Reasoned document for High Capacity Semi Permanent Coupler Either With Intermediate Tube Or With Type-10 Head For Maximum Speed Up To 200 Kmph

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
1.0	SCHEDULE OF TECHNICAL REQUIREMENTS FOR HIGH CAPACITY SEMI-PERMANENT COUPLER EITHER WITH INTERMEDIATE TUBE OR WITHTYPE-10 HEAD ~~WITH BALANCED DRAFT GEAR SUITABLE~~ FOR MAXIMUM SPEED UP TO 200 kmph FOR FITMENT ON ~~LHB PASSENGER~~ COACHES OF INDIAN RAILWAYS	Noted	-----	----	----	Type-10 head automatic coupler feature has also been added.
1.1	This specification covers the design, manufacture, supply and acceptance of semi-permanent couplers (SPC) either with intermediate tube or with Type-10 head (mechanical & pneumatic coupling only) between units of rake and its associated components like draw and buff gear mounting gear etc. for ~~LHB Coaches~~ Indian Railways.	Noted	------	Noted & no comments.	-----	Type-10 head automatic coupler is for mechanical & pneumatic coupling only
1.2	This specification is intended to include everything requisite to the manufacturing of the couplers, notwithstanding that everything required may not be mentioned herein.	Noted	------	----	-----	
1.3	Though the properties contained in the specification were/are generally for SPC either with intermediate tube or withType-10 head with Balanced Draft Gear (BDG). However, Technologies other than BDG meeting all the functional & technical requirements can also be considered provided it is a proven and established system globally to be demonstrated by firm and subject to clearance by RDSO.	Noted	------	Noted& no comments.	-----	
1.4	The OEM/Suppliers should have designed, manufactured and supplied the tendered type of coupler for trains operating at 200 kmph or above on at least 200 coaches or their principles have designed, manufactured and	Noted	------		------	

<table>
<tr><th>Clause No.</th><th>Description</th><th>M/s Escorts Comment</th><th>M/s Faiveley</th><th>M/s Voith</th><th>M/s Dellner</th><th>RDSO remarks</th></tr>
<tr><td></td><td>supplied the system for trains operating at 200 kmph or above on at least 200 coaches. The couplers installed by the tenderer in the past should have completed minimum 2 years' satisfactory service till the date of advertisement of the tender for ~~bulk~~ purchase.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1.5</td><td>In order to promote "Make in India" initiative of Govt. of India, indigenous suppliers will be allowed to design & develop these couplers after approval of design document by RDSO, for such suppliers. One rake quantity will be put in service trials for a period of not less than 12 months and subsequently clearance by RDSO before being considered for bulk quantity.</td><td>Noted</td><td>------</td><td>-----</td><td>-----</td><td></td></tr>
<tr><td>1.6</td><td>Though the specification deals with retractable type jerk free couplers however certain specific properties/ features as applicable for Type-10 head automatic coupler is contained in Annexure-F.</td><td>-----</td><td>-----</td><td>------</td><td>------</td><td></td></tr>
<tr><td>1.7</td><td>Following relevant standards (latest version) may be referred unless specified otherwise for reference.<table><tr><th>SN</th><th>Standards</th><th>Descriptions</th></tr><tr><td>1.</td><td>EN 15551</td><td>Railway Application-Buffers</td></tr><tr><td>2.</td><td>EN 16019</td><td>Railway Application-Automatic coupler</td></tr><tr><td>3.</td><td>EN 15227</td><td>Crashworthiness requirement of Rly. vehicle</td></tr><tr><td>4.</td><td>EN 12663</td><td>Railway Application-Structural requirement</td></tr><tr><td>5.</td><td>AAR- M 201 E</td><td>Coupler & draft gear components steel castings</td></tr><tr><td>6.</td><td>AAR-M 211</td><td>Coupler, Yoke-purchase and acceptance</td></tr></table></td><td>Noted</td><td>------</td><td>------</td><td>EN 16019- Railway Application-Automatic Coupler
A type 10 coupler head as per EN 16019 is not suitable for the operating conditions defined in this specification. If RDSO wants to introduce a latch coupler in their trains it is better to design a new type of latch coupler</td><td>During the meeting held on 19.10.2023 at RDSO, OEM's including M/s Dellner confirmed that higher capacity automatic type 10 head are being manufactured to be used for loco hauled large trains. Further, the bit of specification is not exhaustive & any</td></tr>
</table>

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	7. APTA-PR - M-RP – 003 -98 Purchase & acceptance of Type- H Coupler The above list is not exhaustive and relevant standards (latest version) especially for testing/ validation should have to be followed by the OEM/Supplier.				that is optimized for long trainsets and could endure higher force levels than what is defined in EN 16019. Dellner will support RDSO in creating a new standard based on EN 16019. EN 15227: Crashworthiness requirement of Rly. vehicle- It is understood by Dellner that the aim of RDSO is to define standardized CEM components for locomotive hauled passenger coaches. RDSO must define the necessary characteristics* of all CEM components (crash buffers, couplers etc.) to ensure compliance to EN 15227. Only after defining these characteristics *(*i.e. anti-climbing force levels, deformation tube force levels and*	suitable specification which can meet IR requirements as detailed in this specification is allowed for. Further, regarding EN-15227 compliance, basic drawings of underframe pockets are already mentioned and it is left to the OEM/Vendor to design these product which meets EN 15227 requirements as far as crash energy management is concerned.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
					stroke values) a final version of this specification could be made. This final version should include the necessary characteristics of all CEM components to meet EN 15227 requirement. Dellner will support in defining these characteristics.	
2.0	DEFINITIONS					
2.1	"PURCHASER" means the Ministry of Railways, or an administration under the Ministry of Railways on behalf of the President of the Republic of India.	Noted	-------	------	-------	
2.2	IR means Indian Railways.	Noted	-----	-------	-------	
2.3	RDSO means Research Designs and Standards Organization, Manak Nagar, Lucknow 22601 1.	Noted	-----	-------	-------	
2.4	INSPECTING AUTHORITY means the representative of Indian Railways/RDSO nominated by Director General, RDSO to inspect the supply on behalf of the purchaser.	Noted	------	-------	-------	
2.5	~~Vendor~~OEM/supplier means the firm/company that has designed & developed~~submits offer for supply of~~ High capacity Semi-Permanent Couplers as mentioned in clause 1.4 and on whom order for supply of couplers, draft gears and associated components, in full or parts as per this specification ~~is~~ may be placed. Suppliers (who are not OEM's) will be considered based upon a valid MOU/Agreement. The MOU/Agreement should clearly state the OEM undertakes to	Noted	Wabtec as a OEM - High Capacity Couplers will be designed, developed and supplied by Wabtec as per the specifications and maintenance shall be as per the agreed	Noted& no comments. This point may not be applicable to Voith since Voith is an OEM. The supply of the couplers will be based on the scope of supply agreed and any upgrades in future will be performed based on	-------	

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	fulfil the warranty and support obligations with respect to technology up-gradations as and when required for the system assembly, even in case the MOU/Agreement is rescinded at some later stage throughout the life of the product.		contract.	the mutual agreement with additional cost or not which is completely depends on the mutual agreement. We can't provide any warranty if our designed parts are procured from our suppliers directly.		
2.6	Sub-vendor means any Firm or company from whom the ~~vendor~~OEM / Supplier may obtain an item of supply not necessarily manufactured by the vendor himself.	Noted	-------	-------	-------	
2.7	SPECIFICATION unless otherwise mentioned, refers to specifications of IR/RDSO and the same could be procured from ~~DG/~~RDSO on normal payment basis, as applicable.	Noted	--------	-------	-------	
3.0	PARTICULAR REQUIREMENTS		------	-------	-------	
3.1	All the couplers in the rake shall be mechanically couplable.	Noted	------	-------	-------	
3.2	The ~~vendor~~ OEM/Supplier shall develop a design based on sound engineering practice and submit general arrangement and working drawings and all technical data to RSDO, Lucknow for approval before commencing manufacture.	Noted	-------	-------	-------	
3.3	The semi-permanent coupler shall work unrestricted and reliably under all environment conditions, e.g. rain, washing water, snow and particularly in hot summers as well as in cold winters. These conditions shall not have any influence on the function of the coupler	Noted	------	The statement is generic one, request to formulate/ quantify with values i.e. operating temperature range -10 deg C to +55 deg C, Storage temperature range - 25	-------	Details are already mentioned in Annexure-A

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
				deg C to +70 deg C, Humidity: 95% etc...		
3.4	In event of failure of the horizontal or vertical support the coupler head shall not fall down and reach the track.	Noted	-------	-------	Noted, this could either be solved within the coupler itself or by a beam under the coupler (carbuilder scope).	No comment
3.5	If the semi-permanent coupler gets exposed to unacceptable load that may have caused a damage to the draw and buffing gear, this damage shall be obviously visible.	Noted	Shear Indicators will be provided	Noted& no comments	-------	No comment
3.6	Manual coupling or uncoupling shall be possible by ~~one~~ two persons within ~~30~~15-20 minute with normal tools for SPC with intermediate tube.	Noted	-------	Noted, Voith recommend tools for coupling and uncoupling. Mainly for Coupling torque wrench is required& procedure will be provided for coupling& un-coupling. Request for reframe the sentence to Manual coupling/ un coupling shall be possible by one person within 20 minutes with firm specified tools and procedure provided.	-------	Clause is self-explanatory.
3.7	The coupler draft gear/bearing bracket with horizontal and vertical support (if applicable) and fastening element shall withstand the operating load during its lifetime	Noted	-------	-------	-------	
3.8	The contractor shall provide a maintenance manual / file that includes all required actions for the maintenance of the coupler.	Noted	Maintenance manual will be provided	-------	-------	Agreed

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
3.9	The coupler head, coupler shank (draw bar), draw and buffing gear, centring device and bearing bracket(if applicable) shall be indelibly marked with the supplier's brand, the date of manufacturing and the serial number.	Noted	Name Plate will be provided as per Wabtec Standards	-------	-------	Agreed
3.10	The semi-permanent coupler shall move freely backwards into the underframe of the car body ~~after the irreversible energy absorption element has been used completely~~ to enable employment of further crash elements behind the coupler's position. (Note: The construction of the car body has to be taken into consideration.).	If we provide irreversible energy absorption in shank region, torsional strength of coupler will not be achieved which based on past experience is safety critical.	Once shear load is exceeded the automatic coupler will retract inside the under-frame.	Noted. In existing coupler mounting of these underframes, the draft gear mounting in a pocket of 510mm+/-5 mm, this needs adjustable type mechanism for draft gear mounting& this arrangement might limit the crash energy requirement for the train. Also the current draft gear pocket limits the stroke of the deformation tube & in most of the underframes there is no provision to mount the vertical support& automatic centering devices to the coupler, hence we recommend to modify the coupler mounting to flange mount. This shall be finalized after mutual discussion with RDSO& ICF. We need drawings and step file of the coach under frame's so that we can propose the changes for this	-------	Clause is self-explanatory.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
				type of mounting.		
3.11	The draw bar (draw and buffing gear) shall be equipped with a reversible elastic element for energy absorption. The elastic energy absorption system shall endure a life cycle test analogous to EN 15551 life cycle test.	Complied	------	-------	EN 15551 is mainly applicable to side buffers and not couplers. Dellner have not performed tests according to this standard.	This is applicable to crash buffers which will be provided at sides of the coach.
3.12	The semi-permanent coupler shall have a visible indicator that shows that the irreversible energy absorption element has been triggered.	Noted	Shear Indicators will be provided	Noted& no comments.	-------	
4.0	GENERAL DESIGN FEATURES: Semi-permanent couplers are required to be retractable type of coupler. The underframe drawings mentioned in the specification are indicative in nature. OEM's are expected to design a product suitable for fitment in existing pocket. However, if any change in pocket size is required, the OEM will be required to submit FEA details of modified design meeting the relevant standards.	------	--------	Noted. We require the drawings and step file of the existing underframes to suggest the modified design. The mounting size (flange mount) shall be mutually discussed and agreed with RDSO.	-------	Drawings can be collected from RDSO.
4.1	The fixing of High capacity Semi-Permanent coupler ~~with Balanced Draft Gear~~ to under frame shall be as per ~~RDSOs drawing no. CG - K4012 Alt. 1 (Annexure-B). The fitting arrangement and under frame cutaways shall be identical for all couplers (end and intermediate)~~ various ICF drawing which can be collected from either RDSO or ICF. ~~Nos: 72611001,72711001,72811001,74411001,~~**~~8891 1001, 89011001, 89111001, 89311001.~~** However, there will be slight variations in the design without affecting the overall dimensions and supplier has to confirm the drawings before taking up manufacturing and supply.	Noted	-------	Noted. In existing coupler mounting of these underframes, the draft gear mounting in a pocket of 510mm+/-5 mm, this needs adjustable type mechanism for draft gear mounting& this arrangement might limit the crash energy requirement for the train. Also the current draft gear pocket limits	-------	Pl. refer para 3.10/4.0 clarification.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
				the stroke of the deformation tube & in most of the underframes there is no provision to mount the vertical support& automatic centring devices to the coupler, hence we recommend to modify the coupler mounting to flange mount. This shall be finalized after mutual discussion with RDSO& ICF. We need drawings and step file of the coach under frame's so that we can propose the changes for this type of mounting.		
4.2	The draft / buffing gear shall be with elastomeric springs or gas hydraulicor any other suitable globally proven technology.	Noted	Elastomer pads are considered for this design	-------	-------	
4.3	The distance between the end wall and coupling line shall be ~~230~~ 230 mm in LHB coaches and 450 mm in Vande Bharat coaches when High capacity Semi- permanent couplers are fitted.	Noted	For Trainset 18 - 450 mm from End wall is applicable. For LHB - 230 mm considered as per updated specification	Noted& no comments	-------	Para is self-explanatory.
4.4	The end coaches should be able to couple with the locomotives which are generally having Transition Centre Buffer Coupler with AAR–H/E type head. In such case, CBC should also have push back mechanism in cases of collision/derailment. ~~For coupling the end caches with locos, the High Capacity Semi-~~	Whether AAR-H Type is a part of this specification? Please provide the details for the same.	Either an Adaptor or AAR H type coupler can be used for End Cars, need to discuss and mutually agree	-------	The rake needs clarification in future revisions of this specification. Which coaches will be fitted with AAR coupler heads,	RDSO specification no. RDSO/2011/CG-03 may be referred for reference.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	~~Permanent Couplers with Balanced Draft Gear should have provision of interchangeability with CBC AAR 'H' head (as per spec. no. RDSO/2011/CG-03 (Rev.-1 or latest) within the same coupling line.~~		on the scope of supply.		Latch type coupler heads and semi-permanent couplers?	
4.5	There should be provision of uncoupling device and supporting device for the end coaches fitted with AAR-H type coupler ~~and supporting device for all coaches~~ as per spec. no. RDSO/2011/CG-03 (Rev.- 1 or latest)	Please let us know whether temporary rigid support is sufficient to hold the Coupler.	Uncoupling device & Supporting device will be provided in case of H Type / Type 10 coupler only	-------	-------	
4.6	The semi-permanent coupler design shall withstand the following forces without permanent deformation: Tensile load = 1500 kN; Compressive load=2000 kN ~~meet the requirements of vertical shear strength as laid down in APTA PR-003-98 dt. 13-02-2004.The value shall be Torsional resistance = 203 Kn and vertical Shear strength = 445 kN.~~	Noted	-------	Noted. The high-speed trains in Europe and China are successfully operating for a tensile load of 1000kN and compressive load of 1500kN which are according to EN16019. Request RDSO to review on these loads. The semi-permanent coupler	See 7.1.1. 1500kN tensile load is "ultimate load".	Clause is self-explanatory.
4.7	Crash energy management (crash buffers/energy absorber with anti-climbing feature) shall be provided additionally on coach ends.	Please provide the crash buffers details for designing stroke of irreversible energy absorption.	-------	-------	See comment under 1.7~~(1.6.3.)~~	The system should be so designed so that it could meet the requirements of EN 15227.
4.8	The provision of semi-permanent coupler and crash buffer/energy absorber with anti-climbers shall not cause a climbing of car bodies or derailment in case of collision i.e. it shall comply the European std. EN16019 and minimum shear strength shall be 445 kN.	Since torsional requirement is not mentioned, derailment possibility may arise.	Train Category C-I is considered as per EN15227 is considered for crash analysis	Noted& no comments	EN 16019 does not specify anti-climbing limits for semi-permanent couplers. The standard is only	This requirement to be meet by semi-permanent coupler and crash buffer combined.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
					applicable for Type 10 coupler heads. See also comment in 1.7 (~~1.6.2)~~. The 445 kN requirement is very high and will restrict the available technical solutions. More cost efficient solutions could be developed if this value is negotiable. Compare anti-climbing requirement present in the UK market (GMRT 2100) where the couplers shall manage a load of 100+100kN (vertical + lateral) when in contact with a beam on the carbody.	
4.9	The semi-permanent coupler with crash buffer/energy absorber with anti-climbers shall fulfil the energy absorption ~~concept~~ requirement ~~for the complete train rake~~ as detailed in ~~compliance to~~ EN 15227.	Please provide the rake configuration for checking compliance to EN 15227.	Train Category C-I is considered as per EN15227 is considered for crash analysis	Noted. RDSO shall specify the side crash buffers energy absorption capacity, stroke length & maximum number of cars in train (For LHB: Push-Pull & Vande Bharath trains-EMU) along with mounting	See comment under 1.7 ~~(1.6.3.)~~	Side crash buffers energy absorption capacity should be as specified in para 8.1.1, mounting details drg. will be collected from RDSO. Stroke length to be

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
				details of side buffers. These details are input for our crash energy& coupling speed (impact) simulations.		advised by OEM for standardization.
4.10	The muff coupling to be used for connection should be forged for meeting strength requirement.	Noted	------	-------	-------	
4.11	The semi-permanent coupler should behave like retractable push back type with draft capacity 667 kN in deformed condition.	Noted	The semi-permanent coupler will behave like retractable push back type with draft capacity of 667KN in deformed condition. However, the operation under this condition will be limited to rescue mode only.	Noted& no comments	TBD. Will be discussed later depending on design of the coupler and underframe. More cost efficient solutions could be developed if this value is negotiable.	Clause is self explanatory.
4.12	The push back property should activate at 2000 kN load.	Noted	-------	-------	See comment under 1.7 (~~1.6.3.~~)	Modified
4.13	The vertical and horizontal pivoting of the semi-permanent coupler shall be at least ± 6° & 12° respectively.	Please note that IR main line Couplers are having articulation upto 16 degree. With lesser horizontal articulation, it will be difficult for train to negotiate the	-----	-------	-------	Clause is self-explanatory.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
		small track radius curves.				
4.14	Manual coupling or uncoupling shall be possible on curve radii≥175 m.	Noted	Type 10 & AAR H type Couplers will have its own gathering range, which enables automatic coupling and manual uncoupling. Whereas, in semi permanent coupler without the above specified head, needs manual intervention.	-------	-------	Clause is self-explanatory.
4.15	When using the semi-permanent coupler, connected vehicles shall run through S-curves with radii≥175 m without any restrictions.	If it is 12° articulation in Couplers, it will not be possible in train to handle S-curves.	-----	Noted& no comments	-------	Simulation result to be shared by OEM/Supplier.
4.16	An energy absorption of 80 % of the elastic system in new condition is considered to be the limit. A value below this level is not appropriate to keep the elastic system in service.	Complied	-------	-------	-------	
4.17	The reversible elastic system shall detect and show whether it is still working after is has been exposed to an impact or crash without dismantling any parts of the elastic system.	Noted	Depends upon the intensity of crash impact, need to follow inspection guidelines before using it for service.	-------	-------	Clause is self-explanatory.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
4.18	The reversible elastic element shall absorb energy during coupling up to 5-6 km/h with the longest possible train formation without any damage on the coupler (and to the train).	Please provide longest rake train formation in terms of number of coaches.	Impact Simulation report can be provided.	-------	-------	Longest train will be 24+1 coach.
4.19	~~The reversible and irreversible elements shall absorb energy during coupling up to 10 km/h with the longest possible train formation without any damage on the coupler (and to the train).~~	Please provide longest rake train formation in terms of number of coaches.	Impact Simulation report can be provided.	-------	It is understood by Dellner that the aim of RDSO is to define standardized components for locomotive hauled passenger coaches. RDSO should define the necessary energy capacity and stroke values for the regenerative components to manage the shunting and coupling scenarios.	Clause is deleted.
4.20	The irreversible energy absorption element shall be replaced after a collision or heavy shunt.	Noted	We understand that if there is a damage to the other elements, the same will also be replaced.	-------	-------	Clause is self-explanatory.
5.0	MATERIAL					
5.1	The material used for ~~the load bearing parts of~~ coupler shall be High strength steel casting to AAR M-201 Grade 'E' standardor equivalent or superior ~~with castings defects free if, any.~~	Noted	-------	-------	-------	
5.2	CHEMICAL COMPOSITION(in case of AAR M-	Noted	-------	-------	-------	

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	201 Grade 'E')					
5.2.1	The percentage by weight of different elements in Grade 'E' steel of specification M-201 shall not exceed the following limits: Carbon, Maximum percent -0.32 Manganese, maximum percent -1.85 Phosphorus, maximum percent -0.04 Sulphur, maximum percent -0.04 Silicon, maximum percent -1.50 Note: Other alloying element may be added in order to improve strength requirement.	Each element limit will be within the range defined in RDS0/2011/CG·03 (Rev.03)	--------	-------	-------	
5.4	HEAT TREATMENT Heat treatment process shall be done as per AAR M-201, Grade 'E' steel specification (latest version).	Noted	For parts which are applicable	-------	-------	
7.0	DRAFT GEAR Draft Gear shall be either balanced type with force flow diagram as shown in diagram in Sketch CG-K8207 Alt.-I (Annexure-C) or gas hydraulic or any other globally accepted design/mechanism. The draft gear shall be with elastomeric spring or gas hydraulic or any other globally accepted design and suitable for running long train. Documents related with draft gear characteristics are to be submitted during prototype approval and Endurance test has to be carried out before aprroval of prototype in presence of RDSO representative.	Complied	------	Noted. Draft gear sizing based on the train level impact simulation results. Based on the train level impact simulations we will propose/ conclude whether draft gear or gas hydraulic damper is required	-------	Clause is self-explanatory.
7.1	Performance and Test Requirements					
	(i) The complete High Capacity Semi-Permanent Coupler with ~~Balanced~~ Draft gear assembly shall withstand tensile load of 1000 kN with the residual strain being below 0.2% after release of load and tensile load of 1500 kN without any rupture of any part of the	-----	---------	Noted. The high-speed trains in Europe and China are successfully operating for a tensile load of 1000kN and compressive load of	-------	Clause is self-explanatory.

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	assembly.			1500kN which are according to EN16019. Request RDSO to review on these loads.		
	(ii) The complete High capacity Semi-Permanent Coupler with ~~Balanced~~ Draft Gear assembly shall withstand compressive load of 2000 kN without showing any permanent deformation. The residual strain should be below 0.2% after release of load.	-----	As defined in clause no. 4.12, the push back property should get activitated at 2000KN +/- 10%. So, the strength test shall be performed at 1800 KN	Noted. The high-speed trains in Europe and China are successfully operating for a tensile load of 1000kN and compressive load of 1500kN which are according to EN16019. Request RDSO to review on these loads.	-------	Clause is self-explanatory.
	(iii) ~~Bending test of the complete High capacity Semi-Permanent Coupler with Balanced Draft Gear assembly shall be carried out by applying a force of 300 kN in graduated steps at the centre of the coupler shank system. The residual strain should be below 0.2%. No fracture should be observed on application of load of 500 KN.~~	-----	------	Noted, bending load application point shall be specified.	Bending test seems obsolete given the requirement in 4.8(~~4.7~~)	Specification is amended.
	(iv) The push back/ retractable arrangement will be checked which should be activated @ load 2000 kN.	-----	-------	-------	-------	
	(v) Anti-climbing test for minimum 445 kN shall be checked, no permanent set/fracture should be observed there.	We understand for point # (v), AAR-H Type Coupler having anti-climb feature. Please clarify.	The test protocol has to be agreed by the OEM and IR	-------	See para 4.8(~~4.7~~)	Anti-climbing feature will be for each coach end where coupler& crash buffer with anti-climber will be included.
7.2	Draft gear characteristics-					
	The draft gear characteristics (for BDG with elastomeric pad) shall be	Noted	-------	-------	How has these values been derived? Is this	LHB coaches with these properties are fit for 10 kmph

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	<table><tr><td>Travel (in draw mode)</td><td>58 mm (maximum)</td></tr><tr><td>Travel (in buff mode)</td><td>90 mm (maximum)</td></tr><tr><td>End force</td><td ~~1600 kN~~/1500 kN (maximum)</td></tr><tr><td>Pre compression of draft gear</td><td>10-20 kN</td></tr><tr><td>Energy storage capacity (dynamic). The energy storage capacity shall be obtained observing both the limits of travel and end force as mentioned above simultaneously</td><td>Buff mode20-35 kJ (maximum) In draw mode. ~~(1 -Damping Factor)* Energy storage in Buff mode (minimum)~~ 8 kJ min.</td></tr><tr><td>Damping Factor</td><td>0.6 (min.)</td></tr></table>				sufficient to manage coupling at 10kmph and the required shunting operations? For maximum end force, what is the purpose of this	shunting speed. Max. end force is for testing purpose of draft gear.
	NOTE: Draft gear (with gas hydraulic or any other globally accepted technology) characteristics shall be ~~choosen~~ decided between Indian Railway & by OEM/Suppliers with proven design suitable for longer trains of Indian Railways. Balanced Draft Gear Pad shall be made of Elastomer having non- linear characteristic with low spring rate at low travel and significantly higher rates at high travel. In the case of draft gears with internal articulation, it shall be the responsibility of the supplier to certify suitability of the same for use in Indian Railways applications. The ~~Vendor~~ OEM/Supplier shall also submit	------	-------	Noted, based on the impact simulation we propose the draft gear (EFG/ RCA)/gas hydraulic buffer and will proceed based on the mutual agreement.	-------	Clause is self-explanatory.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	static and dynamic force travel diagram indicating the preload/ pre-compression, end force, energy absorbed and the damping factor (both in draw and buff modes) of the draft gear along with the offer. .					
7.3	The couplers shall allow coupled coaches to negotiate curves of radius 175 meters and shall be capable of passage in either direction over standard 1 in 8 1/2 turnouts and shall function satisfactorily with a 75 mm difference in headstock heights of adjacent coaches.	If it is 12° articulation in Couplers, it will not be possible in train to handle S-curves.	--------	-------	-------	Simulation result to be submitted.
7.3.1	When using the semi-permanent coupler, connected vehicles shall run through S-curves with radii≥175 m without any restrictions.	-do-	------	Noted& no comments	-------	
7.4	The couplers should be jerk free in service.	Noted	-------	-------	-------	
7.5	Coaches with coupled condition the coupler should take minimum vertical swing 75 mm. in either direction.	Noted	--------	-------	-------	
7.6	Coaches with coupled condition the coupler should take minimum horizontal swing 284 mm in either direction.	Noted	--------	-------	-------	
7.7	Firm will submit the test plan to RDSO for approval and type testing shall ~~also~~ be carried as per RDSO approved test plan as per this specification	Noted	-------	-------	-------	
8.0	CRASH ELEMENT ~~(if required by the purchaser)~~					
8.1	~~Vendor shall quote separately for crash element in his offer, if required by the purchaser at the time of purchase.~~ Crash element should be integral part of coupler& draft gear assembly in addition to other crash buffers/energy absorber with anti-climbers and/or crash energy management system provided in train. The coupler should behave like a retractable push back type within draft	250 kJ will not be complied as per EN-15227 for AW4 coaches.	---------	-------	As discussed with RDSO. The coupler pocket must be redesigned for successful implementation of CEM systems. Increasing the coupler length is of	May please refer to clause 4.0

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	gear pocket ~~(as per Annexure-B or ICF drg. No. 72611001, 72711001, 72811001,74411001, 88911001, 89011001, 89111001, 89311001)~~, in case of collision or derailment. The deformed coupler should have draft capacity of 667 kN for toeing purpose. The crash element should trigger at 2000~~±10%~~kN and should absorb energy ~~at a rate of approximately 1600 kN~~ for minimum displacement of 200mm. Energy absorption should be ~~more than 320 250 kJ~~ in compliance to EN 15551 for crash buffer.				benefit (and perhaps a must) as the current length of 1030mm adds a severe restriction to what stroke values that will be available in the coupler and crash buffers. As the stroke will be limited, the forces will be increased in all CEM components of the train.	
8.1.1	Additional crash buffers/energy absorber with anti-climber or crash energy management system to be fixed at coach end should have anti-climbing feature (min. 445 kN) in addition to crash energy absorbing property. Energy absorption of individual crash buffer/energy absorber or crash energy management system should be ~~more than 250Kj~~ in compliance to EN 15551 for crash buffer.	Please provide the crash buffers details for designing stroke of irreversible energy absorption.	Need to mutually agree on force and stroke for crash buffers.	-------	445kN seems to be high, the needed anti-climbing force should be derived from perfroming 3D crash analysis according to EN 15227, section 6.2. For reference, crash buffers in Vande Bharat sleeper cars manages 120-150kN (for each buffer). For energy requirement please refer to sect. 1.6.3 above	Para is modified suitably.
8.2	In case of new design, service trial of the couplers shall be carried out post fitment for a period of ~~06~~ 12 months for assessing the field	Noted	Noted	-------	-------	

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	performance. For, OEM/Supplier as covered under clause 1.4 shall be exempted from service trial.					
9.0	SUPPLY OF TECHNICAL DATA					
9.1	~~Vendor~~ OEM/Supplier shall develop/adopt a design based on sound engineering practice and submit complete assembly drawings and related specifications of the coupler and assembly being offered by him.	Noted	--------	-------	-------	
9.2	~~Vendor~~ OEM/Supplier should prepare Quality Assurance Plan for the manufacture and inspection of the coupler and draft gear system [sub-vendor and it should be submitted to RDSO for approval. The heat treatment processes shall be verified at the supplier's end through process flow and control plan defining all critical processes and characteristics, to be confirmed by test rep orts.	Noted	-------	-------	-------	
9.3	List of the manufacturing and acceptance gauges used by the ~~Vendor~~ OEM/Supplier or the Sub-vendor to check the components of the coupler to ensure interchangeability should be submitted to RDSO.	Noted	------	------	-------	
9.4	Onus of obtaining license, if required any shall lie with ~~Vendor~~ OEM/Supplier.	Noted	-------	-------	-------	
9.7	The use of special tools for the maintenance and replacement of the semi-permanent coupler or its parts shall be avoided. Where the use of special tools for maintenance and replacement the semi-permanent coupler or its parts is required, the customer shall be provided with the detailed information as well as necessary tools along with the supply. This document informs about the operation	Noted	--------	Note, our maintenance manual specifies the details of tools and inspection criteria with limit values and the necessary actions.	-------	Agreed

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	purpose, ~~which measurements have to be made, which values are acceptable (e. g. system technical threshold value)~~ and how the calibration of the special tools has to be made (point of time, procedure).					
10.0	QUALIFYING REQUIREMENTS:					
10.1	~~Vendor~~ OEM/Supplier meeting any one of the following criteria shall qualify.		--------	-------	-------	
	(ii) ~~Vendor having experience in supplying AAR 'H' type coupler to INDIAN RAILWAYS~~ The supplier should have designed, manufactured and supplied the tendered type of coupler for trains operating at 200 kmph or above on atleast 200 coaches or their principles have designed, manufactured and supplied the system for trains operating at 200 kmph or above on atleast 200 coaches. The couplers installed by the tenderer in the past should have completed minimum 2 years' satisfactory service till the date of advertisement of the tender.	It is also known fact that there is no train running at 200 kmph or above in India hence RDSO must Consider the experience of existing supplies being Indian Company which is in line with our Prime Minister policies of 'MAKE IN INDIA' and 'ATAMNIRBHAR BHARAT. Hence, we should be allowed to get the awarding order for the couplers up to 200 kmph based on our experience and credentials. Reference RDSO letter No.MC/BIB/CBC Dated-	--------	-------	-------	Para is self-explanatory.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
		08.09.16				
	(iii) In order to promote "Make in India" initiative of Govt. of India, indigenous suppliers will be allowed to design & develop these couplers after approval of design document by RDSO, for such suppliers. One rake quantity will be put in service trials for a period of not less than 12 months before being considered for bulk quantity.	Noted	--------	-------	-------	
	(iv) ~~Vendor~~ Subsidiary of OEM/Supplier having experience in manufacturing of Semi-Permanent Coupler / AAR 'H' type coupler and supplying to reputed international Railway like European, American, Japanese or any other developed country is also eligible to submit the offer for trial orders if it is located in India.	Noted	--------	-------	-------	
10.2	~~Vendor~~ OEM/Supplier or Sub-vendor should have adequate plant and manufacturing capacity to manufacture and supply the couplers within the delivery schedule.	Noted	--------	-------	-------	
10.3	~~Vendor~~ OEM/Supplier should have a well-established quality control system and organizational set up to ensure adequate quality at all stages of manufacture.	Noted	---------	-------	-------	
10.4	~~Vendor~~ OEM/Supplier not submitting the above mentioned requisite information should note that incomplete offer is liable to be rejected.	Noted	--------	-------	-------	
10.5	In addition to the above, further information, if required by the PURCHASER, shall be promptly provided by the ~~Vendor~~ OEM/Supplier.	Noted	---------	-------	-------	
11	GENERAL REQUIREMENTS					
11.1	Inspection of coupler assemblies and associated components shall be carried out by the INSPECTING AUTHORITY and	Noted	--------	-------	-------	

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	notwithstanding what has been specified in this specification, inspection shall be conducted as per relevant standard international practices/specifications and as mutually agreed to by the INSPECTING AUTHORITY and ~~Vendor~~ OEM/Supplier. In case of a dispute, however, the decision of the PURCHASER shall be final. If purchaser desires in process inspection can be carried out at the manufacturing stage also.					
11.2	A test plan should be submitted by the ~~Vendor~~ OEM/Supplier and after the assessment of the test plan, RDSO may modify or supplement the test plan before granting approval to it.	Noted	-------	-------	-------	
11.3	The type test of the product shall be witness by RDSO if testing in India otherwise witness by ~~RA Berlin or~~ representative of Railways ~~RDSO~~ if testing in abroad.	Noted	---------	-------	-------	
11.4	The general design and the arrangement drawings of the coupler and draft gear system should be got approved from RDSO. Further modifications and improvements to the product design if any in future, should be got approved from RDSO	Noted	--------	-------	-------	
11.5	The inspection of coupler assemblies and associated components shall be done at the ~~Vendor~~ OEM/Supplier's premises- ~~Vendor~~ OEM/Supplier shall also provide at his cost labour and appliances (gadgets required by the INSPECTING AUTHORITY for conducting complete inspection as required under the contract.	Noted	--------	-------	-------	
11.6	~~Vendor~~ OEM/Supplier shall be responsible for execution of the contract in accordance with this specification and for satisfactory fitment and operational performance of the couplers supplied, irrespective of any approval which the PURCHASER/RDSO may have given.	Noted	-------	-------	-------	

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
11.7	~~Vendor~~ OEM/Supplier shall provide adequate supervision to ensure satisfactory fitment of 10 coupler sets for the first supply of new design under this specification and satisfactory service performance.	Noted	-------	-------	-------	
11.8	~~Vendor~~ OEM/Supplier shall also provide training to IR officials at his own cost, regarding maintenance practices of the coupler system.	Noted	------	-------	-------	
11.9	The design of coupler and associated components must be such that it may not warrant any major maintenance/ attention up to 6 years.	Noted	Regular maintenance as per schedule shall be followed	-------	-------	
11.10	The coupler offered shall render a service life of 35 years.	Noted	------	-------	-------	
11.11	All the provisions contained in RDSO's ISO procedures laid down in document No. QO-D-8.1-11 dated 07-07-2023 (titled "Vendor-Change in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful ~~Vendor~~ OEM/Supplier in the contracts floated by Railways to maintain quality of products supplied to Railways.	Noted	-------	-------	-------	
13.0	MAINTENANCE OF COUPLERS ~~Vendor~~ OEM/Supplier shall provide detailed instructions for day-to-day and workshop maintenance and shall include the following:	Noted	------	-------	-------	
13.1	Detailed work content of various inspection/maintenance practices including procedure for assembly and fitment of couplers. The work content of each schedule shall also be intimated.	Noted	Maintenance manuals for couplers will be submitted			Agreed
13.2	~~Vendor~~ OEM/Supplier shall also submit a list of technical specification (for procurement purpose) of all special purpose toots, gauges and testing /measuring instruments required	Noted	--------	-------	-------	

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	for examination repair and over hauling / reconditioning of couplers. Price proposal for these tools gauges and testing /measuring instruments shall also be submitted with the offer separately. One set of gauges should be supplied for every supply of ~~60 (sixty)~~ 100 (hundred) nos. of couplers.					
13.3	~~Vendor~~ OEM/Supplier shall make recommendations suggesting scale of spares to be maintained per 100 couplers for a period of 6 (Six) years. Price proposals for these spares shall also be submitted with the offer separately during procurement.	Noted	------	-------	-------	Modified.
13.4	~~Vendor~~ OEM/Supplier shall specifically advise criteria for replacement of components of couplers during maintenance.	Noted	--------	-------	-------	
13.5	~~Vendor~~ OEM/Supplier shall supply min. 10 (Ten) copies of Maintenance Manuals for every supply of 500 (five hundred) couplers to PURCHASER and subsequently whenever revised. A soft copy of the Maintenance manual shall also be submitted.	Noted	------	-------	-------	
14.0	~~GUARANTEE~~ WARRANTY ~~Vendor~~ OEM/Supplier shall assist the coach builders in the fitting testing and commissioning of these couplers and shall be responsible for their satisfactory working. ~~Vendor~~ OEM/Supplier shall at his cost replace/ repair the couplers and associated components failing prematurely or proving unsatisfactory in service for reasons attributed to defective/faulty design, defective material or poor workmanship within a period of ~~48~~ 84months from the date of delivery or ~~36~~	Noted	------	-------	-------	Modified as per existing CBC spec. No. RDSO/2011/CG-03 Rev.03 warranty period.

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	72months from the date of fitment, whichever is earlier. This warranty shall survive notwithstanding the fact that the couplers may have been inspected, accepted and payment thereof made by the PURCHASER. ~~For the replaced coupler/components, the period of 3672 months shall commence when the replaced coupler /component is commissioned in service.~~ The sole judge in this case shall be the PURCHASER.					
15.0	Any design/ manufacturing/ raw material deviation/alteration on the items should be approved by RDSO.	Noted	---------	-------	-------	
16.0	MARKING: Each item of scope of supply shall be embossed /punched clearly with UNIQUE numbers along with manufacturer logo and year of manufacture.	Noted	-------	-------	-------	
17.0	PACKING:					
17.1	All the items shall be covered in polythene cover thickness not less than 25 microns and shall be packed in wooden crates. Machined/unpainted areas shall be treated with rust preventive oil. Items shall be packed separately and 26 abele in individual wooden boxes. These boxes shall be adequately protected to avoid damage during handling and transit. No organic material such as dry grass shall be used as filling material.	Noted	-----	-------	-------	
17.2	Air coupling ends shall be provided with dummy caps to avoid corrosion of bushes. Threaded holes to be protected suitably.	Noted	-------	-------	-------	
17.3	All mounting screws and dowels shall be secured to the respective items .Dummy nuts shall be provided to avoid the missing of the	Noted	------	-------	-------	

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	fasteners.					
	Annexure-A	Noted	-----	-------	-------	
	Annexure-B	Noted	-----	-------	-------	
	Annexure-C	Noted	-----	-------	-------	
	Annexure-D	Noted	-----	-------	-------	
	Annexure-E		-----	-------	-------	
	Annexure-F Requirement for the Type -10 Head: The requirements mentioned in Annexure-F are specific to Type -10 head for automatic coupling. In case of any mismatch in requirements for Type-10 head as detailed in specification vis-a-vis as mentioned below, the details available in Annexure-F will prevail. 1. The Type -10 Head alongwith other crash energy absorber on coach end shall comply the EN 15227 requirement. 2. The design & function of Type -10 head shall be as per EN-16019 except strength requirement. 3. Proof Strength requirement for the Type -10 head shall be 1000 kN(within 0.2% yielding), 1500 kN (without fracture) in Tensile & 2000 kN(within 0.2% yielding) in compression mode. 4. There will be no specific requirement of draft gear for the Type -10 head, but they should meet the strength requirement as per 1000 kN (within 0.2% yielding) as well as 1500 kN (without fracture) in Tensile and 2000 kN (within 0.2% yielding) in compression mode.		------	-------	-------	

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	5. The Type -10 head coupler should behave like retractable push back type with draft capacity 667 kN in deformed condition. The push back property should activate at 2000 kN load. 6. The provision of Type-10 head coupler and crash buffer/energy absorber with anti-climbers shall not cause a climbing of car bodies or derailment in case of collision i.e. it shall comply the European std. EN16019 and minimum shear strength shall be 445 kN. 7. The couplers shall allow coupled coaches to negotiate curves of radius 175 meters and shall be capable of passage in either direction over standard 1 in 8 1/2 turnouts and shall function satisfactorily with a 75 mm difference in headstock heights of adjacent coaches. 8. When using the Type -10 Head coupler, connected vehicles shall run through S-curves with radii≥175 m without any restrictions. 9. The vertical and horizontal pivoting of the Type -10 Head coupler shall be at least ± 6° & 12° respectively. 10. Manual coupling or uncoupling shall be possible on curve radii≥175 m. 11. During couplability test with other coupler head of same make, gathering range will be tested as per clause 5.1.4 of EN-16019. 12. The couplability of Type-10 head with other make should be ensured within its gathering range.					

Clause No.	Description	M/s Escorts Comment	M/s Faiveley	M/s Voith	M/s Dellner	RDSO remarks
	13. The Type-10 head shall must be fitted with manual uncoupling device which can be used for uncoupling in regular or in emergency case as well. 14. Additionally, the mechanical–pneumatic coupling un-coupling criteria of Type -10 head shall be as per EN-16019. 15. The routine test for couplability, dimension, function shall be done as per EN-16019. 16. An energy absorption of 80 % of the elastic system in new condition is considered to be the limit. A value below this level is not appropriate to keep the elastic system in service. 17. The reversible elastic system shall detect and show whether it is still working after it has been exposed to an impact or crash without dismantling any parts of the elastic system. 18. The reversible elastic element shall absorb energy during coupling up to 5-6 km/h with the longest possible train rake formation (24 coaches) without any damage on the coupler (and to the train). 19. The irreversible energy absorption element shall be replaced after a collision or heavy shunt.					