

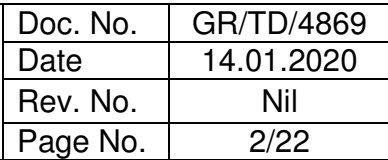


BEML LIMITED
BANGALORE
R & D CENTER

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MRS1 Project
Procurement Technical Specification
of Electrical Wiper System

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1. Introduction

1.1. General

This Procurement technical specification (PTS) specifies the requirements of Electrical wiper system to be supplied for 'MRS1' contract for Mumbai Metro Line-2 & 7 Project.

BEML will carry out all required works and activities as Contractor to the Employer for MRS1 project, while the sub contractor shall be responsible for all works required in this PTS with regard to wiper system 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.

The trains will be operated in GoA2/GoA3 modes with driver/ attendant during initial phase of the project and shall finally be upgraded to GoA4 (UTO).

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.

*: Wiper system will be externally mounted on all driver's cabins of DM cars

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1.3. Climatic & Environmental Conditions

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

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
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 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
Maximum Width over Body		3,200 mm
Minimum Passenger Saloon Headroom		2,050 mm


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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		17 Tonne (including all tolerances as per IEC 1133-1992)

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 wiper system 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 wiper system 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 wiper system for MRS1 project cars.


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3. Qualification Criteria for Sub contractor

- i) Firm should be a reputed OEM of Electrical wiper system for Railway Rolling stock and should have design, manufacture and testing capability. Company profile and the infrastructure details shall be submitted by the firm along with the technical offer.
- ii) The firm should have manufactured and supplied the electrical wiper system 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. 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.
- iii) Along with the technical offer, the subcontractor shall submit the filled Vendor approval form along with all the required supporting documents for obtaining the vendor approval for Wiper system from DMRC. Selection of Vendor is subject to DMRC approval.
- iv) The firm should undertake 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 firm shall submit detailed proposal in this regard along with the technical offer.
- v) 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 wiper system shall conform to the latest editions of internationally recognized Standards viz., Indian, American, European, Japanese, ISO, etc.

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5. Design Criteria

The Sub contractor shall meet the following system requirements for wiper system, as a minimum.


- i) The area covered by the windscreen wipers shall be at least 80-90% of the foreseen visibility. Externally mounted windscreen washer/wiper units shall be provided. The wipers shall sweep the largest possible arc and clear a windscreen area that shall enable, when manual mode, the driver to meet all external vision requirements. The washer reservoir shall have a adequate capacity, refillable from the exterior of the Metro train at track and station platform levels.
- ii) The three wipers viz. wipers on Windscreens on either side & wiper on detrainment door shall be externally mounted and shall be operable from the train driver's control panel.
- iii) Wipers shall be electrically operated.
- iv) The sub contractor shall submit details of the system configuration and components like screen wiper blades, washer nozzle, the washing media, reservoir etc.
- v) Wiper control shall have the following modes of operation:
 - Slow speed.
 - High speed.
 - Wash mode.
- vi) It shall be possible to operate one or all of the wipers in the operating cab.
- vii) It Shall be possible to operate wiper from active cab only.
- viii) The wipers shall not obstruct the operator's vision when in the parked position. The wipers shall provide efficient operation at all train speeds and environmental conditions

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6. Technical Requirements

6.1. General


- i) The Wiper System shall meet the requirements design criteria specified at Clause 5 of this PTS.
- ii) The wiper system shall comply to Electrical Wiper system arrangement drawing no. 525-18084(Ref. clause 10 : Appendices of this PTS)
- iii) Wipers shall be provided with controllers/wiper switch, DC-DC converter(if any) to operate the wipers from the driver's cabin.
- iv) The max. design speed of the Metro car is 90 kmph & the max. operating speed is 80 kmph. The system components shall have sufficient strength to withstand the operating load, refer section 1.4 of this PTS for Vehicle performance requirements.
- v) The wiper system shall ensure an effective wiping with minimum noise.
- vi) When the system is not engaged the wiper blade and arm assemblies shall remain in the park position near the side edge of the windscreen glass as per tender drawing.
- vii) The wiper shall wipe the windscreen glass clearly without leaving any traces or marks of the dirt etc in every wipe.
- viii) The wiping operation shall be smooth & continues without sticking the wiper blade on the glass.
- ix) The Wiper washer tank shall be external mounted(on carbody underframe) consisting water level indicator and washer pump.
- x) The washer tank pump shall produce sufficient flow pressure through nozzles on arms, so that the water jet can reach the extreme edges of the windscreen glass in wash mode.
- xi) The sub contactor shall furnish the details of min. contact pressure to be maintained by the blade on windscreen glass during operation and tracing force required by the blade for clear wiping operation along with technical offer.
- xii) The mounting holes/slots size & pitch for the wiper motor mounting bracket shall be as per tender drawing.

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- xiii) The structural components of wiper blade & arm assembly shall be painted/powder coated to colour RAL 9005 Jet black with good corrosion resistance & adhesion.
- xiv) The wiper motor assembly shall comply to standards IS: 7827(Part II) or equivalent International standards.
- xv) The wiper blade shall conform to clause 4.2 of SAE J198.
- xvi) The Wiper switch shall be of microprocessor controlled type & shall conform to SAE J1455 or equivalent International standards.
- xvii) The Wiper switch shall be compatible to operate all the three wipers together and as well as individual wipers.
- xviii) The complete wiper system shall qualify for the SAE J198 specification for 3 million cycles durability test (20000 cycles for the control valve/ switch).
- xix) The Wiper system shall be 110V DC operated. If not complying for 110V DC, then suitable DC-DC converter(24V DC) shall be provided by the sub contactor based on the total power consumption.
- xx) The Cables, connectors and all non-metallic accessories of Wiper system shall comply to fire safety standard EN 45545, Category 4-A (HL3) R1 requirements.

6.2. Technical data

S.No	Description	Technical Details
1	Wiper Type	Pantograph type
2	Windscreen profile	Curved
3	Parking position	As per tender drawing
4	Dynamic parking	Required
5	Sweep Angle	Sub contactor to specify (Meeting clause 5(i) of this PTS)
6	Speed (strokes/min.)	Low speed 35 High speed 50
7	Operating temperature	-10°C to +90 °C.
8	Wiper blade length	Sub contactor to specify
8.1	Contact pressure	
9	Wiper arm length	
9.1	Wiper arm tracking force	

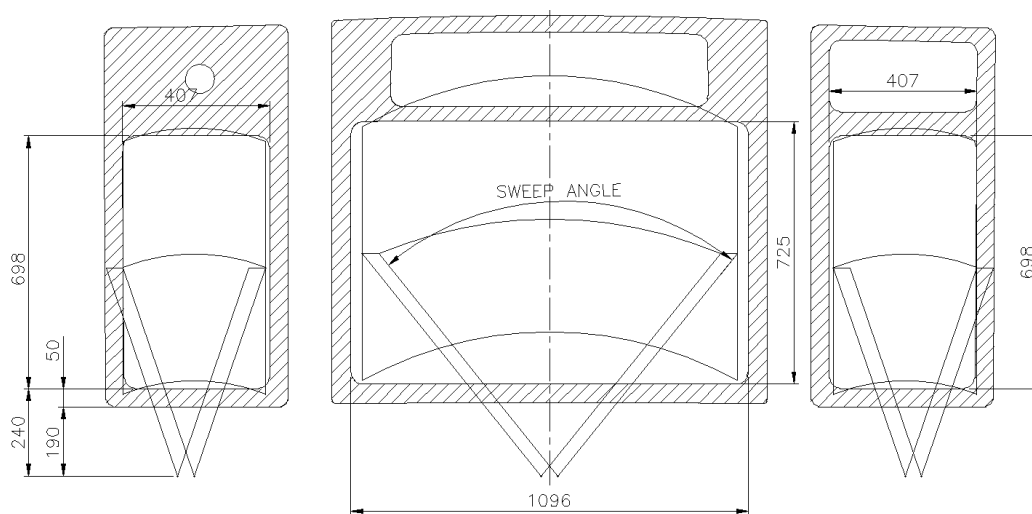
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11	<u>Wiper Switch</u>	
11.1	Type	Micro processor controlled rotary switch
11.2	Rating	110V / 24V DC-20000 cycles minimum (Ref. Note *)
12	<u>Wiper Motor assembly with pulse generator</u>	
12.1	Type	Permanent magnet DC motor with Dynamic parking
12.2	Nominal/Rated voltage	110V / 24V DC (Ref. Note *)
12.3	Power rating	Sub contactor to specify
12.4	Mounting Location	Bottom mounted (below windscreen) inside the driver's cabin
12.5	Modes of operation	High speed, Low speed & wash modes
12.6	Protection	IP54
13	<u>Washer tank assembly</u>	
13.1	Capacity	20 Litres / 5 Gallons
13.2	Tank Material	Fire safe PVC/ Polyethylene/Any other proven material complying to EN45545-HL3 requirement
13.3	Washer pump rating	110V / 24V DC-20000 cycles minimum (Ref. Note *)
13.4	Hose assembly	15000 mm approx.
13.5	Hose material	Fire safe EPDM/ silicon/ Neoprene

* Note : The Wiper system shall be 110V DC operated. If not complying, then suitable DC-DC convertor (24V DC) shall be provided by the sub contactor based on the total power consumption.

6.3. Windscreen glass dimensional data.

Wiper shall be able to be mounted on fixed GFRP (Glass Fiber Reinforced Plastic) cab mask with following dimension and blades shall be resting on windscreen glass.



Name	Windscreen glass Size	Clear area	Minimum Wiped Area	Windscreen shape
Wind screen glass(sides)	1054 x 503 x 12 Thk	698 x 407	80-90% of clear area	Curved rectangular
Wind screen glass(Central)	1058 x 1205 x 12 Thk	1096 x 725		


6.4. Fire Safety

The wiper system shall be designed to reduce to the maximum extent practical, the heat load, rate of heat release, propensity to ignite, rate of flame spread, smoke, emission and toxicity of combustion gases. All the non-metallic parts of wiper system shall confirm to fire safety requirements of EN 45545, Category 4-A (HL3) R1 requirements.

The fire performance deliverables shall be provided in accordance with following table.

Sl. No.	Deliverables	Remarks
1	Fire safety plan	As per EN45545 HL3
2	Fire safety Test Reports including heat release rate.	As per EN45545 HL3

Fire safety test reports as per EN 45545 of wiper systems supplied to previous projects shall be submitted along with the technical offer for reference.

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7. Quality Assurance Program

7.1. General

The sub contactor shall hold ISO 9001/ IRIS certification and shall manufacture the product accordingly. The sub contactor shall submit a copy of ISO 9001 / IRIS certification along with the offer. The sub contactor 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 Sub contactor's Quality management system.

7.2. Quality assurance plan(QAP)

The sub contactor shall develop and submit a Quality assurance plan (QAP) to BEML for review and approval based on ISO 9001 / IRIS guidelines

8. Scope of Supply

The sub contactor shall be responsible for the scope of supply of the wiper system, which shall comprise, unless specifically excluded, the design, manufacture, testing, delivery, commissioning and rectification of defects during the Defects Liability Period.

The Sub contactor shall meet the system requirements for wiper system in accordance with this PTS, as a minimum.


The design of wiper system shall be rugged and shall ensure a durable life of 35 years in the Mumbai environment and the operating conditions.

The firm should depute Engineer/Technician to install & demonstrate the first wiper system & train the concern staff to carry out the same.

8.1. Hardware

The sub contactor shall supply the complete wiper system including all sub-assemblies and mounting accessories in ready to install and operate condition.

The sub contactor shall supply the following, as a minimum, per set of wiper system.

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1. Wiper motor assemblies.
2. Wiper Arm assemblies with spray nozzle.
3. Wiper blade assemblies
4. Connecting linkage assemblies.
5. Housing/ pivot assemblies including all fittings viz. locknuts, special washers, gaskets, weather caps etc.
6. Microprocessor control rotary type wiper switch.
7. Washer Tank assembly - 20 litres/5 gallons capacity,- the washer tank shall be equipped with water level indicator, washer pump 110V / 24V DC (with DC-DC converter) with electrical connections,
8. Hose assembly with bulk head connectors, Hose bend (90 deg), Non-return valve, Tee hose clamps and adopter assemblies.
9. Control System with pulse generators.
10. All connectors, wires/harness to be supplied in crimped condition. Mating connectors & necessary crimping tools for car side wiring also to be supplied by wiper system sub contractor.
11. Water tank mounting bracket along with mounting hardware.
12. The special tools for installation viz. arm extractor tool along with first wiper system to be supplied.
13. Any other accessories deemed essential for the proper installation and functioning of the wiper system.
14. Equipment side connectors for Dielectric test: Subcontractor shall supply one full set of connectors and its contacts as mounted on the equipment to carryout vehicle level voltage withstand test at BEML factory. Detailed list shall be decided and finalized before first supply.

8.2. Weight


The weight of the complete wiper system including washer tank(without water) and accessories shall be minimal and shall not exceed 28kg \pm 10%. However, the subcontractor shall furnish the exact weight of proposed wiper system and individual part wise along with technical offer.

8.3. Submission of Documents

The Sub contractor shall submit the following documents, as a minimum.

Drawings & 3D Models:

- The drawings for the proposed Wiper system, with OEM part nos in the Bill of material (BOM) & Electrical connections/ control circuit diagrams of complete wiper system including washer tank pump connections.

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- Complete 3D Models of the proposed wiper system.
- Technical Description document of proposed Wiper System including detail description of all the parts in the wiper system.
- Complete Wiper system and individual part wise weight.
- Technical data sheets of wiper switch and other standard items.
- Technical specifications for Wiper motors, electrical connectors, washer tank assembly including pump, wiper switch, link assemblies, housing or pivot assemblies etc.
- Operation & Maintenance manual.
- Installation procedure.
- Fire safety test reports for all non-metallic components including cables and connectors as per EN45545 HL3 requirements including Heat release rate prior to first wiper system supply.
- FAI Test Procedure & Type test reports of standard parts/wiper system.
- The Sub contractor shall submit the following documents conforming to the Technical Specification along with every batch of supplies.
 - Material test certificates
 - Dimensional check sheets

8.4. Supply of spares

8.4.1. Consumable Spares


The sub contractor shall supply consumable spares for maintenance of wiper system in all trains during commissioning, service trials and up to completion of warranty period.

The Sub contractor shall supply following consumable spares as a minimum.

Sl. No.	Description	Unit	Qty in units
1	Wiper blade	Nos.	504

8.4.2. Commissioning and DLP Spares

The sub contractor shall supply commissioning and DLP spares & sub contractor shall submit to BEML/DMRC for review a list of minimum spare parts that he intends to

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make available during the installation, erection, and commissioning and defect liability periods. The list shall be submitted along with technical offer.

The sub contractor shall keep on site, at his own cost, throughout the installation, erection, commissioning and defect liability periods, stocks of spare parts, as per the list to enable rapid replacement of any item found to be defective or in any way in non-conformance with the specification.

Spares as per the agreed list shall be supplied prior to receipt of first wiper system.

The firm should provide Technical/service support during commissioning and post commissioning period, till completion of the Defect Liability period or from their local partner in India.

8.5. Packing

The Wiper System 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 sub contractor. The sub contractor should ensure, all the components/parts are packed as per the wiper system BOM before dispatch.


9. Type Test & Routine Tests

The Wiper system shall be type and routine tested in accordance with relevant standards and specifications.

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

The sub contractor shall carryout the following type tests and routine tests as a minimum.

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SI No.	Type of Test	Type Test	Routine Test	Remarks
1	Function Test	✓	✓	
2	Strength Test	✓	—	
3	Endurance Test/ Durability test of the wiper system	✓	—	
4	Material Test	✓	✓	
5	Dimensional Inspection	✓	✓	
6	Fire Safety Test	✓	—	For all non-metallic material
7	Wiper blade tests	✓	—	
8	Wiper Motor tests	✓	—	
9	Wiper switch tests	✓	—	

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. First Article Inspection (FAI)

The sub contractor/subcontractor shall offer the wiper system for First Article Inspection by BEML/DMRC in accordance with the BEML/DMRC 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 wiper system 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,

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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 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 Approval form.
- 2) Technical offer Submittals Check List
- 3) Electrical wiper system arrangement drawing: 525-18084
- 4) Wiper Blade assy. drawing : 525-18340

11. Submittals with Technical Offer

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

- 1) Complete Technical Offer for wiper system with washer tank & hose assembly.

	Procurement Technical Specification of Electrical wiper system for MRS1 Project	Doc. No.	GR/TD/4869
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- 2) OEM Drawing for the proposed Wiper systems with complete BOM.
- 3) Technical Description document along with electrical wiring diagram of Wiper System.
- 4) Technical data sheets of wiper switch and other standard items.
- 5) Fire safety test reports as per fire safety standard EN 45545 of wiper systems supplied to previous projects for reference as per PTS clause 6.4.
- 6) Power consumption details of complete wiper system (at High speed, Low speed and wash modes).
- 7) Weight details of complete wiper system with individual part wise weight.
- 8) List of commissioning & DLP spares as per clause 8.4.2 of this PTS.
- 9) Clause-wise comments against the PTS Doc No. GR/TD/4869.
- 10) Supporting documents for qualification criteria as at Clause-3 of this PTS.
- 11) Vendor approval documents including QAP, ITP, Company profile with infrastructure facilities, product range etc

Date:

Proforma No: MRS1/BEML/V.NNO/CAT-___/___/M/___

CHECKSHEET FOR SUBMISSION OF DOCUMENTS FOR NOTICE OF NO OBJECTION FOR SUB-CONTRACTOR/VENDOR FROM DMRC			
ITEMS:			
Category	A	Items manufactured outside India and proposed to be used in all MRS1 trains.	<input 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>			

Date: _____

Proforma No: MRS1/BEML/V.NNO/CAT-___/_____/P1/_____

PROFORMA FOR SUBMISSION OF DOCUMENTS FOR NOTICE OF NO OBJECTION FOR SUB-CONTRACTOR/VENDOR FROM DMRC					
1	Item description				
2	Vendor particulars along with proposed manufacturing unit submitted in Annexure-I		<input type="checkbox"/> YES		<input type="checkbox"/> NO
3	Technical Specification & Inspection Plan		—		
3.1	Enclosed copy of Technical Purchase Specification of BEML		<input 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- ____ / ____ /P2/ _____

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- ___/___/___/A1/___

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: <div style="display: flex; justify-content: space-between;"> (a) BEML <input type="checkbox"/> (b) Proposed Main vendor <input type="checkbox"/> </div>
4	Marketing Office/Head Office
4.1	Complete address (including website)
4.2	Contact person details in Head Office
	<ul style="list-style-type: none"> • 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
	<ul style="list-style-type: none"> • 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.
<div style="display: flex; justify-content: space-between;"> (BEML Limited) _____ (Proposed Vendor) </div>	

Date:

Proforma No: MRS1/BEML/V.NNO/CAT- __ / __ /A2/ __

Annexure-II	
<u>Certificate for compliance with Contract conditions regarding Software requirements.</u>	
<p>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):</p>	
(a)	<p>Clause 6.6 of ERGS and GCC 5.8</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p>
(b)	<p>Clause 8.12 of ERGS:</p> <p>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 vender.</p>
<div style="display: flex; justify-content: space-between;"> (BEML Limited) _____ (Proposed Vendor) </div>	

Undertaking for Technical/Service Support

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To Delhi Metro Rail Corporation Ltd.


We _____ (proposed Vendor) shall provide Technical/Service support during Commissioning and post Commissioning period, till completion of the Defect Liability Period, for Mumbai Metro Line 2 & 7, 'MRS1' Project from their local office in India.

BEML Limited

(sign, Name & designation with stamp)

Proposed Vendor

(sign, Name & designation with stamp)

	SUBMITTALS CHECK SHEET	Project : MRS1
Aggregate :	ELECTRICAL WIPER SYSTEM	PTS DOC No.: GR/TD/4869

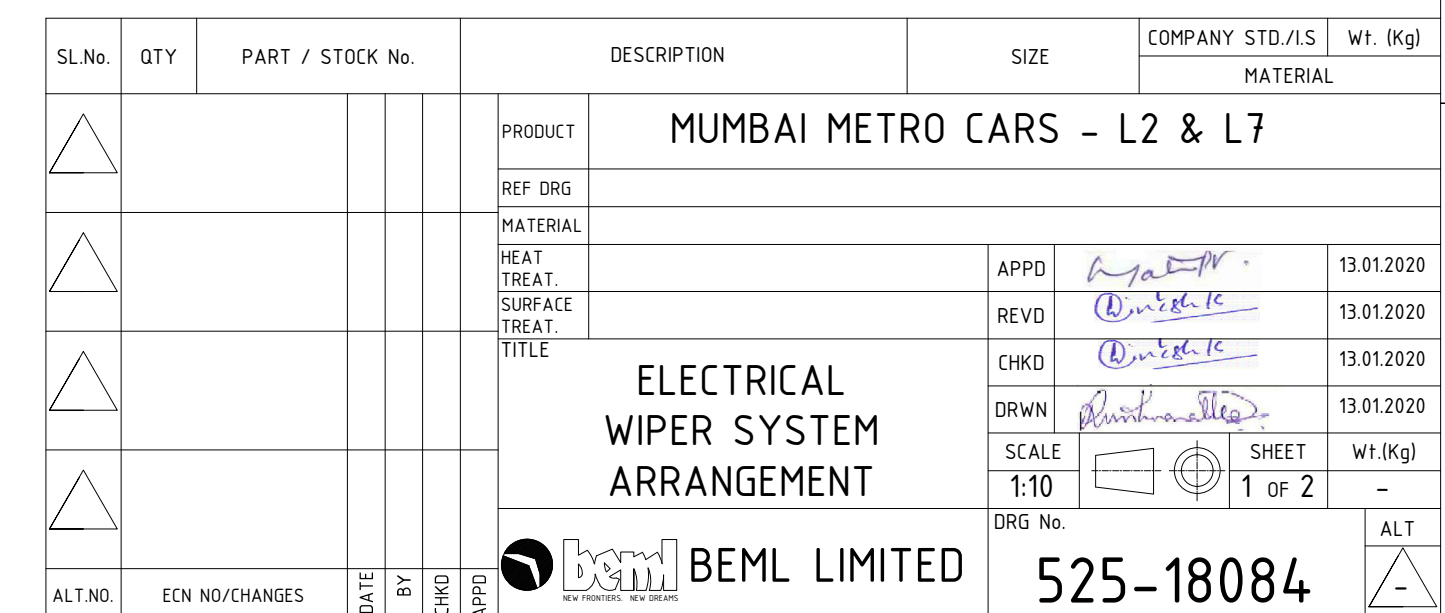
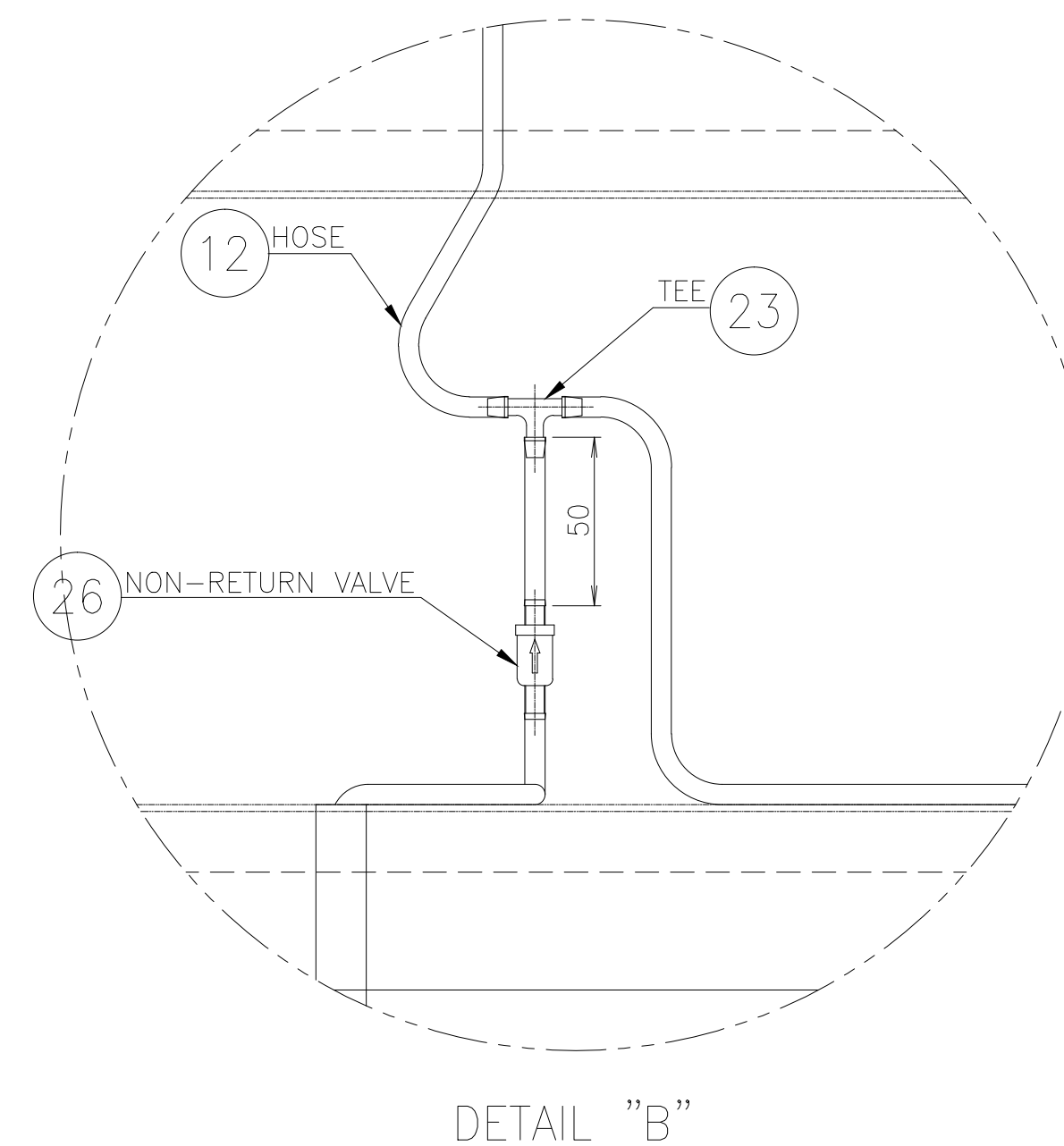
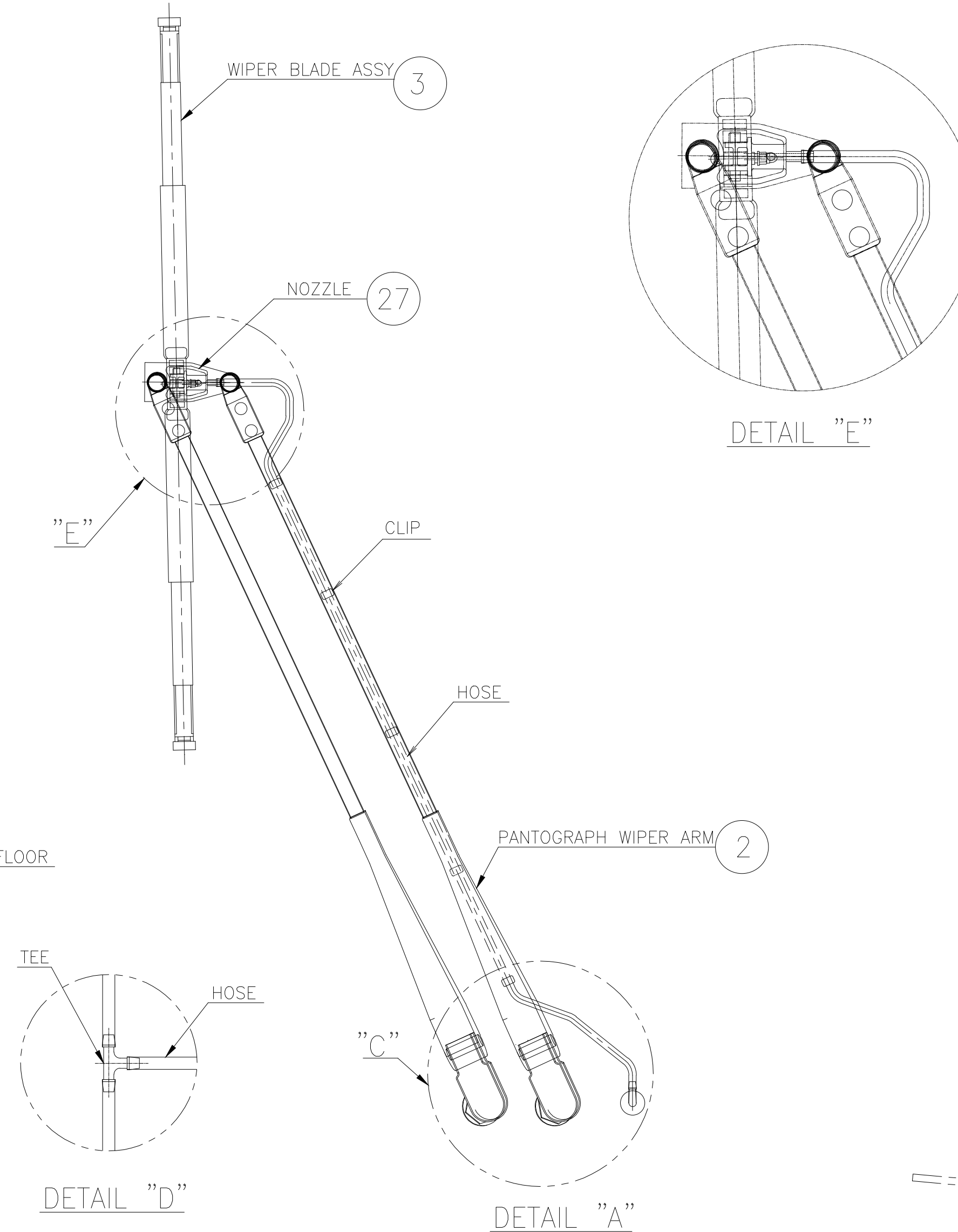
TECHNICAL			
SL.NO.	DETAILS	SUBMITTED	NOT SUBMITTED
1	Complete Technical Offer for wiper system with washer tank & hose assembly	<input type="checkbox"/>	<input type="checkbox"/>
2	OEM Drawing for the proposed Wiper systems with complete BOM	<input type="checkbox"/>	<input type="checkbox"/>
3	Technical Description document along with electrical wiring diagram of Wiper System	<input type="checkbox"/>	<input type="checkbox"/>
4	Technical data sheets of wiper switch and other standard items	<input type="checkbox"/>	<input type="checkbox"/>
5	Fire safety test reports as per fire safety standard EN 45545 of wiper systems supplied to previous projects for reference as per PTS clause 6.4	<input type="checkbox"/>	<input type="checkbox"/>
6	Power consumption details of complete wiper system (at High speed, Low speed and wash modes)	<input type="checkbox"/>	<input type="checkbox"/>
7	Weight details of complete wiper system with individual part wise weight.	<input type="checkbox"/>	<input type="checkbox"/>
8	List of commissioning & DLP spares as per clause 8.4.2 of this PTS	<input type="checkbox"/>	<input type="checkbox"/>
9	Clause-wise comments against the PTS Doc No. GR/TD/4869	<input type="checkbox"/>	<input type="checkbox"/>
10	Supporting documents for qualification criteria as at Clause-3 of this PTS GR/TD/4869	<input type="checkbox"/>	<input type="checkbox"/>
11	Duly filled Vendor approval documents including QAP, ITP, Company profile with infrastructure facilities, product range etc and satisfactory revenue service performance certificate from end user/Metro corporations for electrical wiper system	<input type="checkbox"/>	<input type="checkbox"/>

Note: Incomplete submissions are liable to Rejection.

.....
Signature of the Bidder with Seal

UN CONTROLLED

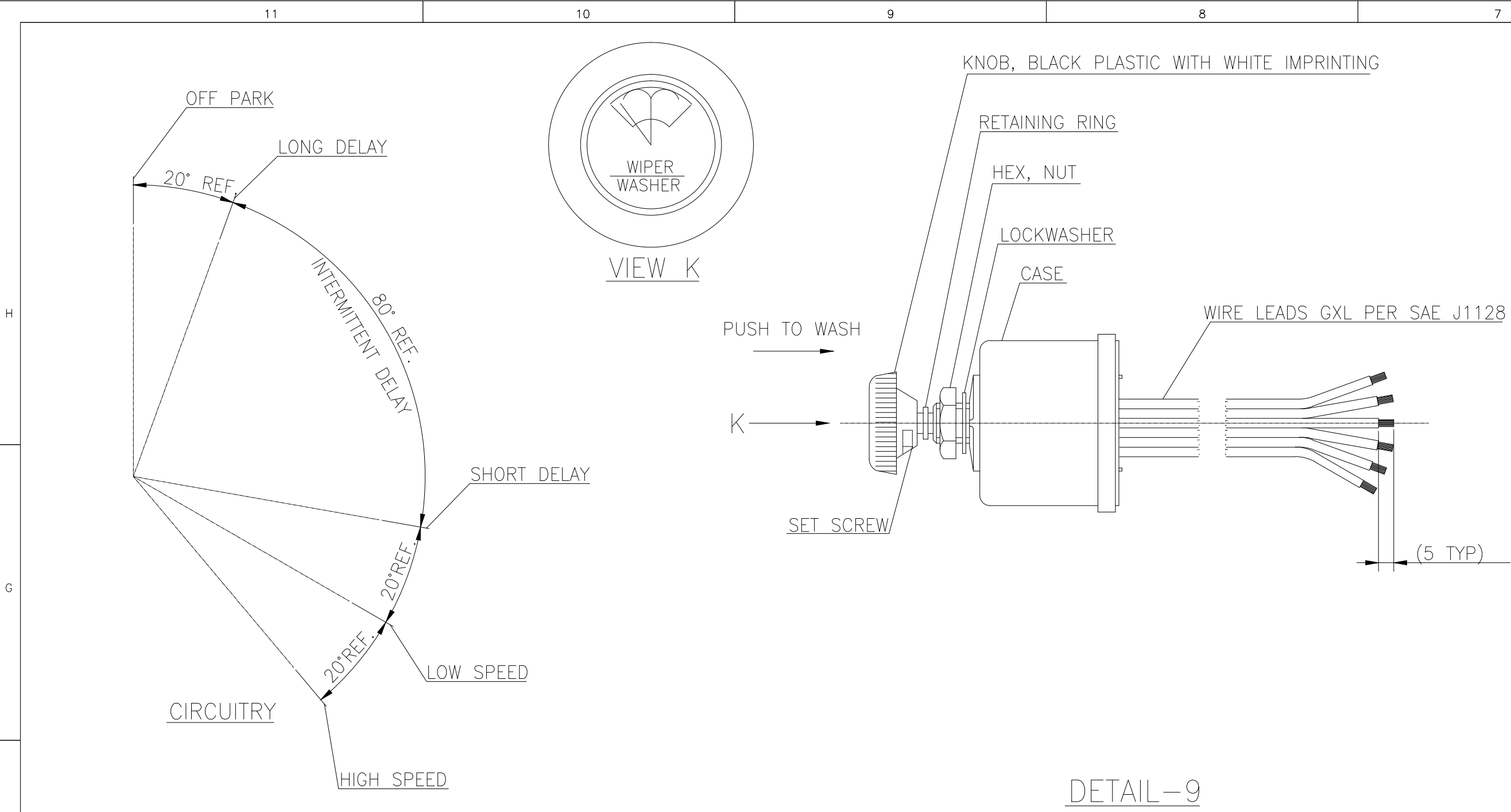
UN CONTROLLED



GRADE No	VALUE	SYMBOL
SURFACE		

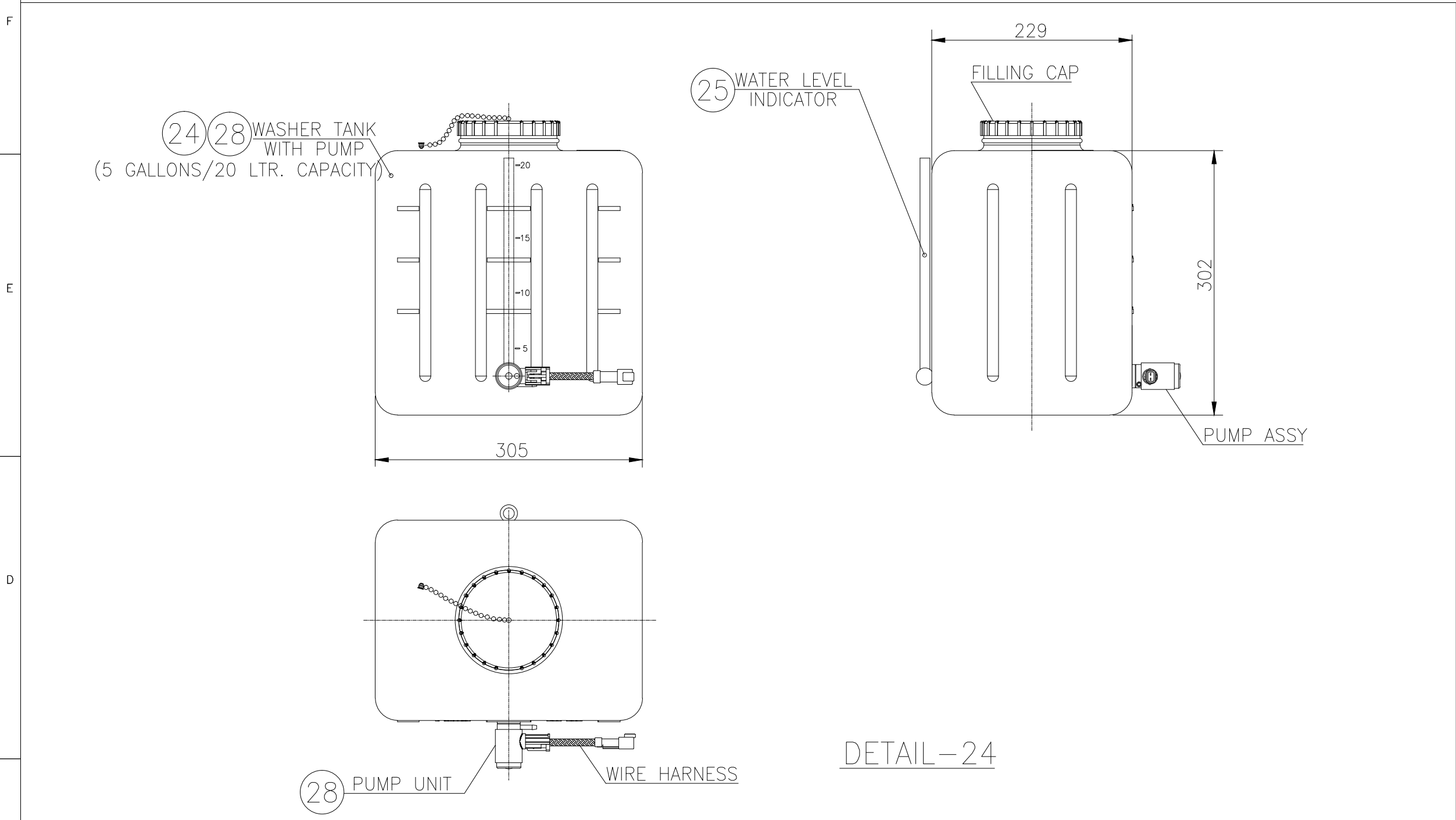
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GRADE No. N12 N11 N10 N9 N8 N7 N6 N5 N4 N3 N2 N1
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SYMBOL
SURFACE
ROUGHNESS

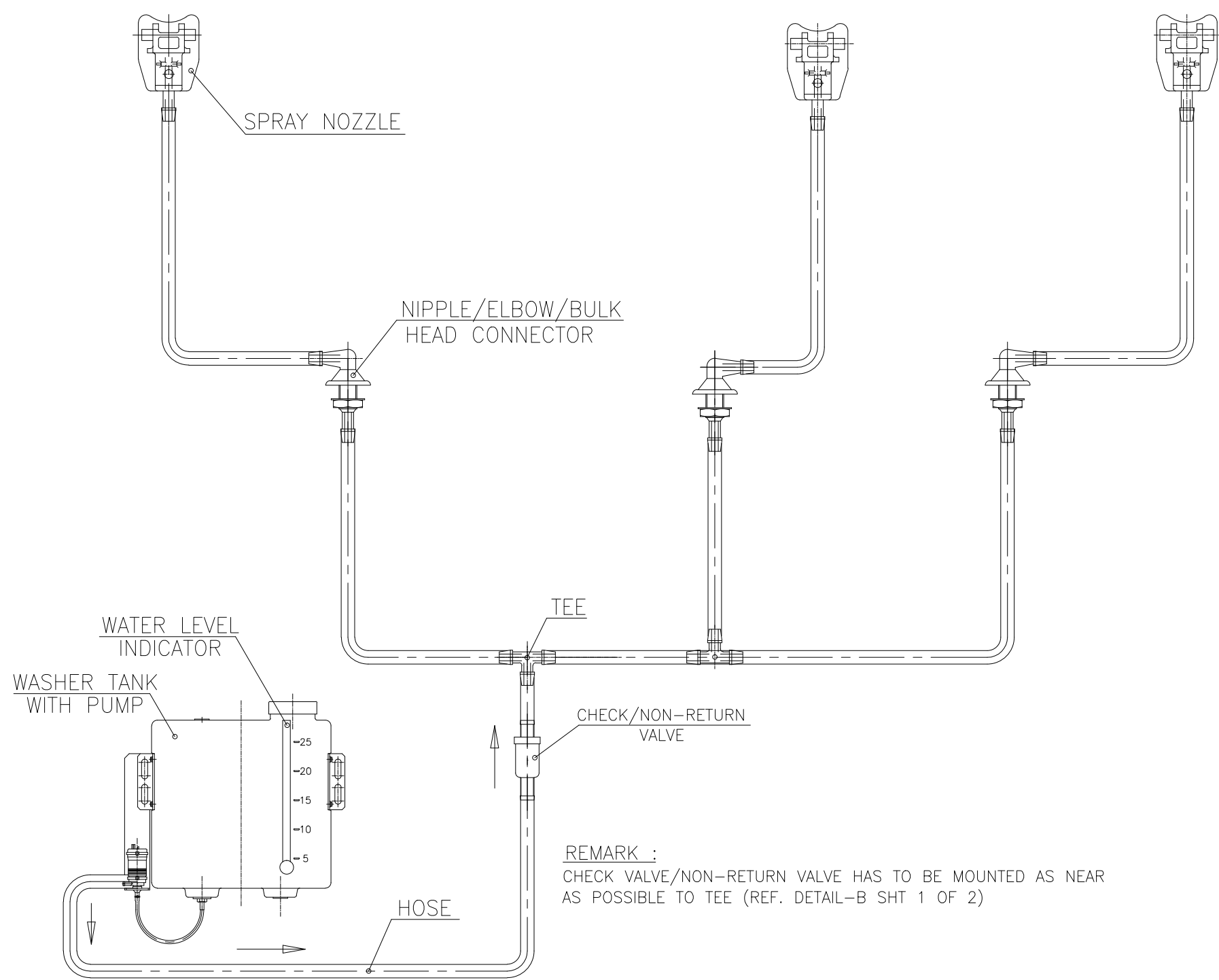


SWITCH CONNECTIONS	
MOTOR LOW SPEED TERMINAL	
MOTOR HIGH SPEED TERMINAL	
MOTOR PARK TERMINAL	
GROUND (B- TERMINAL)	
WASHER PUMP (B+ TERMINAL)	
B+ TERMINAL	
SEPARATE B+ AND GROUND CONNECTIONS MUST BE MADE TO THE WIPER MOTOR	

- NOTE:
1. TO CONTROL 110V/24V DC PERMANENT MAGNET MOTOR WITH DYNAMIC PARK (NEGATIVE GROUND ONLY REVERSE POLARITY PROTECTED)
 2. PUSH TO WASH (WASHER & WIPER CIRCUIT ACTIVATED – 1 TO 3 WIPES AFTER WASHER CIRCUIT DEACTIVATED)
 3. RATING: 110V/ 24V DC – 20000 CYCLES MINIMUM. WASHER CIRCUIT: 110V/24V DC – 20000 CYCLES MINIMUM.
 4. SWITCH SHALL CONFORM TO SAE J1455:
 5. SWITCH SHALL BE OF MICROPROCESSOR CONTROLLED TYPE MAKE: COLE HARSEE.
 6. SWITCH SHALL BE COMPATIBLE TO OPERATE ALL THE THREE WIPERS TOGETHER AND AS WELL AS INDIVIDUAL WIPERS.



- NOTE:
1. WIPER ARM SHALL BE PARKED AWAY AUTOMATICALLY WHEN THE ARM IS PULLED BACK.
 2. THE SPRAYING OF WATER THROUGH NOZZLE SHALL BE INSTANT(WITHOUT ANY DELAY).
 3. A SEPARATE WATER LEVEL INDICATOR SHALL BE PROVIDED IN WATER TANK FOR MONITORING WATER LEVEL IN TANK.
 4. WASHER TANK KIT CONSISTS OF WASHER TANK/RESERVOIR, PUMP, DC-DC CONVERTER, WASHER FLUID LEVEL INDICATOR, NON-RETURN VALVE, TEES, ELBOWS,CONNECTORS & NOZZLES.
 5. THE WIPER SYSTEM SHALL CONFORM TO PTS DOC NO. GR/TD/4869.
 6. ALL THE NON-METALLIC MATERIALS INCLUDING CABLES & CONNECTORS SHALL MEET THE FIRE SAFETY REQUIREMENTS AS PER EN 45545 HL3 STANDARD.
 7. SAMPLE APPROVAL SHALL BE OBTAINED BEFORE BULK SUPPLIES.



WASHER KIT ASSEMBLY
(HYDRAULIC CIRCUIT)

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 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										STATUS:					
WELDING SHALL BE CARRIED OUT AS PER IS: 9595-96										PROTO/PRODUCTION					

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SPECIFICATION:-

WIPER TYPE	PANTOGRAPH WIPE
WINDSCREEN PROFILE	CURVED
PARKING POSITION	AS PER DRAWING
DYNAMIC PARKING	REQUIRED
SWEEP ANGLE	SUPPLIER HAS TO SPECIFY FOR 80-90% WIPE WINDSCREEN AREA
STROKE/MINUTE	
LOW SPEED :	35
HIGH SPEED :	50
NOMINAL VOLTAGE	110V DC/ 24 V DC(WITH DC-DC CONVERTER)
OPERATING TEMP RANGE	AS PER MUMBAI (INDIA) ENVIRONMENT
WIPER BLADE LENGTH	SUPPLIER HAS TO SPECIFY
CONTACT PRESSURE	SUPPLIER HAS TO SPECIFY
WIPER ARM LENGTH	SUPPLIER HAS TO SPECIFY
ARM TRACKING FORCE	SUPPLIER HAS TO SPECIFY
WIPER MOTOR	
POWER CONSUMPTION:	
AT HIGH SPEED	SUPPLIER HAS TO SPECIFY
AT LOW SPEED	
MOUNTING LOCATION	BOTTOM MOUNTED (BELOW WINDSCREENS) INSIDE THE DRIVER'S CABIN
MODE OF OPERATION	HIGH SPEED, SLOW SPEED & WASH MODES
PROTECTION	IP54

29	1	-	DC-DC CONVERTOR (REQUIRED FOR 24V DC SYSTEM)		
28	1	-	WASHER PUMP ASSY	110V/24V DC	ASSY
27	3	-	NOZZLE ASSY	-	-
26	1	-	NON-RETURN VALVE	-	-
25	1	-	WATER LEVEL INDICATOR	-	-
24	1	-	WASHER TANK, CAP:20L/5GAL.	305x302x229	FIRE SAFE PVC/POLYETHYLENE/ANY OTHER PROVEN MAT'L COMPLYING TO EN5545-HL3
23	3	-	HOSE,TEE	-	-
22	3	-	SPECIAL FLAT WASHER	-	-
21	AR	-	MALE TERMINAL	-	-
20	AR	-	FEMALE TERMINAL	-	-
19	AR	-	FEMALE SOCKET TERMINAL	-	-
18	1 SET	-	PLUG CONNECTOR HOUSING	-	-
17	1 SET	-	CONNECTOR LOCK	-	-
16	1 SET	-	CONNECTOR LOCK	-	-
15	1 SET	-	PLUG CONNECTOR HOUSING	-	-
14	1 SET	-	MALE CONNECTORS HOUSING	-	-
13	1 SET	-	FEMALE CONNECTORS HOUSING	-	-
12	1	-	HOSE ASSY	L=15000	FIRE SAFE EPDM/SILICON/ NEOPRENE
11	3	-	GASKET	-	-
10	3	-	SPECIAL LOCK NUT	-	-
9	1	-	MICROPROCESSOR CONTROLLED, ROTARY SWITCH	110V/24V DC	MAKE: COLE HERSEE
8	1	-	HOUSING ASSEMBLY-CENTER	-	ASSY
7	2	-	HOUSING ASSEMBLY SIDE	-	ASSY
6	6	-	HOSE PIPE BEND(90°)	-	-
5	3	-	WEATHER CAPS	-	-
4	3	-	ADAPTER ASSY/ELBOW	-	ASSY
3	3	-	WIPER BLADE ASSY	-	ASSY
2	3	-	WIPER ARM ASSY	-	ASSY
1	3	-	MOTOR ASSY WITH PULSE GENERATOR	110V/24V DC	ASSY
SL.No.	QTY	PART / STOCK No.	DESCRIPTION	SIZE	COMPANY STD./I.S. MATERIAL

PRODUCT		MUMBAI METRO CARS - L2 & L7			
REF. DRG.					
MATERIAL					
HEAT TREAT.					
SURFACE TREAT.					
TITLE		ELECTRICAL WIPER SYSTEM ARRANGEMENT			
APPROVED		APPD	REV D	13.01.2020	
CHNGD		CHKD	13.01.2020		
SCALE		DRWN	13.01.2020		
SHEET		SCALE 1:10	2 OF 2		
DRG No.		525-18084			
ALT.NO.	ECN NO/CHANGES	DATE	BY	CHNGD	ALT

B&M BEML LIMITED

UN CONTROLLED

NOTE:

THE SUPPLIER SHALL SUBMIT THE DRAWING OF WIPER BLADE ASSY ALONG WITH THE TECHNICAL OFFER.

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