

Annexure 1 – Technical Tender Conditions

Train B28 Project Mainline Specific Energy Consumption (SEC) test for HSR Rolling Stock

Intended vendor should be a reputed service provider in the field of Mainline Specific Energy Consumption (SEC) testing of High-Speed Rail (HSR) Rolling Stock as per European (EN) standards. Company profile and the infrastructure & experience details shall be submitted by the vendor during tender stage.

The vendor shall provide all the required documents to prove their expertise and for obtaining the vendor approval from BEML/Nominated Agency (NHSRCL). Test Agency credentials (Accreditation, Testing Equipments, Experience) are subject to BEML/ Nominated Agency (NHSRCL) approval.

The intended vendor should fulfill the following requirements and shall submit the relevant applicable documents as part of tender submission.

1. The testing agency shall have proven experience record of conducting such tests in at least 3 projects in the last 10 years for Rolling Stock designed for 250 kmph or above at onsite Location (Depot & mainline).
2. Test Agency shall comply to BEML Test Specification **FPIIC/TD/094, Rev.0**, and shall submit detailed clause by clause compliance as part of Technical package of the Tender and relevant documents if any.
3. Test agency shall provide the Test Campaign schedule, Test Apparatus details with datasheet and any other relevant technical details as part of the Technical package of the Tender.
4. Test Agency shall have required accreditation of Specific Energy Consumption (SEC) test standards as per BEML Specific Energy Consumption (SEC) Test Specification **FPIIC/TD/094, Rev.0** shall submit the copy of the same as part of Technical package of the Tender.
5. Test Agency shall have all the required Test Setup/equipment's as per BEML Specific Energy Consumption (SEC) test Procedure **FPIIC/TD/094, Rev.0** duly calibrated for the test period, shall submit the details of the same as part of Technical package of the Tender.
6. Specific Energy Consumption (SEC)
 - a) SEC is the maxim energy consumption of the Train per seat per kilometre distance travelled (kWhr/Seat-km) meeting the requirements as mentioned in this Clause. Supplier shall endeavour to design the Rolling Stock such that the SEC achieved is comparable to the existing international semi-high-speed Trains. As a reference, the target value for SEC may be considered as 0.034 kWhr/Seat-km.
 - b) Supplier shall submit the detailed simulations of energy consumption, indicating the SEC during design stage considering the following operating conditions:
 - (i) Trains will stop at each station.
 - (ii) Dwell time shall be 60 seconds at each intermediate station stoppages (including door opening and closing time) and 6 minutes at terminal stations i.e., three (03) minutes at each terminal station (including two cycles of door opening and closing at each terminal).
 - (iii) Train will be required to run 500 meters at each turnaround.
 - (iv) Passenger loading with all seats occupied i.e., Design Mass under Normal Payload as defined in Table-3 of EN15663.
 - (v) Maximum acceleration/braking rate and jerk rate shall remain within limits as per applicable standards and best industry practices.
 - (vi) Loading of traction system shall be kept within the boundary limits of the design. Regenerative

braking shall be maximized subject to meeting the requirements of travel time and safety in braking.

(vii) Auxiliary loads will be considered at full design load and with duty cycle of 100% wherever applicable.

(viii) Energy consumption of HVAC shall be considered at the design capacity.

c) Supplier shall submit the detailed methodology of validating the SEC in the Trial Section during design stage.

7. Energy Consumption

a) The Supplier shall measure the required values of energy consumption for an 8-car, fully loaded Train in all out run, (full traction up to max. service speed followed by full service braking up to standstill).

b) The validation of efficiency and energy consumption shall be done on the combined system test bed as per the IEC 61377 and 61133.

c) The Supplier shall validate the Specific Energy Consumption as per Clause 4.11 in the Trial Section.

8. The Testing Agency shall submit detailed test procedures, measurement methodology, instrumentation details and proposed acceptance criteria along with the Technical Bid. The proposed test procedure and acceptance criteria shall be reviewed and mutually agreed between the Train Operator and BEML prior to commencement of testing.

9. For type testing work, Test Agency shall bring all Test instruments/set up to Surat/Mainline MAHSR corridor, India and for executing the Specific Energy Consumption (SEC) Type Test.

10. During/after the tender, Test Agency shall follow opinion of design team of BEML/Nominated Agency/Purchaser/Design Verifier/Propulsion & Electrics Supplier. In case of any conflict or ambiguity, BEML/Nominated Agency/Purchaser/Design Verifier/Propulsion & Electrics Supplier decision shall be final and binding.

11. Specific Energy Consumption (SEC) Test Specification approval is under progress with customer. If any comments from Customer, same need to be addressed by testing agency.

12. Section Availability:

a) Approximately 46 km main line section between Bilimora-Surat will be available by Dec 2026 final route will be decided mutually with train operator before testing.

13. Schedule:

b) Submission of test Procedure – 2 weeks from PO.

c) Conducting tests as per Specific Energy Consumption (SEC) test Procedure – Schedule will be intimated by BEML (Tentatively between April 2027 and August 2027).

d) Submission of preliminary test report – 1 week from test completion.

e) Submission of detailed test report – 2 weeks from test completion.

14. Vendor shall submit the below details as part of Technical Bid requirement.

i. Clause by clause compliance for BEML Document **FPIIC/TD/094, Rev.0.**

ii. Clause by clause compliance for Technical Tender Conditions (Annexure 1).

iii. References & details on Successful completion of Specific Energy Consumption (SEC) Type Tests in at least 3 projects in the last 10 years for Rolling Stock designed for 250 kmph or above at onsite Location (Depot & mainline).

- iv. Detailed list and datasheet of Instrumentation for Specific Energy Consumption (SEC) Type Test.
- v. Detailed proposed day wise Test program including the timeline for Test pre requisites.
- vi. Details on accreditations of Specific Energy Consumption (SEC) Type Test standards.
- vii. Technical proposal for performing Mainline Specific Energy Consumption (SEC) Type test as per BEML Document **FPIIC/TD/094, Rev.0.**
- viii. Company Profile.
- ix. Any other details deemed as necessary for Technical Evaluation of Vendor proposal.
