BMRCL 5RS-DM Project
Procurement Technical Specification of Floor Covering, Wheelchair Logo and Joint Sealer

	Name	Date	Signature
Approved By	Nanda Nandan	13.04.2024	
Reviewed By	Dinesh K	13.04.2024	
Prepared By	Purushothaman R	13.04.2024	

REVISION HISTORY:

Rev. No.	Clause No.	Page No.	Changes	Revision Date
Nil	-	-	First Issue	13.04.2024

Table of Contents

1. Introduction

1.1. General

1) This Procurement Technical specification (PTS) specifies the technical requirements of Floor Covering to be supplied for cars under Bangalore Metro Rail Corporation Limited (herein after BMRCL) 5RS-DM project. The Floor Covering shall comply in all respects with BMRCL Employer's Requirements General Specification (ERGS) and Employer's Requirements Technical Specification (ERTS).
2) BEML will carry out all required works and activities as Contractor to the Employer for BMRCL 5RS-DM project, while the subcontractor shall be responsible for all works required in this PTS with regard to Floor Covering and shall be responsible for supporting the BEML activities as contractor for BMRCL 5RS-DM project.
3) The scope of work covers design, development, testing, manufacture and supply of the Floor Covering, the training of Operation and Maintenance personnel of the owner on the Floor Covering.
4) The scope of work includes all items of work which may be required to meet the performance requirements, trouble free and efficient operation of trains and meeting the best international practices even if not specifically mentioned in this PTS.
5) The trains shall initially be operated in 'GoA2' and shall be progressively used in 'GoA4'.

1.2. Trainset Configuration

1.2.1. Train Composition

The rake formation shall generally be as follows:

3 Car unit formation: DMC – TC – MC –

6 Car Train formation: DMC – TC – MC – MC – TC – DMC

where,

DMC	:	Driving Motor Car
TC	:	Trailer Car
MC	:	Motor Car

1.3. Climatic & Environmental Conditions

The car shall operate reliably and safely under the climatic and environmental conditions specified at ERTS clause 2.1. Accordingly, the Floor Covering shall be designed to operate with satisfactory performance under the following conditions as per ERTS clause 2.1.

Description	Limiting Values
Maximum ambient temperature (See note below)	42℃
Minimum temperature	8℃
Humidity	92% saturation during rainy season
Rainfall	Rain occurs generally from May to October. Average annual rainfall is approximately 1065 mm. Maximum rainfall in any 24h period is 178mm.
Atmosphere during hot season	Extremely dusty
Maximum wind speed	125 km/h
SO_2 level in atmosphere	6.7 - 80 micro g/m^3
NO_x level in atmosphere	16 - 80 micro g/m^3
Respiratory Suspended particulate matter in atmosphere (RSPM)	49 -120 micro g/m^3
Total Suspended Particles Matter in atmosphere (TSPM)	111 - 360 micro g/m^3
Altitude	1000m
Conditions in stations	All underground stations will be fully air-conditioned. All ground stations will have air-conditioning for certain designated rooms only
Flood Proofing	The traction sub-systems mounted on the under-frame will be designed to permit propulsion of the train at 10 kmph through water up to a depth of 75mm above rail level. Traction sub-systems shall be made splash proof in accordance with International Standards
Life	The Metro car is designed for min.35 year of life. Accordingly, the subject items & accessories shall also not deteriorate in their performance for 35 years

Note:

(i) The Rolling Stock must be able to operate regardless of the external conditions. They must also be so designed as to avoid abnormal wear due to adverse weather. They can be parked outdoors regardless of the atmospheric conditions.

(ii) The temperature inside of an “inactive’ metro train parked in the sun can easily exceed +60°C.

(iii) In addition to the climatic aspect of the surrounding air, allowance must be made for a variety of products carried in the air such as grease, conducting dust, textile fluff, long fibers, various papers and sulphuric gas.

(iv) The maximum design temperature inside the tunnel is expected to be 46°C under normal as well as congested conditions.

1.4. Vehicle Performance Requirements

The vehicle performance requirements with fully loaded train and tangent track are as per the following table.

Item	All Corridors
Maximum permissive speed (Design) on tangent and level track	90 kmph
Maximum permissive speed in operation on tangent and level track	80 kmph
Commercial speed with minimum 8% coasting (by time), with fully loaded(AW4 condition) train(excluding reverse time in terminal station)	34 kmph
Average Acceleration rate from 0 kmph to 30 kmph for fully loaded (AW4) train on tangent & level track	1.0 m/s^2 ± 5%
Average service deceleration from 80 to 0 km/h.	0.95 m/s^2 ± 5%
Instantaneous full service deceleration;	1.1 m/s^2
Jerk rate	0.7 m/s^3 ± 0.05
Maximumu adhesion limit in tunnel	18 %
Minmum average emergency deceleration	1.3 m/s^2
Annual running distance of one train	150,000 km

2. Definitions and Abbreviations

The following definitions and abbreviations are applicable to the PTS.

2.1. Definitions

- "**Employer**" means Bangalore Metro Rail Corporation Ltd. (BMRCL), its legal successors and assignees.
- "**Subcontractor**" means the Supplier who supplies the required Floor Covering to BEML for BMRCL 5RS-DM project. Subcontractor shall carry out the works in accordance with ERTS and ERGS with regard to Floor Covering.
- "**Contractor**" means the persons or person appointed by the Employer to undertake the execution of the works for BMRCL 5RS-DM project. In order to avoid misunderstanding of the roles of the Contractor in ERTS and ERGS, the term "Contractor" shall be read as "Subcontractor" in

ERTS/ERGS for those ERTS/ERGS clauses referred to in this PTS.

- "**Contract**" means the contract between Subcontractor and BEML in relation to the supply of Floor Covering for BMRCL 5RS-DM project.
- "**Engineer**" means any person nominated or appointed from time to time by the Employer to act as the Engineer for the purposes of the Contract and notified as such in writing to the Contractor.
- "**Engineer's Representative**" means any Assistant of the Employer appointed from time to time by the Employer.
- "**GTC**" means "General Terms and Conditions for Supply of Floor Covering for BMRCL 5RS-DM Project" issued by BEML.
- "**BEML**" means the Contractor to procure the Floor Covering for BMRCL 5RS-DM project cars.
- **"ERGS"** means Employer's requirements General Specification for BMRCL 5RS-DM contract.
- **"ERTS"** means Employer's requirements Technical Specification for BMRCL 5RS-DM contract.
- **"PTS"** means BEML's Procurement Technical Specification.

2.2. Abbreviations

GOA	:	Grade of Automation
UTO	:	Unattended Train Operation
ERGS	:	Employer's Requirements General Specifications
ERTS	:	Employer's Requirements Technical Specifications
FAI	:	First Article Inspection
ISO	:	International Standards Organization
ITP	:	Inspection Test Plan
NCR	:	Non-Conformance Report

3. Precedence of Documents

1) This PTS shall be read in conjunction with ERGS, ERTS and GTC. It is the intent that all subcontractors providing equipment or services to BEML shall comply with the Employer's requirements. When the Employer does not have any specific requirements, the subcontractor shall comply with the requirements of this PTS as appropriate. Subcontractors must comply with the requirements stated herein unless otherwise agreed to in writing by BEML. Any conflict between the Employer's requirements and this

specification shall be brought to BEML's immediate notice for resolution. Notwithstanding conflict resolution, the most restrictive requirement shall apply.

2) This PTS shall in no way relieve the subcontractor from any requirements specified in the ERTS and ERGS. In case of conflict among contract documents, the following order of priority shall govern:

Order of Precedence	Document title
1	BMRCL 5RS-DM ERTS
2	BMRCL 5RS-DM ERGS
3	GTC
4	PTS

3) The complete requirements are those found in the above documents. It shall be the subcontractor's responsibility to ensure that equipment, documentation, and services furnished against this PTS are in full compliance with all the above documents.

4) Also, in the event of any conflict among the requirements of particular parts of the PTS, ERTS and ERGS, the subcontractor shall seek clarification with BEML prior to making a contract. After making a contract, the subcontractor shall comply with BEML's Interpretation for any discrepancies.

4. Qualification Criteria

1) Subcontractor shall be an Original Equipment Manufacturer (OEM) of Floor Covering for Railway Metro Rolling stock having experience in design, manufacturing, testing and commissioning.

2) The subcontractor shall meet the qualification criteria mentioned in ERTS 5.1.2 as follows for Floor Covering. The Proposed type of Floor Covering Manufactured and Supplied by the subcontractor should have been in use and have established their satisfactory performance and reliability on at least three Mass Rapid Transit Systems in commercial / revenue service over a period of three years or more (in each MRTS) either outside the country of origin in three different countries or in MRTS in India. Satisfactory Revenue service performance certificates for a period of 3 years or more from end users / Metro Operators for the above shall be submitted along with the technical offer.

3) Along with the technical offer, the subcontractor shall submit all the required documents for obtaining the vendor approval for Floor Covering as per ERTS 5.1.5 and vendor approval format enclosed at appendices. Selection of Vendor is subject to BMRCL approval.

4) The subcontractor shall submit undertaking to provide the support during Testing & Commissioning, service trials, revenue service and DLP period

either by themselves or through sister company or a partner in India. The subcontractor shall submit detailed proposal in this regard.

5) The subcontractor (OEM) shall provide ISO 9001-2015 / IRIS certification or equivalent international certification along with the technical offer and shall manufacture the products accordingly.
6) The subcontractor shall submit QAP (Quality Assurance Plan), ITP (Inspection Test Plan), company profile with infrastructure facilities, product range etc., along with technical offer
7) The subcontractor shall submit undertaking that technical support shall be provided during design stage, maintenance and repair work.
8) Subcontractor shall submit undertaking that if any repair of floor covering is required then the floor covering material required for the repair work will be provided by the subcontractor for a minimum period of 15 years from the date of last car handed over to BMRCL by BEML**.**
9) Subcontractor shall submit undertaking that in case of any future procurement action by Employer, subcontractor will quote directly to Employer.

5. Standards

The design, testing and manufacturing of the floor covering shall conform to the latest editions of internationally recognized Standards viz., Indian, American, European, Japanese, ISO, etc.

6. Design Criteria

The Floor Covering proposed by the sub-contractor shall comply with the following design criteria.

(i) Flooring shall remain non-slip and not present a hazard to passengers when wet.
(ii) The transition between saloon floor, cab floor and gangway vestibule between cars shall be smooth and free from steps and unduly steep gradients, which would impede the flow of passengers between cars.
(iii) The non-skid floor structure shall be floating floor type comprising of glass wool insulation, stopper, rubber cushion and phenolic composite floor board and floor covering to achieve low noise level inside the cars and less weight. The phenolic composite floor board shall be with Reinforced Rigid Cell Foam Core or equivalent technology.
(iv) The floor installation shall be continuous over the complete area of the saloon without floor traps, gaps, or holes. Either coving sections shall be provided between all floor and vertical sections or the floor coving should extend up into the side wall lining. At all door openings, the floor shall make a weather-tight connection. No opening in the subfloor is permitted.
(v) Floor covering shall have a design life of not less than 20 years.
(vi) It shall be feasible to replace all, or sections of the floor covering and coving during the life of the train if necessary. The floor design shall allow

the floor covering to be removed without damage to the floor sub-structure.

(vii) The floor board and its mounting structure, shall be designed to withstand any loads that may be applied over 35 years in normal operation of metro train. Floor shall resist to a load of 1.5 x AW4 and to a stamping effort of 35 daN on a surface of 25 mm².

(viii) Floor covering material shall be laid with the minimum number of joints. Floor covering shall be so arranged to ensure that the bend radius required at the plinth base does not coincide with a joint in the covering that will affect the visual continuity between the plinth and floor. Where joints occur, they shall not coincide with those of the floor boards. Joints shall be sealed against the ingress of dirt, moisture and water. Any sealant used shall be coloured to match the background colour of the floor covering.

(ix) The train shall be designed to prevent fire propagation through the use of fire barriers in the floor, and in walls at the sides and ends and fire resistant equipment housings.
Flammable materials shall be well contained and protected. The vehicle floor shall provide a fire barrier of minutes duration tested in accordance with EN45545 Part 1 to 7(Hazard level HL3) latest editions or better equivalent standard. There shall be no hatches in the floor of passenger areas. Floor hatches in the driving console shall be avoided.
The design and the materials used in the cars shall conform to fire safety requirements of EN45545 Part 1 to 7 (Hazard level HL3) latest editions or better international standards.

(x) The sub-floor shall be insulated for anti-drumming and noise suppression.

(xi) Floor covering shall show no significant signs of wear. Test results for abrasion shall be submitted.

(xii) Flooring shall remain colour fast as specified in ISO:105-B02 for the following minimum conditions specified below. Flooring with minimum colour fastness according to EN ISO 4892-2 or equivalent international standards shall be implemented for resistant to stain, the applicable standard is ISO-26987.

- Light
- Shampoo
- Dry cleaning
- Water spotting
- Acid spotting
- Alkali spotting
- Rubbing

(xiii) Flooring shall be easily cleaned with the minimum of effort using readily available cleaning agents meeting the requirements.

(xiv) Flooring shall not require glazing, polishing or any other post-production refinishing in short intervals to maintain its finish; the cleaning procedure shall be submitted.

(xv) Flooring shall suit regular cleaning schedules and during service and shall not appear dirty between scheduled cleaning.

(xvi) The flooring shall not be damaged or discoloured by materials usually encountered in depot or service use.

7. Technical Requirements

7.1. General

7.1.1. The subcontractor shall meet the floor covering requirements as per Design Criteria at Section-6 above, as a minimum.

7.1.2. The subcontractor shall support in all aspects in obtaining customer clearance of the proto type Floor Covering after successful completion of tests.

7.1.3. The floor covering and the joint sealer supplied shall comply with the environmental conditions and design criteria specified at clause 1.3 and 6 and the following technical requirements.

7.2. Standards

7.2.1. The floor covering supplied shall be in accordance with the requirements of the standards specified in this PTS. The subcontractor may propose an alternative equivalent international standard during the design stage. The acceptance of alternative standard will however be subject to review by BEML / BMRCL. When a Standard is referred to, it shall be assumed that the revision that is current during the design finalization shall be applicable, unless otherwise stated.

7.2.2. Where no standard is identifiable, the subcontractor shall make a proposal, based on the best international practice, which shall be subject to review by BEML / BMRCL.

7.2.3. During the design phase, the subcontractor shall submit a consolidated list of all the standards that he intends to use for the design, manufacturing and testing and other phases of the contract, for review of BEML / BMRCL.

7.3. Proven Design (ERTS Clause 5.1)

7.3.1. The proposed Floor Covering by the sub-contractor against this PTS shall satisfy the “Proven Design” clause 5.1.2 of ERTS. The proposed Floor Covering shall have been in use and have established its satisfactory performance and reliability on at least three mass rapid transit systems in revenue service over a period of three years or more (in each MRTS) either outside the country of origin in three different countries or in MRTS in India.

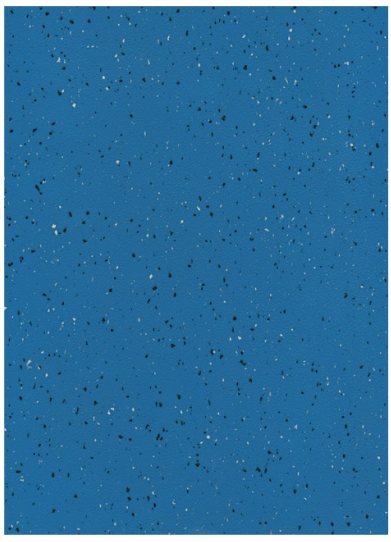
7.3.2. The subcontractor shall manufacture and supply the Floor Covering only from such manufacturing units that have supplied the Floor Covering that fulfill the proven design requirements as above. (Refer ERTS clause 5.1.2).

7.3.3. The subcontractor shall be fully responsible, for the suitability, adequacy, integrity, durability and practicality of the proposed Floor Covering. The subcontractor shall

warrant that the subcontractor's Proposals meets the Employer's Requirements and is fit for the purpose thereof. Where there is any inadequacy, insufficiency, impracticality or unsuitability in or of the Employer's Requirements or any part thereof, the subcontractor's Proposal shall take into account, address or rectify such inadequacy, insufficiency, impracticality or unsuitability at subcontractor's own cost;

7.3.4. The subcontractor shall warrant that the Works have been or will be designed, manufactured, installed and otherwise constructed and to the highest standards available using proven up-to-date good practice.

7.4. Technical Characteristics of Floor Covering

Sl. No.	Technical Characteristic	Test Method	Requirement
1	Material	ISO 17257	Rubber, Homogenous with same composition, color and speckles throughout the thickness. Shall be free of PVC, Halogens, asbestos & Phthalate. Identification of rubber by ISO 17257.
2	Visual Inspection	-	Free from visual defects (pinholes, blisters, porosity, blow holes, tear, wrinkles, lumps and other visual defects)
3	Colour and speckles	As per approved sample.	Reference colour and speckle shown below.  RAL 5007

Sl. No.	Technical Characteristic	Test Method	Requirement
4	Surface	As per approved sample.	Embossed
5	Length	-	21000 mm, +50, -0
6	Width	-	Middle Roll = 1200 mm +10, -0
			Side Roll = 800 mm, +10, -0
7	Thickness	EN ISO 24346	3 ± 0.15 mm
8	Weight	ISO 23997	≤ 4.7 kg/m^2
9	Hardness	ISO 7619	83 ~ 93 Shore A
10	Residual indentation	ISO 24343-1	≤ 0.20 mm
11	Abrasion resistance	ISO 4649 (Method A - 5N)	≤ 200 mm^3
12	Dimensional stability	EN ISO 23999	±0.4 %
13	Slip resistance	EN 16165 Annex B	R9
14	Resistance to cigarette burns	EN 1399	Method A ≥ 4 Method B ≥ 3
15	Flexibility	ISO 24344 Method A. (Mandrel dia. 20 mm)	No fissuring
16	Tensile strength	ISO 37, Type A	≥ 6 MPa
17	Tensile elongation	ISO 37, Type A	≥ 150%
18	Tear strength	ISO 34	≥ 35 N/mm
19	Colour fastness to artificial light	ISO 105-B02 Method 3	≥ 6 on the blue scale, ≥ 3 on grey scale
20	Noise Attenuation	ISO 10140-3	Actual Measured
21	Effect of chemicals (minimum 8 substances)	ISO 26987	Resistant
22	Static electrical propensity	EN 1815	≤ 2 KV, antistatic
23	Fire Safety	EN 45545-2, R10	HL3

Sl. No.	Technical Characteristic	Test Method	Requirement
24	Thermal Conductivity	EN 12667 / EN 12664	Actual Measured
25	Gross Heat of Combustion	ISO 1716	Actual Measured
26	Heat Release Rate	ISO 5660-1	Actual Measured

The subcontractor shall submit the technical description and technical data sheet of the floor covering meeting the above Table.

7.5. Floor Covering Joint Sealer

7.5.1. A proven floor cover joint Sealer, suitable for the sub-contractor's floor covering, shall be proposed by the sub-contractor. The colour of the sealer shall match with floor covering. Supporting documents for provenness of the proposed sealer, the project references where the proposed sealer has been successfully used and the technical data sheet of the joint sealer shall be submitted along with the technical offer.

7.5.2. The proposed sealer shall be suitable for application in Indian climatic conditions. The sub-contractor shall confirm its suitability for Indian climatic conditions and submit the test report along with the technical offer.

7.6. Floor Covering Adhesive

7.6.1. The adhesive proposed by the contractor for installation of floor covering will be Adesilex G12 or Adesilex G19FR of M/s. Mapei / Ceresit K 188 of M/s. Henkel / D-5250NF(SP) of M/s. Daehung Chemical Co., Ltd.

7.7. Floor Covering Removal

7.7.1. If any floor covering repair work to be carried out, the floor covering removal shall not damage the floor board. The subcontractor shall submit the detailed floor covering and adhesive removal procedure along with the technical offer.

7.8. Weight

7.8.1. To minimise energy costs, great importance will be placed on achieving practical designs of minimum car weight whilst meeting specified structural and performance requirements. **Accordingly, the weight of the Floor Covering shall be kept to a minimum. The total weight of Floor Covering shall not exceed by more than +4% of the estimate weights.**

7.8.2. The subcontractor shall submit estimated weight for Floor Covering along with the technical offer.

7.9. Workmanship and Finish

7.9.1. The subcontractor shall ensure that after completion of installation of the floor

covering by the contractor the floor covering shall be free from pinholes, blisters, porosity, blow holes, tear, wrinkles, lumps and other visual defects that would impair usability of the floor covering. The floor covering bottom surface shall be suitable for adhesive bonding.

7.10. Quality Assurance Program

7.10.1. **General**

The subcontractor shall hold ISO 9001-2015/ IRIS certification and shall manufacture the product accordingly. The subcontractor shall submit a copy of ISO 9001 / IRIS certification along with the offer. The subcontractor shall monitor and control the Quality systems as per ISO 9001 / IRIS guidelines. BEML and/or BMRCL's representative may periodically conduct compliance audits of the Subcontractor's Quality management system.

7.10.2. **Quality assurance plan**

The subcontractor shall submit Quality Assurance Plan (QAP) based on ISO 9001-2015 / IRIS guidelines during the preliminary design phase.

8. Scope of Supply

8.1. General

The subcontractor shall be responsible for the scope of supply of the Floor covering, logo and joint sealer along with the tools required for the proper installation of the floor covering, as a minimum., which shall comprise, unless specifically excluded,

- Design, manufacture, testing, delivery and rectification of defects.
- Supply of tools, required for the 15 years comprehensive maintenance of cars in sufficient quantities.
- Documentation and support material associated with the operation and maintenance of the floor covering.
- Technical support and rectifying the defects and deficiencies as communicated by the BMRCL / BEML.
- Training of engineers, operations and maintenance staff including providing the training materials, training kits and demonstration.
- operations and maintenance manuals for review and acceptance by the BEML/BMRCL.

Note: If any special tools / equipment are required for installation of Floor Covering, the subcontractor shall supply 3 nos. of such equipment at subcontractor own cost.

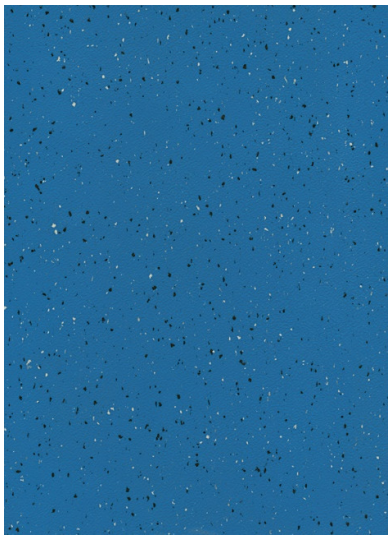
8.2. Scope of Work

Sl. No.	Scope of Work	
	Sub-Contractor	**BEML**
1	Supply of following, • Floor Covering. • Wheelchair logo • Joint Sealer.	Receiving and storing of floor covering, wheelchair logo and joint sealer
2	• Sub-contractor to provide installation training for 4 cars. • Sub-contractor to submit the floor cover installation procedure.	• Floor covering installation will be done by BEML.
3	• Sub-contractor to provide Operation and Maintenance training to the satisfaction of BEML / BMRCL staff. • Sub-contractor to submit the Operation and Maintenance manual for the floor covering.	• BEML has to carry out the maintenance of the rolling stock for period of 15 years as Defect Liability and Maintenance Period (DLMP). The DLMP shall start after commencement of revenue service of the first train and shall end 15 years after the start of revenue service of last train. There are 53 trainsets.
4	• Subcontractor to provide the clause-by-clause compliance during the pre-final design stage.	• BEML has to submit the design documents conforming to the ERTS and ERGS applicable for the floor covering. • As per the contract the design process is made into three stages. (i) Preliminary Design. (ii) Pre-final Design. (iii) Final Design. As per the contract to BEML by BMRCL, during the pre-final design stage, BEML need to submit clause by clause compliance of the applicable clause of the ERGS and ERTS from the OEM of the sub-system. The applicable ERGS and ERTS clauses for the floor covering are covered in this PTS. However, any additional requirements by BMRCL will be informed to the subcontractor and subcontractor to comply the same without any additional cost implication after the placement of the purchase order.

8.3. Floor Covering, Logo and Joint Sealer

8.3.1. Floor Covering Colour

The floor covering colour is shown below.

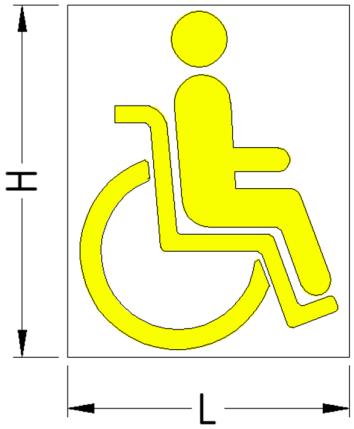


BEML / BMRCL approval for the floor covering color, surface pattern and speckles is mandatory. Any changes to these parameters as required by BEML / BMRCL shall be adhered to by the sub-contractor without any additional cost implication.

8.3.2. Logo

The subcontractor shall supply wheelchair logo as shown in the below image.

Wheelchair Logo, Size (L) 320mm x (H) 400 mm. The wheelchair with human logo colour to be yellow and other area colour to be same as floor covering colour.



8.4. Tools

The supplier shall supply three complete sets of tools required for installation of the floor cover, along with the first supplies of the floor cover at subcontractor cost. The list of tools shall be submitted along with the technical offer.

8.5. Supply for Mock-up

BEML has to supply to BMRCL, a full scale, half-car-length engineering mock-up of DMC car. Accordingly, the subcontractor shall supply the f**loor covering, wheelchair logo, joint sealer** for Mock-up activity of BEML. The floor covering, wheelchair logo and joint sealer shall be the actual material conforming to technical characteristics specified in this PTS.

The Subcontractor shall carry out any minor modification as suggested by BMRCL during mockup activity without any cost implication.

8.6. Floor Covering Cleaning

Due to heavy dusty environmental conditions, lot of abrasive dust gets accumulated on the floor within short time and gets stick to floor covering. Floor covering shall be easily cleaned with the minimum of effort using readily available cleaning agents meeting the requirements.

Flooring shall not require glazing, polishing or any other post-production refinishing in short intervals to maintain its finish; the cleaning procedure shall be submitted.

Flooring shall suit regular cleaning schedules and during service and shall not appear dirty between scheduled cleaning.

The flooring shall not be damaged or discoloured by materials usually encountered in depot or service use.

Sub-contractor shall propose suitable cleaning machines and liquid and demonstrate the cleaning procedure to the satisfaction of BEML/BMRCL and without any damage to flooring on long term basis.

The technical specifications of the cleaning machine and the cleaning solution shall be submitted along with the technical offer.

8.7. Training

The sub-contractor shall impart training to BEML personnel on proper installation of the floor cover in the first 3 cars.

8.8. Submission of Samples

The sub-contractor shall submit 5 no. of A4 size samples for colour, speckles and embossed surface reference meeting the technical requirements of this PTS, for BEML / BMRCL approval. The approved colour, speckles and embossed surface shall be followed for the supplies by the subcontractor The approved sample will be representative of the floor covering to be supplied after award of contract.

8.9. Packing

The Supplier shall pack properly in order that in transit and after supply of the floor covering to the place allocated by BEML, no damage to the floor covering shall occur. In the packing details the shelf life and of the floor covering and joint sealer to be clearly indicated

8.10. Design Warranty

The sub-contractor shall warranty the Floor covering for a minimum of 20 years of Design life.

8.11. PTS Compliance

The subcontractor shall offer a valid and fully compliant proposal for the Floor Covering as detailed in this PTS. The subcontractor shall submit compliance report for all the clauses of PTS with regard to Floor Covering.

The subcontractor shall submit, along with the technical offer, the Clause-by-Clause Compliance for the PTS as follows:

- Complied: "Complied" shall be indicated by the subcontractor where the subcontractor is able to comply with the clause.
- Noted: Where a clause merely provides information

Offers with Non-compliance and deviations to any of the PTS clauses with regard to Floor Covering, are liable for rejection.

9. Testing and commissioning

9.1. General

- The subcontractor shall submit Inspection and Testing Plan according to the technical requirements.
- Individual cars and complete trains will be type and routine tested in accordance with IEC 61133.
- The Floor Covering shall be type- and routine-tested in accordance with detailed respective test procedures to be drawn up by subcontractor and agreed by BEML/BMRCL which shall take into account the requirements of

respective international standards and this PTS and test programme drawn up by the subcontractor to demonstrate that the floor covering meet the specified technical requirements. The test plan shall be approved by BEML/BMRCL.

- All such tests shall be carried out at the subcontractor's cost, wherever performed, in the presence of and to the satisfaction of BEML/BMRCL, who reserves the right to witness any or all of the tests.
- Wherever any equipment, system or sub-system is not specifically covered by an internationally recognised specification or test procedure, or where the type and routine tests prescribed by IEC or other international standard do not adequately cover the requirement, tests which are acceptable both to the subcontractor and to BEML/BMRCL, shall be devised.
- Type tests may be waived if these were carried out earlier on floor covering of identical design, witnessed by a reputed organisation, and the service performance of such equipment was found to be reliable. The subcontractor shall submit a proposal in this regard to BEML/BMRCL for review. The waiver of Type Test is entirely at the discretion of BEML/BMRCL.
- Change of manufacturing place may require re-type test.
- BEML /BMRCL reserves the right to witness any or all of the tests, and to require submission of any or all test specifications and reports. BEML/BMRCL reserves the right to reasonably call for additional tests as are considered necessary. BEML/BMRCL may, if considered necessary, call for conducting optional tests as per relevant standards without any additional cost to BEML/BMRCL. In case of repetition of tests, as decided by BEML/BMRCL, entire cost including that of BEML/BMRCL representative(s) shall be borne by the subcontractor.
- The results of all tests shall be submitted to BEML/BMRCL, who will record his conclusions as to whether or not the floor covering being tested has passed satisfactorily.
- The Subcontractor shall be responsible for undertaking and passing all necessary testing activities for Floor Covering.
- **All tests essential for Safety Certification and technical clearance of Metro systems by CMRS shall be carried out for Floor Covering by the subcontractor and test reports as per the format insisted by CMRS shall be submitted.**
- Prior to the start of testing, BEML & BMRCL shall have all approved test plans and procedures for the test and all relevant prerequisite testing shall have been completed by subcontractor.
- All test & inspection specifications and reports including all repair activities

and check-lists shall be submitted to and approved by BEML/BMRCL.

9.2. Test Planning & Procedure

The subcontractor shall submit detailed test procedures for each test for the review of BEML/BMRCL. The test procedure shall include the following information:

(i) Relevant specification applicable to each of the test.

(ii) Type, routine and special test to be carried out.

(iii) Description of the test, scheduled date, and locations of the test.

(iv) Test parameters to be measured.

(v) Constraints to be applied during the test.

(vi) Defined pass / fail criteria

(vii) Facilities, equipment, and test and measurement tools.

Test procedures shall be amended, as required throughout the duration of the Contract, to reflect changes in system design or the identification of additional testing requirements.

BEML / BMRCL shall have the access to monitor all tests and have access to all test records.

For each of the identified tests, the subcontractor shall produce a test report, in three copies, and in an approved format, within an agreed period following the test, for acceptance by the BEML / BMRCL. The subcontractor shall sign all reports of Tests. BEML / BMRCL reserves the right to reasonably call for additional tests if considered necessary.

9.3. Test Reports

1) All test reports for Floor Covering shall be prepared by the subcontractor and they shall be submitted to BEML/BMRCL. The Test reports shall include, but not be limited to, the followings:
   (a) The reference to the corresponding Test Procedure
   (b) The date of the test was executed
   (c) Description of any test conditions, input data, or tester actions
   (d) Details of test instruments used (Make, Model) along with calibration certificate.
   (e) The test results for each test including a Passed / Failed indication
   (f) Identification of the Subcontractor's test engineer
   (g) Action and the result of the action for comments by the Engineer
   (h) Copies of any deficiency reports generated as a result of the execution of the correction.
   (i) Configuration data that fully describes the hardware and software that was tested, including software version and identifiers for every

software module

2) Written reports of all tests performed shall be submitted within 2 weeks of test performance to BEML/BMRCL for acceptance.
3) Records of all inspection and testing shall be kept completely by the Subcontractor and available to the Engineer during the performance of this subcontract and for a minimum of ten (10) years after expiration of the warranty period.
4) All test reports shall be certified and signed by an approved member of the Subcontractor's staff. The subcontractor shall prepare and submit a separate deficiency report, if there is a problem during tests

9.4. Equipment Type Test & Routine Test

The Floor Covering shall be type and routine tested in accordance with relevant standard and specifications at ISO 17025 accredited laboratory (subcontractor own laboratory or external laboratory) at subcontractor own cost.

The subcontractor shall carryout the following type tests and routine tests as a minimum and shall submit the reports.

Sl. No.	Kind of Test	Test Method	Type Test	Routine Test
1	Material	ISO 17257	✓	✓
2	Visual Inspection	-	✓	✓
3	Colour and speckle	As per approved sample	✓	✓
4	Embossed Surface	As per approved sample	✓	✓
5	Length	-	✓	✓
6	Width	-	✓	✓
7	Thickness	EN ISO 24346	✓	✓
8	Weight	ISO 23997	✓	✓
9	Hardness	ISO 7619	✓	✓
10	Residual indentation	ISO 24343-1	✓	✓
11	Abrasion resistance	ISO 4649 (Method A - 5N)	✓	✓
12	Dimensional stability	EN ISO 23999	✓	✓
13	Slip resistance	DIN 51130	✓	✓
14	Resistance to cigarette burns	EN 1399	✓	×
15	Flexibility	ISO 24344 Method A.	✓	✓

Sl. No.	Kind of Test	Test Method	Type Test	Routine Test
		(Mandrel dia. 20 mm)		
16	Tensile strength	ISO 37, Type A	✓	✓
17	Tensile elongation	ISO 37, Type A	✓	✓
18	Tear strength	ISO 34	✓	✓
19	Colour fastness to artificial light	ISO 105-B02 Method 3	✓	✓
20	Effect of chemicals	ISO 26987	✓	✓
21	Static electrical propensity	EN 1815	✓	×
22	Noise Attenuation	ISO 10140-3	✓	×
23	Fire Safety	EN 45545-2, R10 for HL-3	✓	×
24	Heat Release Rate	ISO 5660-1	✓	×
25	Gross Heat of Combustion	ISO 1716	✓	×
26	Thermal Conductivity	EN 12667 / EN 12664	✓	×

✓ – to be carried out

× - not required

The type test procedure document shall be prepared by the sub-contractor and BEML / BMRCL approval shall be obtained before conducting the tests.

The routine test reports shall be submitted along with every batch of supplies.

9.5. First Article Inspection (FAI)

The subcontractor shall offer the Floor Covering for First Article Inspection by BEML/ BMRCL in accordance with the Engineer approved FAI plan prior to serial production in order to confirm that the item produced fully complies with the technical specifications, System design and manufacturing process.

The Subcontractor shall ensure that the produced Floor Covering is compliant to all requirements prior to inviting for testing and FAI. The pre-test result prior to official testing/FAI shall be submitted with the invitation letter to request Engineer's witness.

At the FAI, the subcontractor shall make available all pertinent design and manufacturing process documentation, test records, material certifications, etc.

During FAI, if any inspections or tests indicate that specific hardware or

documentation does not meet the specified requirements, the appropriate items shall be repaired, replaced, upgraded, or added by the Subcontractor at their own cost, as necessary to correct the noted deficiencies. After correction of deficiency, all tests necessary to verify the effectiveness of the corrective action shall be repeated.

If FAI has to be repeated due to non-compliances/ deficiencies noticed, the cost towards the same and the cost towards BEML/BMRCL visit to subcontractor's place for witness of re-FAI shall be to subcontractor's responsibility.

Upon acceptance of the FAI by End User, the subcontractor is then free to proceed to manufacture all pertinent hardware. The hardware must meet or exceed the quality standards set at the FAI, and must incorporate any comments made by End User at the FAI.

Subcontractor shall note that the Engineer FAI clearance will not relieve the subcontractor's responsibility towards design, production, quality, reliability, availability, maintainability and safety of the systems and sub-systems during the revenue service.

9.6. Installation and Commissioning

After the Floor Coverings are delivered, the subcontractor shall depute his Engineer for the installation and commissioning training of the Floor Covering on the First 3 cars.

Modifications/ corrections, if any, shall be carried out by the subcontractor at his own cost.

10. Warranty

As per GTC (General Terms and Conditions).

11. Appendices

1. Vendor Approval form.
2. Technical offer Submittals Check List.
3. Wheelchair Logo Drawing (507-16129).

12. Submittals with Technical Offer

The Subcontractor shall provide as a minimum, the following along with the technical offer.

1. Complete Technical Offer for floor covering, wheelchair logo, joint sealer including technical description.
2. Technical data sheet of floor covering, logo, joint sealer, installation tools and depot floor cleaning machines and cleaning liquids.
3. Fire safety test report copies of earlier similar projects.
4. Installation and maintenance guide for the floor cover.

5. Supporting documents for Qualification Criteria compliance. (Clause 4)
6. Vendor approval Documents including QAP, ITP, company profile with infrastructure facilities, product range etc., (Clause 4)
7. Clause-wise compliance report against the PTS.
8. Dully filled vendor credential form along with supporting documents.
9. Submittals check-list.

CONTRACTOR'S LETTER HEADER

Request for Vendor Approval

We hereby request for Notice of No Objection from the Project Manager (GC) for the selection of vendor/sub-contractor as described below:

Date:	DD-MMM-YYYY			
Customer:	Bangalore Metro Rail Corporation Limited (BMRCL)			
Contract:	5RS-DM			
Product/Item name for which approval is required:				
System ☐	Subsystem ☐	Equipment ☐	Service ☐	Others ☐
Proposed vendor name:				
Vendor's contact data:	Postal address :			
	Contact person name:			
	E-mail address:			
	Telephone:			
	Mobile:			
	Fax:			
	Company website:			
Company Profile (Brief introductory description, **business areas**)				
Manufacturing Plant for proposed product/item				
Detailed Product Information	Please see Annex 1			
Manufacturing Supply Records	Please see Annex 2			
Commitment Declaration	Please see Annex 3			

Vendor's Production capacities and facilities with their location	
Organisation structure for this product/item	
Certification to international standards ISO, IRIS, OHSA...etc	
Time limit of the project	
Reason that motivates the proposal	
National production or imported	
Is Product/item belongs to table-1C/1D of ERGS ?	*(if Yes, provide compliances to ERGS 1.3)*
Proposed percentage of local content	
Energy Efficiency	

According to ERGS clause 1.3 and ERTS clause 5.1.2, 5.1.3, 5.1.4 and 5.1.5 BEML hereby submit the information given in the above table for Project Manager's review and Approval.

Yours Sincerely,

Mr. ----

Project Manager

BEML

Annex 1

1. **Detailed description of the product.**

2. **List of detailed product (components) information:**

S.N.	Product	Type	Name of OEM	Address of OEM	Additional information
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

Annex 2

The product shall be a state of the art and of proven design and meet the following:

- Manufacturing and supply of equipment /sets / components shall have been in use and have established their satisfactory performance and reliability on at least three mass rapid transit systems in commercial / revenue service over a period of three years or more (in each MRTS) either outside the country of origin in three different countries **(FORMAT-A)** or in MRTS in India **(FORMAT-B)**.
- Manufacturing and supply of equipment /sets / components used in existing Rolling Stock in MRTS in India do not get automatically qualified for use unless specifically approved by the Project Manager for this project.
- If required by the Project Manager, certificate of satisfactory performance for a period of three years or more from the Metro operators. Where similar sub-systems of a different rating are already proven in service as per the above criteria then the design shall be based on such sub-systems.
- The number of years in commercial / revenue service and operation for the above requirements shall be calculated as on the contracted Key Date No. 3.1 corresponding to 'Pre-Final Design Completion.

In case the Contractor proposes to use sub-system(s) that do not fulfil all criteria described in ERTS 5.1.2, then the Contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered sub-system(s) for review of the Project Manager.

FORMAT-A :

Sl. No.	Manufacturing Plant location	Type of eq.	Year of Supply	Qty. per Trainset	Cars per Trainset	No. of Trainsets	Qty of cars supplied	Years in Revenue Service	Rolling Stock Manufacturer	Country Of Supply	End user / Metro Line	Country/ City

FORMAT-B :

Sl. No.	Manufacturing Plant location	Type of eq.	Year of Supply	Qty. per Trainset	Cars per Trainset	No. of Trainsets	Qty of cars supplied	Years in Revenue Service	Rolling Stock Manufacturer	Country Of Supply	End user / Metro Line	Country/ City

[VENDOR'S LETTER HEADER]

Annex 3

Vendor's Declaration

To whomsoever it may concern:

We hereby declare that we, [Name of the Company] will supply [Product Name] to BEML for Contract No. 5 RS-DM made between Bangalore Metro Rail Corporation Ltd. (BMRCL) and BEML.

We hereby further declare that we shall supply requisite quantity of spares indicated in the Contract, and if additional procurement of spares is required by BMRCL after the expiry of Contract Period, we shall make direct quotation of such spares to the BMRCL. Such quotation shall supersede any contract which we have with M/s BEML Limited, whether express or implied.

Signature: _____
Name:
Designation:
Company:
Stamp/seal

1.2. Localisation

Maximum number of 6-car trainsets that can be manufactured in the off-shore factory outside India is 13 trainset of 6-car each i.e., 78 cars. Balance cars shall be manufactured in India. For this, an essential condition for complying with the bid is that the Contractor shall either establish independent manufacturing facility in India or partner or associate with a suitable Indian reputed manufacturer for local manufacturing of coaches in India.

In case local manufacture is undertaken in the facilities of the local partner, Quality control (total) and testing at Works shall be the responsibility of the member/s of consortium based on whose credentials the bidder has qualified for this bid. The bidder shall submit detailed proposal indicating details of the Indian Partner (if any), the place of manufacture in India, Work schedule etc in the bid. However, if not finalized at Pre-bid stage, the Contractor shall submit all these details within 06 (six) months of the Effective Date for approval by the Employer.

Total number of coaches, trainsets units (including configuration) required to be supplied along with Key Dates for delivery & commissioning are indicated in the 'Attachment of Appendix LB-1 to the Letter of Bid'.

1.3. In order to facilitate ease in maintenance and easy availability of spares, BMRCL is keen in standardisation and expects Contractor to make efforts to source maximum number of equipment and materials from India.

The items given in Table 1C of Employer's Requirements-General Specifications shall be indigenized and sourced from India to meet the required performance requirements and quality standards.

Contractor and the selected and approved OEMs shall either choose their partner in India or open a wholly owned subsidiary in India for manufacture of all such items that are listed in Table 1C. The Contractor as well as the OEMs (as the case may be) shall arrange granting of unqualified licenses to their chosen Indian partners to manufacture and sell such indigenised items for other than 5RS-DM Contract requirements also. The Bidder shall certify in its Bid that the 'Local Content' (LC) shall meet the requirement for 'Class-II Local Supplier' as defined in the Order No. P-45021/2/2017-PP (BE-II) of Ministry of Commerce and Industry, Department for Promotion of Industry and Internal Trade, Government of India, dated 16th September 2020 as amended up to date of Bid submission for the items listed in Table1C.

BMRCL also expects that efforts will be made by the Contractor to indigenise items given in Table 1D.

During vendor approval stage, the Contractor shall also submit a commitment from the approved vendors that in case of any future procurement action by BMRCL, they shall quote for the procurement directly to BMRCL.

Contractor shall submit comprehensive proposal indicating details of the Indian Partner(s)/vendor(s), the place of manufacture in India, work schedule etc. for the above identified items for indigenization within 6 (six) months of the Effective Date for approval by the Employer. An approved comprehensive proposal for indigenisation of items indicated in 'Table–1C' shall be a pre-requisite for finalisation of Final Design. Maintaining quality standards, ensuring performance requirements and timely delivery shall be the sole responsibility of the Contractor. Contractor shall ensure that

indigenisation content in the train sets is progressively increased. BMRCL expects that for all 318 cars (equivalent items for 53 trainsets of 6-car each), the items given in Table 1C of Employer's Requirements-General Specifications shall be sourced from India.

In case of any deviation on above, the Employer at his sole discretion on representation by the Contractor giving detailed reasons for not achieving indigenisation as per above may accord approval for waiver subject to the condition that in case of non or partial accomplishment of indigenisation of any item(s) listed in Table 1C (except Consumables) for specified number of cars noted above, the Contractor shall supply 20% of shortfall items (non-indigenised) as spares free of cost (including taxes and duties) to BMRCL. For consumables the Contractor shall remit cost of equivalent spares to BMRCL.

Table 1C: Mandatory items for Localisation

Sl. No.	Description of Items
1.	Current Collection Device (CCD)
2.	Auxiliary Power supply
3.	Battery Box
4.	Ni-Cd Battery
5.	Heating, Ventilation and Air Conditioner (HVAC)
6.	Driver Desk Panel (FRP)
7.	Luminaries
8.	LED Head Light & Saloon Light
9.	All types of Glasses (i.e., glasses of Door, Window & Windshield)
10.	Axle Box with Earth return brush
11.	Gear Drive
12.	Bogie Frame
13.	Air Duct
14.	Stainless Steel/ FRP Passenger Seats
15.	Axle Bearing
16.	Axle Brake System
17.	Pneumatic Piping - Stainless steel
18.	Air Reservoir for Secondary Suspension
19.	FRP Panel
20.	Semi-permanent couplers/ Electric Coupler
21.	Stainless Steel sheets
22.	Wheel Flange Lubricator

Table 1D: Recommended items for further Localisation

Sl. No.	Description of Items
1.	Floor cover
2.	Floor Board
3.	Dampers
4.	Brake Electronics

5.	Bearings (other than Axle Bearings)
6.	Wipers
7.	Secondary springs
8.	PCBs used in different equipment.
9.	Public Address (P/A) / Public Information System (PIS)
10.	CCTV

5. VEHICLE DESIGN AND ARCHITECTURE

5.1 Proven Design

5.1.1 The Contractor shall develop the design based on this specification and on sound proven and reliable engineering practices. The broad design details shall be submitted with technical data in the technical bid. Detailed calculations shall be submitted to the Project Manager during the design process stage for review and approval.

5.1.2 Sub-systems other than propulsion system

The Rolling Stock including Carbody, bogies, brake system components (valves etc.) all subsystems, equipment's and major components etc. (hereinafter referred as 'sub-systems') shall be state-of-art and of proven design. Proposed sub-systems shall have been in use and have established their satisfactory performance and reliability on at least three mass rapid transit systems in commercial / revenue service over a period of three years or more (in each MRTS) either outside the country of origin in three different countries or in MRTS in India. Sub-systems/components used in existing Rolling Stock in MRTS in India do not get automatically qualified for use unless specifically approved by the Project Manager for this project. If required by the Project Manager, Contractor shall provide certificate of satisfactory performance for a period of three years or more from the Metro operators. Where similar sub-systems of a different rating are already proven in service as per the above criteria then the design shall be based on such sub-systems.

All 'sub systems' shall be procured from the approved vendors and sourced from only such manufacturing units that have supplied the sub-systems that fulfil the proven design requirements as above. The Contract envisages commencement of manufacturing only after completion of Pre-final design. Accordingly, the number of years in commercial / revenue service and operation for the above requirements shall be calculated as on the contracted Key Date No. 3.1 corresponding to 'Pre-Final Design Completion.

In case the Contractor proposes to use sub-system(s) that do not fulfil the above said criteria then the Contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered sub-system(s) for review of the Project Manager. The Project Manager's decision on Contractor's proposal shall be final and binding.

5.1.3 ~~Propulsion System (Traction motor, VVVF-Inverter, Auxiliary Power supply unit),~~

~~Propulsion systems manufacturer shall have atleast 10 years' experience of design and manufacturing of similar system. Proposed propulsion systems from the proposed manufacturing unit shall have been in use and have established their satisfactory performance and reliability for 5 years in minimum aggregate 500 cars comprising of both powered and non-powered cars, supplied against minimum five (5) different contracts in the Metros (i.e. MRT, LRT, Sub-urban Railways and High Speed Railway) of minimum two (2) different countries outside his country of origin. If required by the Project Manager, the Contractor shall provide certificate of satisfactory performance (for the supplies made from the proposed manufacturing unit) for a period of five years or more from the Metro operators. Where similar Propulsion systems of a different rating are already proven in service as per the above criteria, then the design shall be based on such systems.~~

~~Propulsion equipment shall be sourced from such manufacturing units that have supplied the equipment that fulfil the requirement of as specified above.~~

i) ~~In case, the manufacturer of the proposed propulsion system is not a member of the Consortium/Joint venture and the Contractor has indicated more than one manufacturer as the possible propulsion system supplier, final supplier out of the proposed manufacturers for the propulsion equipment shall be decided only after BMRCL's specific approval.~~

ii) ~~In case the Contractor proposes to use sub-system(s) that do not fulfil the above said criteria then the Contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered sub-system(s) for review of the Project Manager. The Project Manager's decision on Contractor's proposal shall be final and binding.~~

Addendum-1 dated 05.12.2022, Sl. No. 83

Propulsion System (Traction motor, VVVF-Inverter, Auxiliary Power supply unit),

Propulsion systems manufacturer shall have at least 10 years' experience of design and manufacturing of similar system. Proposed propulsion systems from the proposed manufacturing unit shall have been in use and have established their satisfactory performance and reliability for 5 years in minimum aggregate 500 cars comprising of both powered and non-powered cars, supplied against minimum five (5) different contracts in the Metros (i.e. MRT, LRT, Sub-urban Railways and High Speed Railway) of minimum two (2) different countries outside his country of origin **or in India.** If required by the Project Manager, the Contractor shall provide certificate of satisfactory performance (for the supplies made from the proposed manufacturing unit) for a period of five years or more from the Metro operators. Where similar Propulsion systems of a different rating are already proven in service as per the above criteria, then the design shall be based on such systems.

Propulsion equipment shall be sourced from such manufacturing units that have supplied the equipment that fulfil the requirement of as specified above.

i) In case, the manufacturer of the proposed propulsion system is not a member of the Consortium/Joint venture and the Contractor has indicated more than one manufacturer as the possible propulsion system supplier, final supplier out of the proposed manufacturers for the propulsion equipment shall be decided only after BMRCL's specific approval.

ii) In case the Contractor proposes to use sub-system(s) that do not fulfil the above said criteria then the Contractor shall furnish sufficient information to prove the basic soundness and reliability of the offered sub-system(s) for review of the Project Manager. The Project Manager's decision on Contractor's proposal shall be final and binding.

5.1.4 ~~Complete propulsion system comprising of traction inverter, auxiliary inverter including auxiliary supply modules and traction motor shall be from/of a single approved vendor. The Train Control and Management System (TCMS) shall either be from the qualified propulsion system supplier (ref. ERTS 5.1.3) or from the carbody manufacturer/vehicle integrator provided the proposed TCMS is satisfactorily functioning in the metro cars.~~

~~The TCMS supplier shall have supplied the proposed TCMS hardware and software in functioning GOA4 lines since last more than three years and shall be compliant with international norms. The Contractor shall submit basic system architecture with hardware for approval at the concept design approval stage and establish 'proven design' as specified. Operational performance of the proposed TCMS system shall be submitted as per "Form EXP-2(c) (Specific Experience in Operational Performances) of Section: IV - Bidding Forms".~~

Addendum-1 dated 05.12.2022, Sl. No. 84

The Train Control and Management System (TCMS) shall either be from the qualified propulsion system supplier (ref. ERTS 5.1.3) or from the carbody manufacturer/vehicle integrator provided the proposed TCMS is satisfactorily functioning in the metro cars.

The TCMS supplier shall have supplied the proposed TCMS hardware and software in functioning GOA4 lines since last more than three years and shall be compliant with international norms. The Contractor shall submit basic system architecture with hardware for approval at the concept design approval stage and establish 'proven design' as specified. Operational performance of the proposed TCMS system shall be submitted as per "Form EXP-2(c) (Specific Experience in Operational Performances) of Section: IV - Bidding Forms".

5.1.5 ~~Vendor Approval~~

~~It shall be obligatory for the Contractor to obtain Notice of No Objection from the Project Manager for the selection of the sub-contractor and vendors for all items of work, even if the name of the subcontractor and vendor is named in the Contractor's Proposal and the works to be done including purchase of materials and equipment's is in accordance with the Standards specified in the Contract. List of items for which Project Manager's approval of vendors is obligatory shall be proposed by the Contractor during preliminary design (well before finalising the vendors), which will be reviewed for approval by the Project Manager. On submission of the list by the Contractor, the Project Manager may direct the Contractor to include other items for which vendor approval shall be mandatory.~~

~~The request for vendor approval shall be comprehensive with all relevant references and details establishing their compliance to the specified conditions. Along with the vendor approval proposal, a commitment from the proposed vendor shall also be submitted that in case of any future procurement action by Employer, they shall quote directly to Employer.~~

~~Contractor shall also ensure that the technical support from Sub-Contractors/Vendors of following major equipment/subsystems shall be made available through permanent positioning of Sub-Contractor's/Vendor's staff at Depots for meeting DLP obligations:~~

i) ~~Propulsion system (including Traction Inverter, Traction motors)~~

ii) ~~Auxiliary Power Supply system~~

iii) ~~Brakes and Pneumatic system~~

iv) ~~Doors~~

v) ~~HVAC~~

vi) ~~Bogies~~

vii) ~~TCMS~~

viii) ~~CCTV~~

ix) ~~PA/PIS~~

Addendum-1 dated 05.12.2022, Sl. No. 85

Vendor Approval

It shall be obligatory for the Contractor to obtain Notice of No Objection from the Project Manager for the selection of the sub-contractor and vendors for all items of work, even if the name of the subcontractor and vendor is named in the Contractor's Proposal and the works to be done including purchase of materials and equipment's is in accordance with the Standards specified in the Contract. List of items for which Project Manager's approval of vendors is obligatory shall be proposed by the Contractor during preliminary design (well before finalising the vendors), which will be reviewed for approval by the Project Manager. On submission of the list by the Contractor, the Project Manager may direct the Contractor to include other items for which vendor approval shall be mandatory.

The request for vendor approval shall be comprehensive with all relevant references and details establishing their compliance to the specified conditions. Along with the vendor approval proposal, a commitment from the proposed vendor shall also be submitted that in case of any future procurement action by Employer, they shall quote directly to Employer.

For sourcing the equipment from indigenous manufacturing facilities, following conditions shall be complied:

a) In case OEM wants to use manufacturing facilities in India (other than his own) for items for which the OEM has been approved, it shall enter into an agreement with such selected Indian equipment manufacturer and obtain prior approval from the Employer. No change in composition, rating, type, model no., manufacturing process, quality standards, design, etc. and make of the components used in assemblies/sub-assemblies of such equipment as manufactured by the approved parent vendor shall be made without specific approval of the Project Manager.

b) In case the vendor uses his own facilities for indigenization after part supply of equipment from the approved manufacturing unit, Contractor shall obtain prior approval from Employer. No change in design, component type/make, quality standards, manufacture procedure, etc. shall be made without specific approval of the Project Manager.

c) In case OEM wishes to change make/type/specifications, etc. of any sub-components for supplies to be sourced from Indian facility, specific prior approval of the Project Manager shall be obtained for changes made, model, specification, etc. Responsibility for obtaining such prior approval shall rest solely with the Contractor. If the prior approval as per above is not obtained by the Contractor and supplies are sourced from the un-approved local Indian source, then the Project Manager at his sole discretion may direct the Contractor to replace equivalent no. of such items with supplies from approved sources free of cost.

Format for submitting the vendor approval request shall be given to the Contractor during initial design stage and the same shall be followed throughout the Contract.

5.1.6 Approval for manufacturing plant(s) for Rolling Stock

It shall be obligatory for the Contractor to obtain Notice of No Objection from the Project Manager for manufacturing of bidded quantity of Rolling Stock in proposed plant(s). The plant(s) proposed by the Contractor shall have minimum five (5) years' experience of manufacturing similar type of Rolling Stock as proposed for this bid. The Rolling Stock supplied from proposed plant(s) shall have been in satisfactory commercial / revenue operation for at least three (3) years.

"In case Contractor proposes a new manufacturing plant(s) then the Contractor shall furnish sufficient information to prove the basic soundness and reliability of the proposal for review of the Project Manager. The Project Manager's decision in this regard on Contractor's proposal shall be final and binding".

5.2 Basic Design Philosophy & Requirements

5.2.1 The design philosophy should meet the following criteria:

i) Application of state-of-the-art technology

ii) Lightweight integral car body.

iii) Service proven design.

iv) Design life 35 years.

v) Crashworthiness.

vi) Minimum life cycle cost.

vii) Low maintenance and overhaul cost.

viii) Use of interchangeable, modular components

ix) Extensive and prominent labelling of parts and wires.

x) Use of unique serial numbers for traceability of components

xi) High reliability.

xii) Low energy consumption.

xiii) System safety.

xiv) Adequate redundancy in system

xv) Fire smoke detection and protection.

xvi) Use of fire retardant materials.

xvii) High passenger comfort including low noise level.

xviii) Environmentally friendly.

xix) Adherence to operational performance requirements.

xx) Safe passenger evacuation in emergency.

xxi) Maximum possible commonality of structure, components, equipments, and sub-systems amongst different cars

APPENDIX-2 OF PTS

	TECHNICAL OFFER SUBMITTALS CHECK SHEET	**Project BMRCL 5RS-DM**
Aggregate	**Floor Covering, Wheelchair Logo and Joint Sealer**	**PTS DOC No.: GR/TD/6830**
BEML Enquiry/ RFQ Reference:		

SL.NO.	DETAILS	SUBMITTED	NOT SUBMITTED
1	Complete Technical Offer for floor covering, wheelchair logo, joint sealer including technical description		
2	Technical data sheet of floor covering, logo, joint sealer, installation tools and depot floor cleaning machines and cleaning liquids		
3	Fire safety test report copies of earlier similar projects.		
4	Installation and maintenance guide for the floor cover.		
5	Supporting documents for Qualification Criteria compliance. (Clause 4)		
6	Vendor approval Documents including QAP, ITP, company profile with infrastructure facilities, product range etc., (Clause 4)		
7	Clause-wise compliance report against the PTS		
8	Dully filled vendor credential form along with supporting documents		

✓ – Submitted

✗ - Not Submitted

Note: Incomplete submissions are liable for Rejection.

Signature of the Bidder with Seal, Name and Designation

MACHINING DEVIATIONS FOR LINEAR DIMENSIONS	RANGE	0 - 6	6 - 30	30 - 120	120 - 315	315-1000	1000-2000	2000-4000	ABOVE 4000	RA
	TOLERANCE	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	±2	±3	~

FOR DIMENSIONAL TOLERANCES OF SHEET METAL PARTS AND WELDED STRUCTURES, REFER STD. RD-227

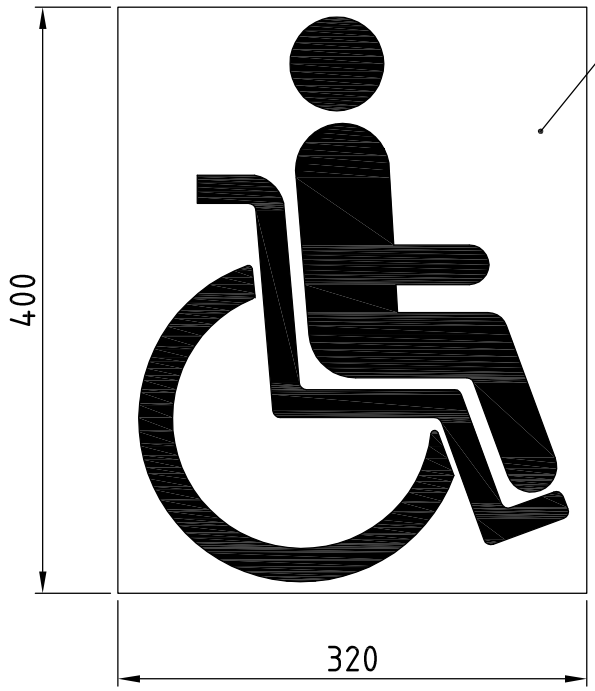
UNSPECIFIED TOLERANCE FOR LINEAR AND ANGULAR DIMENSIONS REF. IS 2102 (PT-1) (MEDIUM) | QUALITY OF WELD JOINTS REF, RD 230 MEDIUM

VALUES OF SURFACE TEXTURE SHALL BE AS PER COMPANY STD DS. 1012.C.

WELDING SHALL BE CARRIED OUT AS PER IS: 9595-96

STATUS: PROTO / PRODUCTION

COLOUR & SPECKLES MATCHING TO FLOOR COVERING



NOTE:

1. ALL DIMENSIONS ARE IN mm.
2. THE WHEELCHAIR LOGO SHALL CONFORM TO PTS DOC. No. GR/TD/6830.

SL.No.	QTY	PART / STOCK No.	DESCRIPTION	SIZE	COMPANY STD./I.S / MATERIAL	Wt. (Kg)
				320x400x3THK		

ALT.NO.	ECN NO/CHANGES	DATE	BY	CHKD	APPD

GRADE No.	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
VALUE	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
SYMBOL												

SURFACE ROUGHNESS

PRODUCT	BMRCL METRO CARS 5RS-DM
REF DRG	–
MATERIAL	–
HEAT TREAT.	–
SURFACE TREAT.	–

APPD	RNN	18/04/2024
REVD	DK	18/04/2024
CHKD	RP	18/04/2024
DRWN	RP	18/04/2024

TITLE

LOGO, WHEELCHAIR

SCALE	SHEET	Wt.(Kg)
1:5	1 OF 1	–

BEML LIMITED
NEW FRONTIERS, NEW DREAMS

DRG No. 507-16129

ALT 0

A4