

## CARRIAGE DIRECTORATE

**Note No. MC/CB / Plug Door**

**Dated: 21.01.2020**

**Sub.:** Comments on Draft Specification for Single Leaf Automatic Plug Door including Locking and Opening Mechanism for BG Mainline Passenger Coaches of Indian Railways

**Ref:** This office letter no. MC/CB/Plug Door dated 21.08.2019.

**Comments/Remarks:** General Description of Single Leaf Automatic Plug Door including Locking and Opening Mechanism for BG Mainline Passenger Coaches of Indian Railways

S. No	Clause No.	Comment of M/s Faiveley Transport	Comment of M/s Knorr - Bremse	Comment of M/s Faiveley Transport	Comment of M/s Escorts Division	RDSO Comments
1	Clause 1	Single leaf Automatic plug doors in the LHB coaches to prevent accidental falling of passengers from running trains. Single leaf Automatic plug door including locking and opening mechanism is a sophisticated complex system in which the coach doors will be close whenever the train starts from Railway station. Similarly, these doors remain closed till the train stops at the next station and eliminate chances of passengers detraining from the moving train. However, Brake should be applied when any door is open condition while train speed is more than 5 kmph. The installation and commissioning of the complete door system shall be made in the LHB type coaches. These doors can be locally opened by pressing emergency button and after stoppage of train in case of emergent situation detected through either by application of Alarm Chain Pulling (ACP) or application of brake etc. by guard. Single leaf Automatic plug door including locking and opening mechanism in coach required to be manufactured and maintained to ensure high degree of reliability and safety. These doors have to be reliable as any malfunction can affect train operation and can result in delays. At the same time, adequate safety mechanism needs to be built into the system to ensure safety of passengers during en-training and de-training and also in case of emergent situation like fire or accidents. Control of these doors with guard is an essential requirement and requires hardware, software and network / connectivity for trouble free and safe operation. Consequently, guard vehicles need to be up-graded on account of provision of Single leaf automatic door including locking and opening system.	Emergency device will be as per EN 14752. As per EN 14752, Emergency device required adequate force to be applied by the passengers to open the door by Emergency device. So, use of button is not recommended. Under power supply failure conditions, the egress device shall remain functional and allow egress.	Emergency door opening shall be managed by a "Mechanical device" which shall be able to be operated irrespective of train running status. Once, the doors are open by "Mechanical emergency device" the same scenario of Alarm Chain Pulling (ACP) application shall be applied. Also, the "Mechanical Emergency Device" Shall be Mono-stable & Capable of getting re-set on it's own on the removal of force on the device. This is to avoid crew physical intervention.  Networking requires very high level of discussion / Clarification. FT suggests to give this activity to TCMS suppliers. It is better if, the door electrical control at train level also is given made part of electrics supplier. Otherwise a detailed specification for Inter-Communication document shall be provided from TCMS supplier to door suppliers for proper status communication.	We are assuming that the speed signal (greater than 5 kmph – digital output signal) will be tapped from switch board panel to guard panel.  Where from the Signal for alarm chain pulling (ACP) will be tapped ?	1. Comments of M/s Knorr have been accepted & para modified.  2. Comments of M/s Faiveley partially accepted & para modified. TCMS is not the part of LHB coaches at present.

	Clause 2.3	Local closing' means powered closing by intervention of the passenger.			Noted. What is the use case for local closing as the powered operation by the passengers should be avoided and only manual operations mode is provided for passengers in emergency situations for opening the door.	M/s Escorts comments accepted & para withdrawn.
	Clause 2.10	'Train crew' means persons authorized to carry out the duties for door operation.			Noted. Is it guard alone or any other personal who will be responsible for Train Door Operation.	The door operation should be done by Guard.
	Clause 2.14	'Access device' means operating element for door opening from outside when the door is not available for normal operation.			Is it emergency device ? Please clarify. If so, it is required inside as well.	M/s Escorts comments accepted & para withdrawn.
	Clause 3	<p>This specification covers requirements of Single leaf automatic plug door including locking and opening mechanism for BG mainline LHB coaches of Indian Railways and is in two parts. Part-I covers general requirements regarding supply, installation, commissioning and maintenance while Part-II covers the functional &amp; design requirements.</p> <p>This specification covers requirements of provisions of Single leaf automatic plug door including locking and opening mechanism for BG mainline coaches of LHB design including disabled friendly coaches.</p> <p>Single leaf automatic plug door including locking and opening mechanism shall be suitable and technically feasible such that it can be provided on new builds coaches giving due consideration to various designs of Indian Railway coaches.</p>	No special requirement is mentioned from door suppliers pertaining to disabled friendly coaches. Required details description on this requirement.		<p>Please provide the details of the interface and the portal for the disabled friendly coaches to understand the requirements.</p> <p>Please provide detailed list of scope of supply for all variants of the coaches</p>	The detailed drawings for different variants of coaches are provided by the Tenderer.
	Clause 5	The space available over the doorway inlet inside the LHB Type coaches for the fitment of the Single leaf automatic plug door including locking and opening mechanism shall be as per RCF drawing no. LZ10105 / LZ10106 with latest alterations.	Mechanical fitment to be finalised during prototype fitment.		<p>These drawings are not available at RCF. Please clarify.</p> <p>We assume that it's a typo error and LZ10105/LZ10106.</p>	M/s Escort comments accepted & Drawing Nos. corrected.
	Clause 6.2	The details of conceptual design of Single leaf automatic plug door including locking and opening mechanism as per clause 5 shall be include technical data, detailed drawing of different components and fixing arrangements of different components of the Single leaf automatic plug door including locking and opening mechanism shall be submitted by the contractor to RDSO.	Regarding drawings, only door installation drawing and the first level subassembly drawing can be provided.			The comments will be considered during approval.

Clause 6.3	Particulars of the past supply of Single leaf automatic plug door including locking and opening mechanism and its subsystems or of the similar design used in other airways, railways and roadways in the world supported by their field experience shall be provided to RDSO.				<p>We propose that this clause be exempted for the suppliers who have developed the automatic plug door indigenously meeting all the requirements of the specification.</p> <p>The clause shall include the provision to allow companies who have developed the product that meets all the requirements as per the standards mentioned in the specification. This would allow the local companies participate as a part of the make in India initiative from Govt. of India.</p> <p>Also, M/s Escorts has the legacy of pertaining with IR in introducing the new technologies. Most of them developed indigenously and have been successfully running in the field. Hence, the credentials to be considered for the established firms who have good R&amp;D and manufacturing strengths for introduction of such new technologies, while exempting to provide prior supply experience.</p>	It's not as eligibility criteria for suitability of vendor. It's only for information better understanding of work. Therefore, no need to change.
Clause 6.4	The details of load calculation of load bearing components of the Single leaf automatic plug door including locking and opening mechanism shall be submitted by the contractor to RDSO.	Only load test report can be provided.				The comments will be considered during approval.
Clause 6.12	Prototype Single leaf automatic plug door including locking and opening mechanism shall be fitted with at least two coaches along with two power car with both ends and the functionality shall be jointly verified by RDSO, Pus / Zonal Railways along with Firm's representative.			The clause 6.11 is sufficient to prove the design with wiring and controls. Faiveley requests to cancel this requirement for approval. We can simulate the coach to condition at the first test only with Jumper cables.		It's clause does not for any approval. It's only the inspection criteria for check the functionality of Door system.
Clause 9	The contractor shall replace at site all products rejected on final acceptance due to their non-compliance with the requirements covered in this specification. The contractor shall also replace those products which show deficiencies during the time period of warranty by products complying with the	Period of 4 days is too short as all the location / depots are not keeping the consignment stock. We can provide the emails from company domains only; hence different domains cannot be provided.			Addressable Deficiencies' period should be formulated after due consideration of distance and / adequate spares should always be maintained. We will spare details of our dedicated service portal for after	Comments of M/s Knorr have been accepted & para modified.

		requirements within a period of four days for the purpose of warranty support. The contractor will provide two e-mail addresses of different domains and time of four days will be considered from the date on which an e-mail/telephonic message/fax has been sent. A fax or other mode of communication will also have same sanctity for counting number of days.			sales services & shall also provide one email id for customer complaint redressal.	
Clause 10.1	The offer shall include recommended list of spare parts required for maintenance of the Single leaf automatic plug door including locking and opening mechanism and spares in the form of kit for various sub-assemblies for the maintenance at the time of POH. The list shall give the Batch no. / Part number & quantity of each component.	Shall be provided on receipt of order.	Not clear what is batch number. Faiveley suggests to add PO ref. instead of batch number.			Comments of M/s Faiveley have been accepted & para modified.
Clause 11.3	Contractor shall associate with Indian Railways during the trials of Single leaf automatic plug door including locking and opening mechanism. He shall also undertake to modify the equipment supplied, if required as a result of trials/during trials.	As the equipment's will be supplied duly inspected as per approved documents. Any modification will be done from next supplies only.				It's should be decided the Tenderer.
Clause 11.4	The Contractor shall arrange to supply at least 5 hard & soft copies of the Operation & maintenance manual and service instructions for proper maintenance of his own proprietary equipment. The number of manuals to be supplied shall be 5 against first contract and 2 at every contract and shall be supplied free of cost.	Shall be provided on receipt of order.				The comments will be considered during approval.
Clause 11.6	Test procedure and standards for various Single leaf automatic plug door including locking and opening mechanism equipments on test bench as well as single unit / coach / rake testing.	Shall be provided on receipt of order.	Wordings are not clear. Whether these information are to be provided along with tender submission? or only for RDSO approval? Re-wording may give better clarity like adding "Tenderer shall provide" or make it as sub clause of 11.5.			The comments will be considered during approval.
Clause 11.12	The contractor shall also arrange to supply along with equipment Wall charts of all equipment being supplied by him for display in maintenance depots. These shall be supplied @ 5 sets against first contract and @ 2 sets against every subsequent contract and shall be supplied free of cost. These charts shall be pictorial, showing all components along with their Part Nos. for each item of equipment.	Supply of display material to be considered only, if the equipment is going to new depot.				It's should be decided the Tenderer.

	Clause 12.2	One Officer and 2 Supervisors shall be trained at the manufacturing works for a minimum period of one week. This training shall cover all the aspects of Single leaf automatic plug door including locking and opening mechanism like design, manufacture, fitment/installation in coach, quality control, maintenance and testing.	We committed to provide necessary training to officers and supervisors but the period to be decided mutually.			It's should be decided the Tenderer.
<b>Part - II</b>						
	Clause 1.1	<p><b>Ambient Conditions:</b></p> <p>The Single leaf automatic plug door including locking and opening mechanism shall be capable of operating efficiently inspite of dirt, dust, mist, torrential rain, heavy sand or stone storms and presence of oil vapours and radiant heat etc. to which the rolling stock is normally exposed in service over Indian Railways. The Single leaf automatic plug door including locking and opening mechanism shall perform satisfactorily under the following climatic conditions:</p> <ul style="list-style-type: none"> <li>i) Ambient temperature : -10°C to 50°C</li> <li>ii) Maximum Sunlight temperature : 70°C</li> <li>iii) Altitude : Sea level to 2500 m</li> <li>iv) Relative humidity : 40% to 100%</li> <li>v) The rainfall is fairly heavy.</li> <li>vi) During drying weather, the atmosphere is likely to be full of dirt &amp; dust.</li> <li>vii) Temperature variation may be quite high in the same journey or short period of time.</li> <li>viii) Coaches running in coastal areas with continued exposure to salt laden air.</li> <li>ix) Airborne contaminants like smoke and chemical vapors.</li> <li>x) Conducting particles like metal clips and fillings.</li> <li>xi) Abrasion damage and</li> <li>xii) Vibration and shock.</li> </ul> <p>Moreover, the Single leaf automatic plug door including locking and opening mechanism should be able to adequately protect against accidental short circuit due to dropped tools, fasteners etc. and stones thrown on the system by the anti-social elements during abnormal situations such as procession, strikes.</p>		<p>Minus 100 degree is a typo error? Is it +10 degree? No door system that can work in -100 degree C. Also, Ambient -100C never experienced in India. Request to review this requirement. Good to mention the EN standard for this requirement.</p> <p>This value is contradicting the above clause 1.1 (i) which declares as 50 degree as maximum ambient. May be reviewed.</p> <p>Door system is placed above lintel so, No such scenario of dropping tools exists. This clause may be deleted.</p> <p>These conditions cannot be handled by door system. Window glass may get broken.</p>	EN 50125 -1 intends to define the European conditions and hence should be tailored / modified to suit Indian conditions. However, the conditions provided under points (v) to (xii) are to be more precise and hence cannot be used for defining the design constraints.	No need to change.

		The environmental conditions for Railway equipment are given in EN 50125-1, such as temperature range, humidity, pollution, ice snow and rain etc. Any deviation from the specified performance, e.g. at the temperature extremes, shall be specified in the contract.				
Clause 1.2		The coach exteriors are cleaned with mildly acidic cleaning agents and using brushes with non-metallic bristles or automatic car washing plants. All exterior panels including end panels are to be hosed with water and brushed with diluted soft soap (detergent solution). The strength of solution may be increased or decreased according to RDSO specification No. M&C/PCN/101/2007. The system should not be affected by this cleaning either in performance, reliability or aesthetic.	The PH value of cleaning solution should be between 7 to 9.			The comments will be considered during approval.
Clause 1.3		110V DC supply is available from the coach circuits. This supply varies from 90V to 140V with 15% ripple in AC & Non-AC, SG and EOG LHB type coaches. The system is only allowed available power supply i.e. 110V DC.		This value is contradicting the Part II 4.5 and 5.1 clause. Good to mention EN standard for voltage fluctuation. Say EN 50155		Comments of M/s Faiveley have been accepted & para modified.
Clause 1.4		Car-body Dynamics: <ul style="list-style-type: none"> <li>± 100 mm vertically</li> <li>± 55 mm laterally</li> <li>± 10 mm longitudinally</li> <li>± 4° bogie rotation about centre pivot</li> </ul>		What is C135? How these details are relevant for door system?		Para deleted.
Clause 2.3		The design of the Door panel / leaf will be built up the follows requirement: <ul style="list-style-type: none"> <li>• Frame: Aluminium frame, welded, with straight corners, sandwich type filled with PU – foam core, bonded together via hot – bond process with the skins and the frame.</li> <li>• Window (mounted by rubber profile), Straight insulated glass, corners with radii, glass clear, silk screen printing on edges.</li> <li>• Finger protection rubber: Material EPDM, pre – mounted on door leaf at leading edge, Fire resistance according to BS 6853 category 1b.</li> <li>• Surrounding seal: Material EPDM, pre – mounted on door leaf at leading edge, Fire resistance according to BS 6853 category 1b.</li> </ul>	IFE recommends the window mounted with glue, which has better sealing performance and aesthetic appearance.  As BS6853 standard has been replaced by EN45545 in EU from 2015, IFE recommends EN45545 as Fire resistance standard. IFE EDPM rubber could comply EN45545-2 HL2.  Free opening width will be 800 mm which meets EN14752 standard. Space required to keep 920 mm free opening area and additional mounting area is not available in the coach body. To meet this requirement, major change in the	Spot welding type of stainless steel doors are available for doors which are more reliable and less sensitive to failure. Faiveley suggests to add spot welded doors into the requirement. The Aesthetics can be still maintained same as bonded Doors.  The window glasses are bonded with PU sealants with latest technologies with 35 years of life. It is good to give option for bonding as well. Bonding type will give better aesthetic look also better reliable than rubber profile	Provision for mounting window with the help of joint sealant should be present and the window glass should be as per the Railway specification MDTS/089.  Fire resistance standard should be EN 45545 as the BS 6853 is withdrawn.  The free opening width should be 800 mm min. as per EN 14752, para 4.1.1.1  Retractable steps are not part of the scope of supply.	Major comments of M/s Knorr, M/s Faiveley & M/s Escorts have been accepted & para modified accordingly. However, the width of opening door should be decided by the Tenderer.

	<ul style="list-style-type: none"> <li>• Bottom guide rail: For door leaf bottom guiding, made of stainless steel.</li> <li>• Guiding systems, rollers, joints, insulated cables, sleeve etc., exposed to operating problems in winter conditions (frost, ice etc.), must be well protected against the effects of bad weather.</li> <li>• Insulated cables must be fitted in such a way that water cannot accumulate and freeze.</li> <li>• Sleeve and other recesses must be provided with sufficient ventilation and drainage.</li> <li>• Open and hollow weather – stripping, in which water can accumulate, must be avoided. The elastomers chosen must be provided with sufficient resilient to withstand low temperature.</li> <li>• Each door must be fitted with two operating handles, one on the inside, the other on the outside, or with operating push – buttons.</li> <li>• It is recommended to indicate the opening direction of the door by means of an arrow placed near the inside handle.</li> <li>• When the doors close, there must be no risk of jamming, injury to persons or damage to luggage.</li> <li>• When closed, entrance doors must not projected beyond the vehicle body.</li> <li>• Free opening width: 920 mm</li> <li>• The other design parameters of Door panel / leaf should be as per Para 4.1 of EN 14752:2015</li> <li>• The doors must be constructed as to ensure as complete tightness as possible to air and noise</li> <li>• Water tightness test according to EN 14752.</li> </ul>	coach body design is required.	<p>mounted window glasses. This technology widely used in metro segment globally. EN 45545 HL2 or HL3 suggested. This shall be left to the system designers. There are some types managed with out bottom guide. (Assume that, the bottom guide rails refers those are mounted to car body) Good to mention any EN Standard for better clarity. The clause does not quantify the requirement. Say Noise reduction shall be minimum 30dB.</p>		
Clause 2.4	<p>The Single leaf automatic plug door including locking and opening mechanism of each coach shall be designed for both Hindi and English language announcement. The mechanism shall give an audio announcement regarding function / working of automatic door and visual indication while opening or locking activity of the door is being done and relay an audio announcement and visual indication till all doors of the coach are not closed completely.</p> <p>Message: "Please stand away from the door, kripya darwaje se dur khade ho" annunciation will be provided.</p>	The announcement function should be incorporated in PA/PIS scope. Audio and Visual indication to the passenger for opening and closing of the door will be indicated by blinking LED and beeping buzzer.	Audio announcement is normally part of PA / PIS system. A beep sound is good.		Comments of M/s Faiveley have been accepted & para withdrawn.

Clause 2.5	<p>In case of emergency, the Single leaf automatic plug door including locking and opening mechanism design may allow user to unlock individual doors either manually or by an electric command from a knob or lever. After using emergency knob or lever, door should like manual door.</p> <p>These knob / lever will be provided nearby the door with broken glass to operate the same. This emergency knob / button only work when train is in stopped condition or speed below 5 kmph.</p> <p>If the release access device of the Single leaf automatic plug door including locking and opening mechanism fails either by electric command or by the automatic opening command from master control unit, the mechanism must unlock all the doors and work manually with existing door locking and opening system.</p>	<p>Release access device should be written as emergency access device.</p> <p>As per EN 14752, Emergency device required adequate force to be applied by the passengers to open the door by emergency device. So use of button is not recommended. Under power supply failure conditions, the emergency egress device shall remain functional and allow egress.</p> <p>Clarification needed on required operations after failure of emergency device.</p>	<p>The emergency condition always calls for opening the door by mechanical means. The electrical requirement may be deleted in line with global practice.</p> <p>The emergency condition always calls for opening the door by mechanical means hence, The knob shall be allowed to be operated under any given condition. The emergency activation of doors can be considered same as Alarm chain pulling by passengers &amp; can be linked to brake application.</p> <p>One emergency device can unlock only one door system. What "Work manually with existing system" is not clear. It is not possible to use it as manual operated door after emergency is applied. To unlock the locked door every time, emergency shall be operated.</p>	<p>The requirement of emergency device inside the car for manual door operation in case of emergency is duly noted and accepted but the statement: "If the release access device of the Single leaf automatic plug door including locking and opening mechanism fails either by electric command or by the automatic opening command from master control unit, the mechanism must unlock all the doors and work manually with existing door locking and opening mechanism." Needs further clarification.</p>	Major comments of M/s Knorr, M/s Faiveley & M/s Escorts have been accepted & para modified accordingly.
Clause 2.6	<p>The main / entrance body side doors of the coach shall be locked mechanically when closed. However, the automatic opening command must not become operative until the door has been unlocked from the master control unit except in any emergency case.</p>		<p>The door opening sequence starts with unlocking. Good to delete this point. (Copy &amp; pasted below point from the clause) "However, the automatic opening command must not become operative until the door has been unlocked from the master control unit except in any emergency case."</p>	<p>In case of an emergency the power to the motor will be cut – off and the doors can be opened manually, but not through the automatic opening command.</p>	Comments of M/s Faiveley have been accepted & para modified.
Clause 2.7	<p>The closing devices must be designed and maintained in a state which ensures safe performance of their function in normal service.</p>			<p>As per our understanding, closing devices means locking and unlocking mechanism.</p>	No need to change.



	Clause 2.8	In particular, the fixed parts (latch) and moving parts (pivot pins, hinged pivot pins) of locking devices must always have sufficient overlap.		How the locking design is managed shall be left to system designers. Every system may have their own way of managing the safe locking.		It's the part of UIC 560 f, Para 1.8.2 for door, therefore, no need to change.
	Clause 2.9	Door – closing mechanisms must be so designed that self – locking closure is ensured. This state must also be maintained during normal service.		Is it a typo-error? The correct wording is given below as per Faiveley understanding. Door – closing mechanisms must be so designed that self – locking "on" closure is ensured.		Comments of M/s Faiveley have been accepted & para modified.
	Clause 2.10	Door locking and unlocking control must be independent for each other.		Not clear of requirement. Good to delete this point.	We understand from this clause that the door locking and unlocking control of each door should be independent of other doors.	Comments of M/s Escorts have been accepted & para modified.
	Clause 2.11	The design of Single leaf automatic plug door including locking and opening mechanism shall allow user to open the doors from outside of the coach also, for the purpose there should be an external mechanical access device by which the door can be opened from external side of the coach in case of any emergency. This external emergency release mechanism shall be protected from inadvertent operation by the use of a frangible cover or a sprung metal flap that must be deliberately broken or operated by the passenger. However, as an additional feature for crew member to operate outside emergency opening device by using an authorized key.		User means, Train crew / Maintenance personnel only. External emergency access device normally meant for Train crew / Maintenance personnel access only. If, this is allowed to passengers to use, un-authorized entry into the train cannot be prevented when the train stopped on the train for want of signal or stopped in station for some other reason. The Spring loaded cover is suggested in line with Metro. Also, This part is integrated one with car body. Hence, the spring loaded cover can be made as part of car body to avoid production delays for want of spring loaded cover ( in case of any delay from door supplier). This suggestion is in line with all metro train coach builder practice globally including india.		This external emergency release mechanism shall be protected from inadvertent operation by the use of a frangible cover or a sprung metal flap that must be deliberately broken before operate by the passenger, therefore no change needed.

	Clause 2.13	The Guard door must be independent to train speed. These doors can be opened & closed at any time by guard.	Noted, for safety concern, IFE recommended all doors open with zero speed signal.			No change needed.
	Clause 2.15	Automatic door control circuit shall employ both Ethernet and Hard Wired feed & return rake control wires.	Door control command should be Hard wired and 110 Volt digital commands is to be used for DCU operation. Ethernet communication should not be used. a. Ethernet is preferred for train sets with fixed rake formation, however, LHB coaches are dynamically coupled in the rake. b. IP security breach is possible. c. Standard protocol to be defined for interoperability.	Good to separate the ethernet communication from door specification. This shall be part of TCMS	We suggest to use Ethernet main bus and redundant bus for fail safe instead of discrete hard wires routing entire train.  What is the mounting location of the Ethernet switch ?	Comments of M/s Knorr, M/s Faiveley & M/s Escorts have been accepted & para modified accordingly.
	Clause 2.16	For transmission of train communication signal in trains provided with self generating coaches form one coach to another coach, provision of suitable means for inter coach communication shall be made.		What is self-generating coach? The standards may be revised as the EN 45545 is for fire and smoke. But, requested for pins? Ethernet cable do not have twisted pair. May be corrected.		Comments of M/s Faiveley have been accepted & para modified.
	Clause 2.17	The Single leaf automatic plug door including locking and opening mechanism shall be designed to work and maintain continuity even one or more of the coaches fitted with Single leaf automatic plug door including locking and opening mechanism are detached and one or more new coaches fitted with Single leaf automatic plug door including locking and opening mechanism are attached. The kind of communication shall be done both hard wired & ethernet bus system. For this purpose, the coach to coach connector, following hard wire & ethernet wiring should follow these requirements:- a. Hard Wire / Pin Coding: Wire / Pin coding "1" & "10" with 0 Volt (continuous type) may be used as Isolated Signal Ground / Common Negative. Wire / Pin coding "2" with 110 Volt DC (continuous type) may be used as other panel enabled. Wire / Pin coding "3" with 110 Volt DC (continuous type) may be used as Door release left. Wire / Pin coding "4" with 110 Volt DC (continuous	Hard Wire signal noted. Door control command should be Hard wired and 110 Volt digital commands is to be used for DCU operation. Ethernet communication should not be used. a. Ethernet is preferred for train sets with fixed rake formation, however, LHB coaches are dynamically coupled in the rake. b. IP security breach is possible. c. Standard protocol to be defined for interoperability.	The clause could be reworded for better clarity. "The Single leaf automatic plug door system shall be designed to work and maintain continuity even one or more coaches added /removed provided that the added coaches shall have the single leaf automatic plug door system". The coaches added or deleted shall have same type / same brand.		Comments of M/s Knorr & M/s Faiveley have been accepted & para modified accordingly.

		<p>type) may be used as Door release right.</p> <p>Wire / Pin coding "5" with 110 Volt DC (pulse type) may be used as Open released the doors.</p> <p>Wire / Pin coding "6" with 110 Volt DC (continuous type) may be used as all door closed loop.</p> <p>In case of series wire connection, Wire / Pin coding "7" with 110 Volt DC (continuous type) may also be used as all door closed loop.</p> <p>Wire / Pin coding "8" with 110 Volt DC (pulse type) may be used as closed the doors.</p> <ul style="list-style-type: none"> <li>• Other wire shall be terminated and may be used as spare or another function.</li> </ul>				
	Clause 2.19	The Single leaf automatic plug door including locking and opening mechanism wiring shall be designed to work and maintain continuity even coach rotated with 180° (reverse direction) or if only one side power car is attached.		We assume that, the power car is attached only at the end.		Generally, the power car is being fitted at both ends.
	Clause 2.20	The Single leaf automatic plug door including locking and opening mechanism shall meet the requirements of electromagnetic compatibility (EMC). Electronic equipments of Single leaf automatic plug door including locking and opening mechanism shall be designed to comply with the requirements of EN 50155 and EN 50121-3-2. The transmitted signals shall not have any interference with the other train operation network wires and shall not be affected by power surges.		The components / other systems used around door system shall meet EMC requirements.		The comments will be considered during approval.
	Clause 2.21	The Single leaf automatic plug door including locking and opening mechanism shall be designed to work and maintain continuity from a centralized location through a master control unit. The master control unit can be provided either in guard's compartment or as decided by the Indian Railways and should be protected against any suspected vandalism and in such a manner that it does not adversely affect the working of the coach system, coach aesthetics and does not cause any injury to the occupants. The guard's compartment shall be with the train and when if it is within one of coaches, this coach can be assembled with any coach's configuration of rake. The locking and opening control of the doors shall be accessed through centralized master control unit. The slave control units for local door control shall be provided in each coach. The HMI screen at master control unit in guard's compartment shall display the actual position and able to operate the all slave units		<p>Master controller shall have only electrical controls. Including electronics into master control unit is not needed since, this can be integrated with TCMS for perfect performance. Also, the electronic fault data communication can go to TCMS.</p> <p>The guard's compartment shall be with the train and when if it is within one of coaches, this coach can be assembled with any coach's configuration of rake".</p> <p>The above wording are not clear.</p>		Comments of M/s Faiveley partially accepted & para modified. TCMS is not the part of LHB coaches at present. However, provision of HMI and ethernet wiring has been withdrawn.

		individually within the rake. The HMI screen at master control unit shall display the individual automatic door condition which will help to identify the fault in any individual door. To bring feedback from all coaches, Train Communication Network should be implemented in the rake. However, the master control unit in closed guard's compartment of the rake at other end shall become un-operational to eliminate the possibility of misuse.		Master controller shall have only electrical controls. Including electronics into master control unit is not needed since, this can be integrated with TCMS for perfect performance. Also, the electronic fault data communication can go to TCMS.		
	Clause 2.25	Automatic plug doors shall close/open normally after removal of an obstruction or when the power supply is lost, removed or interrupted.		Electronic door control unit (EDCU / DCU) will go for booting / watch dog function once the power is reset. In such case there will be delay in responding to open / close commands.		The comments will be considered during approval.
	Clause 2.27	The control system shall be designed in such a manner that at least two independent faults have to occur before the respective door opens un-commanded if the door is not enabled. If the enable signal cannot be transferred through the train because of interfacing problems with existing vehicle, the requirement only applies when the speed exceeds 5 km/h.		"If the enable signal cannot be transferred through the train because of interfacing problems with existing vehicle, the requirement only applies when the speed exceeds 5 km/h". The above mentioned sentence is not clear. Better this could be deleted since, we are mandatorily implementing the enable signal. For trains with 160 KMPH speed, the enable signal is a vital signal. Cannot be considered as optional.		It's the part of EN 14752:2015, Para 5.1.4 for single point failure of door system, therefore, no need to change.
	Clause 2.28	The master and slave control units of Single leaf automatic plug door including locking and opening mechanism shall be of a proven design, equipped with self-diagnostic functions.	Self – diagnostic function is a feature of Door control unit. Present guard panel do not have self – diagnostic function.	Please refer Faiveley comments to clause 2.20 of Part II		The comments will be considered during approval.
	Clause 2.29	The opening and closing time of the all automatic plug doors on rake shall be adjustable in the range of 4 to 6 seconds.		Close time could be extended up to 8 seconds for safe operation.		Comments accepted & Para modified accordingly.
	Clause 2.30	For provision of apply the brake, when any door of the train is open, it may be ensure that the BP line pressure should be dropped gradually but not to drop more than 2 Kg / cm <sup>2</sup> .	Pressure should not drop more than 3 kg.		We suggest that IR provides the required pneumatic interfaces such as valves to measure & control the pneumatic pressure and mentioned in the specification.	Comments of M/s Knorr have been accepted & para modified.

	Clause 3.1	The doors shall equipped with a robust locking mechanism that shall automatically engage mechanically when the door is closed, whether power or air pressure is available or not. The mechanism shall not be mechanically and electrically independent of the door opening and closing device. The locking device shall be linked to electricity so that in case of power failure, the doors get unlocked with the activation of emergency release device. The operating force of the emergency egress device shall not exceed 150 N. The location & design of emergency egress device shall be in accordance with as per Para 4.3.2 of EN 14752: 2015.		"The mechanism "SHALL NOT"" be mechanically and electrically independent of the door opening and closing device" This seems typo error. The lock mechanism shall be independent irrespective of electrical / pneumatic pressure availability & Shall stay remain closed and locked once locked. Door lock is an mechanical device from the same clause. It shall not be connected to electricity.		Comments of M/s Faiveley have been accepted & para modified.
	Clause 3.2	The locked mechanism shall withstand a minimum force of at least 1200 N applied in the opening direction without breaking or becoming unlocked. The locked mechanism shall be capable of withstanding the forces that occur when passengers are leaning or falling against the door panels without causing any non-elastic deformation or loss of operation (service force is repetitive). For this purpose, a closed and locked door panel shall withstand a pushing force applied 1000 N per linear meter from inside the vehicle onto the door panel.		Good to connect with EN 14752 standard to have better clarity.		Comments of M/s Faiveley have been accepted & para modified.
	Clause 3.3	Means to unlock and open the door under emergency conditions shall be provided on the interior of the coach. The suitable emergency knob / lever to be provided inside of the coach which is accessible to the passengers for opening of the door in the emergent situation while train is not move more than 5 Km / Hr.		This requirement may be reviewed as the door emergency is provided for operating irrespective of train speed. However, the emergency activation can be connected to emergency brake application. ( same as chain pulling )		Comments of M/s Faiveley have been accepted & para modified.
	Clause 3.4	With the Activation of interior emergency release shall remove power/air from the door drive to allow the door to be opened mechanically. However, this emergency knob / push button will not work when train is in running condition (speed above 5 kmph). A sticker may also be provided near the emergency device which indicates for how to use along with warning message to avoid unauthorized use of this emergency device.		This requirement may be reviewed as the door emergency is provided for operating irrespective of train speed. However, the emergency activation can be connected to emergency brake application. ( same as chain pulling )		Comments of M/s Faiveley have been accepted & para modified.

Clause 3.5	When the interior emergency release mechanism is activated, the door status warning red lights inside & outside of the coach shall immediately begin to blink at 1 Hz along with audible alarm until the mechanism is reset and door has been closed & locked.	During emergency operation, internal and external (orange) LED continuously glow along with the buzzer. Which distinguish deviation from normal operation.			Comments of M/s Knorr have been partially accepted & para modified.
Clause 3.7	The emergency egress device shall be mono-stable type. On activation, it shall unlock the door once, the force on emergency is removed then the emergency device shall re-set automatically without manual intervention.	Noted. Current LHB design is manual reset. Auto reset need greater force to compensate the spring load.			Comments of M/s Knorr have been accepted & para modified.
Clause 4.1	Passengers shall be protected from injury by a moving door by the obstacle detection provisions of the door control system.			Detection method to be defined.	It's the function of DCU which comes under supplier scope of work.
Clause 4.3	The door closing time shall be adjustable to between 4 to 6 seconds. Door closing time is defined as the time from initiating the close command to achieving door close and locked status excluding any close warning delay time.		Good to have more time like 4 to 8 seconds for closing as this has potential for kids injury.		Accepted & Para modified.
Clause 4.6	It shall be permissible to apply mechanical power in the close direction if the emergency release is activated while the train is in motion.		Not clear what is mechanical power? Is it manual operation of doors in closing direction?	What is use case? This clause needs clarification.	If emergency device activated while train is running more than 5 kmph, the mechanism should to make attempt for Door close condition.
Clause 4.7	Doors Out of Service Indicators (Ultra High Luminance LED, Power 1.5 W, Brightness $\geq$ 75 mcd, Continuous type Red Light, Dia 40 mm) shall be provided on the coach interior and exterior that denote that the door panel(s) of a cut-out door operator is (are) out of service. These shall be integrated with the coach aesthetic styling.	For door out of service, the existing amber LED will glow constantly to indicate door is isolated.			Accepted & Para modified.
Clause 5.2	The Train Guard/Crew shall have full use of all single leaf automatic swing door controls available from master control unit provided in the Guard's compartment. These controls shall be activated when the master control switch is not in the "OFF" position and other cab is not enabled.		The clause refers swing doors? May be re-looked. Also, Good to clarify what is master controller & it's functions?	Swing door controls should be corrected to plug door controls.	Master controller means a Panel available at Guard Coach where different buttons & indicators will be provide to proper functioning of door operation & indication.
Clause 5.3	The Train Guard/Crew shall be provided with the following single leaf automatic plug door controls / indicator ergonomically located to facilitate door operation:  <ul style="list-style-type: none"> <li>One barrel key for ON / OFF master control unit</li> <li>One indicator for other panel enable</li> <li>One push button to check all indicator test</li> </ul>	Controls and indicators will be incorporated; However, dimensions will be finalised during design freeze / prototype.  The size of button will be similar, however, exact dimension will be shared during the design freeze.	What is CD?  Faiveley suggests to leave this controls / monitoring to electrical supplier instead adding into of door supplier scope.	We recommended standardizing the guard connectors and signals pin out. And also we recommended adding one diagnostics port on guard panel master control unit to download the fault data of particular door / all the doors.	Dimensions of Guard Panel are given only for standardization. CD means centre distance between buttons or indicators. Announcement has been withdrawn.

		<ul style="list-style-type: none"> <li>• One illuminating push button for release LS of the door</li> <li>• One illuminating push button for release RS of the door</li> <li>• One push button to open the doors to which the release signal has been given.</li> <li>• One push button for close the all the door (Left / Right / Both)</li> <li>• One push button to give open / close command to guard door within power car.</li> <li>• One indicator for green loop / status about all close door</li> </ul> <p>Additionally device like 01 Push button for reset the brake application, 01 an illuminative alarm buzzer (Frequency 1900 Hz ± 500 Hz, 75 dB) and an HMI touch screen (to display &amp; operate the actual position of all slave units within the rake) may also be provide on Guard panel.</p> <ul style="list-style-type: none"> <li>• Each Button Dia : 30 mm</li> <li>• CD of Button (Horizontally) : 80 mm</li> <li>• CD of Button (Vertically) : 60 mm</li> <li>• Size of HMI Screen : 7"</li> <li>• Volume of Guard Panel : 500 mm x 400 mm x 210 mm</li> <li>• Colour code of the Button : As shown in sketch</li> </ul>	<p>HMI operation should be optional as interoperability will be challenge till standardised protocol for all door suppliers is fixed.</p>	<p>Both push button depressed is requested but, only one push button is mentioned.</p> <p>Faiveley suggests to delete the hindi and english voice announcement request. These are not needed for long distance trains where the passenger traffic is very less. Beep sound shall be sufficient. Such voice announcement is needed only for local trains like metro where every alternate KM the train shall stop and start.</p>		<p>To download the fault data, required device under the scope of supplier.</p>
Clause 5.6		<p>The automatic door control commands shall be as follows:</p> <ul style="list-style-type: none"> <li>• Door Open: - provided that the prerequisite parameters are available, the operation of simultaneously depressing both "Door Open" push buttons and the door opening protocol is activated automatically. All the automatic doors on the corresponding side shall synchronously open. All automatic doors on the opposite side at the rake shall remain "Closed and Locked".</li> <li>• Door Closed: - the automatic doors shall be capable of being closed without the prerequisite parameters being available. The operation of the "Door Close" push button shall broadcast an audible warning in each coach signifying that the automatic doors shall subsequently close. After a pre-set time, adjustable between 0 and 5 seconds, following the finish of the audible warning, the</li> </ul>	<p>Beep to be used for alerting the passengers inside and outside via amber LED. However, announcement feature should be kept in PA / PIS supplier scope.</p>		<p>The statement "the operation of simultaneously depressing both "Door Open" push buttons and the door opening protocol is activated automatically" is not clear.</p>	<p>Comments of M/s Knorr have been accepted.</p> <p>Opening protocol means the activation of devices during door opening such as buzzer &amp; light etc.</p>

		control system shall synchronously "Close and Locked" all the automatic doors on the corresponding side. The location of the audible warning devices within the coaches and the output sound pressure levels shall be such that they are clearly audible by passengers in the rake and passengers standing on the platforms. Buzzer with illuminating flashing orange colour light will be installed near the door, which will generate audible voice for 10sec in Hindi and English Annunciation. Time adjustment can be in steps 4, 8, 12sec as per voice statement. If beep voice is used, then time adjustment is possible. Sound level from buzzer will be 70 +6/-0 dB				
	Clause 5.7	The local door control mechanism shall be designed to interface with the master door control system (MCU) and provide a secure indication of door closed & locked status and secure and safe means of opening and closing the door as commanded by train line signals from the master control system.	All door closed and locked status will be displayed in Guard panel through all door close loop.			No change needed.
	Clause 5.8	Circuit configuration shall be such that any short circuit in the individual door control, door system monitoring, or the door motor and its power control circuits shall cause protective devices to operate and shall not affect door closed & locked status.		it is better to use the TCMS for electronic interface instead of having a display for door system in electrical control panel that will be positioned in guard coach.		Presently, LHB coaches are not having TCMS.
	Clause 5.9	Upon power up, the local door control system shall initiate a series of self checks in order to validate its correct operation. If the local system is 'OK' then a "system normal" indication shall be available to the master control system. If the system fails its self-test then the system shall revert to a safe condition and require a Reset before further use is possible.	Door control door unit will do self – check and indicate the status in DCU.			Accepted & Para modified.
	Clause 6.2	Once a valid door open command from master control unit has been received, the local door controller shall commence the door opening sequence. The door controller shall indicate loss of door closed & locked status within 800-1200 mili second of receiving the open command even if the door does not physically unlock or open due to malfunction and this information shall be sent back to the master control unit through the network.	It should be part of TCMS feature.	What is master controller? Is it TCMS? How it will receive the feedback from door controller? Whether it is part of scope of supply of this specification?		Presently, LHB coaches is not having TCMS.  Master controller means a Panel available at Guard Coach where different buttons & indicators will be provide to proper functioning of door operation & indication.



Clause 6.3	Once the door has reached at least 90% of the fully open position, a "Door Open" status indication shall be available for use by the master control system if required. The "Door Open" status indication shall be sent back to the master control unit through the network.	It should be part of TCMS feature.	What is master controller? Is it TCMS? How it will receive the feedback from door controller? Whether it is part of scope of supply of this specification?	Door open definition given in clause 4.2 calls for 95% which is contrary to 90% defined here.	Presently, LHB coaches are not having TCMS.  Master controller means a Panel available at Guard Coach where different buttons & indicators will be provide to proper functioning of door operation & indication.  Para corrected.
Clause 7.2	Door shall remain open until a Door Close command is generated. Loss of no motion signals to the door system shall not cause door closing. The door close sequence shall begin within 1-2 second of Door Close command receipt.	Loss of no motion signal will automatically close the door which is as per safety requirement.	The doors shall be allowed to close in case of loss of NO MOTION or LOW SPEED signal. This is a safety requirement.		Comments of M/s Knorr & M/s Faiveley have been accepted & para modified accordingly.
Clause 7.3	On receipt of the Door Close command, an audible door close warning that is audible from inside and outside the vehicle shall be immediately provided to warn passengers prior to door closure. The audible alarm shall sound for at least 1 second before the door starts to close and continues for at least 2 second in total. The sound shall be clearly audible from platform level outside the vehicle and inside within a specified distance from the doorway. The sound level shall be specified by the contract, the contract shall also specify if the sound level should be adapted to suit the operating environment and application. It shall be specified by the contract if the alarm is to be repeated when a door reopens after detecting an obstacle. Recommended frequency for the alarm is 1900Hz.			Specified distance is not required as the Decibel level of the alarm is already mentioned.	Accepted & para modified accordingly.
Clause 7.5	The audible/visual warning shall cease once the doors are closed & locked. The warning shall begin again if it has previously stopped prior to door re-closing on striking an obstruction. Indication for closed position shall be provided to avoid unnecessary banging on door.		How the closed door indication is expected? Via a separate indication lamp apart from normal indication or a double color single lamp is preferred.		It is proposed that the closed door status in the form of close loop status should display in the Guard Panel.
Clause 8.1	When a non – elastic rod with a maximum rectangular cross section of 15 mm x 60 mm is trapped with its long edge vertically between the door leading edge and the frame of the door shall not be indicated as closed and locked. The requirement shall be verified at three positions, the bottom, the middle and the top of the door. If soft horizontal bottom rubbers are provided, this requirement applies from the bottom		it is good to add additional safety feature "Anti drag", which can detect soft objects like Saree / cloths etc. The "Anti-drag" system shall be able to assist the train system and the driver with suitable information to	The dimension of rectangular cross section should be 30 mm x 60 mm, as per EN 14752 para 5.2.1.4.1	The change was made to make more sensitive obstacle detection.

		edge of the door leaf upwards above the rubber.		stop the train either automatically or manually if, any passenger is getting dragged from outside of train and at the same time if, the soft object (like saree, cloth) is trapped when passenger is inside, it shall not stop the train until, emergency alarm is physically activated.		
	Clause 8.4	Door system should be capable to detect an obstacle object of at least 10 mm.		This clause is contradicting with 8.1	In light of Clauses 8.1 and 8.3, the clause 8.4 may be removed.	Accepted & Para withdrawn.
	Clause 8.7	Door closed and obstruction sensing information shall be sent from each coach in the rake to Master Controller.	It should be part of TCMS feature.	What is master controller? Is it TCMS? How it will receive the feedback from door controller?		Presently, LHB coaches are not having TCMS. Master controller means a Panel available at Guard Coach where different buttons & indicators will be provide to proper functioning of door operation & indication.
	Clause 10.2	When the doors locked out (Cut-out is applied) mechanically in the event of malfunction, the cut out device bypassing the train lines. A red light will be continuously glowing from both inside & outside of the coach which indicates that the door has already mechanically locked and not in use.	Existing Amber light will glow continuously to indicate isolation of door.			Accepted & Para modified.
	Clause 10.3	Operation of the cut-out device shall cause the local door system to store data in such a way that it is saved in its memory and can be extracted into a portable computer via the diagnostic port. However, the controller shall no longer log faults nor shall it continue to indicate a fault to the master control system or update status indications, except for emergency release status over any train network. The door controller shall ignore any further open or close commands until such point as the cut-out device is restored to the in-service position.	Existing Amber light of door will blink with frequency in case corresponding DCU lodged any fault.	The type of communication port needed for Master control shall be specified for better clarity. Also, it is better to clarify, What is Master controller & it's functions clearly. How it will receive the feedback from doors etc.		Its comes under the scope of Door supplier to take fault details from the DCU. Therefore, no change needed.
	Clause 11.7	Door system components requiring access during maintenance for door setting/adjustment shall not be positioned in the immediate proximity of any hazardous area, i.e. potential trapping hazard or electrical hazard, alternatively a local isolation system shall be provided.		This shall be mutually agreed at design phase. It is difficult to assume the hazardous places without having inputs from IR		The comments will be considered during approval.

	Clause 11.8	Risks due to breaking of overhead contact wire shall be taken into account.		This clause do not apply to automatic door system		Accepted & Para withdrawn.
	Clause 12.3	A large no. of doors has to open and close at every station, very high reliability of operation is necessary. The door system equipment provided under this specification shall meet or exceed an MTBF (Mean-Time-Between-Failure) of 27,500 hours per doorway. The bidder shall quote MTBF Figures. The MTBF Figure shall be supported by the date for the equipment already in use and supplied by vendors.			In case of indigenously developed system, the MTBF should be allowed to be provided based on the number of doo open and close operations which equals 27,500 hours of field operations during in house endurance testing.	The comments will be considered during approval.
	Clause 12.4	The Mean-Time-To-Repair (MTTR) shall not exceed 1.5 hours and the maximum corrective maintenance time shall not exceed 3.0 hours.	It is to be defined after sufficient experience on IR, as the working conditions are different.		MTTR should be formulated after due consideration of distance and adequate spares should always be maintained at the depots. Hence, it should be discussed further.	Accepted & Para withdrawn.
	Clause 13	Replacement/repair free of cost at primary depot location of Indian Railway the whole system or portion of items which malfunction during operation within 72 months from date of commissioning but not later than 84 months from date of receipt at consignee stores.	The main parts of door system i.e. door leaf & drive shall have a warranty of 72 months from the date of commissioning of coach or 84 months from the date supply, whichever is earlier. For balance items e.g. cables, connectors etc which are standard items shall have a warranty of 24 months from the date of commissioning of coach or 36 months from the date of supply, whichever is earlier. The above warranty of 72/84 months on major parts of door system shall be valid only if IR is maintaining our equipment as per the operational guidelines document no. DDSTE10788E09 issued by our principles. Further any design modification arising out of operational requirement shall be covered in the original warranty. If any additional cost is incurred on account of design modification arising out of new requirement of customer, the same shall be borne by the customer / user Railways.		The warranty should be 36 months from date of commissioning but not later than 48 months from date of receipt at consignee stores.	It's should be decided the Tenderer.