



No. EL/2.2.1/High Reach

Dated: 27.09.2022

Principal Chief Electrical Engineer,

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| 1. Central Railway, Mumbai CST-400 001 | 2. North Western Railway, Jaipur-302 006 |
| 3. East Central Railway, Hazipur-844 101 | 4. South Central Railway, Rail Nilayam, Secunderabad-500 071 |
| 5. East Coast Railway, Chandrashekharpur, Bhubaneswar-751 016 | 6. South East Central Railway, Bilaspur- 495 004 |
| 7. Eastern Railway, Fairlie Place, Kolkata-700 001 | 8. South Eastern Railway, Garden Reach, Kolkata-700 043 |
| 9. North Central Railway, Subedarganj, Allahabad-211 033 | 10. Southern Railway, Park Town, Chennai-600 003 |
| 11. Northern Railway, Baroda House, New Delhi-110 001 | 12. South Western Railway, Hubli-580 024 |
| 13. North Eastern Railway, Gorakhpur-273001 | 14. West Central Railway, Jabalpur-482 001 |
| 15. North East Frontier Railway, Maligaon, Guwahati-781 011 | 16. Western Railway, Churchgate, Mumbai-400 020 |
| 17. Chittaranjan Locomotive Works, Chittaranjan – 713331 | 18. Banaras Locomotive Works, Varanasi-221004 |
| 19. Patiala Locomotive Works, Patiala-147003 | |

Amendment No. 1

Sub: Amendment No. 1 to RDSO Technical Specification for High Reach Pantograph for A.C. Electric Locomotives Specification No. RDSO/2007/EL/SPEC/0054 Rev. '3'.

Following clauses of RDSO specification No. RDSO/2007/EL/SPEC/0054 Rev. '3' for High Reach Pantographs for Electric Locomotives are amended as under:

Clause No.	Existing	Amended as																				
1.1	This specification applies to Pantograph for use on 25 kV, A.C., 50 Hz, Electric Locomotives for satisfactory operation up to speeds of 200kmph under contact wire heights varying from 4.58 up to 7.570meters from the rail level	This specification applies to Pantograph for use on 25 kV, A.C., 50 Hz, Electric Locomotives for satisfactory operation up to speeds of 200kmph under contact wire heights varying from 4.54meters up to 7.570meters from the rail level.																				
1.2	The pantographs shall be complete with all parts and accessories including Auto Drop Device (ADD) as per clause 4.9 of IEC-60494-1-2013 and Over Reach Detection (ORD) device necessary for its efficient operation. Over Reach Detection Device should get activated between 3.7m and 3.8m above locked down height to lower the pantograph. Control unit should be provided in machine room. Pantograph shall be with air bellow operated mechanism for raising and lowering preferably. All such parts and accessories shall be deemed to be within the scope of this specification whether specifically mentioned or not.	The pantographs shall be complete with all parts and accessories for its efficient operation. Control unit should be provided in machine room. Pantograph shall be with air bellow operated mechanism for raising and lowering preferably. All such parts and accessories shall be deemed to be within the scope of this specification whether specifically mentioned or not.																				
5.1	<p>Climatic and environmental conditions</p> <table border="1"> <tr> <td>Atmospheric temperature</td> <td>Under Sun: 70°C max. In shade: 50°C max. Temp. Inside working locomotive may reach 60°C. Minimum temperature: 5°C</td> </tr> <tr> <td>Humidity</td> <td>100% saturation during rainy season.</td> </tr> <tr> <td>Altitude</td> <td>1000 Mts. above mean sea level.</td> </tr> <tr> <td>Rain fall</td> <td>Very heavy in certain areas.</td> </tr> <tr> <td>No. of rainy days per annum</td> <td>May be as high as 120 days.</td> </tr> </table>	Atmospheric temperature	Under Sun: 70°C max. In shade: 50°C max. Temp. Inside working locomotive may reach 60°C. Minimum temperature: 5°C	Humidity	100% saturation during rainy season.	Altitude	1000 Mts. above mean sea level.	Rain fall	Very heavy in certain areas.	No. of rainy days per annum	May be as high as 120 days.	<p>Climatic and environmental conditions</p> <table border="1"> <tr> <td>Atmospheric temperature</td> <td>Under Sun: 70°C max. In shade: 50°C max. Temp. Inside working locomotive may reach 60°C. Minimum temperature: -10°C</td> </tr> <tr> <td>Humidity</td> <td>100% saturation during rainy season.</td> </tr> <tr> <td>Altitude</td> <td>1776 Mts. above mean sea level.</td> </tr> <tr> <td>Rain fall</td> <td>Very heavy in certain areas.</td> </tr> <tr> <td>No. of rainy days per annum</td> <td>May be as high as 120 days.</td> </tr> </table>	Atmospheric temperature	Under Sun: 70°C max. In shade: 50°C max. Temp. Inside working locomotive may reach 60°C. Minimum temperature: -10°C	Humidity	100% saturation during rainy season.	Altitude	1776 Mts. above mean sea level.	Rain fall	Very heavy in certain areas.	No. of rainy days per annum	May be as high as 120 days.
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	<p>No. of thunder storms days/ year.</p> <p>Coastal area</p>	<p>May be as high as 85 days</p> <p>Equipment shall be designed to work in coastal areas in humid and salt laden atmosphere with maximum pH value of 8.5, sulphate of 7 mg per liter, max. Concentration of chlorine 6 mg per liter and maximum conductivity of 130 micro Siemens /CM, wind pressure reaching 216 kgf/m².</p>	<p>No. of thunder storms days/ year.</p> <p>Coastal area</p>	<p>May be as high as 85 days</p> <p>Equipment shall be designed to work in coastal areas in humid and salt laden atmosphere with maximum pH value of 8.5, sulphate of 7 mg per liter, max. Concentration of chlorine 6 mg per liter and maximum conductivity of 130 micro Siemens /CM, wind pressure reaching 216 kgf/m².</p>
6.0	<p><u>MAIN FEATURES:</u></p> <p>(iv) Max. Extension :At least 3.7 Meters from the locked down height</p> <p>(vi) ADD system: As per IEC-60494</p> <p>(vii) ORD device: Should get activated between 3.7m and 3.8m above locked down height to lower the pantograph</p> <p>viii) Max. Weight : 180 kg. Approx. (Without insulators)</p> <p>(xiii) Wearing strip material: Metallised carbon strips as per RDSO's Specification No: RDSO/2009/EL/ SPEC/0097, Rev. '1' or Specification No: RDSO/2009/EL/SPEC/0114, Rev. '0' suitable for ADD system. In case the design of the strip is different from above, prior approval shall be taken from RDSO.</p> <p>(xv) Compressed air supply: The compressed air supply in the loco may vary between 5.5 kg/cm² and 11 kg/cm², depending upon the type of stock, compressor operation etc. Panto shall start lowering if the air pressure drops below 4.5 kg/cm².</p>		<p><u>MAIN FEATURES:</u></p> <p>(iv) Max. Extension :At least 3.8 Meters from the locked down height</p> <p>(vi) Deleted</p> <p>(vii) Deleted</p> <p>viii) Weight : 200 kg. Approx. (Without insulators)</p> <p>(xiii) Wearing strip material: Metallised carbon strips as per RDSO's Specification No: RDSO/2009/EL/ SPEC/0097, Rev. '1' & drawing No. SKEL-4303 (Rev.6). In case the design of the strip is different from above, prior approval shall be taken from RDSO.</p> <p>(xv) Compressed air supply: The compressed air supply in the loco may vary between 5.5 kg/cm² and 11 kg/cm², depending upon the type of stock, compressor operation etc. Panto shall start lowering if the air pressure drops below 4.5 kg/cm². Pantograph shall work properly with existing compressed air quality available in locomotive.</p>	
7.5	<p>The pantograph shall be of light weight, robust and compact, suitable for use under existing OHE as well as under the OHE of the Dedicated Freight Corridor, where OHE contact wire height varies from 4.58 to 7.570 meters from the rail level.</p>		<p>The pantograph shall be of light weight, robust and compact, suitable for use under existing OHE as well as under the OHE of the Dedicated Freight Corridor, where OHE contact wire height varies from 4.54 meters to 7.570 meters from the rail level.</p>	
7.12	<p>Painting: The pantograph sections/assemblies/sub-assemblies shall be made from scale free pickled and oiled steel. These shall be grit/sand blasted before application of rust preventive primer followed by Powder coating/Polyurethane painting of orange (RAL 2005) with a thickness of minimum 80 microns of synthetic resin paint. Any air reservoir incorporated in the pantograph assembly shall have primer and paint applied to the inner surfaces complying with standard schedule for coating of internal surfaces of the air reservoir. Complete details of painting may be furnished by firm.</p>		<p>Painting: The pantograph sections/assemblies/sub-assemblies shall be made from scale free pickled and oiled steel. These shall be grit/sand blasted before application of rust preventive primer followed by Powder coating/Polyurethane painting of orange (RAL 2004) or similar with a thickness of minimum 80 microns of synthetic resin paint. Any air reservoir incorporated in the pantograph assembly shall have primer and paint applied to the inner surfaces complying with standard schedule for coating of internal surfaces of the air reservoir. Complete details of painting may be furnished by firm.</p>	
7.13	<p>ii) A light weight articulated system bearing the bow and ensuring its contact with the catenary system under a specified pressure with a minimum variation in this pressure for any variation in the</p>		<p>ii) A light weight articulated system bearing the bow and ensuring its contact with the catenary system under a specified pressure with a minimum variation in this pressure for any variation in the height of the</p>	

	<p>height of the contact wire which may be between 4.58 m – 7.57 m. A curve showing the pantograph extension and contact force during raising and lowering shall be submitted by the firm. The articulation system should be designed to allow a maximum extension of 3.7 meters. Adequate damping of the main frame shall also be ensured.</p> <p>vi) The panto pan main strips shall be as per RDSO's Specification No: RDSO/2009/EL/SPEC/0097, Rev. '0' & drawing No. SKEL-4303 (Rev.6) for Metallised Carbon Strip or Specification No: RDSO/2009/EL/SPEC/0114, Rev. '0' suitable for ADD system & Drawing No. SKEL-4994 Alt. '0'. In case of other design metallised carbon strips are required suitable for ADD system, complete details are to be submitted for approval.</p>	<p>contact wire which may be between 4.54m – 7.57 m. A curve showing the pantograph extension and contact force during raising and lowering shall be submitted by the firm. The articulation system should be designed to allow a minimum maximum extension of 3.8 meters. Adequate damping of the main frame shall also be ensured.</p> <p>vi) The panto pan main strips shall be as per RDSO's Specification No: RDSO/2009/EL/SPEC/0097, Rev. '0' & drawing No. SKEL-4303 (Rev.6) for Metallised Carbon Strip. In case of other design metallised carbon strips are required, complete details are to be submitted for approval.</p>																																																																																																																																						
8.0	<p>INSPECTIONS AND TESTS :</p> <p>(i) The Pantograph shall be subjected to type and routine test as per IEC 60494-1: 2013 at the manufacturer's premises or at mutually decided venue where all the facilities should be made available for carrying out the prototype test. The type test shall also include Wind tunnel test, shock and vibration test and current collection test. This will be followed by an extensive field trial for a period of at least six months.</p>	<p>INSPECTIONS AND TESTS :</p> <p>(i) The Pantograph shall be subjected to type and routine test as per IEC 60494-1: 2013 at the manufacturer's premises or at mutually decided venue where all the facilities should be made available for carrying out the prototype test. The type test shall also include Wind tunnel test, shock and vibration test and current collection test. This will be followed by an extensive field trial for the quantity and period as per extant ISO guidelines.</p>																																																																																																																																						
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This is for kind for your kind information and necessary action please. This issues with approval of competent authority.

(Rajesh Kumar)
for Director General Std./Elect.

Encl: Nil.

Copy to:

1. Secretary (Electrical), Railway Board, Rail Bhavan, New Delhi-110001
(Kind Attn.: Shri Kishore Vaibhav, DEE/RS/RB): - for kind information please.
2. M/s Schunk Metal & Carbon (India) Pvt. Ltd., No. 485/2, 13th cross Road, 4th phase, Peenya Industrial Area, Bangaluru-560058.
3. M/s Faiveley Transport Rail Technologies India Ltd., P. Box -39, Harita, Hosur – 635109
4. M/s Morgan Advanced Materials India Private Limited, No.419, 4th A Cross, HRBR Layout, 2nd Block, Kalyannagar, Bangalore- 560043.
5. M/s Air Control and Chemical Engineering Co Ltd., Barejadi, PO Nandej, Western Railway, Ahmedabad-382435
6. M/s Nike Energy Manufacturing Private Limited, Plot No 279/2, Ganeshpur, Tarna, Shivpur, Varanasi-221003.
7. M/s Contransys Pvt. Ltd., 16, Hare Street, Kolkata, 700 001.
8. M/s Daulat Ram Engineering Services Pvt. Ltd. 10/2 NH-12 Simrai Post Obedullahganj, District Raisen, Simrainagar, Manddideep -494993
9. M/s River Engineering Pvt. Ltd. Plot No. 54-55, Toy City, Ecotech-III, Greater Noida, Greater Noida-201306,
10. M/s Haswell Technik Pvt. Ltd, Plot No. 41 Industrial Area, Phase-1, Chandigarh-160002
11. M/s Black Stone Terry Engineering Company, B-35/36, Industrial Estate, New Power House Road, Jodhpur. RAJ, Jodhpur-342003, Rajasthan, India
12. M/s Sequoia Safety Products Pvt. Ltd., A-34/2/1, Block-1, Site-IV, Industrial Area, Sahibabad, Ghaziabad-201010.
13. M/s RSI Switchgear Pvt. Ltd., Plot No. F- 252 and 253, RIICO Industrial Area, Bhiwadi-301019.
14. M/s Mersen India Private Limited, 5, Bommasandra Industrial Area, Bangalore-560099

(Rajesh Kumar)
for Director General Std./Elect.

Encl: Nil.