



BEML LIMITED
BENGALURU
R & D CENTER

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MRS1 Project

**Procurement Technical Specification of
Flip-up Stainless Steel Seat**

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1. Introduction

1.1. General

This Procurement Technical specification (PTS) specifies the technical requirements of flip-up type stainless steel seat to be fitted in the interiors of the Metro cars of DM, M & T cars, to be supplied under the 'MRS1' contract for Mumbai Metro Line-2 & 7.

BEML will carry out all required works and activities as Contractor to the Employer for MRS1 project, while the subcontractor shall be responsible for all works required in this PTS with regard to flip-up stainless steel seat and shall be responsible for supporting the BEML activities as contractor for MRS1 project.

The scope of work includes all items of work which may be required to meet the performance requirements, reliable and efficient operation of trains and meeting the best international practices even if not specifically mentioned in this PTS.

1.2. Train Composition

The rake formation shall generally be as follows:

3 Car unit formation : DM – T – M –

6 Car Train formation: DM –T–M – M – T – DM

In case of 8-car formation (if required):

2 Car train formation : – T – M –

8 Car Train formation: DM – T – M – T – M – M – T – DM

where,


DM : Driving Motor Car

T : Trailer Car with pantograph

M : Non -Driving Motor Car

1.3. Climatic & Environmental Conditions


The Metro cars shall operate reliably and safely under the climatic and environmental conditions of Mumbai. Accordingly, the stainless steel saloon seat shall be designed to operate with satisfactory performance under the following conditions.

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Description	Limiting Values
Maximum ambient temperature (See note below)	36 °C
Minimum temperature	14.3 °C
Humidity	≥ 95% RH
Rainfall	The annual precipitation is 2,078 mm with 34%(709mm) falling in the month of July.
Atmosphere during hot season	Extremely dusty including bird feathers
Maximum wind speed	150 km/h
Vibration and Shocks	The sub-systems & their mounting arrangements shall be designed to withstand satisfactorily the vibration and shocks encountered in service as specified in IEC 61373 and IEC 60571.
SO ₂ level in atmosphere	80 – 120 mg/m ³
Suspended particulate matter in atmosphere (TSPM)	360 – 540 mg/m ³
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 50mm 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 years of life. Accordingly, the subject items & accessories shall also not deteriorate in their performance for 35 years

Note:


- 1) 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) Any moisture condensation shall not lead to any malfunction or failure.
- 3) Adequate margin shall specially be built into the design particularly to take care of the higher ambient temperatures, high humidity, dusty and corrosive conditions, etc. prevailing in Mumbai area.

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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
Safe speed	With inflated secondary suspension	90 kmph
	With deflated secondary suspension	80 kmph
Maximum operational speed	With inflated secondary suspension	80 kmph
	With deflated secondary suspension	70 kmph
Minimum Design Average Acceleration rate for fully loaded (AW3) train on level tangent track shall be as under: 0 kmph to 40 kmph 0 kmph to 60 kmph 0 kmph to 80 kmph		1.0 m/s ² 0.75 m/s ² 0.40 m/s ²
Minimum Operational Average Acceleration rate for AW2 loaded train on level tangent track shall be as under: 0 kmph to 35 kmph 0 kmph to 60 kmph 0 kmph to 80 kmph		1.20 m/s ² 0.80 m/s ² 0.45 m/s ²
Average Service braking rate from 80 kmph to standstill for fully loaded(AW3) train on level tangent track.		1.0 m/s ²
Average Service braking rate from 80 kmph to standstill for AW2 train on level tangent track.		1.1 m/s ²
Average Emergency braking rate from 80 kmph to 0 kmph for fully loaded trains on level tangent track		1.3 m/s ²
Jerk rate (Maximum)		0.75 m/s ³
Annual running distance of one train (for design purpose)		150,000 km
Note : The specified average minimum acceleration shall be the finally achieved values inclusive of the specified jerk rate.		

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1.5. Track structure Parameters

The MRS1 cars will operate with the track parameters as specified in the following table:

Description	Elevated and At-grade Corridor		Underground Corridor
	Ballasted	Ballast less (DFF)	Ballast less (DFF)
Track Laying Gauge	1435 mm		
Rail Type (Main Line & Depot)	60 EI (UIC 60) 880/HH	60 EI (UIC 60) 1080/HH	60 EI (UIC 60) 1080/HH
Rail Profile	UIC 861-3		
Inclination Of Rail	1 in 20		
Sleeper Spacing (Main line)	600 mm ± 10mm	600 mm ± 10mm	700 mm ± 10mm
Sleeper Spacing (Depot)	650 mm ± 10mm	Not applicable	
Ballast Cushion Depth(Main line)	300mm	Not applicable	
Ballast Cushion Depth (Depot)	250mm	Not applicable	
Standard Rail Length	13m and 18m	18m	
Rail Panel Lengths	Longer than 200m		
Minimum Radius of Curvature	200m-Underground, 110m-Elevated 100m-Depot		
Minimum Turn out Radius.- (Main line)	1 in 9 - 300m radius 1 in 7- 190m radius		
Minimum Turn Out Radius Depot	1 in 7 - 190m radius		
Maximum Cant Permissible	110 mm		
Maximum Cant Desirable	110 mm		
Maximum Cant Deficiency Permissible	85mm		
Maximum Cant Deficiency Desirable	85 mm		
Maximum Permissible Cant Gradient	1 in 440		
Maximum Desirable Cant Gradient	1 in 720		
Turn-out Speed : Turnout (1 in 9) R-300	45 km/h	45 km/h	40 km/h
Turn-out Speed : Scissors (1 in 9) R-300	45 km/h	45 km/h	40 km/h
Turn-out Speed : In Depots (1 in 7) R-190	35 km/h	35 km/h	25 km/h
Turn-out Speed : Turnout (1 in 7) R-190	35 km/h	35 km/h	25 km/h
Turn-out Speed : Turnout(1 in 12) R-410	50 km/h	50 km/h	50 km/h

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Turn-out Speed : Turnout(1 in 12) R-410	50 km/h	50 km/h	50 km/h
Turn-out Speed : Turnout (1 in 8.5) R-218	30 km/h	30 km/h	30 km/h
Turn-out Speed : Turnout(1 in 8.5) R-218	30 km/h	30 km/h	30 km/h
Maximum Gradient Main Line	4%		
Maximum Gradient Depot Connection	4%		
Minimum vertical curve radius of curvature	1500m		

1.6. Current Collection System


System Particulars	For all sections and depot
Supply Voltage System	25kV AC single phase 50Hz
Current Collection	Through Pantograph

1.7. Signalling System

Item	Description
Train Control System	CBTC based On board Continuous Automatic Train Control system (CATC) consisting of i) Automatic Train Protection ii) Automatic Train Operation (ATO) iii) Automatic Train Super-vision (ATS) iv) Attended/Unattended train operation (GoA2/GoA3/GoA4)
Train Control mode	i) Automatic mode ii) Coded Manual modes iii) Restricted Manual mode iv) Run on Sight mode v) Cut-out mode vi) UTO vii) Standby

1.8. Principal Notional Vehicle Dimensions/ Leading Particulars

Description		Dimension
Gauge		1,435 mm
Maximum Length over body(including end-fairings)	DM car	22,010 mm
	T and M cars	22,010 mm
Maximum Length over couplers for all cars		23,000 mm


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Maximum Width over Body		3,200 mm
Minimum Passenger Saloon Headroom		2,050 mm
Locked down pantograph height for 25kV AC cars from rail level at Car Centre Line		4,048 mm
Maximum Floor height above rail level of any unloaded vehicle		1,130 mm
Minimum Floor height above rail level of fully loaded vehicle		1,100 mm
Maximum height of coupler above rail level for unloaded vehicle		815 mm
Minimum height of coupler above rail level for fully loaded vehicle		740 mm
Bogie Wheel Base	Maximum	2400 mm
	Minimum	2200 mm
Distance between bogie centres	Maximum	15,100 mm
	Minimum	14,400 mm
Wheel diameters	New	860 mm
	Fully worn	780 mm
Maximum axle load (including all tolerances as per IEC 1133-1992)		17 Tonne

2. Definitions

The following definitions are applicable to the PTS.

- **"Employer"** means Delhi Metro Rail Corporation Limited (DMRC), its legal successors and assignees.
- **"Subcontractor"** means the Supplier who supplies the required flip-up stainless steel seat to BEML for MRS1 project.
- **"Contractor"** means the persons or person appointed by the Employer to undertake the execution of the works for MRS1 project.
- **"Contract"** means the contract between Subcontractor and BEML in relation to the supply of flip-up stainless steel seat for MRS1 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.
- **"BEML"** means the Contractor to procure the flip-up stainless steel seat for MRS1 project cars.

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3. Qualification Criteria

- (i) Sub-contractor shall be an Original Equipment Manufacturer (OEM) of Flip-up seats for Railway Rolling stock having experience in design, manufacturing, testing and commissioning.
- (ii) The sub-contractor shall have manufactured and supplied the flip-up type seat and such supplies should have been in use and have established their satisfactory performance and reliability in Railway rolling stock applications. Supporting documents from end users for the above shall be submitted along with the technical offer.
- (iii) Sub-contractor shall submit the complete details of the type of flip-up seat supplies made, technical specifications, manufacturing methods, process details, type test carried out, list of parts supplied.
- (iv) The sub-contractor shall have experience in stainless steel fabrication and shall have qualified stainless steel welders. Details of experience and welder qualification certificates shall be submitted along with the technical offer.
- (v) Along with the technical offer, the sub-contractor shall submit the filled vendor credential form with all the required supporting documents.
- (vi) The firm should undertake to provide the support during DLP period either by themselves or through sister company or a partner in India. The firm shall submit detailed proposal in this regard along with the technical offer.
- (vii) 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.


4. Standards

The design, testing and manufacturing of the flip-up saloon seat shall conform to the latest editions of internationally recognized Standards viz., Indian, American, European, Japanese, ISO, etc.

5. Design Criteria

The Flip-up saloon seat shall comply with the following Design criteria:

- 1) Flip-up seats is used to make more floor area available for wheelchair and bi-cycle as required. The seats shall be designed to ensure they are:
 - i. Comfortable and aesthetically pleasing.
 - ii. Easily cleanable, repairable and changeable and will not be adversely affected by normal cleaning agents.

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- iii. Sitting surface shall be metal surface and bucket shape to provide passenger resistant against sliding during train acceleration and braking.
 - iv. Mountings shall be capable of withstanding the loads arising in service condition. Mounting fasteners shall not protrude outside the seat body.
- 2) Seats shall be interchangeable. It is preferable that only one style of seats be used throughout the train.
 - 3) The mechanism of operation of the seat shall be designed for smooth operation without jerks. The operation of the seat shall be designed so that the operation will not harm the passenger in any case.
 - 4) Weight reduction measures shall be considered in the seat design.
 - 5) Firm shall implement any modification suggested by BEML / DMRC based on the seat fitment and operation in first proto vehicle, without any cost implication.


6. Technical Requirements

6.1. General requirement

- (i) The subcontractor shall meet the Flip-up type stainless steel saloon seat requirements as per design criteria at section 5 above, as a minimum.
- (ii) The flip-up type stainless steel saloon seat supplied shall comply with the environmental conditions at clause 1.3.
- (iii) Seat should be in folded condition when not in use. Passengers should be able to unfold the seat and use it easily. Basic design shall be in line with the drawing. Firm shall propose the flip up mechanism.
- (iv) Firm shall obtain the approval for the design from BEML/DMRC before manufacturing. Firm shall consider all design modifications suggested BEML/DMRC.
- (v) Firm shall supply one seat unit to BEML for checking fitment and obtain clearance for series production. Firm shall implement all modifications suggested BEML/DMRC for the supplied unit.

6.2. Flip-up seat construction

- (i) The flip-up seat shall be bucket shape and shall be made by roll forming and press forming method. The sub-contractor shall submit detailed technical proposal, dimensional details and manufacturing process along with the technical offer.
- (ii) The stainless steel sheet raw material shall be SUS 304 L / AISI 304 L, 2B Finish. The stainless steel sheets shall be procured from reputed OEMs like M/s. SAIL & M/s. Jindal.


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- (iii) The mechanism shall be based on dead weight / spring / gas spring. The detailed drawing along with the bill of material shall be provided with the technical offer.
- (iv) The proposed flip-up seat shall be aesthetically pleasing and no internal parts shall be seen while the seats is in closed / open condition.
- (v) The flip-up mechanism proposed shall be such that passenger hand / finger shall not get trapped / injured while using.
- (vi) The flip-up seat shall not have jerks and shall not make any sound during operation.
- (vii) The mechanism shall be a proven one and the same should have been used in rolling stock. Reference project in which the proposed mechanism applied shall be submitted along with the technical offer.
- (viii) The weight of the complete flip-up seat proposed shall be < 15kg.

6.3. Technical Parameter

The stainless steel saloon seat shall be subjected to following tests

Sl. No.	Technical Data	Test Method	Requirement
1	Visual Inspection		There shall be no crack, die marks, wrinkles, pin hole, scratch and other visual defects. Ensure proper welding if applicable so that no visible impressions are seen at the front side of the seat pan
2	Dimensional Inspection	-	-
3	Load Test		
I	Static load test	UIC 566 / Appendix 7	As per section 4.2.1.3 of UIC 566
II	Fatigue test	NF F31-119 1 million cycles	The flip-up mechanism shall function normally. No permanent deformation is permitted. No crack or rupture must be detected.
4	Material Test	Chemical composition & Mechanical properties	Mill / Manufacturer test certificate

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5	Functional test	Flip-up Mechanism test	There shall not be any jerk or sound in the functioning of the seat. The seat shall not harm any passenger in its mechanism of operation.
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6.4. Workmanship and Finish

Flip-up stainless steel seat shall be manufactured conforming to the drawing dimensions.

Flip-up stainless steel seat shall be manufactured using dedicated press forming and roll forming tool. The supplier shall submit the detailed manufacturing process.

Welding required shall be welded by qualified welders. The weld areas shall be pickled and passivated. The sub-contractor shall submit the pickling and passivation process.

The supplier shall submit welder qualification certificates as per EN 287-1 and Welding Process Qualification records as per EN/ ISO/ DIN standard.


The flip-up stainless steel seat saloon seat assembly shall be of uniform quality consistent with good manufacturing and inspection process. The seats shall have no imperfections, free of crack, die marks, wrinkles, pin hole, scratch and other visual defects which would impair the usability of the item after bead blasting

6.5. Service Life

The sub-contractor shall ensure a guaranteed revenue service life of 35 years for the flip-up seat. The flip-up mechanism shall not fail during the complete service life of the Metro car.

6.6. Bead Blasting

Before fitting on the carbody, the seat assemblies will be bead blasted for non-directional matt finish and after bead blasting, no weld marks, die impressions or any other visual effects which impair the aesthetics of the seat pan are permitted. Bead blasting is BEML scope. Hence, sub-contractor shall take necessary care during the manufacturing process to prevent the occurrence of any such effects. A suitable enclosure shall be provided in order to protect the flip-up mechanism from any effect of bead blasting.

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7. Quality Assurance Program

The subcontractor shall hold ISO 9001/ 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 DMRC's representative may periodically conduct compliance audits of the Subcontractor's Quality management system.

The subcontractor shall submit Quality Assurance Plan (QAP) based on ISO 9001 / IRIS guidelines.

8. Scope of Supply

8.1. Hardware

The flip-up stainless steel seat shall be supplied as per the drawing dimensions and confirming to this PTS requirement as a minimum. The sub-contractor shall be responsible for the design / functioning of the seat, submission of design information and execution of test and inspection. Any changes as required by BEML/DMRC shall be adhered to by the sub-contractor without any cost implication.

8.2. Submissions of Documents

The Supplier shall submit the following documents conforming to the technical requirements during design phase.


- ✓ Assembly drawings
- ✓ Type test procedure document covering all the physical and mechanical properties.
- ✓ FAI Procedure document.
- ✓ Type test & FAI reports.
- ✓ Weighment document with Actual weights of each of the seat assemblies.
- ✓ Material test certificates.
- ✓ Dimensional check sheets for each of the assemblies.

8.3. Submissions of Samples

One sample of flip-up type of seat assembly shall be submitted before FAI for checking the fitment on carbody.

8.4. Packing

The sub-contractor shall ensure proper packing (for each seat assembly) to avoid transit

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damages and after supply of the saloon seat to the place allocated by BEML.

9. Type Tests & Routine Tests

The saloon seat shall be type and routine tested in accordance with relevant standards and specifications specified at clause-6 of this PTS.

All such tests shall be carried out at the sub-contractor's cost, wherever performed, in the presence of and to the satisfaction of BEML and DMRC, who reserves the right to witness any or all of the tests and to require submission of any or all test specifications and reports.

BEML and DMRC reserve the right to reasonably call for additional tests, if necessary.

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


Sl. No.	Kind of Test	Test Method	Type Test	Routine Test
1	Visual Inspection	-	O	O
2	Dimensional Inspection	As per drawing dimensions	O	O
3	Load Test			
I	Static load test	UIC 566	O	
II	Fatigue test	NF F31-119 1 million cycles	O	
4	Raw Material Chemical Analysis	-	O	O (For every batch)
5	Raw Material Mechanical Properties	-	O	O (For every batch)
6	Functional test	-	O	O (For all seat)

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

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

9.1. Visual Inspection

Each component of the saloon seat assembly, irrespective of lot size shall be examined visually for surface defects, irregularities and surface finish. The components shall be free of crack, die mark, wrinkle, pin hole, scratch, other visual defects and manufacturing defects that would impair the utility of the item.

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9.2. Dimensional Inspection

Dimensional inspection of the assembly / components as per drawing requirements shall be carried out and all parameters shall be recorded and the dimensional check sheet shall be submitted along with the supplies.

9.3. Chemical Composition & Mechanical properties

The chemical composition and mechanical properties of the components shall conform to specifications. The supplier shall carryout the chemical analysis and mechanical tests as per specification requirements and test reports shall be submitted with every batch of supplies.

9.4. Load test

Load test shall be carried out as a type test on flip saloon seat assembly, to determine the appropriate performance under specified load as per clause 6.3 (3) of this PTS, prior to the start of the mass-production. The sub-contractor shall submit the type test procedure for BEML/ DMRC approval and shall offer the test for BEML/ DMRC witness. Each lot of the flip-up seat assembly shall withstand the loading conditions and conform to the UIC 566 for static load test and NF F 31-119 standard considering 1 million cycles for fatigue load test. Test report for the same shall be submitted.

9.5. First Article Inspection (FAI)


The subcontractor shall offer the flip-up seat for First Article Inspection by BEML/ DMRC in accordance with the FAI plan to be approved by BEML/DMRC, 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 saloon seat 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 BEML/ DMRC 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/DMRC visit to subcontractor's place for witness of

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re-FAI shall be to subcontractor's responsibility.

Upon acceptance of the FAI by BEML/DMRC, the subcontractor can 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 BEML/DMRC at the FAI.

Subcontractor shall note that BEML/DMRC FAI clearance will not relieve the subcontractor's responsibility towards design, development, testing, manufacture and supply during the revenue service.

At any point of time, during the execution of the contract, if BEML/DMRC has any concerns about the quality of the product supplied, BEML/DMRC reserves the right to randomly draw samples from any of the supply lots and the sub-contractor shall carryout the type tests at accredited outside labs and shall submit the reports.

10. Appendices

1. Vendor credential form.
2. Technical offer Submittals Check List.

11. Submittals with Technical Offer

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

1. Complete Technical Offer for flip-up type saloon seat assembly including operation mechanism, assembly drawing, details of previous supply to other railway rolling stock (with supporting documents) as minimum
2. Clause wise comments against PTS Document No. GR/TD/4947.
3. Details of infrastructure facilities available for the production of flip-up seat.
4. Stainless steel Welder qualification certificates.
5. Welding Process Qualification. (WPS & PQR) records.
6. Supporting documents for Qualification Criteria compliance (Clause 3).
7. Duly filled Vendor credential form along with supporting documents
8. Company profile with infrastructure facilities, product range etc.,

<u>Vendor Credentials - Flip-up Seat</u>									
Sl. No.	Product	OEM & the manufacturing plant address	Drawing & Technical Specification of Flip-up Seat	Project	Year of Supply	Qty. Supplied, (nos.)	Years of Revenue Service (>3 yrs)	Supplied to (car builder)	End User (Metro Train Operator)
1	Flip-up Seat								
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									

	TECHNICAL OFFER SUBMITTALS CHECK SHEET	Project MRS1
Aggregate	Flip-up Type Stainless Steel Saloon seat	PTS DOC No.: GR/TD/4947
BEML Enquiry/ RFQ Reference :		

Sl. No.	DETAILS	SUBMITTED	NOT SUBMITTED
1	Complete Technical Offer for flip-up type saloon seat assembly including operation mechanism, assembly drawing, details of previous supply to other railway rolling stock (with supporting documents) as minimum	<input type="checkbox"/>	<input type="checkbox"/>
2	Clause wise comments against PTS Document No. GR/TD/4947	<input type="checkbox"/>	<input type="checkbox"/>
3	Details of infrastructure facilities available for the production of flip-up seat.	<input type="checkbox"/>	<input type="checkbox"/>
4	Stainless steel Welder qualification certificates	<input type="checkbox"/>	<input type="checkbox"/>
5	Welding Process Qualification. (WPS & PQR) records.	<input type="checkbox"/>	<input type="checkbox"/>
6	Supporting documents for Qualification Criteria compliance (Clause 3).	<input type="checkbox"/>	<input type="checkbox"/>
7	Duly filled Vendor credential form along with supporting documents	<input type="checkbox"/>	<input type="checkbox"/>
8	Company profile with infrastructure facilities, product range etc.,	<input type="checkbox"/>	<input type="checkbox"/>

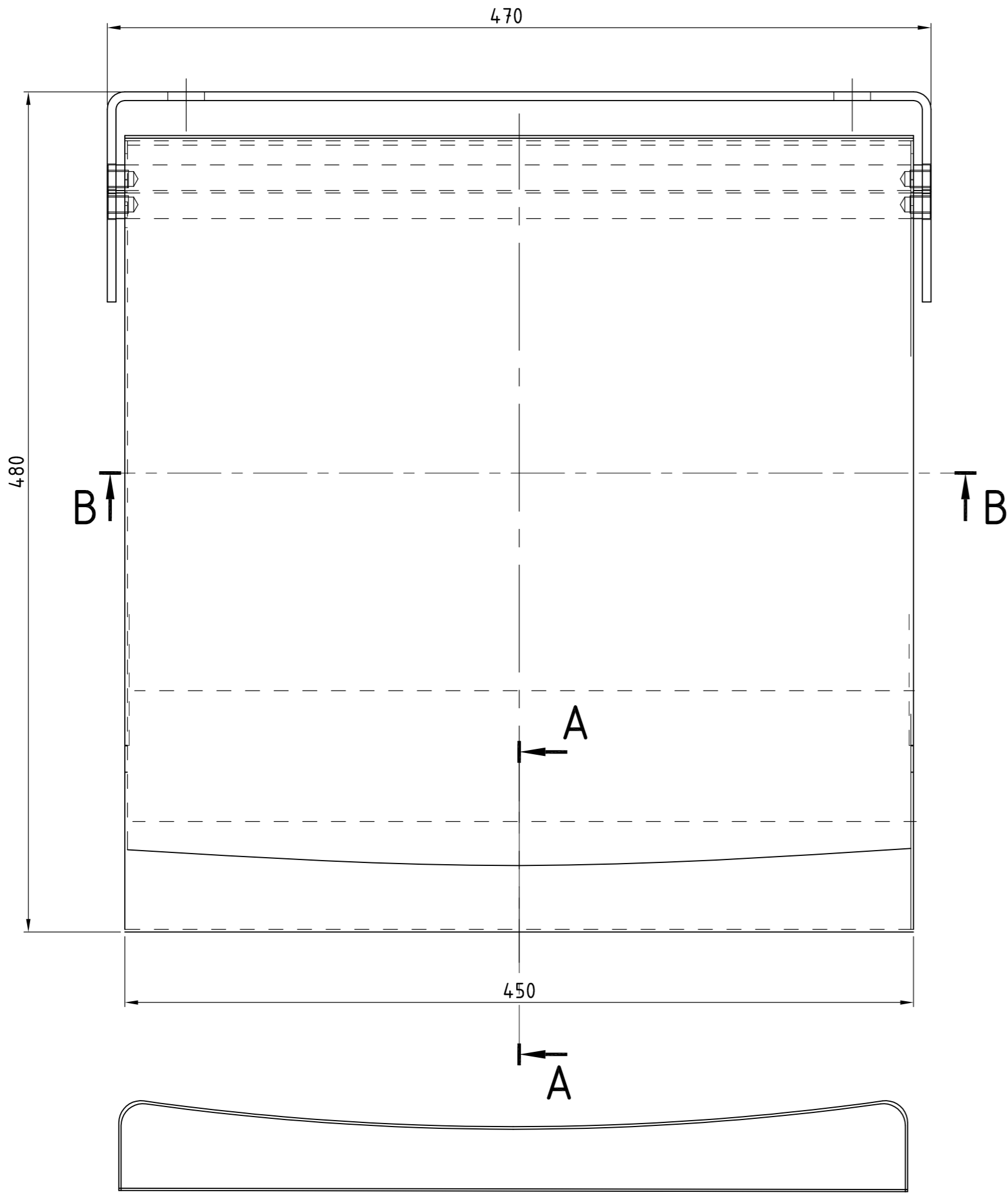
Note : Incomplete submissions are liable for Rejection.

Signature of the Bidder with Seal

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DRAWING RELEASED FROM PLM, PHYSICAL SIGNATURE NOT REQUIRED

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

SURFACE
ROUGHNESS

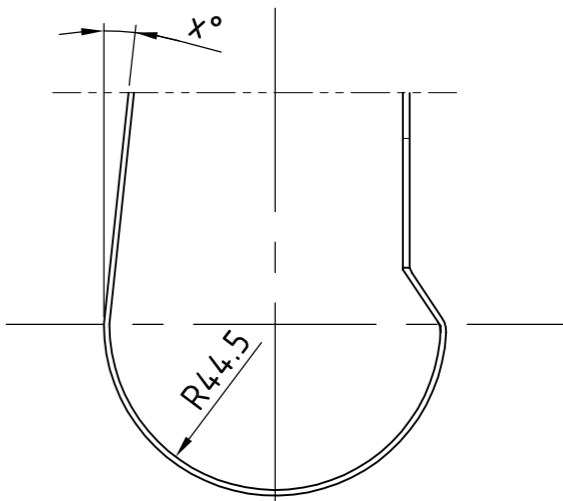
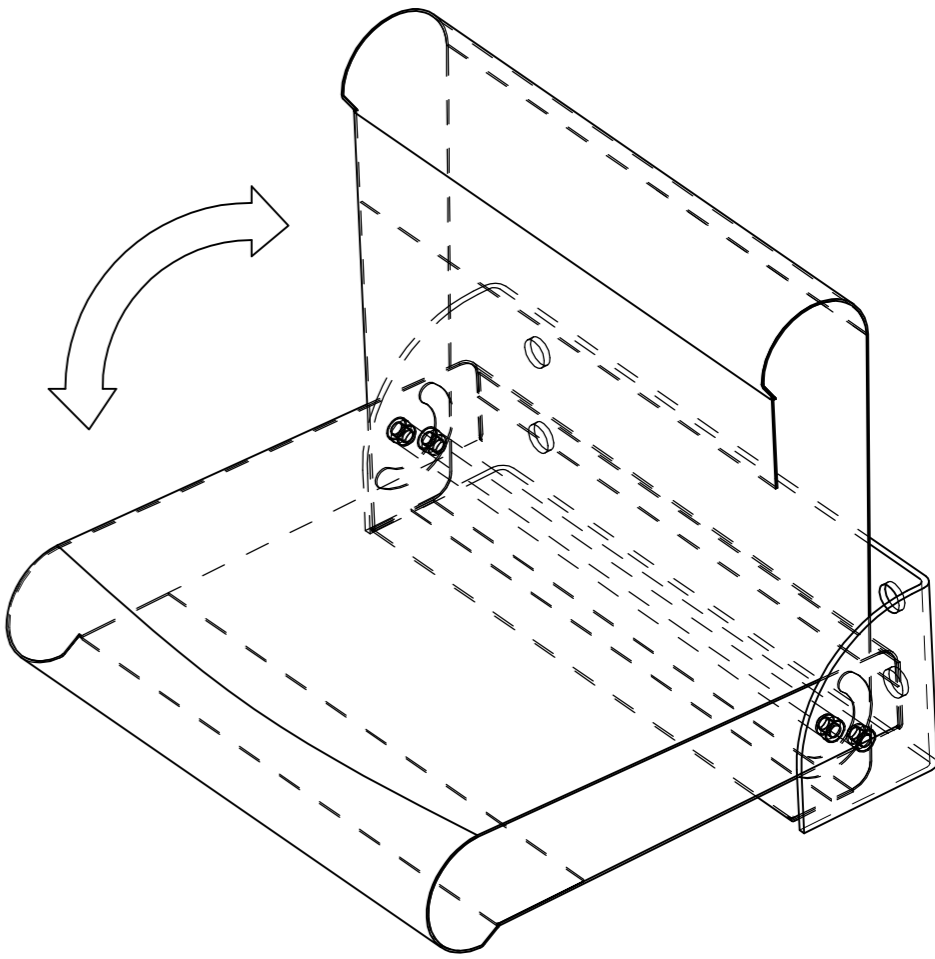


SECTION B-B

UNCONTROLLED

- NOTE:
- ALL DIMENSIONS ARE IN mm.
 - THIS DRAWING GIVES THE DIMENSION REQUIREMENT OF SEAT LENGTH, WIDTH AND BUCKET PROFILE.
 - THE SUB-CONTRACTOR SHALL SUBMIT THE DETAILED TECHNICAL PROPOSAL AND DIMENSION DETAILS OF ALL PARTS ALONG WITH THE TECHNICAL OFFER.
 - ALL WELD AREAS SHALL BE PICKLED AND PASSIVATED.
 - REMOVE ALL SHARP EDGES AND BURRS.
 - THE ASSEMBLY SHALL BE BEAD BLASTED FOR NON-DIRECTIONAL MATT FINISH. BEAD BLASTING IS BEML SCOPE.
 - THE PROPOSED FLIP-UP SEAT SHALL CONFORM TO DOC. No. GR/TD/4947.
 - THE SEAT INCLINATION "X°" SHALL BE PROPOSED BY SUB-CONTRACTOR AND SHALL BE MINIMUM 6°.
 - MOUNTING DIMENSION SHALL BE SUBMITTED BY THE SUB CONTRACTOR.
 - MOUNTING HARDWARES IS TO SUPPLIER SCOPE.

3		2					1			
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 Z102 (PT-1) (MEDIUM)							QUALITY OF WELD JOINTS REF. RD 230 MEDIUM			
VALUES OF SURFACE TEXTURE SHALL BE AS PER COMPANY STD DS. 1012.C.							STATUS:	---		
WELDING SHALL BE CARRIED OUT AS PER IS: 9595-96										



SECTION A-A

1:2

SL.No.	QTY	PART / STOCK No.	DESCRIPTION	SIZE	COMPANY STD./I.S	Wt. (Kg)
			MUMBAI METRO CARS L2&L7			
			PRODUCT			
			REF DRG			
			MATERIAL	SUS 304 L / AISI 304 L, No. 2B FINISH		
			HEAT TREAT.	-	APPD	20/02/2020
			SURFACE TREAT.	-	REVD	20/02/2020
			TITLE			
			CHKD	20/02/2020		
			DRWN	20/02/2020		
			SCALE			
			SHEET OF	---		
			DRG No.			
			ALT			
ALT.NO.	ECN NO/CHANGES	DATE	BY	CHKD	APPD	
			BEML LIMITED			
			525-23031			