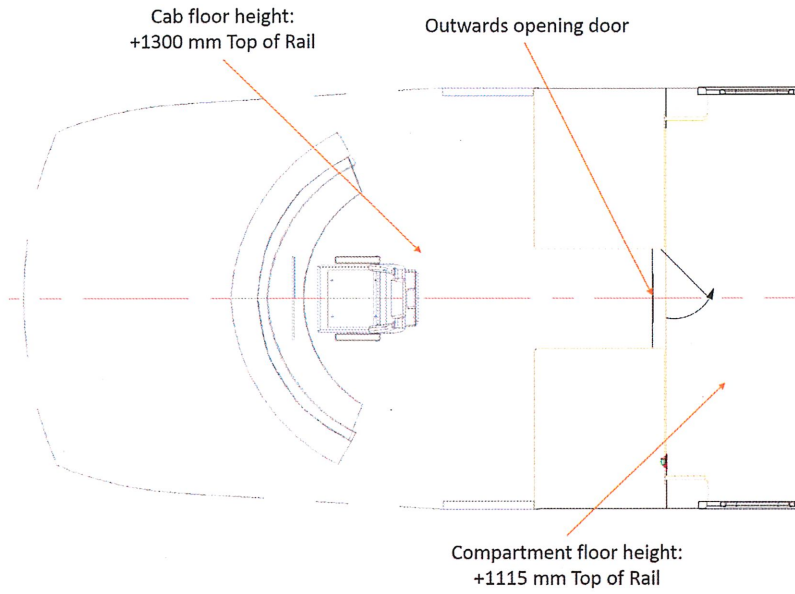


Figure 6 – Cab internal door layout

According to the TSI & EN regulations, the main door dimensions shall be as shown in the figure below.

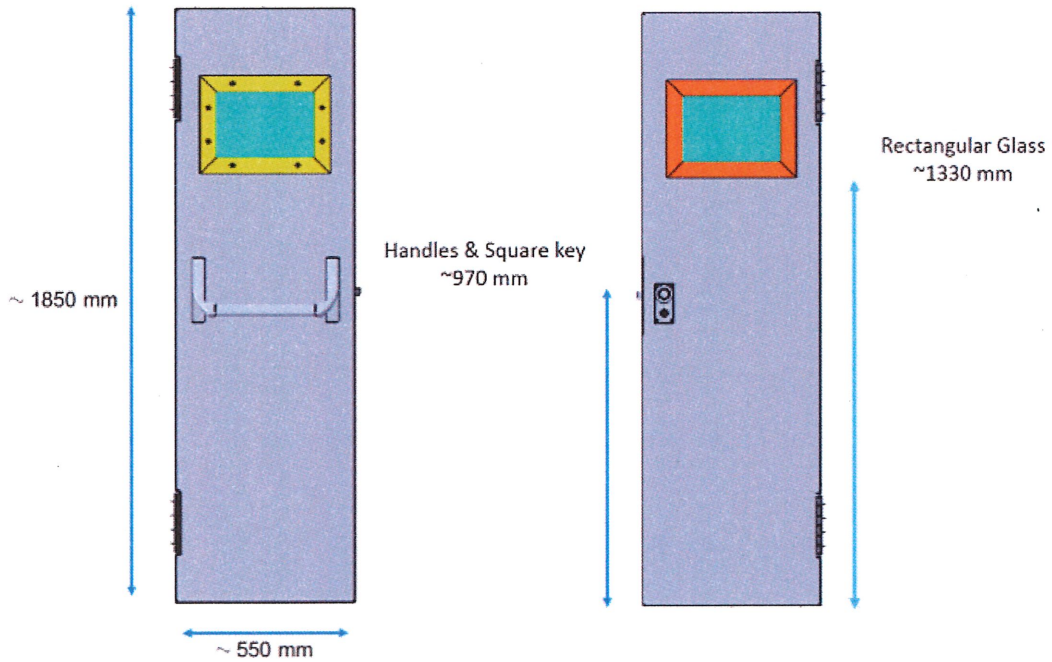


Figure 7 – Cab internal door main dimensions (draft)

Minimum free passage space shall be: 1750 x 500mm.

3.2.2.2 Door main requirements

The following requirements are requested for:

- Handles
 - the locking device shall be inserted by means of the square key from compartment side
 - the handle (or the panic bar) shall automatically unlock the locking device
 - necessary strength to open the handle: $< \sim 150$ N applied at distance of 120 mm from the center of the handle
 - necessary strength to open the panic bar: ~ 100 N applied in the center of the handle
- Rectangular Glass
 - thickness 6mm and dimensions: $\sim 300 \times 200$ mm (Width x Height)
 - laminated or toughened glass for rolling stock application
 - luminous transmission coefficient: $\sim 10 \div 15\%$ to avoid annoying glares inside the cab
 - Rubber shore around the perimeter
 - double aluminium frame (EW 6000)
- Hinge
 - Commercial hinge for the outwards opening of the door
 - Screws M4 (a special insert shall be mounted on cab frame)

3.2.2.3 Cab door frame and panels

The cab door structure shall be composed by:

- aluminum door frame (EW 6000)
- aluminum covering panels (EW 5000)

The frame shall be a welded structure made by standard profiles 30x30mm thickness 2mm which allows to install all main components described above.

The frame is shown in the following figure:

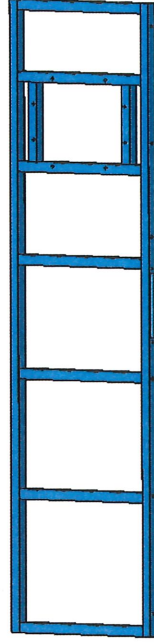


Figure 8 – Cab internal door frame

Special inserts M6 shall be installed on the frame and rubbers in order to avoid any vibration when the cover panel is installed.

The cover panel shall be a sheetmetal product with 2 mm of thickness, connected to the frame through screws M6 and Sika 1270 or equivalent.

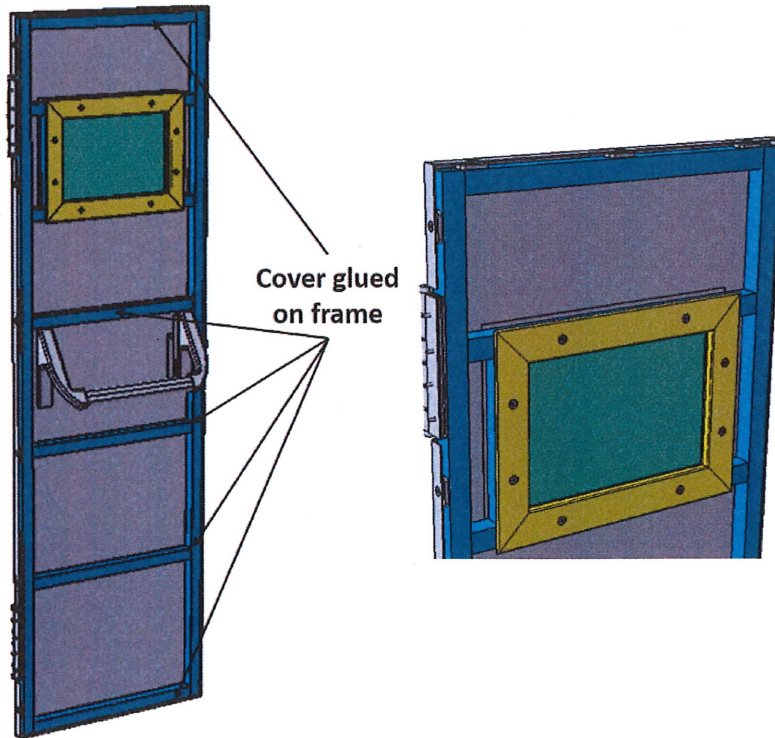


Figure 9 – Cab internal door frame & cover panels (draft)

3.3 WEIGHT

The Supplier shall be committed to the process of weight management required in order to meet target weights as the train design develops.

The supplier shall adopt design solutions such as to respect a weight for each external door (including frame) of approximately 50 kg.

The target weight for the driver cab internal door is 30 kg.

Weight is one of the significant characteristics of the equipment, and it shall be taken into great account by supplier.

3.4 MANUFACTURING

N/A

3.5 PAINTING

Concerning resistance to corrosion, design and processes shall take in account the effect of potential galvanic corrosion. The supplier shall take into account that the car body structure of the train is made of light alloy (aluminium alloy).

The final colours and technical detail of painting shall be defined after the contract by TÜRASAŞ.

3.6 INTERFACE SPECIFICATION

3.6.1 Mechanical Interface

3.6.1.1 External doors mechanical interface

The connection between the door frame and the doorway shall be made by means of screws placed radially on the four sides of the doorway.

The water tightness between the frame and the doorway will take place by interposing a polyurethane sealant on the front.

Particular attention shall be paid to the choice of the mechanical connection used for joining the car body structure and the metal structures of the doors, in order to avoid galvanic couples capable of triggering corrosion in the material.

3.6.1.2 Internal door mechanical interface

The driver cab internal door shall be mechanically fixed to the substructures of interiors panels.

Mechanical fixing details of the driver cab internal door TBD in design phase.

3.6.2 Pneumatic Interface

N/A

3.6.3 Digital and/or Analogue Inputs/Outputs

N/A

3.6.4 Earthing

3.6.4.1 External doors earthing

A single earthing point on the door shall be available, to electrically connect the door to the carbody.

Position of the earthing ground point shall be in the upper part of the door, all the other earthing connections used by the door inside the system (e.g. between the door and the frame) shall be included in the scope of supply.

3.6.4.2 Internal door earthing

For protective provisions relating to electrical hazards on railway vehicles EN 50153 - standard is valid and shall be obeyed.

All equipment causing an electric shock shall be protected against direct contact.

All conductive surfaces of electrical equipment on the vehicle shall be connected to an earthing point for equalization of the electrical potential. This includes conductive surfaces of cubicles, doors and covers.

Exceptions are small items of interior trim in an environment otherwise protected by bonding to car body and/or insulation (e.g. grips, coat hooks, etc.).

All equipment operating at AC-voltage >25V or at DC-voltage >60V shall be earthed for safety.

Each earthing point of the equipment shall be designed as follows: the earthing points shall be of good electrical conduction to ensure low touch voltage, the earthing points shall have large contact surface and shall be able to carry a possible short circuit current.

A design according to EN 60529, min IP20 (>12,5mm) is required for cubicles containing Band III voltages. The min IP20 shall be achieved when there are situations when the cubicle is open and Band III voltage is live.

Each earthing point shall be easily accessible for assembly.

The Supplier shall provide an earthing diagram of its equipment including earthing bonds and shields.

A

B

The Supplier shall indicate which cables of his system will be shielded.

Cable shielding may only be used for shielding purposes and NOT as signal, ground or reference wires.

If supplier does not request different connection, cable shields shall be grounded on both ends in order to obtain high shielding efficiency against electric and magnetic fields.

This requires potential equalisation between both grounding points, e.g. through chassis or appropriate structural components.

Grounding of cable shields shall be made with low impedance (large contact surface, preferably over 360 deg. circumference). Grounding by means of sheath wires (pig tails) or connector pins is NOT permitted.

The Low Voltage 0V level in the cars is floating, so shall be avoided an internal connection in the equipment between metallic chassis and the 0V connection; grounding connections in the equipment shall not be connected to car Low Voltage DC power supply.

3.7 ENVIRONMENTAL CONDITIONS

3.7.1 Climatic condition

The system object of the present document specification shall work properly in the specified climatic conditions (temperature, rain, snow, ice, dust, wind and so on) in particular ice and snow shall not be cause of malfunction.

General climatic conditions are reported in the mentioned General Technical Specification.

3.7.2 Noise, Vibration and Shock

Regarding the acoustic insulation, the assembly cab door shall respect the requirements of the TSI NOI 1304:2014.

No part of the equipment shall produce any discernible noise or vibration.

General noise vibration and shock conditions are reported in the mentioned TŞ-01.139 Gaziray Commuter Train - General Technical Specification.

3.7.3 Electromagnetic Compatibility (EMC)

N/A

3.8 SYSTEM AND COMPONENTS LIFE

The Supplier shall indicate the component life.

3.9 MATERIAL REQUIREMENT

3.9.1 General Requirements

Materials shall be suitable to allow the normal maintenance activities without need to adopt special protections including welding, cuts and so on. They shall be suitable for the waste disposal without need of particular care.

All information about safety and health shall be provided, even for consumables like lubricants and cleaning agents.

The choice of materials shall be done to prevent corrosion in every usage condition.

3.9.2 Fire Resistance Behaviour

The train-set has been classified into Category A for rolling stock fire safety, according to TSI 2014/1302/EU LOC&PAS for interoperability operation.

The supplied system/equipment/components including all their elements therefore shall be compliant to the applicable sections of EN 45545 family norms (-1, -2, -3, -4, -5, -6).

In particular according to EN 45545-1 and -2 the train-set is ranked as 2N (or N2) where:

- 2 indicates the operation category
- N indicates the design category

The fire performance requirements established for materials are given by means of R(n) index reported by the EN 45545-2 “table 5”.

These performances requirements of materials and components depend not only on their intrinsic nature but also on the location, the shape and the layout, the surface exposure, the relative mass and the thickness of considered material. In “table 2” of the EN 45545-2 are listed different products and their location on the train-set to identify the relevant R(x) requirements.

The Bidder shall follow the instruction of paragraph 4.2 “General” and paragraph 4.3 “Grouping rules” with the flowchart of Figure 1 “Assessment Process – grouping rules” of EN 45545-2 not only to identify all the material eventually not mentioned hereafter or not mentioned at all in the “table 2”, but also to verify if the requirements are applicable or not (i.e. in case of small quantity, small mass, small exposed areas and so on).

To complete the punctual requirements identification in table 5, the Hazard Level “HL2” shall be used. This hazard level has been determined on the basis train-set classification 2N and it identifies the relevant tests pass-no-pass condition.

Concerning the materials used for the Scope of Supply of present Technical Specification following requirements have been identified.

Applicable Product type (No)	Definition	Details	Requirement
IN1A	Interior vertical surface	Interior doors, interior lining of the front-/end-wall doors and external doors	R1
IN16	Interior seals	Longitudinal seals such as windows seals, door joints, panel connections.	R22
IN7	Windows frame	Window surround (including sealants and gaskets)	R1

Table 4 – Material Fire Requirements

The Supplier shall adopt materials with required characteristic and also identify other materials not mentioned above. The above R(x) list is not definitive; the Bidder/Supplier shall complete it according the materials used in the Scope of Supply.

The Supplier shall give the list of the inflammable materials used with material type, quantity and fire resistance behaviour tests.

The documentation presented by the Supplier relevant fire performance will be examined for approval by the Notified Body / Designated Body in charge of certification of the Gaziray Project nominated by the TURASAS. The Supplier/Bidder shall be responsible to perform all necessary activities which are required by Notified Body / Designated Body.

3.9.3 Tamper proof and cleanability

It shall be possible to remove the graffiti using commercial or industrial cleaners.

The surface coatings and finishing of the surfaces shall be resistant to commercial or industrial cleaners without any damage even after years of applications.

Supplier of each part of the interior shall provide the list of products suitable for cleaning. It's not allowed detergents containing dangerous substances or prohibited by law. The detergents must be commercially easy to find.

4 GENERAL REQUIREMENT

4.1 RELIABILITY, AVAILABILITY, MAINTENABILITY & SAFETY (RAMS)

N/A.

4.2 MAINTENANCE MANUAL

4.2.1 Main features of the Manual

The Supplier shall prepare integrated manual for the operation and maintenance of its scope of supply equipment.

The manuals shall contain:

- supplied system/equipment description;
- preventive maintenance tasks description;
- corrective maintenance tasks description (repair instructions included)
- information in order to carry out the overhaul of the system/equipment and the heavy repair (if it is repairable and off Train)

The manual will be used as the basis for Train operation and maintenance by Final User staff. The manual shall be prepared in electronic editable format and the language UK English; and Turkish.

If the Supplier submits the manuals in their own format, the documents shall be in editable format.

4.2.2 Contents of the Manual

The manual shall contain as minimum the following information/instructions:

Description and Operation

- General description and operation of system/equipment
- Functional description and operation of all LRU's and components
- Mechanical and electrical data sheets for all LRU's and components

Maintenance Activities

- Preventive Maintenance Plan including the maintenance periodicity (frequency) table for system/equipment.
- Reported information shall be the same of those described by the Preventive Maintenance analysis and be linked with detailed Maintenance Instructions
- Preventive Maintenance Plan shall report reference to specific/special tools needed for the maintenance works (if used)

- Maintenance Instructions shall report step by step detailed description of each task of the maintenance plan in order to include all information necessary for carrying out the relevant work
- The Preventive Maintenance Plan shall include all activities foreseen for the system/equipment from daily inspection up to major repair/overhaul

Preventive Maintenance card/instruction

Each maintenance instruction shall include:

- task periodicity
- safety warnings
- cleaning materials
- recommended lubricants
- torque values
- special tools (if any): as special tool is intended either a tool (hardware and/or software) that is exclusively produced by the Supplier and is essential for system/equipment maintenance, either a tool available on market but expensive, sophisticated, with long lead time and so on
- step by step activity description with necessary schemes, drawings and illustrations, including:
 - scheduled activities (greasing, topping up, visual check, etc)
 - removal and refitting
 - off-Train overhaul
 - final functional check

The Supplier is responsible to update the maintenance instructions until the end of the general warranty period of the last supplied equipment.

Corrective Maintenance card/instruction

Each maintenance instruction shall include:

- trouble shooting
- safety warnings
- torque values
- special tools (if any)
- step by step activity description with necessary schemes, drawings and illustrations, including:
 - removal and refitting
 - off-Train repair
 - failure diagnosis
 - final functional check

The Supplier is responsible to update the maintenance instructions until the end of the general warranty period of the last supplied equipment.

Special tools

The use of special tools shall be avoided, nevertheless if they are essential for maintenance (upon Supplier and TÜRASAŞ agreement), following information shall be supplied in a dedicated section of the Maintenance Manual:

- descriptions and technical data (including SW if present)
- drawings
- use instructions
- list of tasks where the tools usage is mandatory (and of course Maintenance Cards shall refer to the relevant special tools when is needed)
- all the information for purchasing it correctly (technical data, builder, price, and so on) if the special tool is available on the market

4.2.3 Format of the Manual

The format of the Maintenance Manual can vary according to the Company and the Final User requirements, therefore here following are reported some rules generally applicable.

Specific requests shall be communicated when available.

- The Manual shall report/contain the same references, drawings, schemes, component codes, Part Numbers, definitions, descriptions, terminology and so on used in the system/equipment configuration and design documentation to guarantee a perfect correspondence and to avoid mismatching during tasks performance.
- It is highlight the importance for a correct identification of LRUs/components by utilizing the same identification name reported by the technical drawings.
- The Manual shall be transmitted by electronic means (CD copy) and in the final version a paper copy is also requested for each release.
- The documentation in electronic format shall be in a completely editable form (Office Word version TBD)
- The PDF format can be used as formal delivery of the documentation (in order to be used as official delivery towards Final User)
- Pictures and photos shall be inserted and not simply linked.
- Photos should be only JPEG format.
- Pictures should be only TIFF format.

Derogations from above listed issues can be discussed and agreed between TÜRASAŞ and the Suppliers pending the respect of the Final User requirements.

4.3 TRAINING

N/A

4.4 TEST

4.4.1 Introduction to Test and Inspection

The Supplier shall perform the tests and the inspection in accordance with the Approved Test Procedure and the Approved Inspection Specification.

TÜRASAŞ and/or end Client have the right to witness any of these tests and inspections at any stage of test and inspection procedure.

Type test can be waived if system or components are already proven and confirmed to waive by end customer. In that case, the Supplier shall provide old test report or certificate to submit for approval.

All test and inspection specifications and reports including all repair activities and check-lists shall be submitted by supplier at least four weeks before FAI for the approval to TÜRASAŞ.

4.4.1.1 Type Tests

Type tests are required to verify that the components of the system object of the scope of supply, operate in accordance with the Approved Design Data.

The Supplier shall perform Type Tests, in accordance with a test procedure approved by TÜRASAŞ with TÜRASAŞ and/or End Client participation.

During testing, the criteria shall be observed and recorded. All alterations, adjustments and maintenance works required by TÜRASAŞ shall be carried out by the Supplier.

The Supplier has the responsibility for the success of mentioned Type Tests.

In the case components are already being used in similar projects or more severe conditions the supplier shall submit to TÜRASAŞ for approval a report explaining in detail the reasons for which it believes the tests need not be carried out, providing evidence of that.

The Supplier shall perform the type tests in accordance with the reference standards.

The tests to be done are as follows, but not limited to:

- Visual, and dimensional test;
- Weight measurement;
- Test for the force required to manually open or close the door;
- Test of safety and locking devices;
- Water and air tightness;

The supplier shall perform a water tightness test on the mock-up on the side doors during the first article inspection (FAI). Pressurized water shall be sprayed on the door leaf from the outer surface of the door. In this case, it is essential that water does not leak into the inside of the door. Test conditions are given below.

- Water Spraying Distance : 1.25 m
- Water Pressure : 1 Bar
- Water Flow : 45 liters/min.
- Number of Water Spray nozzles : Min. 6 pieces
- Test Duration : 20 min.
- Water Spray Angle : Perpendicular to the door leaf.

The doors shall be subjected to the tightness test under the same conditions during their assembly to the first vehicle. If leaks are detected during these tests, it will be the supplier's responsibility to fix the problems caused by the leaks. The supplier shall make these changes free of charge.

4.4.1.2 Routine Tests

Routine tests are required to verify that the components of the system object of the scope of supply have been built in such a way that it satisfies the requirements of the Approved Design Data as verified by the Type Test.

The Supplier shall perform routine tests in accordance with a test procedure approved by TÜRASAŞ under his responsibility, and, if necessary, with TÜRASAŞ participation.

During tests, the criteria shall be observed and recorded in a logbook and necessary alterations, adjustments and maintenance works shall be carried out.

Records from Routine tests shall be kept by the Supplier and made available timely for TÜRASAŞ and/or end Client's inspection.

All copies of the approved routine test results shall be submitted.

Additional copies of records of all tests/inspections results shall also be kept at the Supplier's work to be made available to TÜRASAŞ or their representative on demand.

This test shall include functional test, visual inspection and dimensional inspection, as a minimum. The test details shall be approved.

4.4.1.3 First Article Inspection

The Supplier shall perform a First Article Inspection (FAI) of the components of the system object of the scope of supply at the Supplier's factory with TÜRASAŞ and/or end Client participation in accordance with an inspection specification issued by TÜRASAŞ and/or end Client, prior to serial production in order to confirm that the hardware & software fully complies with the Supplier's scope of supply design and manufacturing process. Supplier shall submit FAI test procedure to TURASAŞ at least 4 weeks before FAI. If any changes are requested by TURASAŞ, supplier shall comply with these requests.

At the FAI, the Supplier shall make available all pertinent design and manufacturing process documentation, test records, material certifications, etc. Shall all the requirements of the FAI not be met, then the inspection shall be considered at a Hardware Review.

Upon acceptance of the FAI by TÜRASAŞ and/or the Client, the Supplier is then free to proceed to manufacture all pertinent hardware. The hardware must meet or exceed the quality standards set at the FAI, and must incorporate any comments made by TÜRASAŞ and/or the Client at the FAI.

4.4.2 Supplier Technical Assistance

The Supplier shall provide all the technical assistance necessary for the first installation. Installation procedures and check lists shall be provided during this operation in order to be verified and validated. Details will be discussed during evolution of the project.

4.4.3 Commissioning

N/A

4.5 WARRANTY

4.5.1 Warranty Conditions

Supplier shall guarantee the quality of products within the scope of this specification against malfunctions, failures and assembly and workmanship defects.

While the warranty period is limited to 30 months starting with the date of delivery of the products to TÜRASAŞ, it is 24 months starting with the commercial commissioning of the EMU set.

The responsibility of performing preventive maintenance on the normally used parts and the protective maintenance in cases where it is evidently clear that the root cause is not the own malfunctions of the unit, shall belong to TÜRASAŞ.

Throughout the warranty period, following the notification by TÜRASAŞ of any malfunction, the Supplier shall respond to that malfunction within five (5) working days and replace the malfunctioning parts and equipment or repair and fix the malfunction.

4.5.2 Systematic Fault / Epidemic Failure

Systematic faults are considered the identical failure on a part/component which occurs on identical parts/components with the same function on the EMU's fleet with the following occurrence:

Number of part/component in each train 1 to 4 = 10%
Number of part/component in each train 5 to 10 = 8%
Number of part/component in each train >10 = 4%

The records of failure is done within 24 months starting from the commercial commissioning of the EMU set, after an initial period of fault debugging (infant mortality period). The fleet is assumed to be composed by 8 trains.

In case of confirmed systematic faults, proper investigations shall be done in order to define a proper technical solution or modification including Spare Parts modification or replacement.

If a failure covered by guarantee occurs during the guarantee period in more than 25% of the same parts/components during the guarantee period, such a failure shall be assumed as “epidemic failure”.

In addition, mean time between failures (general average failure time) for the failures occurring in main components/parts used in all sets within annual periods during the guarantee term is shorter than guaranteed MDBF or MTBF value, such a failure shall be deemed as an epidemic failure.

4.6 ACCEPTANCE

4.6.1 Cancel

4.6.2 Final Acceptance

After successful delivery of the all products under scope of supply and required documentation the final acceptance report shall be issued by TÜRASAŞ.

4.7 PACKAGING, LABELLING AND STORAGE

4.7.1 Packaging

System/equipment/components shall be delivered in suitable packages with adequate strength to be resistant against shocks and transportation damages including effects of dust, rain, snow, solar, wind etc. In the climatic conditions foreseen by the TŞ-01.139 Gaziray Commuter Train – General Technical Specification.

Packing boxes shall be convenient for stacking one on another and shall allow easy lifting by fork-lift truck (where reasonably applicable) or travelling bridge-crane

Following information shall be reported on the package (in a legible, non-erasable and non-removable mean).

- Name, address and registered logo of the manufacturer.
- Assembly Part Number and applicable Tech. Specification reference.
- Date of manufacturing and serial number (if applicable).
- Date and number of the contract.

Furthermore, if the content of a box consists of more than one component, a components list shall be added inside and outside of the box and each individual component shall be labelled. Definition of the content of these boxes shall be done with the participations of TÜRASAŞ. Lists of the boxes shall be finalized after approval of the lists by TÜRASAŞ. A copy of each list shall be sent to TÜRASAŞ at the beginning of the shipment.

4.7.2 Labels/Marking

The system/equipment/components supplied shall be provided with technical markings, in order to fulfil requirements of electrical safety, and provide information to maintenance personnel. Wherever required for health and safety purposes, including where necessary to comply with legislation, parts shall be fitted with suitable safety and warning signs.

In particular the parts supplied, including all replaceable parts, shall be identified by a label showing:

- Serial number.
- Data of manufacture.
- Supplier's part number (if any).
- Revision level.
- Company's part number (if any).

Format and positioning of all labels/markings shall be subject to approval by TÜRASAŞ. Wherever possible, the position shall be such that any company information (Logo and brand etc..) cannot be viewed when the relevant part is installed within the vehicle. All labels shall be permanent and indelible.

Any additional marking shall be by agreement between the supplier and TÜRASAŞ.

4.7.3 Storage Conditions

The Supplier shall provide any useful information it is deemed necessary for the correct storage of the goods delivered.

4.7.4 Mounting and Handling

All the components shall be supplied ready for installation and possibly already mounted and pre-regulated.

Special care is requested to the Supplier to list all the necessary tools for mounting and maintenance.

4.8 DOCUMENTATION TO BE SUPPLIED TO TÜRASAŞ

The following tables report the list of requested documents (with schedule) to be supplied to TÜRASAŞ. Tablo 5 shows the documentation which shall be given by the Bidders in the offer phase.

Table 6 and Table 7 shows the documentation which shall be provided by the Supplier for the Preliminary Technical Review and the Detail Technical Review respectively.

Id.	Stage 1 –OFFER Phase	Time Schedule	Language
1.1	Clause by Clause commentary of present Tech. Specification	With offer	Turkish
1.2	Scope of supply list		Turkish
1.3	IRIS or ISO 9001 Certification of the Bidder (If the Bidder is an agency of the manufacturer, the Bidder shall show the manufacturer's certificate)		Turkish or English
1.4	Design schedule, in line with project milestones		Turkish
1.5	Spare part price list which is requested chapter 2.1		Turkish

Table 5 – Stage 1 Offer Phase: list of requested documents and due date

Id.	Stage 2 - PRELIMINARY Review	Time Schedule	Language
2.1	First level drawings with weight and centre of gravity indications in 3D and 2D formats	Within one month after signing the contract	Turkish

Table 6 – Stage 2 list of requested documents and due date

Id.	Stage 3 - DETAIL Review	Time Schedule	Language
3.1	Definitive drawings with weight and centre of gravity indications in 3D and 2D format.	Within one month After FAI	Turkish
3.2	Installation drawings		Turkish
3.3	Installation instruction		Turkish and English
3.4	All the technical documentation and information requested during the project (including final version of documents of previous stages)		Turkish and English
3.5	Reports of tests (FAI, routine, type, commissioning and homologation) performed on components and systems		Turkish and English
3.6	Servicing and lubricating table (if needed)		Turkish and English
3.7	Final documentation for Certification		Turkish and English
3.8	Maintenance Manuals		Turkish and English
3.9	Certificates of the fire smoke behaviour of non-metal materials and electric cables		English
3.10	Spare Part Catalogue		Turkish and English

Table 7 – Stage 3 list of requested documents and due date

The Bidder shall review and confirm the above lists of documents for all the phases of the project. Any deviation shall be submitted to TÜRASAŞ for approval.

Notes:

- 3D models shall be provided in .step format.
- 2D drawings shall be provided in .dwg/dxf format.
- Electrical schemes shall be provided in .dwg/dxf format.
- Other documents shall be provided in an editable format and in .pdf format.
- In the documentation, the Turkish version shall prevail in case of utilisation both Turkish and English languages.
- All documents in stage 1 shall be provided as hardcopy and softcopy in “CD” or “USB”

5 ANNEXES

Annex 1 – Reference Documents

Code	Document Description
TŞ-01.139	Gaziray Commuter Train Project - General Technical Specification

Annex 2 – Reference Drawings

Code	Drawing Description
GZ10.07.19.00000	3D Drawings of Driver external doors (Left and Right)
GZ10.12.07.80000	3D Drawings of Cabin internal doors

END of DOCUMENT

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