3799309/2025/O/o ED/CARRIAGE/RDSO

REASONED DOCUMENTS

RDSO's REMARKS ON PROPOSED SUGGESTION/COMMENTS GIVEN BY FIRMS/RLYS ON EXISTING RDSO/CG- 18005 Rev.02 FOR SCHEDULE OF TECHNICAL SPECFICATION & TECHNICAL REQUIREMENS FOR LHB DAMPERS & VANDE BHARAT COACHES.

Clause No.	Description of clause of existing Spec. No. RDSO/CG- 18005 Rev.02	Comments of M/s AVTEC LIMITED Dhar M.P	M/s GB equipment Dehradun Uttrakhand	M/s Knorr Bremse Palwal Haryana	M/s Sequoia safety products Pvt. Ltd. New Delhi	M/s ZF	M/s Escorts Kubota Faridabad	M/s PAN India Consultants Pvt. Ltd./M/s ITT Koni	Remarks/Decision of RDSO
1.3	All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-8.1-11 Version 2.5 or latest (titled "Vendor-Changes in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways.	--	-	-	-	Document QO-D-8.1-11 Version 2.5 is unknown.	-		Documents given at RDSO website as link below:- https://rdso.indianrailways.gov.in/view_section.jsp?lang=0&id=0,5,268,5443,5444
1.4	The Government of India policy on "Make in India" shall be apply.	-	-	-	-	noted. ZF is currently working on implementation of Railway-Dampers at ZF PUNE for RDSO approval.	-		Noted
1.5	Drawings	-	-	-	-	OK, see related ZF drawings: (21045) 401300020139 (21046) 401300020138 (21047) 401300020137 (21048) 401300020140 (21049) 401300003847 (PV Vande Bharat)	-		**Vendor to ensure compliance of drawings in RDSO specification.**

						401300004818 401300004470 (SV Vande Bharat) 401300004819 401300004471 (SH Vande Bharat) 401300004820 401300004472 (DR Vande Bharat) 401300004821 401300004473			
1.6	End Mountings	-	-	-	-	Ok,See related ZF drawings	-		**Vendors to ensure compliance of drawings in RDSO specification.**
1.5.1.2	For Vande Bharat Coaches	-	Since both LHB & Vande Bharat dampers are identical & having nearly similar space envelop, we request & suggest to change the reservoir tube dia. Of Primary Vertical Damper, Secondary vertical Damper & Secondary lateral Damper From Ø73(max.) to Ø76(max). This will help to standardize the tube sizes which is readily available.	-			-		Firm comment is not acceptable for weight consideration. Moreover, trial has been completed with max. tube diameter 73 mm max.

2.1	Condition of use	-	-	-	-	ZF Damper Design is according DIN EN 13802, ZF Standards and for Railway Use. Typical Cleaning agents, which are used for railway applications, can be accepted. A contamination of Urine, feces, kitchen waste, brake and ferric oxide dust have to be prevented by the customer and are unacceptable.	-		**Firm comment is not acceptable.** Urine, feces, kitchen waste, brake and ferric oxide dust may come in damper contacts, occasionally.
2.1.1	-	-	-	-	-	Ok, see ZF drawings	-		Vendors to ensure compliance of drawings in RDSO specification.
2.2	Cleaning of the bogie	-	-	-	-	ZF Damper Design is according DIN EN 13802, ZF Standards and for Railway Use. Typical Cleaning agents, which are used for railway applications, can be accepted.	-	RDSO to specify Acidic & Alkaline cleaning products. Our general statement is that no paint solvents or graffiti removal chemicals should be used.	Noted
2.3.1	Load	-	-	-	-	Ok, see ZF drawings	-		Vendors to ensure compliance of drawings in RDSO specification.
2.3.2	Acceleration	-	-	-	-	OK, all dampers are tested according IEC 61373	-	For VB platform not applicable as not being part of original specification, for LHB according IEC61373.	Noted

2.3.3	Weight	-	-	-	-	Ok, see ZF drawings & quality documents	-	Dampers weight will be checked during tests, no weight check in serial production.	Vendors to ensure compliance of drawings in RDSO specification.
2.4	Storage & transport	-	-	-	-	Packaging is concerted with our customers.	-		Packing instruction approved by RDSO or as per consignee/costumer instruction will be applicable.
2.6	Hydraulic liquid	-	-	-	-	Safety Data Sheet can be requested at ZF	-		**Noted**
2.7	Marking							Name of manufacture, manufacturer part number, manufacturing date and serial number are marked in the reservoir tube with 8mm Height letters. Other information will be indicated on a sticker type plate as per RDSO drawings.	Vendors to ensure compliance of drawings & RDSO specification for marking.
2.8.1	Damper finishing	-	-	-	-	ZF use Senosol-2K-water-based paint. 30 - 50µm	-		Paint thickness should be 50 µm min.
2.8.2	Resistance of paint	-	-	-	-	ZF Dampers are according DIN EN 13802	-		Testing of resistance of paint should be in compliance as per ISO 2409 latest.

2.8.3	Resistance to salt environment	-	-	-	-	ZF Dampers are according DIN EN 13802. The dampers fulfill the requirements of 720h	-		Noted
2.8.4	Colour	-	-	-	-	see ZF drawings. All LHB-Dampers are in Basalt Grey.	-		Firm comment is not acceptable. Colour of damper should be as per para 2.8.4.1 & 2.8.4.2 of RDSO specification. Modified drawings may be submitted for approval.
2.8.5	Thickness of the layer	-	-	-	-	ZF use Senosol-2K-water-based paint. 30 - 50µm	-		Paint thickness should be 50 µm min.
3.2	Demands for the force/ velocity characteristics	-	-	-	-	-	-	For dampers with symmetric characteristic there will be shown one nominal line for both directions	Noted, ensure RDSO Drawings & RDSO specification.
3.1,3.2 4.1.1 & 4.1.2, 4.2.1	Test machine & test temperature & design condition	-	-	-	-	See ZF Type tests reports & routine test report	-	Dimensions check will be done during First Article Inspection	Noted & ensure RDSO inspection check sheet & RDSO specification.
4.2.2 & 4.2.3	welding seams at dampers & testing of welding seams					Welding according to DIN EN 15085-2 CL1	-	According EN15085 class-1	Noted. **Para modified accordingly.**

4.3.1	Production test	-	-	-	-	Characteristics will be tested (End of Line, 100%) and recorded according ZF drawings.	-		Noted Vendors to ensure compliance of drawings in RDSO specification.
4.3.3	Routine testing	-	-	-	-	Characteristics will be tested (End of Line , 100%) and recorded according ZF drawings. The requested test need to be performed under Lab conditions. See ZF Type test specification.	-	for LHB Train sets: Currently we are doing Routine test but we propose Routine test not required during Purchase inspection. We propose to remove this Routine test from Purchase inspection. For Yaw Damper: 0.02 for LHB & 0.03 for Vande Bharat For VB Train sets: Routine test is not applicable as per originally EC ENGG. Specification	Noted Vendors to ensure compliance of drawings in RDSO specification.
4.3.4 4.3.5 4.3.6 4.3.7 4.3.8 4.3.8.1 4.3.8.2 4.3.9	Dynamic stiffness Series stiffness & damping coefficient, extreme temperature, leakage set, fatigue test, static test ,dynamic test & priming test	-	-	-	-	See ZF Type test specification.	For yaw damper, the test stroke should be ±12.5 mm.	**Dynamics stiffness/series stiffness and damping coefficient =** For VB platform only applicable for the yaw damper **Leakage test & measurement at extreme temperature =** For VB platform, tested according EN13802 **Static test=** Not applicable for Vande Bharat Train sets, as per original EC	1) M/s ZF remarks have been noted. However, additional test as mentioned in RDSO specification shall be applicable. 2) M/s Escort comment is acceptable. Correction has been made for stroke (±12.5

								specifications **Dynamics testing=** Not required for already approved vendors on Vande Bharat platform	mm)in specification & drawings. 3) Noted, Vendors to ensure compliance of drawings in RDSO specification.
4.3.11 & 5.1,5.2,5.2.2	Specification for the final acceptance	-	-	-	-	See ZF type test report & routine test report		for LHB Train sets: Currently we are doing Routine test but we propose Routine test not required during Purchase inspection. We propose to remove this Routine test from Purchase inspection. For Yaw Damper: 0.02 for LHB & 0.03 for Vande Bharat For VB Train sets: Routine test is not applicable as per originally EC ENGG. Specification	1) M/s ZF remarks have been noted. However, additional test as mentioned in RDSO specification shall be applicable. 2) Vendors to ensure compliance of drawings in RDSO specification.
5.3	Auditing	-	-	-	-	ZF is certified according: IRIS ISO 9001 ISO 14001 EN 15085-2 Q1 If RDSO want an additional Audit, ZF has to charge RDSO with all related Costs.			Firm comments is not acceptable. For verification of quality of product, RDSO can audit the works of manufactures with or without prior intimation.

6.1	Maintenance instruction	-	-	-	-	The dampers are maintenance free. In case of failures, the dampers have to be replaced.			Noted
7	Procedure for testing of prototype dampers	-	-	-	-	No prototype dampers needed. All dampers are provided since many years	-	Not applicable for already approved dampers	Noted
8.1 8.1.1 8.1.2 8.1.3 8.1.4 8.1.5 8.1.6	Regular procedure for inspection and testing	-	-	-	-	ZF is certified according: IRIS ISO 9001 ISO 14001 EN 15085-2 Q1 If RDSO want an additional Inspection, ZF has to charge RDSO with all related Costs. A plant visit has to be coordinated with ZF. An internal requalification of all damper types / family will be conducted continuously.		As Damping velocity / characteristics of Primary vertical damper - RDSO/CG/DRG/ 21047 and Secondary lateral Damper - RDSO/CG/DRG/ 21049 covers damping velocity / characteristics of Secondary lateral Damper - RDSO/CG/DRG/ 21045, Secondary Vertical Damper - RDSO/CG/DRG/ 21046, Secondary Vertical Damper- RDSO/CG/DRG/ 21018, Fatigue test for Primary vertcal damper and	Firm comments is not acceptable. Before supply of material to IR, material shall be inspected by Inspecting authority as decided by IR. (Vendors to ensure compliance of drawings in RDSO specification.)

								Secondary Lateral damper should be good enough.	
2.7	Marking	Noted Name plate & permanent marking with desired details will be done on dust cover.	-	-	-	-	**Noted**		**Noted**
3.2	Demands for the Force/Velocity Characteristics There are two different Damper Force/ velocity characteristic, one for each direction of travel -----	-	-	-	In service condition tolerance should be ±30% after field trial a damper evaluation is typical after service operation because damper undergoes live testing with high acceleration, vibrational and fatigue which leads to deterioration of rubber parts and rubber mountings. Rubber having life of 3-5 years and beyond this rubber parts will get damaged. So warranty period of damper should be 4 years from manufacturing and 3 years from fitment whichever is earlier.				**Firm comment is not acceptable.** Tolerance range of force/velocity after service trail will be applicable as per para 3.2 of RDSO specification.
4.3.1	Production tests Production test shall be carried out on every damper and recorded. The test will be carried	-	-	-	For LHB coaches acceptance of damping forces will be considered only on specific velocity which is mentioned in RDSO drawings , while damping force at second				During routine inspection damping force is verified at specified velocity in Drawing. However, for other velocity graph should be as per para

	out at a stroke of 50mm (unless is otherwise specified in drawing or purchase order) and at two different velocities. For LHB Coaches, one velocity should be the same as mentioned in RDSO's Drawings at which damping force is specified and second velocity shall be decided by manufacturer. For Vande Bharat Coaches, production test should be carried out at two velocities mentioned in RDSO's Drawings at which damping forces are specified.				velocity have no value addition for damper acceptance.				3.1. Para modified accordingly.
4.3.3	Routine Testing This measurement serves for drawing up the graph described in section 3.1 **Table 3:** Force velocity characteristics test **Table 4**: Velocity's for the	-	-	-	Measurement will be done min 2% and maximum 5 Nos during purchase inspection. As testing is already done on two different velocities, so there is no need to test on all velocities given in table 4.				Purchase inspection testing will be done as per para 4.3.11 (table 16). & Testing of damping force at two different velocities is done during production test on 100 % dampers. However, during routine test damping force is tested on selected samples. Hence, comments of firm is not acceptable.

	force/velocity characteristics test								Routine testing will be done as per 4.3.3 (Table -4).
4.3.4	Measurement of the dynamic stiffness Table 5-9	-	-	-	Graphical representation may differ from section 3.1 & 3.2 at lower amplitude and higher frequency. **Test will be carried out only during first articles/ prototype testing.**				Noted. (Graphical representation will not be much differ at lower amplitude & higher amplitude.)
4.3.5	Measurement of Series stiffness and Damping coefficient At the type-approval stage the manufacturer shall calculate and ensure the value of series stiffness and the damping coefficient of the damper -articulated joint system or of the dampers alone in the case of particularly flexible articulated joints. The dampers must be tested in its working position (see assembly drawing) and over the range of displacements and frequencies specified in the table 10. **Table 10**	-	-	-	The test method for measuring of series stiffness and damping coefficient is not clear in respect to the mode of progression from lowest frequency to highest frequency. **Test should be removed as during dynamics stiffness testing , damping characteristics is established at a combination of higher frequency with low stoke and lower frequency with high stroke.**				Measurement of series stiffness & damping coefficient test will be applicable for LHB dampers. Para modified accordingly.

4.3.6	Measurement at extreme temperature **Table 11 & 12**	-	-	-	Measurement of characteristic according to table 12 at -40^{0}C not possible due to temperature loss during fitment and testing at -40^{0}C have no addition of so it is not possible to get exact result on -40^{0}C.				Loading and unloading time for testing of damper should be lowest possible to minimize the temperature loss up to -30^{0}C. **Para modified accordingly.**
4.3.9	Priming Test: Table 15	-	-	-	Analysis made for only damper which have to define force at velocity 0.1m/s. In LHB coaches only 2 dampers are tested on 0.1 m/s with specified tolerance.				Firm comment is accepted & para 4.3.9 has been modified.
4.3.10	Paint Fire Resistance Test: Paint should comply the requirements of EN 45545 (fire protection: Hazard level – HL3 – R7).	The damper consists of Metallic Parts, Rubber Parts, Polymer Seals & Hydraulic Oil. Except Metallic Parts, all items are flammable. So this test is only applicable to Painted Metallic Parts of -Damper and the remaining i-tems should be removed as they are not considered above.	-	-	Test will be done on separate test panel/piece of paint not on damper.				Noted Para modified accordingly.

4.3.11	Specifications for the Final Acceptance **Table 16**	-	-	-	Min.2% and maximum 5 Nos/only Routine test to be done instead of test on 2 different velocities. Test will be carried out only during first article /prototype testing. Priming test will only done on specified velocity of 0.1 m/s which have define tolerance limit.				Purchase inspection testing will be done as per para 4.3.11 (table 16). & Testing of damping force at two different velocities is done during production test on 100 % dampers. However, during routine test damping force is tested on selected samples. Hence, comments of firm is not acceptable. Routine testing will be done as per 4.3.3 (Table -4). & Firm comment is accepted & para 4.3.9 has been modified.
4.3.8 .2	Dynamic Testing	Complied for LHB Damper Details not given for VB-2 Coaches	-	-					Dynamic testing is applicable for both type damper LHB & VB. Para has been modified accordingly.
8.1.1		Complied with Approved QAP for manufacturing procedure & testing. As per the specification & drawings, only the Raw Material of Dust Cover is	-	-					Noted. Raw Material purchase should be as per approved QAP & compliance of RDSO specification/drawings.

		specified, i.e. SS-304/ AISI-304/ X5CrNi1810 as per RDSO Spec C-K201. Raw Materials of other parts are subjected to manufacturer's discretion.							
9.3.1		Complied. As per the specification & drawings, only the Raw Material of Dust Cover is specified, i.e. SS-304/ AISI-304/ X5CrNi1810 as per RDSO Spec C-K201. Raw Materials of other parts are subjected to manufacturer's discretion.	-	-					Noted. Raw Material purchase should be as per approved QAP & compliance of RDSO specification/drawings.
10 10.1 10.2 10.3	Guarantee / Warranty	Guarantee & Warranty Clause to be modified considering conditions of Indian Tracks and terrains, Real Time loading capacity of coaches, weather and environmental conditions & workmanship in Production Units and Sick lines. As per mentioned conditions it should	Warranty period shall be revised as per C-8703 or as per FIAT spec. with periodic overhauling. The given period is too long considering life of rubber & seals.	-	Warranty period will be 3-4 years with periodic overhauling because rubber and sealing parts have its self-life, they may get wear and tear with a long time period or running same is also followed by motive power, 3- phase electric locomotive (CLW) and ICF warranty for dampers is 2-4 years.	The warranty don't cover wear and tear. No all-around-carefree guarantee.		There should be a kilometer limitation. Mission profile (kilometers per year) is unknown We propose: The supplier shall ensure the efficiency at least of the dampers over 4 years from date of supply or 3 years from the date of fitment or 1,2 million kilometers in service,	Warranty clause is as under: - The supplier shall ensure the efficiency of the dampers over 06 years from the date supply or 05 years from the date of fitment or 1.2 million kilometers in service, whichever is earlier.

		be -decided by the competent authorities. As these coaches are regularly running on tracks, the overhauling should be done manufacturer premises on purchaser's expense in every two years to maintain the damping consistency as required. The replacement of parts will be as per POH Kit including (a) Seals, (b) Silent Block / Spheric Block / Flexible Attachments , (c) Valving Components like: Shims, Springs , (d) Hydraulic Oil			The supplier shall ensure the efficiency at least of the dampers over ~~6~~ 4 years from date of supply or ~~5~~ 3 years from the date of fitments , whichever is earlier.			whichever is earlier. In Service Condition (With attachment element) during testing by zonal railways and after one-year field trials dampers should be tested in range of 23 +/- 5 degree and priming of dampers before test is allowed There should be a kilometer limitation. Mission profile (kilometers per year) is unknown We propose: The supplier shall furnish a guarantee to ensure the efficiency at least of the dampers over 4 years from date of supply or 3 years from the date of fitment or 1,2 million kilometers in service, whichever is earlier. There should be a kilometer limitation. Mission profile (kilometers per year) is unknown We propose: 4 years from date of	

								supply or 3 years from the date of fitment or 1,2 million kilometers in service, whichever is earlier.	
12	General inspection	-	-	-	-	ZF is certified according: IRIS ISO 9001 ISO 14001 EN 15085-2 Q1 If RDSO want an additional Inspection, ZF has to charge RDSO with all related Costs. A plant visit has to be coordinated with ZF.			Firm comments is not acceptable. For verification of quality of product, RDSO can audit the works of manufactures with or without prior intimation.
12.3.1	Adopt any means he may think advisable to satisfy himself that the materials or fittings as per the specifications are actually used in the construction.	-	-	-	-	-	-	Only if there is reasonable doubt and any known historical related failure.	Vendors will follow the RDSO ISO, drawings & specification.
12.3.4	In the event of a dispute between the inspecting authority and the manufacturer the decision of the purchaser shall be final and binding.	-	-	-	-	-	-	Only valid if there is a proven deviation of the damper of any kind compared to this technical specification including CBC	Vendors will follow the latest RDSO ISO, latest drawings & latest specification.
13	Training and Infrastructural Facilities	Complied But repair / overhauling of dampers to be done at manufacturer premises to ensure the quality required for performance.	-	-		**N/A**			Overhauling of LHB dampers is not being done yet.

14	Packing	-	-	-	-	See ZF offers			Packing instruction approved by RDSO or as per consignee/costumer instruction will be applicable.
15 (a) (b) (c) (d) (e) (f) (g) (h) & 16.1	Special condition	Complied Details not given for VB-2 coaches	-	-	-	ZF dampers are according customers request and for about 18 years in service in India. For any additional activities regarding type tests, additional tests or trials, RDSO will be charged with all related costs.		15 (a)=ITT Koni group is a global company and we have centralized R&D centers. 15(h)= Repeating any of the tests as specified in Appendix II in case of failing one of tests shall be on account of vendor. Cost of any new not earlier specified test shall be on account of buyer/RDSO.	**M/s Avtech** Para 15 will be applicable for both type of dampers (LHB & VB). Accordingly, paras have been modified. **M/s ZF** Comments of firm are not acceptable. Vendor registration process shall be as per RDSO specification/extent ISO guidelines RDSO. **M/s ITT** a) Noted h) Not acceptable.
16.1 (1)		Equivalent Drawings to be shared for Approval after final release of the referred specification.	-	-		ZF dampers have been designed and developed together with OE ALSTOM/LHB. ZF = OE supplier for this projects. ZF offers contain following information: - Price per P/N - drawings - weight (Information on the drawings) Additional information and tests can be offered on request.			Vendors to ensure compliance of drawings in RDSO specification.

16.1 (2)		Mentioned on Equivalent Drawings shared for Approval after final release of the referred specification	-	-					**Noted**
16.1 (3)	Whether proposed Dampers for LHB Coaches is being used by any other rail-road system? If yes, details regarding quantity, type of stock, max. operating speed, type of service, average annual running kilometers, life cycle obtained by the user rail-road and maintenance cycle followed by them shall be furnished.	No		-					**Noted**
16.1 (4)	Details of deviation from the specification.	Not deviation but modification. Guarantee & Warranty Clause to be modified considering conditions of Indian Tracks and terrains, Real Time loading capacity of coaches, weather and environmental conditions & workmanship in Production Units and Sick lines.	-	-				This CbC document	Warranty clause is as under: - The supplier shall ensure the efficiency of the dampers over 06 years from the date supply or 05 years from the date of fitment or 1.2 million kilometers in service, whichever is earlier.

16.1 (5)	Content of indigenous and imported items in offered Dampers for LHB Coaches.	100% Indigenous	-	-					Noted
16.1 (6)	Expected life cycle in operating and environmental conditions enumerated in this specification.	Competent Authorities should re-consider Guarantee & Warranty Clause and decide.	-	-					Warranty clause is as under: - The supplier shall ensure the efficiency of the dampers over 06 years from the date supply or 05 years from the date of fitment or 1.2 million kilometers in service, whichever is earlier.
Appe ndix-I	(space envelop drawing for Yaw Damper)	-	-	For Yaw Damper, Tolerance on Damping force (with attachment) should be ±20%					Firm comment is accepted. Correction has been made in Yaw damper drawings for damping force (± 20%).
Draw ing	RDSO/CG/DRG/--- Primary Vertical Damper • Radial stiffness top End 10-15 KN/MM • Dimension R31(Max.) • Max. diameter in the area of welding seam 74 mm (bottom***)	-	-	-	•Supplier should specify the Radial Stiffness. • Dimension should be R35 (max) to give strength to ends. •Max. diameter in the area of welding seam should be 78 mm. because min. welding radius occurs 8			Complied Yaw damper=N/A	• **Noted** • Firm comment is not acceptable for weight consideration. Moreover, trial has been completed • **Drawing updated.**

					mm and at joint it could be higher.				
Drawing	RDSO/CG/DRG/--- Secondary Vertical Damper • Dimension 133.5± 1.5 mm • Dimension missing • Radial Stiffness 10.5 KN/MM (min.) • Max. diameter in the area of welding seam 74 mm (bottom***)	-	-	-	• Dimension should be 136±1 mm •Dimension missing bottom side for distance of silent block from outer tube. •Supplier should specify the radial stiffness. •Max. diameter in the area of welding seam should be 78 mm. because min. welding radius occurs 8 mm and at joint it could be higher.			•	• Firm comment is not acceptable for weight consideration. Moreover, trial has been completed. • **Not required** •**Noted** •**Drawing updated.**
Drawing	RDSO/CG/DRG/--- Secondary Lateral Damper • Dimension missing • Radial stiffness 9.4 KN/MM (Min.) • Dimension R31 (Max.) • Dimension 29-	-	-	-	• Dimension missing bottom side for distance of silent block from outer tube. •Supplier should specify the radial stiffness. •Dimension should be R35 (max) to			•	• **May be decided by manufacturer .** • **Noted** • Firm comment is not acceptable for weight consideration. Moreover, trial

	37 • Max. diameter in the area of welding seam 74 mm (bottm***)				give strength to ends. •Dimension should be 40.5 max/39-48 •Max. diameter in the area of welding seam should be 78 mm. because min. welding radius occurs 8 mm and at joint it could be higher.				has been completed. • **Comment may be elaborated.** • **Drawing updated.**
Appendix-II	**Dynamic Stiffness**	-	-	-	-	-	-	For VB platform only applicable for the yaw damper	(Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-II	**Series Stiffness & Damping Co-Efficient**	-	-	-	-	-	-	For VB platform only applicable for the yaw damper	(Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-II	**Extreme temperature**	-	-	-	-	-	-	For VB platform , tested according EN13802	(Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-II	**Fatigue test**	-	-	-	-	-	-	Not applicable for Vande Bharat Train sets, as per original EC specifications	(Vendors to ensure compliance of drawings & RDSO specification.)

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Appendix-II	**Leakage test**	-	-	-	-	-	-	For VB platform , tested according EN13802	(Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-III	**Routine Testing**	-	-	-	-	-	-	for LHB Train sets: Currently we are doing Routine test but we propose Routine test not required during Purchase inspection. We propose to remove this Routine test from Purchase inspection. For Yaw Damper: 0.02 for LHB & 0.03 for Vande Bharat For VB Train sets: Routine test is not applicable as per originally EC ENGG. Specification	(Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-III	**Marking of Damper**							Name of manufacture, manufacturer part number, manufacturing date and serial number are marked in the reservoir tube 8mm Height. Other information will be indicated on a sticker type plate as per RDSO drawings.	(Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-I Appendix-IV	**GENERAL INFRASTRUCTURES**							Laboratory for material testing, Machining facilities and painting facility are outsourced activities under ITT KONI INDIA Quality control. Damper Manufacturer having at least 10 years of experience of proven record for High speed train platform.	(Vendors to ensure compliance of drawings & RDSO specification.)

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Appendix-I Appendix-IV	**MANUFACTURING FACILITIES:** Welding machine The firm shall have the availability of special purpose welding machine and fixture for welding work on the main shell (casing tube), protection covers, damper eye etc.	-	-	-	-	-	-	we proposed to have robotic welding to ensure welding quality produced instead of checking weld quality Penetrant Test/Magnetic Particle Test.	
Appendix-I Appendix-IV	Machining facilities The firm shall have following machining facilities inhouse or at Sister / Allied concern for manufacturing / machining of child parts of dampers: Grinding Machine CNC Horizontal Machining Centre Vertical Machining Centre Lapping Machine Drilling and Tapping Machine Turning centre Power saw machine for cutting of shaft and tubes Outsourcing of machining facilities with experienced sub vendors under quality control of vendor (who supply dampers to IR) is permitted. However, same shall be intimated during intial registration	-	-	-	-	-	-	Machining is outsourced activity under ITT KONI INDIA Quality control.	Noted, (Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-I Appendix-IV	**INSPECTION & TESTING FACILITIES** Laboratory for material testing The firm shall have laboratory facilities of material testing for metallic as well as rubber components as per the requirements of the drawings & specification (s). In case, the firm is not having complete	-	-	-	-	-	-	ITT KONI INDIA Quality control carries out Material testing at NABL Accredited testing lab. as & when required	(Vendors to ensure compliance of drawings & RDSO specification & latest RDSO ISO documents.)

	laboratory facilities in-house, the firm shall take prior approval to carry out the test from NABL accredited testing laboratory / Govt. lab having capability to get the tests done as per the requirement of specification / approved drawing.								
Appendix-I Appendix-IV	Damping force testing machine The firm shall have a computer controlled servo hydraulic testing machine, to check the damping force of the dampers on variable frequency at different strokes in accordance to specification.	-	-	-	-	-	-	ITT Koni group is a global company and we have centralized R&D centers	Noted, (Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-I Appendix-IV	Testing machine for twisting and cardanic angles The firm shall have a testing machine with suitable fixtures for testing of twisting and cardanic angles of the dampers in assembled condition as per the requirements of the drawings / specification.	-	-	-	-	-	-	ITT Koni group is a global company and we have centralized R&D centers.	Noted, (Vendors to ensure compliance of drawings & RDSO specification.)

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Appendix-I Appendix-IV	Endurance test machine The firm shall have a separate computer controlled servo hydraulic endurance testing machine with suitable fixtures for endurance testing of dampers as per the requirements of the specification.	-	-	-	-	-	-	ITT Koni group is a global company and we have centralized R&D centers.	Noted, (Vendors to ensure compliance of drawings & RDSO specification.)
Appendix-I Appendix-IV	Vibration testing machine The firm shall have a vibration testing machine with suitable fixtures for vibration testing of dampers as per the requirements of the specification. In case, the firm is not having Vibration Testing Machine, the firm shall take prior approval to carry out the test from 'International Centre for Automotive Technology (ICAT), Manesar' or	-	-	-	-	-	-	ITT KONI is global company and carries out Vibration test at common laboratory - Suzhou Changling Testing Technology Co. Ltd for all plants	Noted, (Vendors to ensure compliance of drawings & RDSO specification.)

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	'Automotive Research Association of India (ARAI), Pune' or any other government accredited testing laboratory having capability to get the test done as per the requirement of specification.								
Appendix-I Appendix-IV	Salt Spray test The firm shall have a Salt Spray test testing machine with suitable fixtures for Salt Spray test of dampers as per the requirements of the specification. In case, the firm is not having Salt spray test facilities in-house, the firm shall take prior approval to carry out the test from NABL accredited testing laboratory / Govt. Lab having capability to get the	-	-	-	-	-	-	ITT KONI conduct Salt Spray test at NABL accredited Lab.	Noted, (Vendors to ensure compliance of latest drawings & latest RDSO specification.)

	tests done as per the requirement of specification								
Appendix-I Appendix-IV	**Qualification of Man Power** The Quality Control Section shall be separately headed by a full time technical expert having a minimum bachelor's degree in Mechanical/ Automobile/ Mechatronics with at least 5 years of experience or diploma in Mechanical/ Automobile/ Mechatronics with at least 8 years of experience. He shall be free from day-to-day production & testing responsibilities. He shall be mainly responsible for development for product, failure analysis, planning corrective and preventive action, control over raw material, devising actions in case of difficulties in achieving the parameters etc.	-	-	-	-	-	-	According to EN 15085 Class-1	Noted, (Vendors to ensure compliance of latest drawings & latest RDSO specification.)
Drawings-Vande Bahara t	Vande Bharat Coaches - Primary Vertical Damper	-	-	-	-	-	-	Comments for modification	**Drawings has been modified for acceptable point.**
Drawings-Vande Bahara t	Vande Bharat Coaches - Secondary Lateral Damper	-	-	-	-	-	-	Comments for modification	**Drawings has been modified for acceptable point.**

Drawings-Vande Bahart	Vande Bharat Coaches - Secondary Vertical Damper	-	-	-	-	-	-	Comments for modification	**Drawings has been modified for acceptable point.**
Drawings-Vande Bahart	Vande Bharat Coaches - Yaw Damper	-	-	-	-	-	-	Comments for modification	**Drawings has been modified for acceptable point.**
15 (a)	Special condition	-	-	-	-	-	-		**Para modified**
15 (k)	Special condition	-	-	-	-	-	-		**New para added**
16.1 (10)	SUBMISSION OF OFFER	-	-	-	-	-	-		**New para added**
Appendix-IV	Inspection & testing facility (salt spray)	-	-	-	-	-	-		**Para modified**

4.1.2	Test Temperature	-	-	-	-	-	-		Para modified
4.3.1	Production tests	-	-	-	-	-	-		Para modified
4.3.8.3	Dynamic test of silent block		-	-	-	-	-		New para added
8.1.7	Testing of weld parts & spring stiffness & load testing.	-	-	-	-	-	-	-	New para added
APPENDIX-IV (para 2.1 – SL. No 10	Leakage testing machine	-	-	-	-	-	-	-	New para added
APPENDIX-IV	Stiffness & load testing machine for Springs	-	-	-	-	-	-	-	New para added

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15 (f)	Service trial VB Added								**New para added** **As per Railway board letter-** ➢ For LHB coach dampers: 12 months from the date of coach commissioning/the actual period in the field. ➢ For VB coach dampers: 18 months from the date of coach commissioning/the actual period in the field.