



BEML LIMITED
BANGALORE
R & D CENTER

Doc No.	GR/TD/4826
Date	14/08/2019
Rev. No	0
Page	1/11

**Procurement Technical Specification of
Flareless bite type double compression fittings
for MRS1**

	Name	Date	Signature
Approved By	Gautam Dua	14.08.2019	
Reviewed By	Sunil Kumar	14.08.2019	
Prepared By	Mahesh Rao	14.08.2019	

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	3/11

Table of Contents

1.1. General	4
1.2. Climatic Conditions	4
2. Definitions and Abbreviations	5
3. Qualifying criteria.....	5
4. General Requirements	6
4.1. Defining of unclear aspects.....	6
4.2. Responsibility of Subcontractor	6
5. Standards	6
6. Scope of Supply.....	6
6.1. General	6
6.2. Submission of Documents	6
6.3. Quality Assurance Plan	7
6.4. Marking & Packing	7
6.5. Quality Assurance Program	7
6.5.1. General	7
6.5.2. Quality Assurance Plan.....	8
7. Technical Requirements.....	8
7.1. General	8
7.2. Dimensional Tolerances, Workmanship and finish	9
8. Testing.....	9
8.1. General	9
8.2. Inspection.....	9
9. First Article Inspection (FAI)	10
10. Submittals with Technical Offer	10

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	4/11

Introduction

1.1. General

This document specifies the technical requirements of Flareless bite type double compression fittings procured by BEML for MRS1 contract for Mumbai Metro Regional Development Authority.

The Subcontractor shall be responsible for all works required in this PTS with regard to Flareless bite type double compression fittings and shall be responsible for supporting BEML activities as Subcontractor for MRS1 Project.

1.2. Climatic Conditions

The MRS1 Cars has to operate reliably and safely under climatic conditions shown in Table below.

Description	Limiting Values
Maximum ambient temperature	38°C (Refer note below)
Minimum temperature	14.3°C
Humidity	≥95% RH
Rainfall	The Annual precipitation is 2078mm with 34% (709mm) falling in the month of July
Atmosphere during hot season	Extremely dusty including bird feathers
Maximum wind load	150 km/hr
Vibration & 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	360 - 540 mg/m ³

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. Any moisture condensation shall not lead to any malfunction or failure.

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	5/11

2. Definitions and Abbreviations

The following definitions and abbreviations are applicable to the PTS.

- “Employer” means, Delhi Metro rail Corporation Limited(DMRC), its legal successors and assignees.
- “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 Representative” means any assistant of the Engineer appointed from time to time by the Engineer.
- “BEML” means the Contractor for procurement of the Flareless bite type double compression fittings for MRS1 Project.
- “Subcontractor/Supplier” means the Subcontractor for Flareless bite type double compression fittings to BEML for MRS1 Project.
- “PTS” means BEML’s Procurement Technical Specification.

3. Qualifying criteria

The Subcontractor shall have designed, manufactured, supplied Flareless bite type double compression fittings in accordance to DIN2353 standards and have been in use, established their satisfactory performance and reliability on at least three mass rapid transit System(MTS) in revenue service for a period of over 3 years or more (in each MRTS) either outside the country of origin in three different countries or in an MRTS in India. Subcontractor shall provide supporting documents (PO/performance certificate) along with offer.

Subcontractor shall provide the details of national/international standards used for manufacturing and testing of Flareless bite type double compression fittings along with offer.

Subcontractor selection is subjected to the Employer approval.

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	6/11

4. General Requirements

The Subcontractor shall supply Flareless bite type double compression fittings in conformance to this PTS, purchase order requirements and the applicable drawings and standards.

4.1. Defining of unclear aspects

If any term or clause is not described in the specification or thought to be unclear, Subcontractor shall discuss those with Design Team in BEML prior to making a contract to confirm their definitions.

After making a contract, Subcontractor shall follow the definition and opinions of Design Team in BEML.

4.2. Responsibility of Subcontractor

Subcontractor shall hold the responsibility for manufacturing and supplying of Flareless bite type double compression fittings in conformance to the PTS, purchase order requirements, applicable standards and BEML drawings.

5. Standards

The Flareless bite type double compression fittings shall conform to DIN2353 standards, BEML drawings and PTS.

6. Scope of Supply

6.1. General

The Subcontractor shall supply Flareless bite type double compression fittings as per the guide lines of the DIN 2323 standards, purchase order requirements and confirming to the technical requirements of clause 7 .

6.2. Submission of Documents

The Subcontractor shall submit the following documents as a minimum at the along with the offer and along with every batch of supplies

- ✓ Details of the existing infrastructure facilities for manufacturing of Flareless bite type double compression fittings.

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	7/11

- ✓ ISO 9001 certificate, DNV type approval certificate, ASME N, ASME NPT certificate.
- ✓ Raw material test certificates viz. Chemical and mechanical properties from the sources for the stainless steel along with supplies according to EN10204 3.1 shall be submitted during product delivery.
- ✓ Type test and all other applicable certificates as per the standards mentioned in the drawing and international standard followed.
- ✓ Dimensional check sheets along with supplies.
- ✓ Applicable test reports along with standard followed, with the supplies.

6.3. Quality Assurance Plan

The Subcontractor shall submit the following documents conforming to the Technical Specification along with every batch of supplies.

- ✓ Dimensional check sheets
- ✓ Material Test certificates

6.4. Marking & Packing

Each Fitting shall be marked with the details of

1. Manufacturers name
2. Type Designation
3. Size

with a permanent marker. Each fitting shall be wrapped separately with plastic cover so as to avoid scratch marks surface.

The Flareless bite type double compression fitting shall be properly packed and due care shall be taken to ensure that no damage occurs during transit.

6.5. Quality Assurance Program

6.5.1. General

The Subcontractor shall hold ISO 9001 certification as well as DNV type approval certification and shall manufacture the product accordingly. The Subcontractor shall submit a copy of ISO 9001 certification and DNV type approval certification along with the offer. The Subcontractor shall monitor and

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	8/11

control the Quality systems as per ISO 9001 and DNV type approval certification guidelines. BEML and/or Engineer/his representative may periodically conduct compliance audits of the Subcontractor's Quality management systems. Also the fittings produced under QAP has been audited by the ASME.

6.5.2. Quality Assurance Plan

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

7. Technical Requirements

7.1. General

1. The Subcontractor shall manufacture and supply Flareless bite type double compression fittings confirming to DIN 2353 and as per the BEML drawings.
2. The steel grade used for fittings shall be SUS316 only. Subcontractor shall procure raw material from reputed sources shall submit material test certificates viz. chemical and mechanical properties from the sources for stainless steel along with the supplies. Also subcontractor shall provide all the material test certificates for raw material and type, routine test certificates for flare less bite type double compression fittings of previous projects during the tender stage.
3. All component parts of the fitting shall be of the same material.
4. The fittings shall be made from bar stock (straight configuration) shall meet ASTM A276/ASTM A479 type316 standards and those made from forgings shall meet ASTM A182 / ASME SA182 standards. Material test certificates according to EN10204 3.1 should be submitted during product delivery.
5. The subcontractor shall provide the product detail, fastening procedure and all copy of applicable standard.
6. The Subcontractor shall provide the 3D models in the neutral format for all the applicable fittings.
7. Final inspection, Packing and dispatch

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	9/11

The material grade in respect of chemical composition, heat treatment, microstructure and mechanical properties shall be as stipulated in the applicable standards.

The Subcontractor shall carryout the all tests mentioned in the standards and shall submit the certificates for the above.

7.2. Dimensional Tolerances, Workmanship and finish

All Flareless Double Compression End Fittings should conform to the dimensions and standards / specifications as mentioned in the drawings supplied along with the purchase order.

8. Testing

8.1. General

The Subcontractor shall perform the tests in accordance with the Standards specified in the drawing and applicable standards. Following tests shall be performed as a minimum

- a .Leakage test
- b. Repeated assembly test
- c. Burst pressure test
- d. Pullout test
- e. Combined cold Vibration test for simulated long life test
- f. Pressure pulsation test
- g. Shock test
- h. Functional random test in all directions like Longitudinal, Transverse, vertical any other test if any specified in the standard.

The performance of all the supplies shall be satisfactory for the warranty period. BEML and/or Employer's representative have the right to witness any of these tests at any stage of test progress.

8.2. Inspection.

a. Visual inspection

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	10/11

Every fitting irrespective of lot size shall be examined visually for surface defects and irregularities. The Fittings shall be free from defects that would impair the utility of the items.

b. Chemical Composition & Mechanical properties

The chemical composition and mechanical properties of the fittings shall conform to grade SUS316. The Subcontractor shall submit test reports for every batch of supplies.

9. First Article Inspection (FAI)

All Flareless bite type double compression fittings shall be offered for First Article Inspection (FAI) at the place of manufacture to BEML and/or Engineer/his representative. Bulk production shall be taken up, only after obtaining clearance from BEML.

10. Submittals with Technical Offer

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

1. Complete Technical Offer for Flareless bite type double compression fittings.
2. Supply/performance details with references for same/similar design for last five years as per clause 3 to be submitted.
3. Plant details - Manufacturing and testing facilities of Flareless bite type double compression fittings along with ISO9001 certificate and DNV type approval certificate.
4. Duly filled Vendor Approval form along with operator's satisfactory running certificate.
5. Supporting document for qualification criteria as per clause 3
6. Clause-wise comments against this PTS document (GR/TD/4826), ONLY in the following form:
 - Complied: "Complied" shall be indicated by the vendor where the vendor is able to comply with the clause.

	Procurement Technical Specification of Flareless bite type double compression fittings for MRS1	Doc No.	GR/TD/4826
		Date	14/08/2019
		Rev. No	0
		Page	11/11

- Noted: where the clause merely provides information.
- Not Complied: where the Subcontractor is not able to comply fully with certain clauses or has any observation or proposes an alternative design. "Not Complied" shall be indicated and comments if any shall be indicated in detail. All clauses with status as "Not Complied" shall be included in the statement of deviations.

7. Statement of deviations report to PTS, along with technical offer and all the clause-wise comments with status as "Not Complied" shall be included in this report. Any "Not Complied" comment by the subcontractor in the clause-wise comments, that is not included in the statement of deviations report shall be treated as "Complied".

Date:

Proforma No: MRS1/BEML/V.NNO/CAT- A /BR.01.05 /M/B012

CHECKSHEET FOR SUBMISSION OF DOCUMENTS FOR NOTICE OF NO OBJECTION FOR SUB-CONTRACTOR/VENDOR FROM DMRC			
ITEMS: Flareless Bite type Double Compression End fittings			
Category	A	Items manufactured outside India and proposed to be used in all MRS1 trains.	<input checked="" type="checkbox"/>
	B	Items manufactured outside India and proposed to be used in all MRS1 trains but likely to be localised after some part quantity from OEM (shall be declared by BEML).	<input type="checkbox"/> Equivalent Localisation Quantity : __ Trainsets
	C	Locally manufactured items proposed to be used in all MRS1 trains.	<input type="checkbox"/>
1	Proforma for Submission of documents		<input type="checkbox"/> YES <input type="checkbox"/> NO
2	Vendor Details	Annexure-I	<input type="checkbox"/> YES <input type="checkbox"/> NO
3	Sub-Vendor Detail	Annexure-I	<input type="checkbox"/> YES <input type="checkbox"/> NO
4	Certificate from BEML	Annexure-II	<input type="checkbox"/> YES <input type="checkbox"/> NO
5	Copy of technical purchase specification of BEML		<input type="checkbox"/> YES <input type="checkbox"/> NO
6	Inspection and Test Plan		<input type="checkbox"/> YES <input type="checkbox"/> NO
Note:	1	Incomplete documents will not be reviewed by DMRC.	
	2	Items used in DMRC's existing rolling stock do not automatically qualify for use unless specifically approved by DMRC for this project.	
<div style="display: flex; justify-content: space-between;"> (BEML Limited) _____ (Proposed Vendor) </div>			

**PROFORMA FOR SUBMISSION OF DOCUMENTS FOR NOTICE OF NO OBJECTION FOR SUB-CONTRACTOR/VENDOR
FROM DMRC**

1	Item description	Flareless Bite type Double Compression End fittings			
2	Vendor particulars along with proposed manufacturing unit submitted in Annexure-I	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
3	Technical Specification & Inspection Plan	—			
3.1	Enclosed copy of Technical Purchase Specification of BEML	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			
4	Details of experience/ satisfactory performance to establish compliance with ERTS 3.2.2.				
The Information shall be submitted in following format:					
S.No.	Mass Rapid Transit System where proposed sub-system/equipment/component has been used	Country	Quantity Used	Period in satisfactory Revenue Service [from/to] (Min 3 yrs in each MRTS)	Manufacturing Unit
	1	2	3	4	5
1	1				
	2				
	3				
2	1				
	2				
	3				
3	1				
	2				
	3				
4	1				
	2				
	3				
4.1	Based on above, is the proposed item compliant with ERTS 3.2.2				<input type="checkbox"/> YES <input type="checkbox"/> NO
4.2	Is the proposed manufacturing unit compliant with ERTS 3.2.2				<input type="checkbox"/> YES <input type="checkbox"/> NO
4.3	Confirmation that the subsystems used in MRS1, as proposed herein, shall have NO CHANGE in source, manufacturing unit, components, specification, material etc. from those approved unless got specifically approved from DMRC.				<input type="checkbox"/> CONFIRMED <input type="checkbox"/> NOT CONFIRMED
4.4	Information submitted herein as above is certified as correct, strictly in accordance with the MRS1 contract conditions and has been verified by BEML. In case any information is found to be factually incorrect or at variance with contract conditions at any stage, BEML commits to replace the concerned 'sub-system' in complete fleet as per the instructions of engineer, which shall be final and binding. In such case, BEML shall not be eligible either for seeking any claim whatsoever or for seeking extension of contract delivery period.				<input type="checkbox"/> CONFIRMED <input type="checkbox"/> NOT CONFIRMED
4.5	Confirmation that DMRC may depute a team of Engineers (around six) at Sub-contractor/vendor's office for requisite duration with a view to expedite finalization of designs in accordance with contract 'MRS1' conditions ERGS 5.11.3.				<input type="checkbox"/> CONFIRMED <input type="checkbox"/> NOT CONFIRMED
5	Notwithstanding the vendor approval communicated by DMRC on the proposal of BEML, responsibility for manufacture, testing, supply, commissioning and quality control shall continue to rest solely with BEML and BEML will be solely responsible for meeting all contractual requirements.				<input type="checkbox"/> CONFIRMED <input type="checkbox"/> NOT CONFIRMED
<div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div>(BEML Limited)</div> <div>_____ (Proposed Vendor)</div> </div>					

Date:

Proforma No: MRS1/BEML/V.NNO/CAT- A /BR01.05 /P2/B012

6	Category B - Sourcing from facilities in India after supply of agreed quantity from approved manufacturing unit.	
6.1	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 DMRC. 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 prior approval of the Engineer.	
6.2	In case the vendor uses his own facilities for indigenization after part supply of equipment from the approved manufacturing unit, no change in design, component type/make, quality standards, manufacture procedure, sourcing of materials etc. shall be made without specific prior approval of the Engineer.	
6.3	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 Engineer shall be obtained for changes made, model, specification, etc. Responsibility for obtaining such prior approval shall rest solely with the contractor.	
6.4	In case of local manufacturing of carbody or any other item(s) manufactured by BEML/OEM and used in initial trains, BEML shall be exclusively responsible for all quality assurance and inspection and their implementation and also ensure provision of physical partition as per the ERGS 1.1.7	
7	Category C- Locally Manufactured Items	
7.1	Does the manufacturing unit satisfy ERTS 3.2.2	<input type="checkbox"/> YES <input type="checkbox"/> NO
7.2	If not, basis/justification for proposal to be submitted for DMRC review	<input type="checkbox"/> YES <input type="checkbox"/> NO
8	BEML confirms that in terms of ERTS 3.2.2, they would seek Notice of No Objection for Sub-Contractor/Vendor from DMRC notwithstanding the item(s) being used in DMRC's existing rolling stock.	<input type="checkbox"/> YES <input type="checkbox"/> NO
9	BEML shall submit Certificate as per enclosed Annexure-II confirming:	
9.1	Compliance with Clause 6.6 of ERGS and GCC Clause 5.8 regarding supply of software tools/documents/materials etc.	
9.2	Compliance with Clause 8.12 of ERGS regarding supply of all drawings, specifications, patterns etc. in case the manufacture of these items is discontinued by the proposed vendor.	
10	Commitment from the vendor that in case of any future procurement action by DMRC, he shall quote directly to DMRC.	
11	Commitment from the Vendor to provide technical support through permanent positioning of Vendor's staff at depots for meeting DLP obligations as per ERTS clause 3.2.5.	
12	BEML commits that the vendor shall be complying with all relevant contract clauses.	
<div style="display: flex; justify-content: space-between; align-items: flex-end; padding-top: 20px;"> <div>(BEML Limited)</div> <div>_____ (Proposed Vendor)</div> </div>		

Date:

Proforma No: MRS1/BEML/V.NNO/CAT- A /BR01.05 /A1/B012

Annexure-I**SUB-Contractor/VENDOR/SUB-SUPPLIER DETAILS**

1	Vendor/Sub-supplier OEM Name	
2	Details of item proposed to be sourced	
3	Sourcing by:	(a) BEML <input type="checkbox"/> (b) Proposed Main vendor <input type="checkbox"/>
4	Marketing Office/Head Office	
4.1	Complete address (including website)	
4.2	Contact person details in Head Office	
	• Name	
	• Designation	
	• Telephone	
	• Fax	
	• Mobile	
	• Email	
5	Details of proposed compliant plant/manufacturing unit from where item is proposed to be sourced	
5.1	Complete address (including website)	
5.2	Contact person details	
	• Name	
	• Designation	
	• Telephone	
	• Fax	
	• Mobile	
	• Email	
5.3	Supply details of the manufacturing unit for the proposed item or item with similar design.	
5.4	It is confirmed that the proposed manufacturing unit and the vendor are fully compliant with ERTS 3.2.2	
5.5	We commit that in case of any future procurement action by DMRC, the proposed vendor shall quote directly to DMRC without any involvement of BEML.	
5.6	We confirm that we will provide technical support through permanent positioning of our staff at depots for meeting DLP obligations as per ERTS clause 3.2.5.	
5.7	We have carefully gone through all relevant clauses of the MRS1 Contract and shall fully abide by the contract conditions and decisions communicated by DMRC during contract execution without exception.	

(BEML Limited)

_____ (Proposed Vendor)

Date:

Proforma No: MRS1/BEML/V.NNO/CAT-A /BR01.05 /A2/B012

Annexure-II

**Certificate for compliance with Contract conditions regarding
Software requirements.**

This is certified that in the contract between BEML and _____ (proposed vendor) for supply of _____, specific conditions for confirming total compliance with the following contract condition/clauses have been included and agreed to between BEML and _____ (proposed vendor):

(a) Clause 6.6 of ERGS and GCC 5.8

It is certified that we shall provide full access of application software(s) and any other software /hardware tools to DMRC which they may specifically require for the intended purpose specified in this specification. For all commercial software BEML shall provide all available documentation for the application and maintenance of that software.

Complete documentation along with the software to be supplied by BEML and its Vendor(s) shall comprise of Signal flow diagram, flow charts, functional blocks, details of signals, interpretations so as to enable engineer to debug and implement vehicle/train level modifications based on DMRC's experience, operational & maintenance requirements. Full access to the application software to DMRC shall be provided for this purpose.

It shall be possible for DMRC to modify/change various parameters/logics used in the software and implement the changes on trains. Full facilities including any software/hardware tools, simulation/test bench which are essential for this purpose shall be supplied.

It is committed to supply the software/hardware etc. within the scope specified in respective clauses of ERTS relevant for the proposed item/vendor and we would be fully complying with GCC 5.8

(b) Clause 8.12 of ERGS:

It is certified that _____ (proposed vendor) will supply all drawings, specifications, patterns and any other information required by DMRC for arranging such items in case the manufacture of these items is discontinued within 10 years by the proposed vendor.

(BEML Limited)

_____ (Proposed Vendor)