

**[TŞ-E27.0002]**

[Rev.D 4021]

# Gaziray Commuter Train Project High Voltage Cables Technical Specification

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|             | Name                    | Title                  | Signature |
|-------------|-------------------------|------------------------|-----------|
| Approved by | İbrahim ERŞAHİN         | Head of R&D Department |           |
| Checked by  | Mehmet Şakir ÇELEBİOĞLU | Manager                |           |
| Prepared by | Yunus Emre MURAT        | Technical Chief        |           |
|             | Oğuzhan HASAR           | Engineer               |           |
|             | Onur HAKYEMEZOĞLU       | Engineer               |           |

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**I. LIST OF ACRONYMS & ABBREVIATIONS**

|             |                          |
|-------------|--------------------------|
| <b>DeBo</b> | Designated Body          |
| <b>EMU</b>  | Electrical Multiple Unit |
| <b>FAI</b>  | First Article Inspection |
| <b>HV</b>   | High Voltage             |
| <b>N/A</b>  | Not Applicable           |
| <b>NoBo</b> | Notified Body            |
| <b>TBC</b>  | To Be Confirmed          |
| <b>TBD</b>  | To Be Defined            |



## 1 INTRODUCTION

### 1.1 SUBJECT

This document describes the technical requirements for the procurement of the High Voltage Cables 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 and its annexes.

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 answers 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 – Gaziray Commuter Train - 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 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 Vehicles 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 45545-1-3-4-5-6:2013<br>2:2020 | Railway applications – Fire protection on railway vehicles                                                                                                                                                           |
| EN 50343: 2014                    | Railway applications - Rolling stock - Rules for installation of cabling                                                                                                                                             |
| EN 50264-1: 2008                  | Railway applications - Railway rolling stock power and control cables having special fire performance -- Part 1: General requirements                                                                                |
| IEC 60502-2: 2014                 | Power cables with extruded insulation and their accessories for rated voltages from 1 kV (Um = 1,2 kV) up to 30 kV (Um = 36 kV) - Part 2: Cables for rated voltages from 6 kV (Um = 7,2 kV) up to 30 kV (Um = 36 kV) |
| IEC 60228: 2004                   | Conductors of insulated cables                                                                                                                                                                                       |

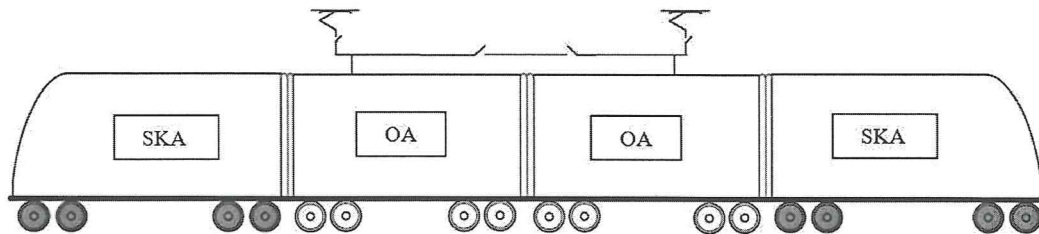
**Table 1 – Applicable Standards**

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.

### 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**

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The types of car are hereafter:

SKA = Leading car with driver cab  
OA = Intermediate car

The SKA vehicles will be interchangeable, and the OA vehicles will be interchangeable.  
The EMU will be fixed configuration Unit: the orientation of the different type of vehicles within a Unit is fixed.

The Unit wheel arrangement will be the following: Bo'Bo'+2'2'+2'2'+Bo'Bo'

### 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 (rescue mode only)



## 2 SCOPE OF SUPPLY

The Supplier shall provide the high voltage cables (25 kV) which specified in the below list. Technical details are given in the attachment. (TBG-Z-415-R04\_HV Cables)

| Product Name                                                                                     | Lenght** |     |    |    |     |       |
|--------------------------------------------------------------------------------------------------|----------|-----|----|----|-----|-------|
|                                                                                                  |          | SKA | OA | OA | SKA | Total |
| The cable between Pantograph (Energy meter) and HV Box (Cable 1*)                                | 3870 mm  | -   | 1  | 1  | -   | 2     |
| The cable between HV Box and Disconnecter (Cable 2*)                                             | 3950 mm  | -   | 1  | 1  | -   | 2     |
| The cable between Disconnecter and Transformer (Cable 3)                                         | 12000 mm | -   | 1  | 1  | -   | 2     |
| The cable between Disconnecter and Jumper (Cable 4)                                              | 19990 mm | -   | 1  | 1  | -   | 2     |
| Jumper Cable (Spring type)                                                                       | TBD      | -   | 1  |    | -   | 1     |
| *Connection of Cable 1 and Cable 2 will be defined according to demand of HV Box’s supplier.     |          |     |    |    |     |       |
| ** Lenghts above are approximate, possible variations during detail design phase can be applied. |          |     |    |    |     |       |

**Table 2 – Scope of Supply (for 1 Gaziray Commuter train set with 4 cars)**

- 2.1 Following the contract, Supplier and TÜRASAŞ will hold design meetings. Production will be carried out according to the decisions taken at the design meetings.
- 2.2 All materials within the scope of this specification will be supplied by the Supplier. Each material will be packaged and delivered as a vehicle. The drawing number to which it belongs will be indelibly written on the materials. Materials will be grouped and packaged separately to avoid confusion. During the design process, TÜRASAŞ and the Supplier will decide on the details together.
- 2.3 The mounting elements (bolts, washers, nuts, etc.) of the materials will be delivered together with the materials in a separate package. The type and quantity of material will be indelibly written on the packaging.
- 2.4 The lengths of the cables given in the table above are not exact. For this reason, these lengths will be clarified by TÜRASAŞ during the assembly of the cables to the first train set and the next production will continue according to these new lengths.
- 2.5 The T-connector of the cable (Cable 3) between the Disconnecter and the Transformer shall be delivered separately without being mounted on the cable. T-connector will be

- mounted on the cable by TÜRASAŞ personnel, and if the assembly process requires a special tool, this special tool will be provided to TÜRASAŞ by the Supplier.
- 2.6 The Supplier shall submit the documents (such as test report, certificate, declaration) showing compliance with all the above-mentioned standards to TÜRASAŞ at the first product inspection (FAI).
- 2.7 The Bidder shall submit the detailed price list for each material to TÜRASAŞ with its offer.
- 2.8 Current carrying capacity shall be in accordance with the EN 50343.
- 2.9 Class according to IEC 60228 shall be minimum 5.
- 2.10 Beding radius, for fixed installation, shall be maximum 6x Diameter.
- 2.11 All cables and connection equipment (terminals, connectors, lugs, fastening elements) shall have 30 years of lifetime in specified environment and working condition in TŞ-01.139. For the external cables, if it is necessary to guarantee lifetime, an external protection conduit can be considered.

### 3 PROJECT MANAGEMENT

- 3.1 In the offer, the items of the specification shall be answered within the same sequence number. Items that are not answered will be considered contrary to the specification.
- 3.2 Before starting production, a Technical Design Meeting will be held to determine the mechanical and electrical details.
- 3.3 TÜRASAŞ or the control firm to be appointed by TÜRASAŞ will be able to monitor whether the system has been manufactured in accordance with the relevant standards, technical drawings and special requests stipulated in the specification, at the company's factories, and will be able to participate in factory tests.

### 4 INSPECTION AND ACCEPTANCE

#### 4.1 TESTS

The Supplier is responsible for carrying out all test and inspection procedures of the products subject to this specification at his own workplace. During the test and inspection of the products subject to this specification, if any malfunction is detected, the Supplier shall undertake activities of change, modification, correction and/or replacement in the design, at his own expense and with the approval of TÜRASAŞ. The products subject to this specification shall pass all tests successfully.

#### 4.2 FIRST ARTICLE INSPECTION

The first article inspection will be carried out by the Supplier with the participation of TÜRASAŞ at the Supplier's facilities in order to verify that the products subject to the specification are produced according to the requirements specified in this technical specification

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and approved design data. The Supplier shall submit the invitation letter to TÜRASAŞ at least four weeks in advance, indicating the inspection time.

The first article inspection will be carried out according to the test procedures prepared by the Supplier and approved by TÜRASAŞ. Test procedure shall include minimum, Pass/Fail acceptance criteria, test methods and sequence, required test equipment and instruments

In the first article inspection, the Supplier shall prepare the documentation, test reports and material certifications regarding the entire design and production process.

Test reports of the first article inspection shall be submitted to TÜRASAŞ after the test is completed.

#### 4.3 INSTALLATION AND COMMISSIONING

The assembly of the products subject to the specification to the Train Set will be carried out by TÜRASAŞ personnel. For this, the Supplier will provide the necessary technical support to TÜRASAŞ personnel.

#### 4.4 PACKAGING

All Materials will have a label with indelible inscriptions, company name, contract date and picture number.

Necessary measures shall be taken by the Supplier to prevent the products from being affected by external atmosphere effects and impacts that may occur during unloading and loading. The following information shall be written on the end surfaces of the packages in a legible, indelible and incorruptible manner.

- Manufacturer company short name, address and registered emblem
- Complete product name
- Manufacture date and serial number
- Contract date and contract number

#### 4.5 DOCUMENTATION TO BE SUPPLIED TO TÜRASAŞ

Table 3 shows the documentation which shall be given by the Bidders in the offer phase.

| Id. | Stage 1 -OFFER Phase                                                                                                                                                                         | Time Schedule | Language            |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------|
| 1.1 | Clause by Clause commentary of present Technical Specification                                                                                                                               | With offer    | Turkish and English |
| 1.2 | Scope of supply list                                                                                                                                                                         |               | Turkish and English |
| 1.3 | General description of the proposed system, including all the characteristics and functionalities and technical documentation and information requested in this specification as preliminary |               | Turkish and English |
| 1.4 | Preliminary 3D models or installation drawings showing the main external space envelope                                                                                                      |               | English             |
| 1.5 | The detailed price list for each material                                                                                                                                                    |               | Turkish and English |

**Table 3 – List of requested documents and due date**

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## ANNEX 1 – EMU – Reference Documents

| Code      | Document Description                                     |
|-----------|----------------------------------------------------------|
| TŞ-01.139 | Gaziray Commuter Train – General Technical Specification |
|           | TBG-Z-415-R04_HV Cables                                  |

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