

Stable electricity magisterial freight electric train technical assignment

1. Title and area of usage

The purpose of stable electricity magisterial electric train is to provide the traction of freight trains on railways electrified with constant electricity of 3 kv voltage, 1520 mm rail of Georgia.

2. Place of delivery and terms

- Tbilisi, Locomotive Round-House Tbilisi – Sorting (nearby station Tbilisi – Sorting).

3. Basic technical requirements

3.1. Technical terms and characteristics of electric train should be approved by edition of August 15th 2015 of JSC Georgian Railway and agreed with „ИКБ ИТ» in relevance with the technical requirements of “Electric carrier magisterial with stable electricity, freight one for Georgia” (technical requirements are attached).

Words “Color décor should be relevant with SST 12.2.056 with amendment according to “Album of colored etalons and enamels for external and internal arrangement of Locomotives (1985)” to be replaced with “color décor of electric train should be agreed with customer.”

Words in par. 3.1.12 “Color décor should be relevant with SST 12.2.056 with amendment according to “Album of colored etalons and enamels for external and internal arrangement of Locomotives (1985)” to be replaced with “color décor of electric train should be agreed with customer.”

Words in par. 6.3.10.1 – “designed for using traction engines with maximum frequency of rotor 3000 turns per minute” to be replaced with “designed for using maximum frequency of rotor of traction engines”

Par. 6.4.15 to be added with par. 6.4.15 – allowed using all-rolled wheels manufactured in accordance with SST 10791-11.

In par. 8.1.2, 8.1.3, 9.1.25 and 10.6 the minimum level of temperature to determine as 40 degrees C.

3.2. Electric train should be built no later than 2015 should not be operated before and should not breach the terms and conditions.

3.3. Main technical parameters of electric train should be relevant with the data given in table 3.1.

Table 3.1 – main technical parameters of electric train

| Parameters | Figures |
|---|----------------------|
| Nominal voltage of stable electricity on electricity receiver, kv | 3,0 |
| Nominal width of rail, mm | 1520 |
| Axis like formula | $2x(2o - 2o)$ |
| Pair wheel nominal static pressure on rails, kg/n tone power | 226 – 245 23 – 25 |
| Service weight, 0.7 portion stock, t | $2x(92 - 100)$ |
| Long-term regime speed, km/h | 45 - 55 |
| Difference of pressure between wheels (for one wheel), %, not more than %, (between sides of electric train section) | 4 3 3 |
| Nominal diameter of wheels on the surface of truss diameter, mm | 1250 |
| Height from the top of rail up to the axis of trailer during new trusses, mm | 1040 – 1080 |
| Minimum radius of curve during 10 km/h speed running on traction rails, m | 125 |
| Constructional (maximum in exploitation) km/h | 120 |
| Constructional speed according to traffic way, km/h | 132 |
| Power of long-term regime on the axis of traction engine, kvt, not less | $2x(4200)$ |
| Height from the top of rail up to the working surface of electricity receiver: - in loosen condition, mm, not more - in working condition, mm | 5100 5500 – 7000 |
| Long-term regime traction power during 45 km/h, kg/n, not less | 500 |
| Type of traction tracking | A-synchronic |
| Long-term regime efficiency % not less | 86** |
| Maximum traction power when moving from place, kg/n, not less | $2x376^*$ |
| Maximum power (considering auxiliary loadings), kvt, not less | 8400 |
| Hourly regime electricity on one electricity receiver, am, not more | 3200 |
| Electric brake power on traction engine axis: - re-cooperation, kvt, not less - re-ostatic, kvt, not less | $2x3800$ $2x2800$ |

Comment to table:

* Realization of electric train power and their figures on rim of the wheel, it is possible in case of following terms:

- not straight rail, iron concrete piles, gravel ballast, "R65" type new rails, width of rail between the top of rails 1520 ± 2 mm, zero plan of the road and profile, dry weather, $20 \pm C$ temperature, delivery of sand, unworn trusses;
- 3 kg nominal voltage on electricity receiver

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** Locomotive long mode efficiency (efficiency) are shown in the following conditions:

- Contact voltage of at least 3.0 kV network;
- Disconnected compressors;
- Disconnected devices, which provide a locomotive crew comfort;
- 20°C ambient temperature;
- Traction converter cooling systems, traction motors, reactors and other power device to the network while working capacity, which is needed for equipment, technical documentation, the temperature within the norms;
- Pairs with a diameter of 1250 mm rolling surface;
- 80 km / h;
- Off of the brake resistors and its fans.

4. The list of required documents

4.1. Closing date must be submitted by the following documents:

- The locomotive of the series title;
- Name of the plant;
- Manufacturer Factory warranty provided by the electric supply
- Plant by certified (signed and stamped) technical specifications;
- Manufacturer Organization of the quality management system (ISO 9001: 2008 standard) certificate, the date of adoption of the proposal;
- electric train Efficiency feasibility study (the БЛ-10, БЛ-11 series locomotives comparison, data is provided in the attached Annex 1), 2014, August 15 edition of "Georgian Railway" approved and "ПКБ ИТ" - was agreed "Electric train magisterial stable electricity current for Georgia" -technical requirements.

4.2. The locomotive delivered the following documents must be submitted:

- Electric train and its constituent parts and units, which are subject to mandatory certification (Railway Transport of the state-participants of the Commonwealth Council approved according to railway transport list of products respectively), the railway transport of the state-participants of the Commonwealth entered in the

register of organizations (who have completed an accredited rail product evaluation activities) regarding Certificates of Conformity;

5. Package

5.1. DC main locomotive.

5.2. The locomotive has to be supplied by the manufacturer of the plant in accordance with the technical documentation: group ЗИП- found, tools, materials, and others.

5.3. Technical documentation and the documents of the 2014 August 15 edition of "Georgian Railway" approved and "Georgian Railway" approved and "ПКБ ЦТ" - was agreed "Electric train magisterial stable electricity current for Georgia" technical requirements.

5.4. Maintenance repairs, technical inspection of equipment and materials in the market with the price list.

5.5. Current repairs and technical inspection technological maps.

6. Rules

6.1. Intermediate examination drawn up a manufacturing plant in the JSC "Georgian Railway" representative.

6.2. Goods will be carried out after conducting a trial run, which will take place in accordance with the program agreed between the Purchaser and the Supplier. But the trial will be held in JSC "Georgian Railway" tracks supplier participation. The trial run of the costs are borne by the supplier.

7. Warranty

7.1. E-train and its equipment warranty period of not less than 5 years

7.2. 3 years, should be provided to the locomotive maintenance services, expendable materials (technical service and repair cycles, respectively), as well as service-organization of the locomotive depot at the level of the necessary equipment, including.

7.3. After the exploitation of one year, the locomotive of both parties, should go through the verification (the stated technical parameters of validation) and there must be a technical report, in accordance with the agreed procedures.

7.4. Points 7.3.-created according to the Ministry of Railways from the product (electric) In case of rejection of the parties shall return to each other what they had received in accordance with the contract.

7.5. The warranty period shall commence from the date of commissioning of the locomotive.

7.6. During the period of validity of the guarantee, elmatlis suspension resulting from damage, one day after the representatives of the parties, it is an act of reclamation.

7.7. Reclamation stated in the defects of the locomotive stop (Reclamation Act signed) from the date of the elimination of defects present, the default supplier shall each day of delay, the value of the contract is 0.001% of the locomotive, but no more than the cost of 1%.

7.8. The warranty period for defects arising from the supplier's fault, the warranty period is prolonged defect remedy time.

8. Staff Training

Further locomotive operation and maintenance services and repairs, staff must go through training, methodical theoretical and practical instruction. Teaching should be the end of the document. The training should be conducted in English (Russian is allowed). Tuition reimbursement provider.

9. Work Experience

The candidate will have to present a proposal mghebis manufacturing plant by the end of 10 years, 1520 mm Lindh trunk railway locomotive manufacturing / sale documents, and positive feedback.

10. Additional Terms

Technical terms, 2014 August 15 edition of "Georgian Railway" approved "Georgian Railway" approved and "ПКБ ЦТ" - was agreed "Electric train magisterial stable electricity current for Georgia" technical requirements implementedby ПКБ ЦТ ОАО «РЖД» Based on the findings, the company ordered.

Enclosure 1

Data of electric trains of vl 10 and vl 11 necessary for technical-economic documentation of efficiency of electric train to be purchased

| Table 1 – technical parameters | |
|---|-------------------|
| Name of parameters | Figures |
| Axis formula | 2x(2o – 2o) |
| Service weight, 2/3 stock of sand, t | 184 |
| Pressure on axis, kn | 225 (23) |
| Long-term regime power on traction engine during hourly regime, long-term | 5360 4600 |
| Nominal voltage on stable electricity in electricity receiver | 3 |
| Traction power, kn, hourly regime long-term when moving | 387 314 614 |

| | |
|--|------------------|
| Speed, km/h, Constructional | 100 |
| Hourly regime | 48,7 |
| Long-term regime | 51,2 |
| Jagged delivery comparison | 88/23 (3,826) |
| Height from the top of rail up to the axis of trailer during new trusses, mm | 980-1080 |
| Nominal diameter of wheels on the surface of truss diameter, mm | 1250 |
| Minimum radius of curve during 10 km/h speed running on traction rails, m | 125 |
| Length of electric train, m | 32,84 |
| Service period | 33 |
| Lubrication system | Yes |

Table 2 – technical service and repair periods

| Repair | Periods between technical service and repairs | |
|--------------------------|---|------------------------|
| | time | Runs, km |
| Capital repair (kr-2) | 12 m | 2 100 000 |
| Capital repair (kr-1) | 6 m | 700 000 |
| Current repair (mr-3) | 3 m | 350 000 |
| Current repair (mr-2) | 1,5 m | 175 000 |
| Current repair (mr-1) | 2 months | 25 000 |
| Technical service (tm-3) | 1 month | 12 500 |
| Technical service (tm-2) | Not more than 48 hours | Not more than 48 hours |

Table 3 – traction items

| Indicators | direction | destination | Traction items |
|--|-----------|--------------------------|----------------|
| | | | |
| area | | Gardabani-Tbilisi-Batumi | |
| Length of area, km | | 385 | |
| Full turn time of electric train in the area, hours | | 28,42 | |
| Length of limiting area (Khashuri-Kharagauli), km | | 41 | |
| inclination of limiting area (Khashuri-Kharagauli), pro-mile | odds | 29 | |
| Average statistic weight of the train, t | Evens | 2696 | 1 |
| | odds | 2129 | 1 |
| Normal weight of the train, t | Evens | 3500 | 1 |
| | odds | 3000 | 1 |
| Average weight of the train at limiting area, t | Evens | 2696 | 1 + 1 |
| | odds | 2129 | 1 + 2 |
| Normal weight of the train at limiting area, t | Evens | 3500 | 1 + 1 |
| | odds | 3000 | 1 + 2 |

table 4 – park necessary for electric trains

| name | El.tr |
|--|-----------|
| Number of electric trains operated during 24 hours | 28,42 |
| Operation stock of electric trains | 0,8 |
| Pushing electric trains | 6,8 |
| Electric trains waiting for operation | 3 |
| Electric trains under repair | 3,7 |
| Totally | 36 |

table 5 – electricity

| | |
|--|---------|
| Figures | |
| Capacity of shipment under loaded condition, mil. T | 14 |
| Park of electric train. one | 36 |
| Expense of electricity on shipment volume, thousand kvt/hr | 180 000 |
| 1 kvt/hr electricity price in USD | 0,042 |
| Cost for electricity on shipment volume per year, thousand USD | 7 560,0 |
| Cost for electricity for one electric train per year, thousand USD | 210 |

Table 6 – number of repairs during service period

| repair | Number during service period |
|--------------------------|-------------------------------------|
| | one |
| Capital repair (kr-2) | 2 |
| Capital repair (kr-1) | 3 |
| Current repair (mr-3) | 5 |
| Current repair (mr-2) | 11 |
| Current repair (mr-1) | 177 |
| Technical service (tm-3) | 198 |
| Technical service (tm-2) | 5626 |

table 7 – technical service and repair expenses

| | |
|--|-------|
| Park of electric trains, one | 36 |
| Technical service and repair expense for the park of electric trains, USD/year | 5 400 |
| Technical service and repair expenses on one electric train, thousand USD/year | 150 |

Table 8 – locomotive brigade salary expense

| | |
|--|-------|
| Park of electric train, one | 36 |
| Locomotive brigade salary expense for the park of electric park, thousand USD/year | 1 701 |
| Locomotive brigade salary expense for one electric park, thousand USD/year | 47,25 |