



BEML LIMITED
BANGALORE
R & D CENTER

Doc No.	GR/TD/3245
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Page	1/11

**Procurement Technical Specification of
Bulk Head Panel and Accessories for
Metro Cars**

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	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	2/11

REVISION HISTORY:

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	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	3/11

Table of Contents

1	Introduction	4
1.1	General	4
1.2	Climatic Conditions	4
2	Definitions and Abbreviations	5
3	Qualification Criteria.....	5
4	General Requirements.....	6
4.1	Defining of unclear aspects	6
5	Standards	6
6	Scope of supply	6
6.1	General	6
6.2	Submission of Documents.....	6
6.3	Packing.....	7
7	Quality Assurance Program.....	7
7.1	General	7
7.2	Quality Assurance Plan.....	7
8	Technical Requirements.....	7
8.1	General	7
8.2	Product Description	8
8.3	Test Requirements of Bulk head panels.....	9
8.4	Inspection of Bulk Head Panels & Accessories.....	9
8.5	Submittals with Technical Offer	11

	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	4/11

1 Introduction

1.1 General

This Procurement Technical Specification (hereafter PTS) describes the technical requirements for the aluminium honeycomb sandwich bulk head panel of draught screen assemblies to be supplied for Metro Cars.

The supplier shall be responsible for all works required in this PTS with regard to bulk head panels and shall be responsible for supporting the BEML activities as contractor for manufacture of Metro Cars.

1.2 Climatic Conditions

The Metro Cars has to operate reliably and safely under the following climatic conditions shown in table.

Description	Limiting Values
Maximum ambient temperature(refer note below)	47 °C
Minimum temperature	3 °C
Humidity	100% saturation during rainy season
Rainfall	Rain occurs generally from June to September. Average annual rainfall is approximately 650mm. maximum rainfall in any 24h period is 50mm.
Atmosphere during hot season	Extremely dusty
Maximum wind load	150 kg/m ²
Vibration & Shocks	The equipment, sub-systems & their mounting arrangements shall be designed to withstand satisfactorily the vibration and shocks encountered in service as specified in IEC 61373
S02 level in atmosphere	80 - 120 mg / m ³
Suspended particulate matter in atmosphere	360 - 540 mg /m ³
Life	The metro cars are designed for min. 35 years life. Accordingly, the bulk head panel & accessories shall also not deteriorate in their performance for 35 years.

	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	5/11

Note: 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.

2 Definitions and Abbreviations

The following definitions and abbreviations are applicable.

- “Customer” means the order placing authority of the Mass Rapid Transport System (MRTS).
- “Customer’s Representative” mean such persons appointed by customer to act as Engineer for the purpose of the MRTS.
- “BEML” means the Contractor to procure the bulk head panel for metro cars.
- “Supplier” means the Supplier of bulk head panel to BEML.

3 Qualification Criteria

- a. The supplier shall be an Aluminium fabricator with Aluminium honeycomb sandwich panel and shall have experience in design, manufacturing, testing and commissioning of such panels.
- b. The supplier shall have manufactured and supplied similar fabricated items using aluminium honeycomb sandwich panels and such supplies should have been in use and have established their 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 an MRTS in India. Supporting documents for the same shall be submitted along with the technical offer, preferably, satisfactory Revenue service performance certificates for a period of 3 years or more from end users/ Metro Operators.
- c. Along with the technical offer, the supplier shall submit the filled Vendor credential form along with all the required supporting documents.
- d. The firm should undertake to provide the support during DLP period.
- e. The firm should give an undertaking to supply spares for a minimum period of 10 years from the date of last car supplied by BEML under this contract

	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	6/11

4 General Requirements

The supplier shall supply bulk head panels in conformance to this PTS, purchase order requirements and the applicable drawings.

4.1 Defining of unclear aspects

If any term or clause is not described or not clear in the specification, supplier shall discuss those with design team in BEML, prior to making a contract, to confirm their definitions.

After making a contract, supplier shall follow the definition and opinions of design team in BEML.

5 Standards

Test and inspection standard applicable for the bulk head panel shall conform to the national and international standards as at clause no. 7.3.

6 Scope of supply

6.1 General

The Supplier shall supply the bulk head panel assembly conforming to this PTS, purchase order requirements and the applicable drawing.

The Supplier shall supply the bulk head panel assembly along with all accessories such as helical coil, cover, packing rubber, pin-pole etc., as per the drawing requirement. The Supplier shall be responsible to ensure that the items supplied meet the climate condition specified at Clause 1.2 and do not deteriorate/ fail during the life time of 35 years of the cars.

6.2 Submission of Documents

Supplier shall submit the following documents as a minimum along with the offer.

- ✓ Technical Specification of bulk head assembly
- ✓ Manufacturing procedure for bulk head panel assembly
- ✓ Repair procedure
- ✓ Technical Data Sheet (TDS) & Material Safety Data Sheet (MSDS)
for Aluminium honey comb, Adhesive used to bond Aluminium sheet
with Al. honeycomb core.

	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	7/11

- ✓ Type test reports

The Supplier shall submit the following documents conforming to the technical specification along with every batch of supplies.

- ✓ Routine Test Reports for Bulkhead panels and its accessories
 - Material test certificates
 - Dimensional check sheet

6.3 Packing

The panels shall be properly packed and due care shall be taken to ensure that no damage occurs during transit. Damages, if any, shall be replaced free of cost by the supplier.

7 Quality Assurance Program

7.1 General

The supplier shall hold ISO 9001 certification and shall manufacture the product accordingly. The supplier shall submit a copy of ISO 9001 certification along with the offer. The supplier shall monitor and control the quality systems as per ISO 9001 guidelines. BEML and / or customer's representative may periodically conduct compliance audits of the supplier's quality management system.

7.2 Quality Assurance Plan

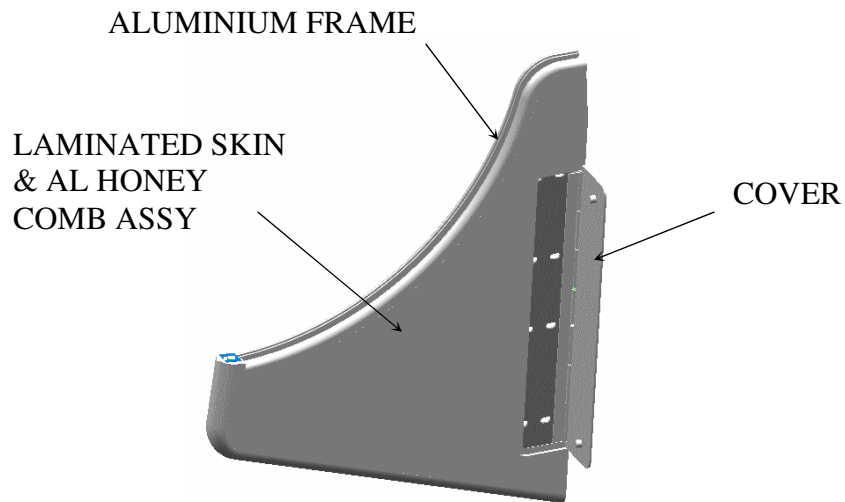
The supplier shall develop and submit a Quality Assurance Plan (QAP) to BEML for review and approval based on ISO 9001 guidelines.

8 Technical Requirements

8.1 General

The bulkhead panel consists of aluminum frame, aluminum honeycomb, aluminum skin and a cover with hinge and spring as shown in tender drawing. Aluminum honeycomb core is inserted in an aluminium frame and Aluminium skin is bonded to the honey comb and frame on either side with an Adhesive. The processing method of assembly shall be a proven one meeting the performance requirements as at clause 8.3 and shall not de-bond during the designed life of minimum 35 years of the Metro car.

	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	8/11



8.2 Product Description

8.2.1 Aluminium Honeycomb

The aluminium honeycomb used in the bulk head assembly shall to be specification as below.

Cell size : 9 mm.

Density : 54 kg/m³.

Alloy : A3003 H18 / A3104 H18

The foils of the core shall be suitably treated to improve anti-corrosion properties. Details shall be submitted along with the technical offer.

8.2.2 Aluminium Skin

The skin shall be made of aluminium alloy to grade A1050-H14. The bonding area of skin shall be abraded / treated suitably to ensure excellent bonding between Al. honeycomb core and aluminum casting. The skin shall be anodized as per IS 1868 AC15.

8.2.3 Adhesive

The adhesive used for bonding aluminium honeycomb core to aluminium skin and frame shall be a proven epoxy glue. TDS of the proposed type of adhesive and the details of previous projects in which the proposed adhesive was used by the supplier and its performance reliability shall be submitted along with the technical offer. The supplier shall guarantee the performance of the bulk head panels for a service life of 35 years with the proposed glue.

	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	9/11

8.2.4 Accessories

The accessories such as cover, hinge, helical coil, rubber, spring latch & pin pole shall meet the tender drawing requirements.

8.2.5 Aluminium casting

The frame of Bulkhead panel is made of aluminium casting to grade LM 25. The bonding area of frame shall be abraded to ensure excellent bonding between Aluminium honeycomb core and Aluminium skin.

8.2.6 Service Life

The supplier shall ensure a guaranteed revenue service life of 35years for the bulkhead panel.

8.2.7 Weight

The supplier shall keep the weight of the complete bulk head assembly to a minimum and submit the estimated weight along with the technical offer.

8.3 Test Requirements of Bulk head panels

8.3.1 Mechanical Test Criteria

TEST	TEST METHOD	TEST REQUIREMENT (Minimum Value)
Drum peel strength (mm-N / mm)	ASTM D 1781	≥ 60
Bending load (N) (3 point loading)	ASTM C 393	≥ 2000
Flatwise compression strength (MPa)	ASTM C 365	≥ 1.5
Tensile lap shear strength (Mpa)	ASTM D 1002	≥ 9

8.4 Inspection of Bulk Head Panels & Accessories

Bulkhead panel and accessories shall be inspected to meet the requirements at Clause - 8.3, tender drawings and technical specifications. Test reports shall be submitted.

	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	10/11

8.4.1 Visual Inspection

The bulk head panel shall have no split, gap, undulation of surface, dents, peel off surface and shall be free from any harmful casting defects such as crack, hole, blowhole etc., which impair the usability of the panels

8.4.2 Type Test & Routine Test

Sl. No.	Kind of Test	Test Method	Type Test	Routine Test
1	Visual Inspection	-	O	O (100% Supplies)
2	Dimensional Inspection	-	O	O (100% Supplies)
3	Weight	-	O	O (100% Supplies)
4	Fitment trials in carbody	-	O	-
5	Drum Peel Strength	ASTM D 1781	O	-
6	Bending Load	ASTM C 393	O	-
7	Flat-wise Compressive Strength	ASTM C 365	O	-
8	Tensile lap shear strength (Mpa)	ASTM D 1002	O	-

8.4.3 First Article Inspection (FAI)

Before taking up mass production, the supplier shall offer the first set of Bulkhead panels for First Article Inspection by BEML/DMRC. After clearance from BEML/DMRC, mass production shall be taken up.

	Procurement Technical Specification of Bulk Head Panel and Accessories for Metro Cars	Doc No.	GR/TD/3245
		Date	28/04/2020
		Rev. No	2
		Page	11/11

8.5 Submittals with Technical Offer

The supplier shall provide, as a minimum, the following along with the technical offer:

- 1) Complete Technical Offer for bulkhead panel.
- 2) Technical data sheet of adhesive, aluminium honeycomb core, aluminium casting, aluminium sheet, packing rubber and accessories.
- 3) Supporting documents for Qualification Criteria compliance (Clause 3).
- 4) Duly Filled Vendor credential form along with supporting Documents including QAP & ITP for RS15 project, company profile with infrastructure facilities, product range etc.,
- 5) Clause wise comments against PTS Document No. GR/TD/3245.