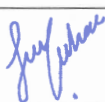


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**TŞ 400133**

# **TECHNICAL SPECIFICATIONS FOR E5000 RAMS REQUIREMENTS**

|                                                                 |                |                                                                                       |
|-----------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------|
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|-------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--|
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|---------------------|----------|
| Date of Preparation | 5.2.2025 |
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## 1. SUBJECT

This technical specification specifies the RAMS Requirements for the subsystem/equipment to be used in the E5000 National Mainline Locomotives to be manufactured by TÜRASAS Eskişehir Regional Directorate.

## 2. SCOPE

For each subsystem/equipment, RAMS Requirements defined specifically for the relevant subsystem/equipment shall apply. The Contractor shall comply with the RAMS requirements specified in the relevant sections of this technical specification for the products to be delivered within the scope of its own procurement.

## 3. DEFINITIONS

**Table 1 - Definitions**

|                                   |                                                                                                                                             |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TÜRASAS</b>                    | Türkiye Raylı Sistem Araçları San. A.Ş.                                                                                                     |
| <b>Administration</b>             | TÜRASAS                                                                                                                                     |
| <b>Administration's Personnel</b> | TÜRASAS work groups appointed to the relevant task                                                                                          |
| <b>Bidder</b>                     | Company/companies that submit a bid for the tender                                                                                          |
| <b>Contractor</b>                 | As a result of the tender to be made, the company that has signed a contract for the works within the scope of this technical specification |
| <b>RAMS</b>                       | Reliability, Availability, Maintainability and Safety                                                                                       |
| <b>E5000</b>                      | E5000 National Electric Locomotive                                                                                                          |
| <b>Vehicle</b>                    | E5000 National Electric Locomotive                                                                                                          |

## 4. STANDARDS

All works to be carried out by the contractor within the scope of the technical specifications shall comply with the standards and references given in Annex-1 RAMS Plan.

Where it is impracticable to comply with these directives, standards and requirements, if the detailed assessment submitted by the Contractor is considered appropriate by the Administration, the conditions mandated by the other relevant international standards, the standards from the European countries, national standards and TCDD regulations and the national legislation may be used.

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## 5. SYSTEM DEFINITION

### 5.1. General

E5000 National Mainline Locomotive is an electric locomotive intended for both passenger and freight transportation. Technical parameters and operating conditions of the vehicle is given below.

Table 2: Technical Parameters of E5000

| Technical parameters |                                |      |                                             |
|----------------------|--------------------------------|------|---------------------------------------------|
|                      | Name                           | Unit | E5000                                       |
| 1)                   | Wheelset arrangement           | -    | Bo'Bo'                                      |
| 2)                   | Height                         | [mm] | 3947 Carbody<br>4450 pantograph             |
| 3)                   | Carbody width                  | [mm] | 2950 (overall)                              |
| 4)                   | Length over buffers            | [mm] | 19700                                       |
| 5)                   | Vehicle base                   | [mm] | 9900 (distance between bogie pivots centre) |
| 6)                   | Track gauge                    | [mm] | 1435                                        |
| 7)                   | Vehicle gauge                  | [mm] | EN 15273-2:2013+A1:2016 G2-GI2              |
| 8)                   | Mass "design in working order" | [t]  | 86 ±2                                       |
| 9)                   | Maximum axle load              | [t]  | 22                                          |
| 10)                  | Curves track                   | [m]  | 150                                         |
| 11)                  | Curves depot                   | [m]  | 80                                          |
| 12)                  | S-curve                        | [m]  | R150m+6m+R150m                              |
| 13)                  | Type of coupling               | -    | Manual End Coupling                         |
| 14)                  | Height of coupler              | [mm] | 1020 +25/-30                                |
| 15)                  | Height of bumpers              | [mm] | 1040 +25/-30                                |
| 16)                  | Power supply (catenary)        | [kV] | 25 kV AC                                    |
| 17)                  | Propulsion                     | -    | AC-AC                                       |
| 18)                  | Total power                    | [KW] | ≥5000                                       |
| 19)                  | Traction motor power           | [KW] | ≥1250                                       |
| 20)                  | Bogie wheelbase                | [mm] | 3000                                        |
| 21)                  | Diameter of the wheel new/worn | [mm] | 1250/1170                                   |

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Table 3: Operating conditions of E5000

| Operating conditions |                      |         |                                |
|----------------------|----------------------|---------|--------------------------------|
|                      | Name                 | Unit    | E5000                          |
| 1)                   | Application          | -       | Universal (Passenger, Freight) |
| 2)                   | Maximum design speed | [km/h]  | 140                            |
| 3)                   | Test speed           | [km/h]  | 154                            |
| 4)                   | Vehicle lifetime     | [year]  | 30                             |
| 5)                   | Operation time       | [h/day] | 18                             |
| 6)                   | Days in operation    | [day]   | 355                            |
| 7)                   | Annual mileage       | [km]    | 200000                         |
| 8)                   | Temperature range    | [°C]    | -25°C / +45°C (T3-EN50125)     |
| 9)                   | Humidity range       | [%]     | 95% (salty sea air)            |
| 10)                  | Maximum altitude     | [m]     | 1000                           |

## 6. RAMS STUDIES

### 6.1. General

6.1.1. The Contractor is responsible for carrying out the RAMS studies of the subsystems/equipment within its scope. The Contractor shall use the RAMS template given by the Administration as an annex to the RAMS Plan.

6.1.2. The Contractor shall submit the RAMS studies to be carried out according to the requirements specified in this specification and its annexes for the approval of the Administration within 2 (two) months following the signing of the contract.

6.1.3. Documents deemed incomplete or inadequate by the Administration will be updated by the Contractor free of charge. This process will continue until the approval of the Administration.

6.1.4. If requested by the Administration, a RAMS meeting will be organized with the Contractor following the signing of the contract.

### 6.2. RAMS Plan

6.2.1. The RAMS Plan that the Contractor will use as a basis for RAMS studies is given in Annex-1.

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### 6.3. RAMS Requirements

- 6.3.1. E5000 Auxiliary Power System RAMS Requirements are given in Annex-2.
- 6.3.2. E5000 Bogie RAMS Requirements are given in Annex-3.
- 6.3.3. E5000 Brake System RAMS Requirements are given in Annex-4.
- 6.3.4. E5000 CCTV RAMS Requirements are given in Annex-5.
- 6.3.5. E5000 Cooling Tower RAMS Requirements are given in Annex-6.
- 6.3.6. E5000 Electrical Cabinets RAMS Requirements are given in Annex-7.
- 6.3.7. E5000 Electric Installation and Cabling RAMS Requirements are given in Annex-8.
- 6.3.8. E5000 Signalling System RAMS Requirements are given in Annex-9.
- 6.3.9. E5000 Fire Detection System RAMS Requirements are given in Annex-10.
- 6.3.10. E5000 High Voltage System RAMS Requirements are given in Annex-11.
- 6.3.11. E5000 Horn RAMS Requirements are given in Annex-12.
- 6.3.12. E5000 HVAC RAMS Requirements are given in Annex-13.
- 6.3.13. E5000 In Vehicle Systems RAMS Requirements are given in Annex-14.
- 6.3.14. E5000 Main Transformer RAMS Requirements are given in Annex-15.
- 6.3.15. E5000 Outdoor Lighting RAMS Requirements are given in Annex-16.
- 6.3.16. E5000 Pantograph RAMS Requirements are given in Annex-17.
- 6.3.17. E5000 TCMS RAMS Requirements are given in Annex-18.
- 6.3.18. E5000 Traction Converter RAMS Requirements are given in Annex-19.
- 6.3.19. E5000 Traction Motor RAMS Requirements are given in Annex-20.
- 6.3.20. E5000 Vehicle Body RAMS Requirements are given in Annex-21.
- 6.3.21. E5000 Wheelset System RAMS Requirements are given in Annex-22.
- 6.3.22. E5000 Wiper RAMS Requirements are given in Annex-23.

## 7. DELIVERY

### 7.1. Deliverables to be delivered with the product:

- 7.1.1. RAMS studies specified for the relevant products in this specification and its annexes will be delivered digitally with the product.

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## OTHER

### 7.2. Language and Number of Copies of Official Communications and the Work Forming the Subject Matter of Bidding

7.2.1. The language of all the technical communications and technical documents from the Contractor to the Administration may be Turkish or English, but the languages to be used in the final versions of those documents shall be Turkish and English. All the technical communications and documents from the Administration to the Contractor shall be in Turkish or English. The Contractor shall be responsible for the translation. The responsibility for the errors arising from the translation of the documents shall rest with the Contractor. In the event of any conflict, the Turkish copies of the documents submitted shall prevail.

### 7.3. Software Licences

7.3.1. All the software (AutoCAD, CATIA, EPLAN, MS Office, FEM Analysis Programs, etc.) used by the Contractor shall be licensed. The Contractor is entirely responsible in this regard.

### 7.4. Matters Forming the Subject of Intellectual and Industrial Properties

7.4.1. Any certificate, design, document delivered to the Contractor and any entity, institution and persons the Contractor collaborates in the scope of the work forming the subject matter of the contract shall not be used for other purposes in any manner whatsoever.

7.4.2. The Contractor shall indemnify any damages arising from the third party's claims in respect of the violation of patent, trademark and/or industrial design rights by virtue of the use by the Contractor of all and/or any part of all kinds of information, certificates and documents relating to E5000 Type Mainline Locomotive during the fulfilment by the Contractor of their contractual obligations.

7.4.3. If, during the fulfilment of the contractual obligations, the Contractor and any entity, institution and persons the Contractor collaborates violate any right and/or interest that is a protected intellectual and/or industrial property, all administrative, legal, penal and financial responsibilities arising therefrom shall belong to the Contractor. The Contractor may make no claim from the Administration in this regard. Nevertheless, if

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the Administration faces any legal sanction, they shall refer this sanction to the Contractor, with other rights reserved.

**7.4.4.** The Contractor may not use any visual, technical, administrative and similar documents developed under this project for the purpose of promotion, reference, project document, etc. in any written, audio or other channel without the permission of the Administration. The Contractor is responsible for all activities of the sub-contractors against the Administration in respect of any matter mentioned herein.

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## ANNEXES

Annex-1: RAMS Plan

Annex-2: E5000 Auxiliary Power System RAMS Requirements

Annex-3: E5000 Bogie RAMS Requirements

Annex-4: E5000 Brake System RAMS Requirements

Annex-5: E5000 CCTV RAMS Requirements

Annex-6: E5000 Cooling Tower RAMS Requirements

Annex-7: E5000 Electrical Cabinets RAMS Requirements

Annex-8: E5000 Electric Installation and Cabling RAMS Requirements

Annex-9: E5000 Signalling System RAMS Requirements

Annex-10: E5000 Fire Detection System RAMS Requirements

Annex-11: E5000 High Voltage System RAMS Requirements

Annex-12: E5000 Horn RAMS Requirements

Annex-13: E5000 HVAC RAMS Requirements

Annex-14: E5000 In Vehicle Systems RAMS Requirements

Annex-15: E5000 Main Transformer RAMS Requirements

Annex-16: E5000 Outdoor Lighting RAMS Requirements

Annex-17: E5000 Pantograph RAMS Requirements

Annex-18: E5000 TCMS RAMS Requirements

Annex-19: E5000 Traction Converter RAMS Requirements

Annex-20: E5000 Traction Motor RAMS Requirements

Annex-21: E5000 Vehicle Body RAMS Requirements

Annex-22: E5000 Wheelset System RAMS Requirements

Annex-23: E5000 Wiper RAMS Requirements