

	BEML LIMITED BANGALORE	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	1 / 32

TRAIN B28

Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation

Approved	19-10-2026	Mahanthesh GM	
Reviewed	19-10-2026	Sushata Goswami/ Mudavath Sreenu	
Prepared	19-10-2026	Nagaram Prateek/ Mohd Sheik Shakil	
	Date	Name	Signature

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	3 / 32

Table of Contents

1.	Introduction	6
1.1.	Consultancy	6
2.	Trainset Configuration	6
3.	Definitions and Abbreviations.....	7
3.1.	Definitions	7
3.2.	Abbreviations	8
4.	Precedence of Documents.....	8
5.	Applicable Standards/Norms/Code	9
6.	Climatic and Environmental Condition	9
7.	Power Supply System	11
8.	Signal and Telecommunication	12
9.	Performance Requirements	12
10.	Passenger Capacity and Payload.....	13
11.	Qualifying Criteria.....	13
12.	Section Availability:	13
13.	Schedule for Train level testing	13
14.	Compliance Matrix to Contract requirements	14
15.	SCOPE OF WORK	22
16.	Test Conditions	22
17.	Specific Energy Consumption.....	24
18.	Test Methodology	24
19.	Energy Consumption Test	25
19.1.	Test Objective.....	25
19.2.	Test Condition	26
19.3.	Test Procedure.....	26
19.4.	Result Evaluation	27
20.	Specific Energy Consumption (SEC) Validation Test.....	27

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	4 / 32

20.1.	Objective	27
20.2.	Test Conditions:	27
20.3.	Test Procedure:	28
20.4.	Measurement and Data Acquisition.....	29
20.5.	SEC Calculation	29
20.6.	Compliance Assessment.....	30
21.	An Overview of the contents of the test report	30
22.	Test Runs and Validity	30
23.	Test Report and Deliverables	30
24.	Safety Requirements	31
25.	Submittals	31
26.	Annexures	32

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	5 / 32

List of Tables

Table 1: Abbreviations	8
Table 2: Applicable Standards/Norms/Code	9
Table 3: Climatic and Environmental Condition	10
Table 4: Power Supply System	12
Table 5: Performance Requirements.....	13
Table 6: Passenger Capacity	13
Table 7: Test Conditions	23
Table 8: Test Report and Deliverables	31
Table 9: List of Annexures	32

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	6 / 32

1. Introduction

This document describes the Test specification of Specific Energy Consumption (SEC) for Mainline validation for High-Speed Rail project with operating speed 249kmph and test speed 280kmph.

The purpose of the test is to verify the B28 train, satisfy the proven standards and the employers Specific Energy Consumption (SEC) requirements in the operating environment of MAHSR corridor. The document defines the Specific Energy Consumption (SEC) test to be performed, the test procedure acceptance criteria and the measuring instruments to be used. The tests are performed and the values recorded to verify if the values are within or without of the prescribed limit or criteria. The test will be performed in the main line of the MAHSR corridor (available sections), some tests could also be performed on the test track of the MAHSR depot provided the test conditions are met.

1.1.Consultancy

- BEML has appointed M/s. EC Engineering, Poland as Design Consultancy for Carbody, interiors and Bogie design.
- Further BEML appointed M/s. DB Engineering and Consulting GmbH as Design Verification Consultancy.
- All proposals, design documents will be shared with these agencies and nominated agency or any other appointed agencies in future.
- The Propulsion, Auxiliary Power supply, TCMS and Battery system are being sourced from M/s. Medha Servo Drive Pvt. Ltd., (MSDPL).
- The Testing Agency is also required to interact with the above-mentioned agencies during the progress of the project.

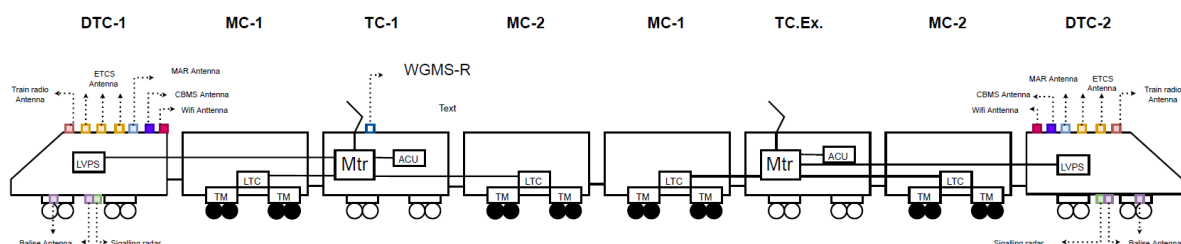
2. Trainset Configuration

The scope is for 8-Chair car High Speed Trainset (also referred as a rake).

Train/Rake configuration: 8 Cars – 2 basic units, each unit consisting of 4 Cars

The tentative configuration of train formation is as follows.

For 8 car formation –



	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	7 / 32

* DTC1 + MC1 + TC + MC2 + MC1 + TC(EC)+ MC2 + DTC2 *

Where ,

DTC1/DTC2 - Driving Trailer Car,

MC1/MC2 - Motor Car,

TC-PRM - Trailer Car with PRM seat,

TC-Ex - Trailer Car (Executive Car)

" * " : Automatic Coupler

" + " : Semi-permanent Coupler

3. Definitions and Abbreviations

3.1. Definitions

The following definitions are applicable to the Test Specification:

Sl. No.	Name	Definition
1	Employer	means ICF-Chennai, its legal successors and assignees
2	Nominated Agency/Purchaser	shall mean NHSRCL and its representatives including an ISA (if any) deployed by NHSRCL for the purpose of carrying out Design approvals, Tests, Trials etc.
3	BEML	means the contractor for Design, Development, Manufacture, Testing and Commissioning of Trainsets for the project.
4	Design Validation/Testing Agency	means the design validation agency or testing agency who carry out the required by BEML for NHSRCL/ICF High Speed Train project. Design validation agency or testing agency shall Carry out the works in accordance with this Test Specification (TS) with regards to design validation.
5	GTC	means "General Terms and Conditions for design validation for NHSRCL/ICF High Speed Rail Project" issued by BEML.
6	TS	means BEML's Test Specification document
7	Contract	means the contract between Design Validation Agency and BEML in relation to the design validation for NHSRCL/ICF High Speed Train Set.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	8 / 32

3.2. Abbreviations

The following abbreviations shall be used as applicable:

Abbreviation	Full Form
A	Ampere
AC	Alternating Current
ATP	Automatic Train Protection
ATC	Automatic Train Control
ATO	Automatic Train Operation
C	Celsius
DC	Direct Current
EN	European Standard
ETCS	European Train Control System
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
GoA	Grade of Automation
IEC	International Electro Technical Commission
ITP	Industry Testing Plan
kg	Kilogram
km	Kilometre
kmph	Kilometre per Hour
kV	Kilo Volt
LTC	Line Traction Converter
mm	Millimetre
ms	Millisecond
N/A	Not Applicable
OHL	Over Head Line
SEC	Specific Energy Consumption

Table 1: Abbreviations

4. Precedence of Documents

- In the event of any conflict between requirements of particular parts of this TS, the design validation agency shall seek clarification from BEML
- any term/clause/definition is unclear in this specification, design validation agency shall seek clarifications from design team in BEML, prior to signing contract, to confirm the same.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	9 / 32

- c) After signing the contract, Testing/design validation agency shall follow the definition and opinion of design team in BEML.

Order of precedence	Document Title
1	GTC
2	TS

- d) The complete requirements are those found in the above documents. It shall be the design validation agency's responsibility to ensure that equipment, documentation, and services furnished against this TS are in full compliance with all the above documents.

5. Applicable Standards/Norms/Code

Following are the applicable standards and documents for Test Specification of Specific Energy Consumption (SEC) test:

S.No.	Standard/ Document	Name	Remarks
1	EN 15663	Railway Applications – Definition of vehicles reference masses	From Technical specification
4	IEC 60349-2	Electric traction - Rotating electrical machines for rail and road vehicles - Part 2: Electronic converter-fed alternating current motors	
5	EN 50388	Railway Applications - Fixed installations and rolling stock - Technical criteria for the coordination between electric traction power supply systems and rolling stock to achieve interoperability - Part 1: General	
6	IEC 61133	Railway applications - Rolling stock - Testing of rolling stock on completion of construction and before entry into service	
8	EN 50463	Railway Applications – Energy Measurement on Board Trains.	
9	Any other standards (IEC/EN/JIS)/documents applicable to calculate energy consumption of Rolling stock		

Table 2: Applicable Standards/Norms/Code

Note: Testing agency shall consider IEC 63593 as the technical reference for carrying out the SEC validation test, as applicable.

6. Climatic and Environmental Condition

The B28 train is designed to operate reliably and safely under Mumbai climatic and

Copyright (C) BEML Limited 2025. All Rights Reserved.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	10 / 32

Environmental conditions as per as per Clause 3.6 shown in following Table. Accordingly, the testing may have to be conducted under the following climatic and environmental conditions as permitted.

Description	Limiting Values
Atmospheric temperature [Note-1]	Minimum temperature: - 5°C Maximum temperature: 50°C Maximum touch temperature of metallic surface under the sunlit and shade shall be considered and calculated as per ASHRAE 2021.
Humidity	100% saturation during rainy season
Solar radiation	Value and calculation method shall be based on ASHRAE 2021.
Altitude	1000 meter above mean sea level
Rainfall	Very heavy and continuous rainfall in certain areas (heavy continuous rainfall up to 2500mm, rainy season is as long as 5 months in some stretches)
Atmospheric conditions	Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach a high value of 0.4 mg/m ³ .
Coastal area	Humid, salt laden and corrosive atmosphere as prevailing in coastal region.
Wind speed	High wind speed in certain areas, with wind pressure reaching 216 kg/m ² . [Note-2]
Flood level	The Train shall function in accordance with these Specifications and Standards in the event of flooding up to 50 mm above Rail Level as follows: In the event of flooding at any level below Rail Level, the Train shall operate in full compliance with these Specifications and Standards. In the event of flooding at a height between Rail Level and 50 mm above Rail Level, the Train shall operate in full compliance with these Specifications and Standards with the exception that it is permissible to restrict the operation of the Train to a maximum of 10 km/h. Allowance is to be made in addition for increase in the height of water level due to the "bow wave" effect of the Train passing through the water.
Design Life	Train is designed for min.30 year of life. Accordingly, the subject items & accessories shall also not deteriorate in their performance for 30 years

Table 3: Climatic and Environmental Condition

Note:

- 1) Ambient temperature for HVAC calculations is based on the highest temperature of the Indian region specified in ASHRAE-2021.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	11 / 32

- 2) Depending on the operational rule, special speed limits shall be imposed on the Train Sets in conditions where wind speed is 20 m/s or greater. Train Set operation shall cease at wind speeds of 30 m/s or greater
- 3) The temperature of the metal surfaces of the vehicles when exposed directly to the sun, for long periods of time, may be assumed to rise to 70°C.
- 4) Any moisture condensation shall not lead to any malfunction or failure.
- 5) Adequate margin is specially built into the design particularly to take care of the higher ambient temperatures, high humidity, dusty and corrosive conditions, etc. prevailing in Mumbai – Ahmedabad area and as approved by its Employer or its Nominated agency.

7. Power Supply System

The power supply system adopted by the Government for operation of the trains is 25kV, 50 Hz single phase AC with following features.

Nominal supply voltage	25 kV (RMS), 50 Hz, single phase, AC
Normal variation in supply voltage	22.5 kV to 30 kV (RMS)
Voltage range for Train to operate in full compliance with these Specifications and Standards	22.5 kV to 30 kV
Occasional maximum voltage	30 kV (RMS)
Occasional minimum voltage	20 kV (RMS) for less than 2 minutes
Normal variation in frequency	± 3% (48.5 Hz to 51.5 Hz)
Type of OHE	Mainline: Heavy Compound Catenary System Depot area, Approach line, Loop line, Cross-over line and All lines of Mumbai station: Heavy Simple Catenary System
Feeding System	Mainline: 2x25 KV AT feeding system Depot and Workshop: 25 KV feeding system Note: Under normal condition each traction substation feeds adjacent sectioning post.
Maximum Speed to be considered for design	Main Line: Test Speed Other Lines: 140 km/h
Stagger of the contact wire	± 150 mm on straight track Up to +200mm on curves
Normal contact wire height in mid span	5 m from Rail Level
Max. contact wire height	5.1 m from Rail Level
Min. contact wire height	4.9 m from Rail Level

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	12 / 32

Neutral sections	After around every 25 kms Note: Automatic Switching Neutral Section of length 1.4 kms is being used on MAHSR corridor. MAHSR corridor is provided with an Automatic Switching Neutral Section (ASNS). Supplier shall discuss the details of the switching of VCBs in accordance with ASNS during design stage.
Max. continuous OHE current rating	1020 Amps.
Features of Contact Wire	1. Material: Grooved hard-drawn copper with Tin alloy (SN alloy) 2. Cross-section: 170 sq.mm. 3. Tension: 19.6 KN Note: Details will be discussed during design stage.
Automatic Tensioning Device (ATD)	Pulley Type ATDs Max. tension: 21.96 KN Tension Load Capacity: 53.9 KN

Table 4: Power Supply System

8. Signal and Telecommunication

The proposed system shall meet the principal details of the signaling and telecommunications assets out in ICF-MD-SPEC-447, Clause 3.7. following details are listed for reference only.

Train control System	Signalling system shall be ETCS level 2, with ETCS level-1 as fall back as defined in UNISIG specification. ATO over ETCS (AOE) (GOA2) functionalities shall be as per IEC 62290.
----------------------	---

9. Performance Requirements

The performance requirements of the train shall be governed according to the following table.

Item	Values
Maximum operational speed during service	249 kmph
Maximum Design speed	280kmph
Minimum average acceleration or speed not less than 75 kmph	0.54 m/s ²
Minimum deceleration during full-service braking following jerk limit as specified	0.8 m/s ²
Jerk rate (Maximum)	0.7 m/s ³ during full-service braking (for all speed range) and 1.0 m/s ³ during emergency braking (for speed

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	13 / 32

	>10 Kmph)
Passenger load	80 kg/person 2-4 standing/m ²
Average running distance of one train (for design purpose)	2,000 km/day

Table 5: Performance Requirements

10. Passenger Capacity and Payload

a) The arrangement of the type of seats along with the quantity is shown in the table below:

Seats	Car				Total
	DTC1/2	MC1/2	TC1_PRM	TC_EX	
Train Formation	2	4	1	1	
1 st Class Seats	-	-	-	53	
2 nd Class Seats	62	78	66	-	
Wheelchair Place	-	-	1	1	
In Total per Train - Seats	124	312	67	54	557
Toilet Universal	-	-	1	1	
Tip-up seats	2	2	3	3	
Pantry	-	-	1	1	
Attendants	-	-	2	2	
Driver Seats	1				

Table 6: Passenger Capacity

b) **Payload:** Weight of 80 kg (including 10 kg for luggage) has been considered per passenger for arriving at gross weight of Train.

11. Qualifying Criteria

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. Supporting documents shall be provided.

12. Section Availability:

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

13. Schedule for Train level testing

a) Conducting tests as per the Test Specification of Specific Energy Consumption (SEC) for Mainline Validation – Schedule will be intimated by BEML (Tentatively between April 2027 and August 2027).

b) In view of the stringent project schedule, no exclusive/separate testing window shall be provided. The testing agency shall plan and conduct the test in coordination with BEML

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	14 / 32

and in accordance with the approved Inspection and Test Plan (ITP) and overall project schedule. To align with the timelines, testing agency may require to work in two shifts.

14. Contract requirements on BEML

Contract Specifications, Chapter 4 – Performance requirements:

Clause 4.11: Specific Energy Consumption (SEC)

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	15 / 32

Clause No.	Clause Description	Compliance
4.11.1.	SEC is the maximum energy consumption of the Train per seat per kilometre distance travelled (kWhr/Seat-km) meeting the requirements as mentioned in this Clause. Testing Agency 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.	
4.11.2.	Testing Agency 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.	

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	16 / 32
4.11.3	Testing Agency shall submit the detailed methodology of validating the SEC in the Trial Section during design stage.		

Clause 7.1: General

Clause No.	Clause Description	Compliance
7.1.1	The Testing Agency shall establish a testing and commissioning plan consisting, but not limited to, the following aspects: (i) Testing Agency's methodology for inspection, testing and commissioning; (ii) all inspections and quality hold points; (iii) the objectives of each test and criteria for successful tests; (iv) organization chart of key personnel in the Testing and Commissioning team; (v) submission of inspection and test specifications and procedures.	
7.1.2	Purchaser / Nominated Agency shall undertake a review of the above received documents and issue a notice of either no-objection (or) no-objection with comments (or) objection with comments to the Testing Agency within four (04) weeks from the date of receiving, upon which the Testing Agency shall appropriately respond and conduct the inspections and tests as required in this TS.	
7.1.3	In the event on notice of objection with comments, the Testing Agency shall take such steps or make such changes in the said methods or supply such further documents or information as may be necessary to meet the Purchaser's requirements and to obtain his notice of no-objection. The Testing Agency shall not change the methods of inspection, testing and commissioning (including Integrated Testing and Commissioning) which have received no-objection from the Purchaser/Nominated Agency without further review and consent in writing of the Purchaser/Nominated Agency.	
7.1.5	Tests and test procedures shall be submitted by the Testing Agency for acceptance by the Purchaser unless specified otherwise elsewhere in these Specifications and Standards.	

Clause 7.2: Integrated Testing and Commissioning of the trains with Infrastructure

Copyright (C) BEML Limited 2025. All Rights Reserved.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	17 / 32

(Overall ITC)

Clause No.	Clause Description	Compliance
7.2.1	General (i) For integrated testing and commissioning of the fixed infrastructure namely civil structure, track, overhead power supply equipment, signalling and telecommunication equipment of complete MAHSR sections along with associated testing and usage of Rolling Stock (referred to as "SEC Test" hereinafter), the Testing Agency shall ensure the availability of Rolling Stock during the SEC Test as well as its compatibility with required interfacing systems.	
	(ii) The Train level SEC test consists of Static Inspection, shall include static inspection of the infrastructure. And Dynamic Inspection, which is conducted by actual Train running.	
	(iii) Prior to the implementation of SEC test, Testing Agency shall scrutinize the design, installation and test status of the Train for ensuring speed potential up to the maximum operating speed along with safety and stability of the Train.	
	(iv) The SEC test shall be done in the Trial Section in stages. As a reference the sections shown below may be considered and it can be revised later based on Purchaser's requirements. Testing Agency shall note that simultaneous testing of two (02) or more stages is not considered. However, the available section for testing will be from VAPI (168km) to SURAT (265km).	

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	18 / 32

Clause No.	Clause Description	Compliance
7.2.8	Role of the Testing Agency/Design Validation Agency: Major activities of the Testing Agency shall be as follows: a) Testing Agency shall deploy a dedicated team of personnel for conducting SEC Test as part of design validation whenever Nominated Agency intimated. b) Testing Agency shall work in cooperation with related contractors/parties in the execution of Overall SEC Test; c) Testing Agency shall place “safety” as the first priority in all activities related to the overall SEC test. d) All defects and shortfalls in the Supplier’s system, discovered in the course of Overall SEC test, shall be made good and re-tested to the satisfaction of the Purchaser. e) NA f) Testing Agency shall cooperate with other contractors identified by Nominated Agency in installing and uninstalling of measuring equipment on/from the rolling stock as and when needed during the period of Overall SEC testing. g) Testing Agency shall remove temporary fittings, if necessary, for the delivery of his items and shall restore the fittings to the original state and to the satisfaction of the Nominated Agency.	

Clause 7.3: Testing of Train

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	19 / 32

Clause No.	Clause Description	Compliance
7.3.1.1	Testing Agency, at its own cost and expense, shall carry out all Tests as detailed in this Chapter-7 and such other Tests that the Testing Agency may consider necessary to demonstrate that the Trains comply in all respects with these Specifications and Standards. The Testing Agency shall provide to the Purchaser / Nominated Agency forthwith, a copy of the Testing Agency's report on each test containing the results of each test and the action, if any that it proposes to take for compliance with these Specifications and Standards.	
7.3.1.2	All type tests shall be conducted by Testing Agency wherever performed in presence of and to the satisfaction of Nominated Agency, who reserves the right to witness any or all of the tests. Nominated Agency on its own cost, may deploy an Independent Safety Assessor (ISA) to witness any or all of the tests.	
7.3.1.3	All tests and trials on Train level will be carried out on TS#01. Tests & trials already carried out on TS#01 will generally not be repeated on subsequent Trains except the routine tests as mentioned in this Specifications. Detailed test plan will be finalized during design stage.	
7.3.1.5	Wherever any equipment, system, sub system is not specifically covered by an international recognized specification or test procedure, the tests which are acceptable to both to Testing Agency and to the Nominated Agency shall be devised.	
7.3.1.6	Without prejudice to any provisions of the contract, the Purchaser, on its own costs and expense, reserves the right to witness any or all of the type tests and to require submission of any or all test specification and reports.	

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	20 / 32

Clause No.	Clause Description	Compliance
7.3.1.7	The Testing Agency shall arrange instrumentation and record speed, voltage, current, temperature rise of various equipment, energy consumption, tractive effort and other relevant parameter as necessary for ensuring compliance of these Specifications and Standards	
7.3.1.8	The temperature of the various parts of the electrical and control equipment shall be recorded during the Tests as per the standard procedure specified. The Testing Agency shall supervise and carry out the Tests at its works at the site and shall provide all equipment and consumables necessary for such Tests.	
7.3.1.9	The Testing Agency shall submit a detailed test plan for specified trials indicating the tests to be conducted, procedure/method to be followed for tests, parameters to be measured and devices/instruments to be used; and Pass/Fail criteria etc. for approval. Submitted test plans shall be as per IEC 61133 and after the approval from Nominated Agency. After successful completion of the tests & trials and acceptance of the results, TS#01 will be cleared by Nominated Agency for commercial services.	
7.3.3.1	Generally, test procedures shall be followed as per the latest IECs of equipment/systems/Sub-systems testing	
7.3.4	Complete Train: Complete Train shall be type & routine tested as per IEC 61133:2016 and as per the test program agreed by Nominated Agency. After erection, the complete equipment shall satisfactorily withstand the dielectric voltages as specified in the IEC specification.	
7.3.5.2	Energy Consumption (i) The Testing Agency shall measure the required values of energy consumption for a 8-car, fully loaded Train in all out run, (full traction up to max. service speed followed by full service braking up to standstill).	

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	21 / 32

Clause No.	Clause Description	Compliance
	(iii) The Testing Agency shall validate the Specific Energy Consumption as per Clause 4.11 of contract specifications in the Trial Section.	
7.3.6.1	Each Train shall be commissioned at Maintenance Depot of MAHSR by the testing agency's staff before putting into commercial service.	
7.3.6.3	Mainline validation tests are intended to prove the satisfactory running performance of the supplied equipment and evaluate their reliability in service, ease of maintenance and operations. Upon successful completion of which the Trains will be accepted by the Nominated Agency/Purchaser (Take Over).	
7.3.6.4	If considered necessary, instrumentation may also be required during service trials in addition to downloading of subsystem data for analysis. During the TS#01 tests/service trials, if any problem arise or feedback is obtained, which warrants a re-check of the design/ manufacture/ quality of the equipment and components, action will be taken as may be necessary by the Testing Agency to carry out the required investigations and to incorporate the modification considered most appropriate to reach compliance with the specification without any extra costs to the Purchaser and in a manner approved by the Nominated Agency on equipment/components already supplied as well as those to be supplied later.	
7.3.7.2	(i) The Trains shall be tested in accordance with Good Industry Practice to determine their compliance with Specifications and Standards.	
	(ii) The Nominated Agency may, in its discretion, require the Testing Agency to furnish copies of the work test certificates (WTC) of any test of the Train.	
7.4.1.	(x) Specific Energy Consumption;	

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	22 / 32

Clause No.	Clause Description	Compliance
7.4.2	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.	

15.SCOPE OF WORK

The Testing Agency shall undertake the complete testing activity from pre-test review up to submission of the final validated results.

- Review the applicable Contract clauses as per Chapter-14 of this Test Specification, B28 SEC requirements and available design-stage SEC simulation/methodology.
- Review the Trial Section route profile, operating conditions and test constraints.
- Prepare and submit detailed SEC test methodology in line with IEC/EN standard and shall also submit the test procedure of at least 1 test conducted on a HSR operated above 250kmph for approval.
- Prepare and submit instrumentation and data-acquisition plan.
- Provide/procure suitable measurement instruments and data-acquisition equipment required for the test, including installation and removal.
- Provide valid calibration certificates and demonstrate traceability of critical measurement equipment.
- Execute the approved Trial Section/Mainline SEC validation test.
- Execute the separate all-out energy-consumption test required under Clause 7.3.5.2(i), as included in the approved test programme.
- Record and acquire all required electrical, dynamic, traction, braking, equipment-temperature and relevant auxiliary parameters.
- Process and analyse raw data and calculate SEC in kWh/seat-km.
- Evaluate measurement uncertainty and repeatability of the measurements.
- Compare measured SEC with the applicable contractual requirement and the Supplier's declared/design-stage SEC simulation.
- Submit raw data, processed data, calculation files, draft report, final report and test certificate.

16. Test Conditions

- The Testing Agency shall conduct the SEC validation under the following contractual operating conditions:

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	23 / 32

Sl. No.	Test Condition	Requirement
1	Station stops	Train shall stop at each station.
2	Intermediate station dwell	60 seconds at each intermediate station, including door opening and closing time.
3	Terminal station dwell	6 minutes at terminal stations, i.e. 3 minutes at each terminal station, including the specified door-opening/closing cycles.
4	Turnaround	Train shall run 500 metres at each turnaround.
5	Passenger loading	All seats occupied; Design Mass under Normal Payload as defined in Table 3 of EN 15663.
6	Acceleration/braking/jerk	Within applicable standards, Contract requirements and approved operating limits.
7	Traction loading	Within the boundary limits of the approved design.
8	Regenerative braking	Maximized subject to travel-time requirements and safety in braking.
9	Auxiliary loads	Full design load and 100% duty cycle wherever applicable.
10	HVAC	Energy consumption considered at design capacity.

Table 7: Test Conditions

b) Specific Energy Consumption (SEC) test shall be carried out as a type test. The test conditions for specific energy consumption (SEC) are listed in the Table below:

Car Type	Test Classification	Test Line	Line Condition	Loading Condition
8-Car Trains (DT-M-T-M-M-T-M-DT)	Type Test	Main line or Depot-Test Track	N/A	1. Empty Load 2. Half Load (50%) 3. Full Load (100%) 4. Any other load if required.

c) The Testing Agency shall clearly distinguish the following two activities in its test programme and report.

Test	Description	Contractual Basis
All-Out Energy Consumption Test	8-Car fully loaded Train; full traction up to maximum service speed followed by full service braking up to standstill.	Clause 7.3.5.2(i)
SEC Validation Test	Validation of SEC in the Trial Section under the operating conditions specified in Clause 4.11.	Clauses 4.11 and 7.3.5.2(iii)

The all-out energy-consumption test shall not automatically be treated as equivalent to the contractual SEC validation test unless specifically accepted in writing.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	24 / 32

17. Specific Energy Consumption

- a) SEC is the maximum energy consumption of the Train per seat per kilometre distance travelled (kWhr/Seat-km) meeting the requirements as mentioned in this Clause. Testing agency shall endeavour to test the Rolling Stock such that the SEC achieved is comparable to the existing international high-speed Trains. The target value for SEC is considered as **0.034 kWhr/Seat-km**.
- b) Testing agency shall consider above given parameters from the Climatic and environmental conditions, Power Supply system, Performance requirements and Passenger capacity and payload along with the following operating conditions for the Train Level Specific Energy Consumption (SEC) the 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) Testing Agency shall submit the detailed methodology of validating the SEC in the Trial section during the design stage.
- d) The testing agency shall measure the required values of energy consumption for a 8-car, fully loaded Train in all out run, (full traction up to max. service speed followed by full service braking up to standstill).
- e) The testing agency shall validate the Specific Energy Consumption (SEC) against the declared, indicating the SEC during design stage as per above mentioned parameters and operating conditions Clause 4.11 in the Trial Section.

18. Test Methodology

- 1) Before commencement of testing, the Testing Agency shall submit a detailed test procedure covering at minimum:
 - a) Test objective and contractual references.
 - b) Test train configuration and loading.
 - c) Trial Section and route profile.
 - d) Test operating sequence.
 - e) Instrumentation arrangement and measurement points.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	25 / 32

- f) Measurement accuracy and calibration.
 - g) Data acquisition and time synchronization.
 - h) Energy measurement boundary.
 - i) Regenerative-energy treatment.
 - j) SEC calculation method.
 - k) Measurement uncertainty and repeatability.
 - l) Test validity criteria.
 - m) Treatment of deviations.
 - n) Proposed number of valid runs.
 - o) Test report format.
- 2) No material changes to the approved measurement boundary, SEC calculation methodology, operating condition, test route, loading basis or treatment of regeneration shall be made without written approval.
 - 3) Test runs shall be carried out on the Trial Section or any other sections on which the Train is to be operated with sufficient number of Trains to ensure that the Train equipment meets the operating conditions. The Testing Agency shall arrange instrumentation (including logistics) and record speed, voltage, current and temperature rise of various equipment, energy consumption, tractive effort and any other relevant parameter.
 - 4) The temperature of the various parts of the electrical equipment shall be recorded during the test as per the standard procedure specified.
 - 5) The Testing Agency shall supervise and carry out the above tests both at his works at the site and shall provide all equipment required for such tests and such special consumable stores as oil, grease etc., for the first filling and for trial runs. Special measuring instruments shall be under the scope of the Testing Agency.
 - 6) During the tests, acceleration, deceleration, speed on straight level track and the energy consumption for a round trip shall be measured. In all cases, 8-Car fully loaded Train shall be tested.

19. Energy Consumption Test

19.1. Test Objective

The aim of this test is to measure and validate the energy consumption of the traction system on the route profile specified in the test specification.

The objective of this test is to measure the energy consumption of the 8-Car fully loaded Train during an all-out run, comprising full traction up to maximum service speed followed by full service braking up to standstill, as specified in the Contract. This test aims to verify the design values under test conditions with the measurements results.

The measured energy consumption and relevant operating parameters shall be recorded and reported for assessment of the train's energy consumption performance.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	26 / 32

19.2. Test Condition

Test condition is according to the route profile specified in the test specification, of which characteristic is defined in Clause 4 of standard IEC 61377.

The characteristics of the route profile shall be recalculated before tests, using the result of torque characteristics described in Clause 7 of standard IEC 61377, instead of the reference torque.

The following minimum shall be recorded:

- a) Train configuration and loading condition;
- b) Test route/track conditions;
- c) Traction supply voltage and current;
- d) Train speed and distance travelled;
- e) Acceleration and deceleration;
- f) Tractive effort;
- g) Energy consumed from the traction supply;
- h) Energy returned to the traction supply during regenerative braking, where applicable;
- and
- i) Other relevant parameters required for evaluation of the test results.

Any deviation from the specified test conditions shall be recorded in the test report and shall be subject to prior approval.

19.3. Test Procedure

- 1) The test for the energy consumption comprises of the Measurement of the following items:
 - a) Specified characteristics and the related operating conditions:
 - Energy consumption versus time.
 - Line voltage versus time.
 - Relevant temperature for energy.
 - Active line power (or active line current) versus time.
 - Motor speed versus time.
 - b) Internal Characteristics (Recommended items).
 - Torque reference versus time.
- 2) The Energy measured shall be recorded to make a clear distinction between energy absorbed from the traction supply and energy returned to the traction supply during regenerative braking.
- 3) The energy consumption should be measured by the measurement of the input power and its integration with time or directly by an energy measurement system. Both the measurement methods should follow the requirements of the relevant standard for energy measurement.
- 4) The Testing Agency shall provide suitable calibrated instrumentation and data-acquisition systems and shall measure and record the parameters necessary for determination of energy consumption.
- 5) The measurement channels shall be appropriately time-synchronized to permit correlation of electrical and train operating parameters.
- 6) The Testing Agency shall provide valid calibration certificates and measurement uncertainty

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	27 / 32

information for the instruments used for the test.

- 7) The test shall be conducted in accordance with the applicable requirements of the Contract and the relevant provisions of IEC/EN 61377 and IEC/EN 61133, as applicable.

19.4. Result Evaluation

The measured energy consumption and relevant operating parameters shall be recorded and reported for the all-out run.

The results shall be assessed against the approved test procedure and applicable contractual/design requirements.

The measured energy consumption and relevant operating parameters shall be recorded and reported for the all-out run. Where sufficient measurement data are available, the corresponding SEC may also be calculated and reported for information. The contractual SEC target/reference value of **0.034 kWh/seat-km** specified in Clause 4.11 shall be assessed as part of the SEC Validation Test specified under clause 7.3.5.2(iii).

20. Specific Energy Consumption (SEC) Validation Test

20.1. Objective

To validate the Specific Energy Consumption (SEC) of the 8-Car High-Speed Train under the specified mainline/Trial Section operating conditions and to verify compliance with the contractual energy consumption requirement.

20.2. Test Conditions:

The SEC validation shall cover the specified round trip operation, including the applicable turnaround condition specified in Clause 4.11. The SEC validation test shall be conducted on the approved Trial Section/Mainline with an 8-Car fully loaded Train in accordance with the operating conditions specified in Clause 4.11 of the Contract.

The following contractual conditions shall be considered:

- Trains will stop at each station.
- 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).
- Train will be required to run 500 meters at each turnaround.
- Passenger loading with all seats occupied i.e., Design Mass under Normal Payload as defined in Table-3 of EN15663.
- Maximum acceleration/braking rate and jerk rate shall remain within limits as per applicable standards and best industry practices.
- 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.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	28 / 32

- g) Auxiliary loads will be considered at full design load and with duty cycle of 100% wherever applicable.
- h) Energy consumption of HVAC shall be considered at the design capacity.
- i) The Testing Agency shall record actual train speed, distance travelled, journey time, station stops, dwell times, traction energy consumption, regenerative energy and other relevant parameters required for SEC determination.
- j) Any deviation from the specified operating conditions shall be recorded in the test report and its effect on the SEC result shall be assessed.

20.3. Test Procedure:

- a) The Testing Agency shall develop the detailed test procedure based on the approved route profile, operating conditions and contractual requirements.
- b) Prior to commencement of testing, the following shall be established and documented:
 - a) Test route and route profile, including gradients, curves and speed restrictions;
 - b) Station locations and scheduled stopping points;
 - c) Intermediate and terminal dwell times;
 - d) Applicable speed profile and maximum permissible speeds;
 - e) Traction supply voltage conditions;
 - f) Train configuration and passenger loading condition;
 - g) Applicable acceleration, braking and jerk limits;
 - h) Regenerative braking conditions and line receptivity, where applicable;
 - i) Auxiliary and HVAC loading conditions; and
 - j) Measurement boundary and methodology for calculation of SEC.
- c) The Testing Agency shall conduct sufficient valid test runs to establish a repeatable and representative SEC result.
- d) The Testing Agency shall record all parameters necessary to demonstrate that the specified operating conditions have been achieved during each valid test run.
- e) For the test run:
 - maximum times to be observed for running the whole distance or various parts thereof;
 For the test route:
 - a) Lengths, gradients and curvature details of the lines.
 - b) Stopping or dwell times.
 - c) Maximum speeds allowable on the various sections.
 - d) An estimate of the service line voltage over the test route.
 - e) The suitability of the line for regenerative braking (if applicable).
 - f) Load conditions.
 - g) The vehicle's load or the hauled load.
 - h) Number of axles or train length.
 - i) Weight multiplication factor to be used to allow for the inertia of the rotating masses, including any trailing vehicles not under test.
 - j) Resistance to motion curve at different speeds for the vehicles, including any trailing vehicles not under test.
 - k) The braking effort curve for the vehicles at various speeds, including any trailing vehicles not under test.
 - l) the maximum acceleration and the maximum variation in acceleration allowable.

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	29 / 32

- m) the maximum braking deceleration allowable.
- n) the driving mode manual or automatic.
- f) The electrical energy consumption (active or reactive) may be deduced by calculation after measurement of line voltage and current values with instruments placed either on the vehicle itself or on a vehicle coupled to it (e.g., a dynamometer car). In addition, the line voltage may be checked by means of a recording voltmeter. The line receptivity for regenerative braking may be monitored.
- g) The electrical consumption measured may depend on certain uncontrolled variables which can be introduced: for example, operating conditions, speed differences and in particular the receptivity of the line where regenerative braking is specified. Following the tests, the Testing Agency may recalculate the predicted values of energy consumption as a result of any changes to the testing conditions.

20.4. Measurement and Data Acquisition

- a) The Testing Agency shall provide suitable calibrated instrumentation and data-acquisition systems for measurement and recording of, as applicable:
 - a) Traction supply voltage;
 - b) Traction current;
 - c) Active power;
 - d) Energy consumed;
 - e) Energy returned during regenerative braking;
 - f) Train speed;
 - g) Distance travelled;
 - h) Acceleration/deceleration;
 - i) Tractive effort;
 - j) Relevant auxiliary/HVAC operating conditions; and
 - k) other parameters necessary for determination and verification of SEC.
- b) All critical measurement channels shall be appropriately time-synchronized.
- c) The Testing Agency shall submit the calibration certificates and measurement uncertainty information for all instruments used for determination of SEC.

20.5. SEC Calculation

- a) The Specific Energy Consumption shall be calculated and reported in kWh/seat-km based on the approved measurement boundary and methodology.
- b) The calculation shall clearly identify:
 - a) Energy quantity considered;
 - b) Distance travelled;
 - c) Number of seats considered; and
 - d) Treatment of regenerative energy.
- c) The SEC shall be calculated as:

$$\text{SEC} = \text{Net Energy Consumption} / (\text{Distance Travelled} \times \text{Number of Seats})$$
- d) The treatment of regenerative energy shall be clearly defined in the approved test procedure and final test report.
- e) The Testing Agency shall report the SEC for each valid test run and the

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	30 / 32

consolidated/validated SEC result.

20.6. Compliance Assessment

- The measured Specific Energy Consumption (SEC) shall be reported in kWh/seat-km and compared against the target/reference value of **0.034 kWh/seat-km** specified in Clause 4.11 of the Contract.
- The final compliance assessment shall be made in accordance with the applicable contractual requirements.

21. An Overview of the contents of the test report

The test report will contain, not exhaustive, the following information.

- Date & period of tests
- Location of tests
- Weather conditions
- Test instruments
- Pictures for Equipment set up
- Numerical or graphical results of each test

22. Test Runs and Validity

- Test runs shall be carried out on the Trial Section or other approved section on which the Train is to be operated.
- The test programme shall include sufficient valid runs to establish reliable results. The exact number of valid runs shall be proposed by the Testing Agency and approved in the test procedure.
- Each run shall be assessed for:
 - Correct train configuration and loading.
 - Required speed and operating profile.
 - Required station stops and dwell times.
 - Acceleration, braking and jerk within approved limits.
 - Traction loading within design limits.
 - Required regenerative-braking condition.
 - Specified auxiliary/HVAC condition.
 - Suitable traction supply conditions.
 - Valid calibration and functioning of instruments.
 - Complete and synchronized data.
- Runs affected by significant deviation or incomplete data shall be identified and technically justified as VALID, INVALID or VALID WITH DEVIATION.

23. Test Report and Deliverables

Stage	Minimum Deliverables
Pre-Test	Technical methodology; detailed test procedure; instrumentation plan; instrument list; calibration certificates; preliminary uncertainty budget; safety documents; test

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	31 / 32
		schedule.	
During Test	Pre-test checklist; test run sheets; instrumentation records; deviation records; preliminary results.		
Post-Test	Raw data; processed data; SEC calculations; uncertainty evaluation; calculation files; draft report; final report; test certificate; supporting records.		

Table 8: Test Report and Deliverables

The final report shall include, at minimum, test conditions, train configuration/loading, instrumentation details, calibration status, route information, run-wise results, energy consumption, SEC calculation, maximum SEC, measurement uncertainty, deviations, comparison with design-stage simulation and contractual compliance assessment.

24. Safety Requirements

- Testing Agency shall comply with all applicable railway, high-speed operation and site safety requirements.
- Temporary instrumentation shall be securely installed and shall not interfere with traction, TCMS, signalling, train protection, braking or passenger safety.
- Testing Agency shall submit the required risk assessment/method statement and coordinate with BEML and the Train Operator/Infrastructure Authority.
- All instrumentation installation/removal activities shall be carried out under approved safety arrangements.

25. Submittals

The Testing Agency/Design Validation Agency shall provide the following as part of technical offer:

- Complete testing procedures for each testing item of train level Specific Energy Consumption (SEC) testing for main line validation of along with technical description, Specification, drawing, duration...etc., details for each test as applicable.
- 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.
- Clause wise compliance against, Test Specification (TS) - Doc no. FPIIC/TD/094 and its Annexures in the following format

Clause No	Response (Complied/Not Complied)	Remarks

Where,

- Complied: "Complied" shall be indicated by the supplier where the supplier is

	Specific Energy Consumption (SEC) Type Test Specification for Mainline Validation	DOC. No.	FPIIC/TD/094
		DATE	19-10-2026
		REV. No.	00
		PAGE NO.	32 / 32

able to comply with the clause.

- ii) Complied with comments" will be considered as fully complied for the clause with no additional commercial impact.

d) Experience details and supporting documents with references for same / similar testing for satisfactory completion as per qualification criteria (section 11) of this document.

e) The Testing Agency shall submit company profile with infrastructure facilities, testing range, test duration...etc, along with technical offer.

26. Annexures

Sl. No.	Description	Document/Drawing No.	Revision No.
1	Compliance Matrix Sheet – Tender Technical Conditions	Annexure-1	--
2	Compliance Matrix Sheet for FPIIC/TD/094	--	--
3	Tentative Layout of Trainset	840-000100-14	14

Table 9: List of Annexures

****The End of Document****