RAIL COACH FACTORY, KAPURTHALA

Technical Specification for Computerized 6-axis Rubber Fatigue & Endurance Testing Machine.

No. C&M/Mech/Spec/2024/05 **Dated 25.05.2024**

1. **Description**: Fully Computerized 6-axis Rubber Fatigue & Endurance Testing Machine with integrated static tester for rubber to metal bonded items used in Railway coaches.

2.Scope- The contract shall cover the following :-

2.1 The supply and delivery of Fully Computerized/automatic Servo controlled 6-axis Endurance tester system with integrated static tester & Rubber Fatigue Testing Machine.
2.2 Installation and commissioning of the equipment at RCF/KXH at Supplier's own cost.
2.3 Training to personnel regarding operation and maintenance of equipment at RCF to the entire satisfaction of purchaser.

3.0 Purpose for which required :-To determine the characteristics of rubber-metal bonded components, variance in characteristics during their life, establish dynamic durability etc.

4.0 General Technical features:-

4.1 The equipment shall fulfill the basic needs of the specification.
4.2 The accuracy of the equipment should be ±1% with traceability to NPL/NDLS.
4.3 This equipment/six axis Endurance system should be supplied into two parts.
Part A:- Fully Computerized Rubber Bush characteristics testing machine for static Testing based on ball screw design.
Part B:- Computerized six axis rubber bush Endurance tester
4.4 The equipment should have inbuilt axial Stroke, Radial stroke, Torsional angle, conical angle & Vertical stroke sensor.
4.5 Axial Force, Torsional angle, Radial Force, Conical angle, conical Force, vertical force, Shear Force etc. should be controlled from the software.
4.6 Printing port and good compatible laser Colour printer (HP, Cannon, Samsung, Brother) to be provided along with the machine to print out Graph & result Print out, Test certificate, Batch test print out and simple statistics Print out. It should also have the facility of Ethernet port for network printing access and to export batch results.
4.7 The interface used should be NI-USA/Germany/Hungary.
4.8 Hydraulics used in the machine should be all Yuken/Bosch-rexroth.
4.9 Software should be window based on Lab view platform.

5.0 (Part A) Fully Computerized Rubber Bush characteristics testing machine:-This unit should be with single test bed & based on ball screw design three axis machine. & dedicated for static testing, capable to plot axial, radial, torsional & conical characteristics of rubber to metal bonded coach components.

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6.0 Technical Requirement:-

Parameter	Specifications
6.1 Axial loading Capacity	0-30000kgfx0.1kgf sensitivity
6.2 Axial loading speed	0-60 mm/min
6.3 Axial stroke	0-200 mm variable
6.4 Axial stroke sensor	0-25 mmx0.05mm sensitivity & 0-200mmX0.1mm sensitivity.
6.5 Radial Loading capacity	0-30000kgfx1kgf sensitivity
6.6 Radial loading Speed	0-25 mm/min variable
6.7 Radial Stroke	0-200mm variable
6.8 Radial Stroke sensor	0-25mmx0.05mm sensitivity & 0-200mmX0.1mm sensitivity
6.9 Torsional load capacity	0±225kgmx0.1kgm sensitivity
6.10 Torsional loading speed	0-20 degree/min variable
6.11 Torsional stroke	0±18 degreesX0.05 degree sensitivity
6.12 Conical Load capacity	0±100kgmx0.1kgm sensitivity
6.13 Conical loading Speed	0-15 degree/min variable.
6.14 Conical angle	0-15 degrees variable.
6.15 Conical stroke	0±15 degreex0.05degree sensitivity
6.16 Controls	Force/Stroke & Loading speed control from software
6.17Space for test coach components	Machine should be capable of test the components up to 450mm dia/lengthX450(B)X350(H)
6.18 Power required	415V,3Phase, 50Hz (10 HP)
6.19 Dimensions (Approx.)	Main Machine:- 1589(L)X987(B)X1765(H) Power Pack:- 400(L)X350(B)X545(H)
6.20 Weight (approx.)	2321 Kg
6.21 Computer	Shall be original Intel with 19" LED screen make Lenovo/Dell/HP. Software shall be window based on labview platform. Window 10 64 bit operating system, 8 GB RAM,01TB Hard Disk space , MS office, Adobe Reader 11.0 or higher, minimum core 5 generation 8 th.
6.22 Display	All parameters like Force(Peak & instant) , Deflection (Peak & instant), Loading speed, Force vs deflection graph, X/Y cursor data part no., Part name, date, time, Pre –load or Pre-stretch values, Auto indication of stiffness through graph, Facility to compare data of up to 10 samples, Data transfer to XLS format. Data log ON/OFF facility etc. should be display on the Computer screen. Auto indication of Hysteresis.
6.23 Testing	The machine should be fully automatic from software, User defined primary cycles & user defined test cycles.
6.24 Holding fixtures/attachments	Holding fixtures should be supplied for all coach components as per clause 8.0 along with the machine.

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(Part B):- Fully Computerized Six Axis Servo Hydraulic rubber bush Endurance tester for Fatigue testing of Rubber bonded Metal parts used in Railways with ± 1% accuracy & traceability to NPL.

7.0 Technical Requirement:-

Parameter for (Bed#1)	Specifications
7.1 Axial loading Capacity	0-3500kgfx1kgf sensitivity
7.2 Axial loading Frequency	0-3Hz variable from software
7.3 Axial stroke	0-30 mm variable
7.4 Axial stroke sensor	Inbuilt in axial servo actuator(0-100mmX0.1mm)
7.5 Axial force Control	From software
7.6 Wave of Loading	Sine
7.7 Radial Loading capacity	0-4500kgfx1kgf sensitivity (Pre load facility should be available)
7.8 Radial loading Frequency	0-3Hz variable from software
7.9 Radial Stroke	0-25mm variable
7.10 Radial Stroke sensor	Inbuilt in axial servo actuator(0-100mmX0.1mm)
7.11 Radial force Control	From software
7.12 Wave of Loading	Sine
7.13 Torque loading capacity	0-200kgmx0.1kgm sensitivity(Pre load facility should be available)
7.14 Torque loading Frequency	0-3 Hz variable from software
7.15 Torque angle	0-10 degrees variable
7.16 Torque angle sensor	Inbuilt in axial servo actuator(0+/-20degreexX0.1 degree)
7.17 Torque angle & Force control	From software
7.18 Wave of Loading	Sine
7.19 Conical Loading capacity	0-150kgmx0.1kgm sensitivity (Pre load facility should be available)
7.20 Conical loading Frequency	0-3 Hz variable from software.
7.21 Conical angle	0-10 degrees variable
7.22 Conical angle sensor	Inbuilt in axial servo actuator(0+/-20degreeX0.1 degree)
7.23 Conical angle & Force control	From software
7.24 Wave of Loading	Sine
Parameter for Bed#2	
7.25 Vertical loading Capacity	0-30000kgfx1kgf sensitivity(Pre load facility should be available)
7.26 Vertical loading Frequency	0-3Hz variable from software
7.27 Vertical stroke	0-20 mm variable
7.28 Vertical stroke sensor	Inbuilt in axial servo actuator(0-100mmX0.1mm)
7.29 Vertical force Control	From software
7.30 Wave of Loading	Sine
7.31 Shear loading Capacity	0-3500kgfx1kgf sensitivity (Pre load facility available)
7.32 Shear loading Frequency	0-3Hz variable from software
7.33 Shear stroke	0-55 mm variable
7.34 Shear stroke sensor	Inbuilt in axial servo actuator(0-100mmX0.1mm)
7.35 Shear force Control	From software
7.36 Wave of Loading	Sine
7.37 Power required	415V,3Phase, 50Hz (80 HP)

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7.39 Weight (approx.)	6324 Kgs

7.40 Power pack	Machine shall have six motor design power pack with individual motor for every axis, 800 Ltrs capacity powder coated tank, Bosch/Yuken hydraulic pumps, Suction strainer, Youken/Eaton valve sets, Return line filter with clogging indicators, water based oil cooler, Auto stop on over temperature with software interfacing, Dedicated control panel for power pack, Consolidated pumping capacity 160 LPM.
7.41 Display	Display of all test parameters on computer screen i.e. Axial force, Radial force, Torsional force or stroke, Conical force or stroke (peak &instant values), Vertical & Shear force, Pre-load values, Cycles, CPM, Part no., Part name, Date, Time,, Force vs cycle graph, Data transfer to XLS format, Screen Shot facility, Data log ON/OFF facility.
7.42 Computer	Shall be original Intel with 19" LED screen make Lenovo/Dell/HP. Window 10 64 bit operating system, 8 GB RAM,01TB Hard Disk space , MS office, Adobe Reader 11.0 or higher, minimum core 5 generation 8 th.

8.0 Attachments/Holding Fixtures required during testing of following rubber bonded coach components. The following fixtures should be supplied along with the machine.

8.1 Attachments for LHB Components:-

i) Primary suspension bush attachment
ii) Axle box pivot bush
iii) Ball joint roll Link
iv) Lateral bump stop
v) Traction center elastic joint
vi) Rubber pad for longitudinal bump stop
vii) Rubber spring
viii) Vertical bump stop
ix) Ball joint traction lever
x) F Pad (secondary suspension)
xi) Emergency spring
xii) Flexible pad for longitudinal stop

8.2 Attachments of Train 18 components:-

i) Primary suspension bush attachment
ii) Rubber Metal Bush for Traction Rod assembly attachments
iii) Central Pivot bush attachment
iv) Side bumper attachment
v) Bump stop for primary Suspension bush attachment
vi) Rubber Pad for primary suspension attachment
vii) Motor Suspension bush attachment
viii) Motor Suspension Pad attachment
ix) Rubber pad for primary suspension attachment
x) Ball joint Stabilizer Link assembly attachment

9.0:Calibration Certificate:
The Supplier should submit the Calibration certificate with traceability to National / International Agencies.

10.0 Spares

10.1 The Tenderer should furnish the details of spares covered under warranty.
10.2 List of important spare parts & accessories and costing.
10.3 List of recommended consumables for two years shall be quoted separately.
10.4 A maintenance tool kit should be supplied free of cost containing hand tools which is required to cover all the fasteners of the machine.
10.5 The Tenderer shall supply a list of concomitant accessories, which will be supplied along with the machine. The cost of each listed concomitant accessory should be quoted separately. Wherever for any reason the cost of any concomitant accessory is included in the basic price of the machine the same should be specifically mentioned.

11.0: Inspection:
Inspection will be carried out by consignee or its representative agency at firm's premises or as per term & condition of railways before dispatch of the equipment and final inspection at M&C Lab/RCF/Kapurthala.

12.0 COMMISSIONING AND PROVING OUT:

12.1 The Supplier shall demonstrate the functioning of the equipment at the time of installation and commissioning at RCF/ Kapurthala & to proving out of samples of rubber bonded components with accuracy and repeatability.
12.2 The Successful Tenderer shall have to commission the machine within 15 days from the date of receipt of machine at RCF, Kapurthala.
12.3 The successful Tenderer shall have to prove out the functioning of the equipment at the time of installation and commissioning at RCF/Kapurthala to the entire satisfaction of at least two RCF staff and prove the accuracy of the equipment at his own cost.
12.4 Training will be given at least two CMS/CMA of RCF staff by firm at his own cost.
12.5 The joint report will be prepared & duly signed by CMS/CMA OF RCF & delegates of supplier & counter signed by competent authority.

13.0 TECHINCAL LITERATURE:

13.1 One copy of the printed illustrative catalogue showing isometric view/sketch & features of the machine and its elements must be enclosed with each copy of the bid.
13.2 The successful tenderer will have to furnish for each machine 02 hard copies & a soft copy in pen drive of spare parts catalogue with basic price giving the part list number of each component with exploded views and assembly drawings.
13.3 Operational instruction manual and troubleshooting guide along with warranty/Guarantee certificate for smooth and trouble free working of the instrument for 2-year warranty on complete system.

14.0 SPECIAL FEATURES:

14.1 Special features incorporated into the machine, if any shall be indicated separately by the tenderer, clearly indicating the advantage of these features.

15.0 Warranty :

15.1 Tenderer should give Warranty/Guarantee certificate for smooth and trouble-free working of the instrument for 2-year warranty on complete system from the date of commissioning. During warranty/Guarantee period supplier will have to replace all spares free of cost on site. It should be very clear to the supplier that in case instrument /any of its part(s) is required to be sent to its principal outside /Inside for repair it will be sole responsibility of the Indian agent /Supplier to make full arrangement to send the equipment for repair and then supply the instrument back to RCF free of cost.

16.0 DOCUMENTS TO BE UPLOADED:

Following documents must be submitted by the bidder along with the offer:

1. Clause wise comments on technical specification
2. Valid Documentary evidence of previous supplies to other Railways
3. Authorization certificate of OEM in case of Authorized dealer
4. Details list of spares covered under warranty.

CMS/Mech	ACMT	CMT	Dy.CME/QA-1	CME/QA-I
(Prepared by)	(Checked by)	Reviewed by)	(Agreed by)	(Approved by)