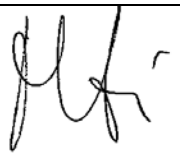
Date: 07/06/2010

N°100_002

Technical Recommendation

Driver Machine Interfaces

in the scope of TSI High Speed and Conventional Rail

Approved	Signature	Name	Date
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UIC		Emilio Maestrini	01.06.2010

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This Technical Recommendation has been approved by the UIC and the UNIFE in this edition, with the exception of the open points listed here below. Both versions of the text, in the body of this document and in the table of open points here below, are to be considered as valid; users are advised to decide by contract about the version that they wish to use.

List of open points / non-agreed items

Nr.	Chap.	Open point / non-agreed item	Finalisation
1	4.4.1 and 4.4.2	UNIFE: The UNIFE disagrees with the present wording and proposes the following: Automatic speed controller, Driver's Automatic Brake handle, Traction/Dynamic Brake Controller and Combined traction/brake elements should be position dependent, but may alternatively be time dependent. Position dependent is preferred. Combined traction/brake controller for auxiliary desks, controls for remote control desks and Direct Brake should be time dependent.	
2	Annex B	UNIFE: Position 010: a tolerance should be added to the dimensions; considering the present existing products, the UNIFE suggests 53mm ± 3 mm for the vertical overall dimension and 50mm ± 3 for the diameter.	
3	Annex C	UNIFE: Pending publication of the cab standard presently being drafted by the WG37 of the CEN TC256, this annex shall not be used. Meanwhile UIC651 should apply.	

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Issue record

Issue	Date	Comments	Source:
1	*June 2010*		

Foreword

The content of this UIC/UNIFE document (TecRec 100:2) has been prepared as a result of the outcomes of the EU funded project Modtrain/Modlink/EUCAB and EUDDplus. The project partners involved were:

- in Modtrain/Modlink/EUCAB: Alstom Transport, AnsaldoBreda, Bombardier Transportation, Deuta Werke, Forschungs - und Anwendungsverbund Verkehrssystemtechnik (FAV), FPC - UPC, IAS, IST Lisboa, KMT Group OY, Lumikko, SIEMENS Transport Systems, TU Berlin, Union Internationale des Chemins de fer (UIC), Union of European Railway Industries (UNIFE)

- in EUDDPlus: ALSTOM Transport S.A., AustriaTech – Gesellschaft des Bundes für technologiepolitische Maßnahmen GmbH, Bombardier Transportation GmbH, Deuta Werke GmbH, EAO Lumitas GmbH, Forschungs - und Anwendungsverbund Verkehrssystemtechnik (FAV), Fundació Politècnica de Catalunya - Universitat Politècnica de Catalunya, IAS Institut für Arbeits- und Sozialhygiene Stiftung, MAV-GÈPÉSZET Zrt, Ceske drahy a.s., ÖBB Traktion GmbH, Siemens Aktiengesellschaft, SKODA TRANSPORTATION s.r.o., Technische Universität Wien / Vienna University of Technology, Union Internationale des Chemins de fer (UIC), Union of European Railway Industries (UNIFE), W. Gessmann GmbH

They have put forward the deliverable from:

- “Modtrain/Modlink/EUCAB”: EUCAB: Report on functional test results (L6.6), Project nb. FP6 - PLT-506652 / TIP3-CT-2003-506652, Priority 6.3 - Transport, EU 6th Framework Programme for Research and Technological Development

- “EUDDplus”: final report (2010), Project No: 031555 – EUDDplus - “European Driver’s Desk advanced concept implementation - contribution to foster interoperability”, Specific Targeted Research or Innovation Project, Priority 6.2 - Sustainable Surface Transport, EU 6th Framework Programme

to UIC and UNIFE for publication as a TecRec.

A Technical Recommendation (TecRec) is a UIC/UNIFE standard designed to be used within the European region. The primary field of application is the European rolling stock domain and associated interfaces with other subsystems and it is the preferred solution by both partners for, in particular:

- Product and interface standards such as standardisation of component interfaces

- Publication of results of common research programs or projects/studies undertaken by either UIC or UNIFE

- Acceleration of and better influence over the European standardisation process

Pending the publication of a European standard, a TecRec will serve as a common comprehensive standard, approved by UIC and UNIFE and therefore recognised as a voluntary sector standard aimed at facilitating the interoperability of and at improving the competitiveness of the European railway system.

The general hierarchy within which a TecRec sits is, in order of significance:

- EN standard

- TecRec

- UIC leaflets

The normative references related to this TecRec can be found in chapter 2 (Normative References) of this document.

TecRecs are managed by a joint UIC/UNIFE standards management group that meets on a regular basis to coordinate the process. TecRecs can be downloaded by UNIFE and UIC members from the two organisations websites: www.uic.org and www.unife.org.

Introduction

This document is a voluntary standard, produced by UIC/UNIFE at the request of the rail sector. Individual companies may choose to mandate it through internal instructions/procedures or contract conditions.

Purpose of this document

This document provides a voluntary standard on the "Driver Machine Interfaces in the scope of TSI High Speed and Conventional Rail" for use by companies in the rail sector if they so choose.

The document is set out in the same format as an EN standard including, where appropriate, normative and informative annexes. This is so as to facilitate the interface with the ENs.

Application of this document

These Standards are voluntary. Individual companies may however elect to mandate all or part of its use through company procedures or contract conditions. Where this is the case, the company concerned must specify the nature and extent of application.

Specific compliance requirements and dates of application have therefore not been identified since these will be the subject of the internal procedures or contract conditions of the companies which choose to adopt this standard.

Safety responsibilities

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Approval and authorisation of this document

The content of this document was approved for publication by the UNIFE Technical Committee on 4th of June 2010 and the UIC Rail System Forum on 29th of March 2010.

Objective

The objective of the driver's cab requirements described in these technical recommendations is to ensure the unrestricted, safe and efficient operation of rolling stock on the entire European railways network as far as driver-machine-interfaces and cab issues are concerned. These technical recommendations are derived from operation, ergonomic aspects and safety. They provide a framework for designing cab-functions and driver-machine-interfaces allocated to the intended operating purpose of the rolling stock. They are supposed to comply with the constraints of the whole Trans-European network in terms of drivers' related interfaces to rolling stock.

This TecRec:

- Defines the operating elements on EMU/DMU, locomotives and driver's cabs of driving coaches, whether high speed or conventional.

- Describes some basic functional and system requirements associated with harmonised Driver-Machine-Interfaces for EMU/DMU, locomotives and related driver's cabs of driving coaches, whether high speed or conventional. It is assumed that all functions relevant for cab-equipped rolling stock may be managed with these interfaces.

More than 15 years of European Research studies have demonstrated that a standardised desk configuration is a key issue for all European drivers independent of the specific type of rolling stock. Therefore the rolling stock specific deviations should be limited to a minimum. A set of nowadays commonly shared conclusions and design principles have been provided by recent projects (e. g. EUCAB) and they have been considered in the course of the elaboration of the UIC /UNIFE TecRec standards.

1 Scope of application

These Technical Recommendations are written in accordance with the TSI HS and TSI CR specification with respect to the driver's machine interface in driver's cabs. The provisions in this TecRec are applicable to new design of the rolling stock concerned.

This TecRec does not replace European legislation (TSI, including specific/national cases).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ENs are developed by CEN[1] or CENELEC[2] and are made available for their members.

NOTE 1: www.cen.eu

NOTE 2: www.cenelec.eu

Criterion in relation with driver machine interfaces	Verification
General	EN 547-3 (other prEN in preparation)
Front visibility	Leaflet UIC 651, pending publication of the EN in preparation (CEN Work Item 00256350 - "CAB")
Optical quality of wind-screen	EN 15152 (derived from UIC 651)
Maximum required actuating forces (= to be considered for applicability by weak people)	EN 894, EN 1005-1, 2, 3,
Safety of machinery / ergonomic requirements for the design of displays and control actuators	EN 894-2 (Displays)
Maximum possible actuating forces (= to be considered for preventing break/malfunction of devices due to strong impact of very strong people)	EN 1005-1, 2, 3
Salt spray test	EN 50021-SS, EN 50155
Damp heat	EN 50155 / IEC 68-2-30
Insulation test	EN 50124
Mechanical impact due to ballast	For front windows: EN15152 part 6.2.1

Temperature range for electronic equipment Air temperature surrounding the printed board assembly	EN 50155: - 25...+70 °C (for Nordic countries the range is –40..+50 °C) EN on “Environmental conditions” (when published)
Lighting inside the cab (illumination)	EN13272 and CEN work item 00256350 - “cab”
External lighting	EN 15153-1, UIC 452 (for luminance)
EMC compatibility	EN 50121-3-2; EN 61000-4-4
Shock and vibration	EN 50125-1 / EN 50155 / EN 61373
Noise	CEN Work Item 00256125 - “Noise”
Interruption of voltage supply	EN 50155, section 3.1.1.2, class S2
Classification of chemically active substances	EN 60721-3-5 5C2
Classification of contaminating fluids	EN 60721-3-5 5F2 (electric) 5F3 (Diesel)
Protection class, inside the rolling stock, inside the cab	EN 60529: IP40
Protection class, inside the rolling stock, outside the cab	EN 60529: IP 54
Protection class, outside the rolling stock	EN 60529: IP 65
Railway applications – Remote control of traction units for freight operation	EN 50 239
Railway applications – Braking – Requirements for the brake system of coaches	EN 15179
Hardware Pictograms	ISO 7001, ISO 9186, ISO 22727, EN 894-2 (if not described in this document)

3 Definitions

pos. xxx refers to a Driver-Machine-Interface shown in Annex A

Running (V > 0) detection in case of increasing speed from v > (1...3) km/h

Standstill (V=0) detection in case of decreasing speed from v < (3 – delta v) km/h
with 0 < delta v < 2.5 km/h

Immediate as soon as possible, i.e. maximum duration t </= 1 s, if not specifically or otherwise defined.

T > 0 traction force increasing from 0 kN.

T = 0 T = 0 kN

ATP Automatic Train Protection. It encompasses ETCS and optionally STM.

STM See TSI CCS.

Driving coach A coach is a non-tractive vehicle in a fixed or variable formation capable of carrying passengers. A coach may be equipped with a driver's cab. Such a coach is then referred to as a driving coach (see TSI CR RST).

Cab Refers to the compartment which is equipped with actuators and instruments for the driver to control traction unit(s) in the train.

Engine room The term Engine room for traction units is the area or compartment or cabinet were drive units (electric or diesel) and/or auxiliary units are situated or the equivalent for driving coaches (e. g. cubicle for ETCS on-board equipment and air-cocks).

Automatic brake (Service brake and emergency brake)

Air brake system for the whole train, for example controlled by the Brake Pipe (BP), in compliance with TSI (including specific/national cases), EN and UIC.

Electro-pneumatic (EP) brake

See CR RST TSI section 4.2.4.1.2.2.

Dynamic brake Brake force generated on traction units.

Parking brake Brake used to prevent parked rolling stock moving under the specified conditions taking into account the place, wind, gradient and rolling stock loading state until intentionally released.

Direct brake Local brake on locomotives, where the brake force is directly commanded by the driver, e. g. by means of TCMS. The brake force will be controlled from 0 kN to the maximum brake force designed.

Holding brake See EN14478

Actuator Equipment that required a manual operation from driver

Lever Switch that provides flip position(s) for pulse selection as well as stable position(s) for permanent selection of a switch position.

Display system Consists of the display units (max. 4 per main desk), the display control unit and the internal and external interfaces to the TCMS.

Display control unit

Control of the complete display system and distribution of the display images regarding the defined concepts in normal operation and in case of failure

Display unit Hardware to display the defined display images with circumferential keys for driver interaction and selection of functions offered by this keys (hard- and soft-keys).

Display image Visible image with a defined content in a display unit.

Operating element Element that is used by the driver for the man machine interface

Redundancy images

Display image with merged content out of two regular display images, which shall be displayed on the remaining display unit (e. g. in case of failure of one display unit).

TRD Train Radio Display

MCB Main circuit breaker (function depends on status of the MCB),

MT Multiple traction (function also valid on slave traction units)

4 Driver´s Cab and Driver's working areas

4.1 General

The following requirements are valid as guidelines for designing the vehicle and thus also for the layout of the driver's cab:

- The driver shall pay the maximum possible attention to signals and interpret their aspects. Therefore it shall be possible to carry out all operating control actions without being distracted from observing the track system and signals. He shall not operate other secondary or non-essential control equipment. Therefore the driver must not interact with the rear panel (see annex A.2) other than at standstill.

- The driver's seat shall be designed in such a way that it allows him to undertake all normal driving functions in a seated position, taking into account the anthropometric measurements of the driver as set out in the Annex C.

- Information that is not essential for driving should only be given if it has an impact on operation (state of traction unit or train, malfunction etc.). A strict standard shall be implemented here in order to avoid unnecessary distraction. Regarding visibility and location of signals, the cab design shall comply with TSI, UIC 651 and the relevant standard EN (pending EN for the cab).

- Manufacturing information should not distract the driver.

Operating functions of minor importance (e. g. light switches), for rare specific operating cases (several test buttons) or for maintenance purposes (e. g. indication of specific data) may be integrated in the DDS (e. g. TDD, CCD), if their operation is only requested in an activated cab (= "In-service"- and "driving"-configuration).

Basic rule: TCMS should detect failures of components with interfaces with TCMS considering driver's intentional action.

In the event of a failure a message shall be displayed on the TDD.

The standardised driver desk may be installed on the left, on the right, or in a central position in the driver's cab. Due to space requirements, desk design can vary between left, right or central position.

4.2 Requirements for DMI-elements

4.2.1 Environmental conditions

The operating elements shall be designed to withstand adverse ambient conditions and excessive mechanical stress (e.g. drinking, eating, smoking at the driver's desk, force effects during operation in case of collisions, e. g. in shunting operation, and panic situations). Their operability shall not be affected by such impacts.

4.2.2 Colour identification

4.2.2.1 General

All colours shall be matt in order to avoid reflections and shall comply with the referenced RAL according to ISO/EN.

Operating elements or operating equipment of minor operational importance (e.g. light switches, socket covers), operated infrequently in specific conditions (several test buttons) or for maintenance purposes (e.g. shut-off cocks for condensate collection tank) shall be coloured in white, black, grey or metal finish (not coated) or neutral colour (in comparison with the surroundings).

4.2.2.2 Colour identification for operating elements while driving (elements on the driver's desk)

Minimum colour differentiation has to be defined for the desk/operating, the desk/pictograms and the desk/marking elements.

Operating elements that shall be operated at the driver's desk while driving shall basically have colour differentiation relative to the surroundings (in this case the desk). It can use black or grey using the range of finishes RAL 9004, 9011, 9017 or 7016, 7021, 7024 according to register RAL 840-HR or equivalent. RAL 9003 can be used for the markings and symbols of the operating elements in the driver cab; RAL 9005 can be used for the base.

4.2.2.3 Colour identification for safety relevant elements

Operating elements and indicators that are operated in the case of faults or emergency are finished in **red** (RAL 3000, 3001, 3002 or 3020 or equivalent). This applies, for instance, to the shut-off cocks in the engine room (pos. 511 – 515), to the emergency stop valve (pos. 010) and to elements to be operated by the driver in the event of a fault, if a fault help text is not available (e. g. reset of all displays of the DDS).

Exceptions:

The outside end cocks for the hose couplings of the brake pipe (BP) and the pointer for the BP-indication (see pos. 007) shall be marked in red.

4.2.2.4 Other colour identification for operating elements

If there is some requirement to highlight an operating element e. g. in case of frequent use for prescribed regular procedures, yellow can be used on the element or on a marked surface coloured.

Especially:

The outside end cocks for the hose couplings of the main air reservoir pipe (MP) and the pointer for the MP-indication (see pos. 007) shall be marked in yellow.

4.2.3 Shape identification for operating elements in the driver's cab

The shape identification for safety relevant function elements shall be used to distinguish between operating elements:

- a mushroom for emergency brake (10)
- a lever with a ball used for sanding (25)
- a lever with cylinder for pantograph (16)
- a push button for ATP (13)
- a lever for ATP (14)
- a lever with a ball for ATP (15)
- a lever for external warning horn (38)
- push buttons for doors (21 – 23)
- a push button for train radio emergency call (12)

4.2.4 Markings and nominal positions

The meaning, functions and positions of all operating elements, apart from exclusively national applications of control-command on-board systems (STM), shall be marked with pictograms specified in the table of the operating elements in the following chapters.

The pictograms shall be easily to recognize, self explaining and meaningful in order to identify the function activated by the operating element positioned next to it. Information about functions, operating impact and constraints may be found in further standards. The detailed names, position numbers and relevant information specific to the individual rolling stock should be provided by the driver's manual.

If the operating elements described subsequently require a plain-text label, the following applies:

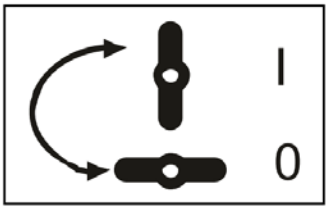
- The function "On" is represented by a Roman "I"; otherwise Arabic numerals shall be used
- ISO 7000 shall be applied to plain-text markings (numerals in medium-spaced lettering, texts in close-spaced lettering).

All markings and symbols shall be fitted in such a way that their recognition will not be affected by detergents or solvents or by hard-to-remove dirt (e. g. in case of engravings without protective cover).

Marking the position of the shut-off cocks, position indicating line of the "Bern lock" and of the key for the pantograph shut-off valve:

I Open (vertical)

0 Closed (horizontal)



If a cock is mounted in a visible pipe, then the position of the cock shall refer to the direction of the pipe: "Open" = in line with the pipe, "Closed" = perpendicular to the pipe.

4.3 Requirements for the driver's cab

4.3.1 General principle

The cab with its desk(s) and its functions shall be designed according ergonomic rules (based on valid anthropometric data according to Annex C).

In seated position the design proposed shall keep the neutral posture as described in the Annex C.

Each action of the driver on a cab display should have a feedback (visual, audio or kinaesthetic). Any other action managed by the TCMS should have a feedback in case of failure.

The driver shall be confident for the function activated.

4.3.2 Rules for the position of desk and equipments of the desk

The design of the desk shall obey to some design rules that are described below:

1 The desk layout shall be designed for an installation in a central, left or right position inside the cab.

2 The arrangement of the main operating elements (traction, braking, signalling) shall support the single driver to focus on operating the train

3 All safety related and/or frequently used equipments of the desk shall be located between the minimum and maximum of the radius of the anthropometric accessibility of the driver.

4 The location of the main operating elements shall reflect the importance of the function, the frequency of use and the safety relevance of the function (see EN 614)

5 All safety related while driving and/or frequently used equipments of the desk shall be easily grasped

6 The information provided to the driver while driving shall be located in the recommended field of vision (A and B area see EN 894-2 : 1997 §4.1.1)

7 Elements that are not needed while driving should not be located on the desk

8 The operating elements on the driver's desk shall be located within an expected area for some and with an optional position for others. It depends on:

- ❖ the type of rolling stock,
- ❖ the type of service (suburban, CR, HST)
- ❖ the train operating importance
- ❖ the space constraints resulting (e.g. from the positioning of the desk or central gangway, …)

9 The operating elements on the driver's desk shall be categorized as standard and optional elements according to the type of rolling stock.

10 The operating elements related to the same function should be combined and placed into groups on the desk. The number of elements in a group should be limited to three.

11 The arrangement in a set of elements shall be coherent with the functional behaviour of the train (e.g. forward, backward or right, left)

12 The design (the shape, the colour, the location) of the elements should facilitate the driver to distinguish different functions

13 Non safety relevant elements should not restrict the access to safety elements.

14 Next to or integrated in each operating element on the desk a pictogram shall be placed in the field of vision for easily finding the element on the desk. The pictograms shall be easy to read, of simple design and self-explaining.

15 The right hand is dedicated to use the pneumatic brake (the automatic brake or the combined traction brake controller) while the left hand stays free for other operations (e.g. Traction dynamic brake controller, train radio, ATC/ATP, Pantograph, Main circuit breaker, Train radio emergency call push button,…).

16 If possible in terms of desk integration, control elements should be placed on or above the desk (e.g. information area) rather than at a console underneath the desk (e.g. for HVAC controls).

17 The design and the location of elements and the grouping of elements shall be such to prevent unintentional activation.

18 The location of operating element shall enable an optimal accessibility. The accessibility of one element should not be disturbed by another element.

19 The key elements for driving are: the speed information (analogue and possibly digital), traction and braking levers, signalling information. They shall be in the driver's main field of vision.

20 The driver shall at all times be able to monitor clearly, unambiguously and immediately the brake pressure (pressure information for brake pipe (BP) pressure (pos. 007 or TDD) and selected

brake cylinder pressures for reference (pos. 008 or TDD), the information pertaining to signal aspects or to monitoring train control systems (driver's cab signalling, CCD) and the timetable (e.g. ETD except when the driver is using the left auxiliary desk) during the running of the train under all lighting and operating conditions . In case where the pressure information is available only on a display, then it's only available when the battery is switched on and when the vehicle is not in a degraded mode.

21 All displays should have a similar user interface as far as possible.

22 Position dependent controls should be the preferred option rather than time dependent ones.

23 The operating elements providing the regular function ("regular element") shall also provide all the safety requirements associated with the function (e.g. emergency brake, pantograph down). Operation of regular element in case of emergency is deemed to be sufficient.

24 Additional operating elements that are only dedicated to emergency operation ("emergency element") may be provided as an alternative to operating the regular element.

4.3.3 Application of the rules on specific elements

The operating elements related to doors and travel direction shall be grouped together on the desk.

The train radio handset should be placed on or above the desk.

Train radio emergency call should be placed preferably on the right side of the Train Radio Display unit or might be an integrated element of it.

4.3.4 Main driver's desk

4.3.4.1 Functional allocation of operating elements and integration constraints at the driver's desk level (figure 1a and 1b)

The operating elements that have a standardized location at the desk shall be located according to the prescriptions of Figure 1a and 1b of this document. The other elements (as indicated in the table 4.3.4.1.1) have optional location.

Whether an operating element itself is a standard interface to the driver or not is provided in the table in chapter 4.3.4.1.1, elements shown in green in figures 1a and 1b mean standard for all types of vehicles.

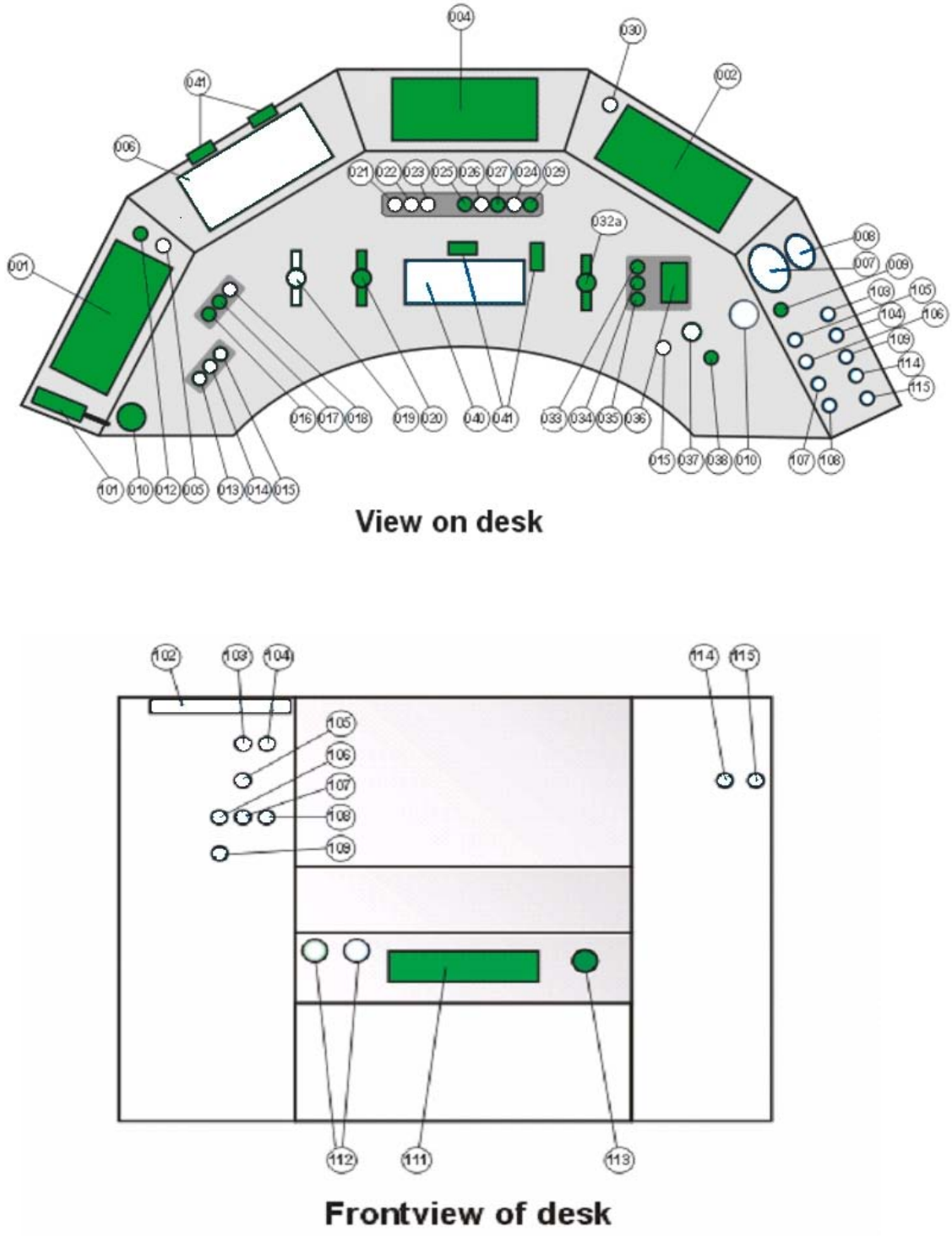
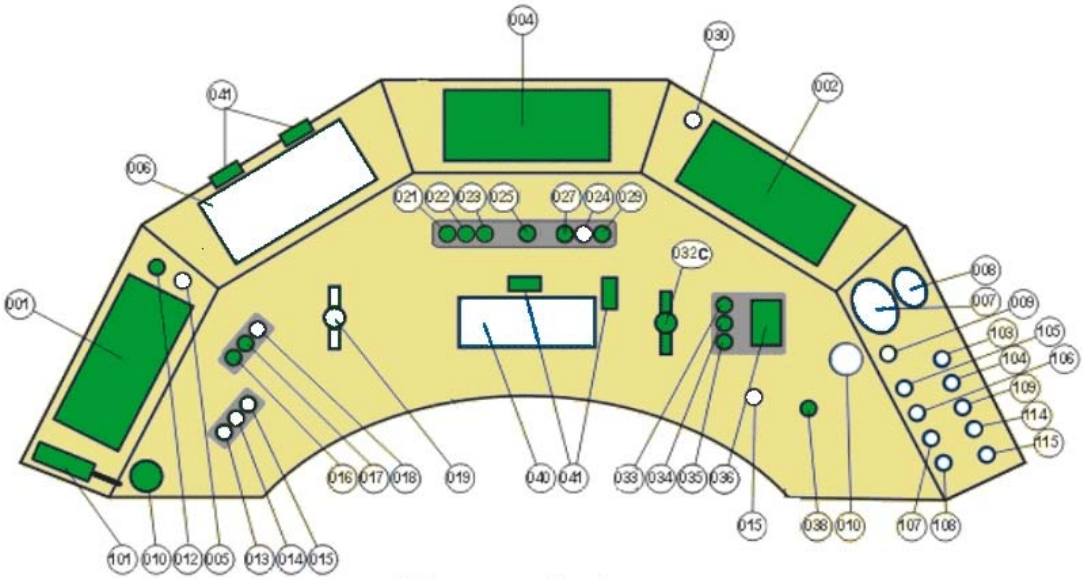
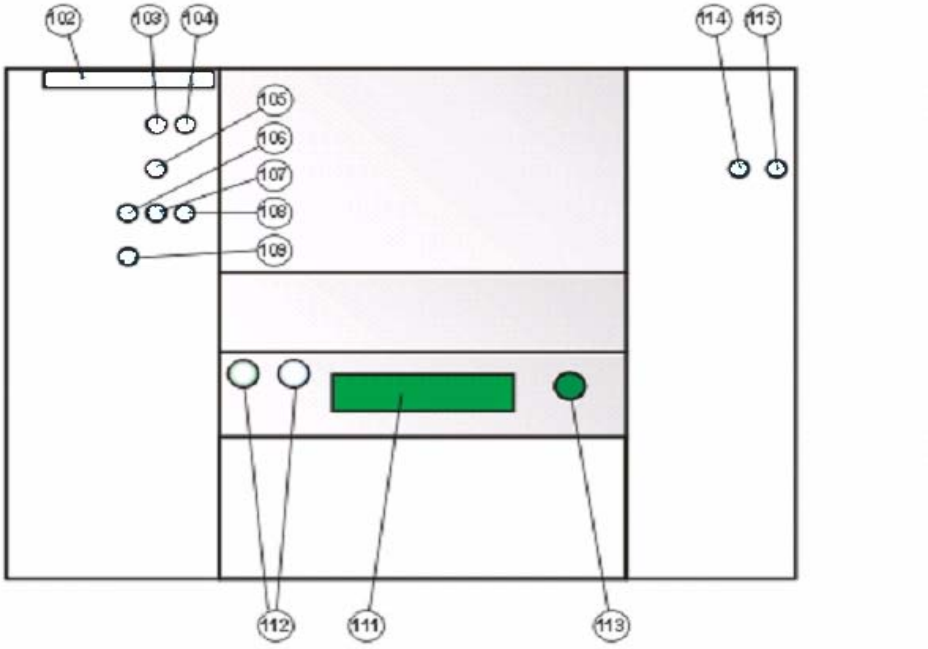


Figure 1a: Informative layout of standardised traction units' and Driving Coaches driver's desk (top and consoles) with maximum integration of equipments, but without integration of heritage ATP-systems (e. g. ATSS, TBL, KVB, SCMT). For some elements, two positions are shown.



View on desk



Frontview of desk

Figure 1b: Informative layout of optional standardised EMU/DMUs' central driver's desk (top and consoles) with maximum integration of equipments, but without integration of heritage ATP-systems (e. g. ATSS, TBL, KVB, SCMT). For some elements, two positions are shown.

4.3.4.1.1 List of elements, their location and their function code (according to prEN 15380-4)

Elements	Standard	Standardized Location	Standard for locomotive	Standard for driving coach	Standard for EMU/DMU	Optional for locomotive	Optional for EMU/DMU	Optional for driving coach	FBS code acc. Pr EN15380-4	Reason for the optional location
001 Train radio display unit (TRD)	X	X							KD, HE H, H	For heritage train radio, different solutions are possible
002 Technical & diagnostic display (TDD)	X	X							DB, EB, H, CF E, HG E, HG D, FC H, JBB	
004 Control command display (CCD)	X	X								
005 Emergency signals (warning lights, may no longer be requested in a new TSI OPE)		X				X	X	X	HE J	
006 Electronic timetable display (ETD)		X				X	X	X	HE H, CL, HB E	
007 BP (brake pipe) & MP (main air reservoir pipe) pressure gauge		X				X	X	X	G	option: to be integrated in the TDD
008 Brake-cylinder pressure gauges		X				X	X	X	G	option: to be integrated in the TDD
009 Brake pipe pressure adjuster (overcharge)		X	X	X			X		G	
010 Emergency stop valve with "Emergency stop" function	X								G	Depending on the position of the desk in the cab * if the desk is left, the emergency stop valve is placed on the right. * if the desk is centre or right, the emergency stop valve is placed on the left.
012 Train radio emergency call	X								KD, HE H	Shall be close to the TRD, preferably on the right side of the Train Radio Display unit or might be an integrated element of it
013 ATP : override (EOA)		X				X	X	X	HC C	Option: to be integrated in the CCD
014 ATP : release intervention		X				X	X	X	HC C	Option: to be integrated in the CCD
015 ATP : acknowledge		X				X	X	X	HC	Option: to be integrated in the CCD

Elements	Standard	Standardized Location	Standard for locomotive	Standard for driving coach	Standard for EMU/DMU	Optional for locomotive	Optional for EMU/DMU	Optional for driving coach	FBS code acc. Pr EN15380-4	Reason for the optional location
									C	
016 Pantograph / Diesel engine	X								FB, FDB	Depending on the size of the desk. Preferred location defined according to figure 1a and 1b.
017 Main Circuit Breaker / Power transmission	X								FB	Depending on the size of the desk. Preferred location defined according to figure 1a and 1b.
018 Train Power Supply						X		X	FB	Depending on the size of the desk. Preferred location defined according to figure 1a and 1b.
019 Automatic Speed Control (ASC)		X				X	X	X	FBB, G	
020 Combined traction/dynamic brake controller with integrated driver activity control push button		X	X	X			X		FBB, G, HEC	The Combined traction/dynamic brake shall be located at the left hand side in a locomotive configuration.
021 Door control: left doors-release & cancel release		(X)		X	X	X			DBB	Agreement pending on location for locomotives, based on EUDDplus results
022 Door control: Forced closing		(X)		X	X	X			DBB	Agreement pending on location for locomotives, based on EUDDplus results
023 Door control: right doors-release & cancel release		(X)		X	X	X			DBB	Agreement pending on location for locomotives, based on EUDDplus results
024 Train lighting (may be replaced in the target system due to TCMS providing the trigger information - see section 5)						X	X	X	CDB	Depending on the size of the desk. Preferred location defined in the standard.
025 Sanding	X	(X)							HEC	Agreement pending on location for locomotives, based on EUDDplus results
026 Release brake		(X)	X				X	X	G	Agreement pending on location for locomotives, based on EUDDplus results
027 External front light	X	(X)							HEJ, KB	Agreement pending on location for locomotives, based on EUDDplus results
028 Instrument lighting (may be replaced in the target system due to TCMS providing the trigger information - see section 5)						X	X	X	CDB	Depending on the size of the desk. Preferred location defined in the standard.
029 Task (on desk) & driver's cab lighting	X								CDB	Depending on the size of the desk. Preferred location defined in the standard.
030 Gooseneck microphone						X	X	X	CFF, CFC	Depending on the size of the desk. Preferred location defined in the standard.
032a Driver's automatic brake controller (automatic brake)		X	X	X			X		G, HEC	
032b Combined traction/brake controller (time dependant)		X					X	X	G, HEC	

Elements	Standard	Standardized Location	Standard for locomotive	Standard for driving coach	Standard for EMU/DMU	Optional for locomotive	Optional for EMU/DMU	Optional for driving coach	FBS code acc. Pr EN15380-4	Reason for the optional location
032c Combined traction/brake controller (position dependant)		X					X	X	G, HE C	Pending specification
033 Travel Direction "Forwards"	X	X							GD B	
034 No Travel Direction: "Neutral"	X	X							GD B	
035 Travel Direction "Backwards"	X	X							GD B	
036 Driver's Identity card reader	X*								HD, HE	Depending on the size and/or location of the desk; indicative location is on the right side on the desk.
037 Direct brake		X	X				X	X	G	
038 External warning horn	X	X							HE J	If pneumatically controlled horn is used, the location can be different.
039 Desk Light									CD B	
040 Key board		X				X	X	X	H	
041 Document holders	X									
051 Second man task light (on desk)						X	X	X		
101 Train radio-handset	X	X							CF F	
102 Lamp centre console						X	X	X	CD B	
103 Centre console lighting						X	X	X	CD B	
104 Lighting strength of the instrument lighting						X	X	X	CD B	Depending on the size and/or location of the desk; preferred location is on the right side on the desk
105 Floor & knee space (knee hole) heating						X	X	X	CE C	Depending on the size and/or location of the desk; preferred location is on the right side on the desk
106 Cab air blower rotational speed						X	X	X	CE D	Depending on the size and/or location of the desk; preferred location is on the right side on the desk
107 Driver's cab temperature						X	X	X	CE C	Depending on the size and/or location of the desk; preferred location is on the right side on the desk
108 Air-conditioning/ventilation						X	X	X	CE B	Depending on the size and/or location of the desk; preferred location is on the right side on the desk
109 Pressure protection driver's cab						X	X	X	CE B	Depending on the size and/or location of the desk; preferred location is on the right side on the desk
111 Driver activity control (DAC) foot switch	X	X							HJ	
112 Foot switch for height adjustment of automatically lifting the foot rest (1 or optionally 2 switches)						X	X	X	CB	

Elements	Standard	Standardized Location	Standard for locomotive	Standard for driving coach	Standard for EMU/DMU	Optional for locomotive	Optional for EMU/DMU	Optional for driving coach	FBS code acc. Pr EN15380-4	Reason for the optional location
113 Foot switch for external warning horn	X	X							HE J	
114 Windscreen wiper & windscreen washer (may be divided into two devices)	X								CC C	Depending on the size and/or location of the desk; preferred location is on the right side on the desk
115 Windscreen heating	X								CC C	Depending on the size and/or location of the desk; preferred location is on the right side on the desk
The following elements depend on the availability of the auxiliary desk, cab rear walls, ...										
121 Diagnosis socket										
122 Electric Shock Proof socket 230 V/ 50 Hz										
211 Driver activity control button (DAC)	X								HJ	
212 Cab lighting						X	X	X	CD B	
301 Override the driver's ID card reader	X	X								
302 Engine room lighting		X	X				X	X	CD B	
303 Isolation of driver's automatic brake controller & ETCS/STM ATP	X	(X)								Pending investigation on national rules (Cross-Acceptance).
304 External light	X	X							KB	
305 EP-brake	X	X							G	
306 Manual application of the holding/parking brake	X	X							G	
307 Manual release of the holding/parking brake	X	X							G	
308 Decoupling		X				X	X	X		Only for automatic coupler.
320 Thermo compartment (fridge/stove)						X	X	X		
321 Locker for thermo compartment						X	X	X		
401 Automatic brake release device						X	X	X	G	
402 brake isolating cock						X	X	X	G	
403 brake indicator		X	X	X			X		G	Only for disc brake and located outside the vehicle as defined in EN 15220-1
405 Mg-brake or eddy current brake						X	X	X	G	
406 brake changeover for brake mode "G"						X	X	X	G	
407 brake changeover for brake mode "P"						X	X	X	G	

Elements	Standard	Standardized Location	Standard for locomotive	Standard for driving coach	Standard for EMU/DMU	Optional for locomotive	Optional for EMU/DMU	Optional for driving coach	FBS code acc. Pr EN15380-4	Reason for the optional location
408 brake changeover for brake mode "R"						X	X	X	G	
409 Tail signal at the left end of the traction unit						X	X	X		
410 Tail signal at the right end of the traction unit						X	X	X		
411 indicator for external power supply						X	X	X		
412 socket for external power supply (shore supply)						X	X	X		
413 rotary switch for external power supply						X	X	X		
501 Passenger Information System (PIS)						X	X	X		
502 Engine room lighting						X	X	X		
503 Fault switch for driver activity control (DAC)						X	X	X	HJ	
504 Mode selection: Train bus-selection						X	X	X		
505 Fault switch "TCMS emergency brake"						X	X	X	G	
506 Override of traction cut-off in case of an open door						X	X	X		
507 Impulse valve "Brake Mode"						X	X	X	G	
508 Preparation/shut-down	X									
509 Impulse valve "Isolate driver's automatic brake controller"						X	X	X		
510 Key lock "Pantograph"						X	X	X	FB	
511 Isolation cock "sanding"						X	X	X	HE C	
512 Isolation cock "automatic emergency brake valve 1"						X	X	X	G	
513 Isolation cock "automatic emergency brake valve 2"						X	X	X	G	
514 Isolation cock "Air Brake bogie 1"						X	X	X	G	
515 Isolation cock "Air Brake bogie2"						X	X	X	G	
516 Isolation switch for passenger alarm function						X	X	X	CF D	
52x Isolation of ATP						X	X	X	HC C	

Informative notes on the above table:

1) The standard location of the elements marked with an X between brackets (X) will be defined in a future revision of this TecRec
2) The element marked with *: standardisation of the element pending

4.3.4.2 Functional allocation of operating elements and integration constraints below the driver's desk level (figure 1)

Operating elements that are operated while driving but which are not essential for a quick and targeted operation may be located on the vertical surfaces to the right and left of the driver kneehole niche.

The foot operated switches in the driver leg room niche are as important for a quick and targeted operation without distraction from the track system as the equipment on the driver's desk itself. The foot switches for the driver activity control (DAC, pos. 111) and for the external warning horn (pos. 113) are located on the foot support of the niche.

4.3.4.3 Normal working procedures of a driver at the main desk imposing design constraints

The driver operates the EMU/DMU, locomotives and driving coaches from a standardised main desk in the cab. The desk may be located in the centre, on the right or on the left. If the desk is located on the right or on the left side of the cab and if there is a permanent work place for a second person, a fixed seat has to be provided. Generally, the operating elements for the main circuit breaker / power transmission, the pantograph / diesel engine and the train control systems are only operated in connection with operating the brakes, and not at the same time with the traction / dynamic brake controller (pos. 020). Therefore, they can be easily operated using the free left hand. The operation elements, which are operated both when driving and when braking, should be arranged on the control panel above the desk central area in the middle, in the case of traction units or driving coaches between the traction / dynamic brake – controller location (pos. 020) and the driver's automatic brake controller (pos. 032) location (see figure 1a) Thereby ensuring that they can be operated using either the free right or left hand without problems: these are toggle switches / brake flip switches for sanding (pos. 025), release for the traction unit's automatic brake (pos. 026), external front lights (pos. 027) and task (on desk) & driver's cab lighting (pos. 029).

The traction / dynamic brake controller (pos. 020) is located on the left side of the desk. The operation of this shall be natural, i.e. comfortable, uncomplicated and not requiring considerable body movement. The extraordinary actions demanding more drivers' concentration can therefore be performed with the free right hand. Nearly all left-hand located elements should be operated with the traction / dynamic brake controller being in the neutral position (e. g. pantograph – pos. 016, or main circuit breaker – pos. 017) or not needing a simultaneous change of its position (e. g. ATP – pos. 013 – 015). Therefore the left hand will not ordinarily be required to operate more than one device at a time.

The push button for the BP overcharge function (see pos. 009) shall be arranged next to the BP pressure indicator or the BP pressure information in the TDD because the indicators provide the feedback to the driver when he is actuating the BP overcharge push button.

Furthermore, an emergency brake device (e. g. push button, pos. 010) shall be provided in the cab close to the driver and the second man so that it can be easily reached from all positions in the driver's cab (e. g. in the case of escaping into the engine room aisle before an accident collision). For a desk located on the right or on the left, the emergency stop valve with "Emergency stop" function (pos. 010) shall be located in the middle cab position.

4.3.4.4 Implementations of the generic Layout with respect to constraints

Constraints justifying different solutions than the standard one can be:

1. Space constraints inside the cab for different reasons (e. g. side cab adjacent to a centre gangway (many DMU/EMU, e. g. in UK))

2. Integration of heritage ATP systems, migration path for different existing signalling systems in the infrastructure

3. Integration of other systems not covered by this TecRec

4. Centre cab locomotives

In case of constraints no. 1 - 4 the layout of the driver's desk can be different from the configuration shown in figure 1a / 1b. In this case the rules from chapter 4.3.2 should be fulfilled.

Driver's desks for other traction rolling stock than locomotives could be inspired from the locomotive desk layout by deleting or modifying elements, depending on the application concerned. This has been the approach for specifying the EMU/DMU desk. No further specific recommendations do currently exist for shunting locomotives, tram-trains and on-track-machinery (OTM).

However, if this TecRec will be (partially) applied to other kind of rolling stock, then the following criteria should apply:

- Location of display units and operating elements in the cab should follow the recommendations of this document for such elements provided in the cab as far as possible. In cases of major space constraints, like in shunting locomotives, EMU/DMU with front gangway and cab inside position or OTM, those operating elements used in the cab should respect the orientation towards each other according to this TecRec and shall at least provide the same functionality.

In case of integration of heritage ATP-systems either the distance between the displays could be enlarged in order to mount ATP-driver-interfaces between adjacent displays or such heritage components could be installed on top of the display-area respecting the minimum view angles for driving in seating and standing position.

4.3.5 Further specific locations in the cab

The roof area in the cab is only permitted for the loudspeaker or cab light or air ducts or air outlets.

4.3.6 Auxiliary driver's desk (as an option)

4.3.6.1 Functional allocation of operating elements and integration constraints

If requested, on or close to each driver's cab side wall, a control facility (auxiliary driver's desk) can be mounted ergonomically, thus enabling driving (e.g. shunting and starting), while the driver is standing at the side window. Moreover, if this control facility is requested, an operating element for the DAC (pos. 211) shall be provided below in such a way that it may serve as a hand grip to the driver for the hand not used to operate the auxiliary desk (see Annex A.1). Alternatively, the DAC switch can be realized by a foot switch on the floor.

List of elements on the auxiliary desk

- 013 ATP: Override (e. g. EOA)
- 015 ATP: Acknowledge
- 033 Travel direction "forwards"
- 035 Travel direction "reverse"
- 038 External warning horn
- 051 Second man task light (on desk)
- 032b Combined traction/brake controller
- 211 Driver activity control button (DAC)

Optional element:

- 021 Doors on the left side (left auxiliary desk) – release and cancel release
- 023 Doors on the right side (right auxiliary desk) – release and cancel release

4.3.6.2 Starting the train and shunting by the driver at the auxiliary driver's desk

Starting (e. g. in slopes) and shunting shall be possible without any kind of restriction.

At least, one emergency brake command initiation point shall be within easy reach.

The driver shall be able to see the BP pressure and the speed on the main desk from this driving position at the side window. This information (speed and BP pressure) shall be visible in standing position at the auxiliary desk, including by turning the head in standing position, but without leaving position.

If the driver can use the direct brake on the main desk, the driver shall be able to see the brake cylinder pressure indicators or the brake cylinder pressure information in the TDD from his driving position.

4.3.7 Driver's cab rear walls

Operating elements that are only operated during standstill but which shall exist in every driver's cab shall be located on the driver's cab rear wall (see Annex A.2).

- List of elements with fixed location:
    - 301 Override the driver's ID card reader
    - 302 Engine room lighting (if there is engine compartment)
    - 303 Isolation of driver's automatic brake controller & ATP
    - 304 External light
    - 305 EP-brake
    - 306 Manual application of the holding brake
    - 307 Manual release of the holding brake
    - 308 Decoupling (optional if there is no coupling)
- Optional elements:
    - 320 Thermo compartment (fridge/stove)
    - 321 Locker for thermo compartment

4.4 Requirements for specific elements

4.4.1 Automatic speed control (019), Traction / Dynamic Brake Controller (020), Driver's Automatic Brake controller (032a)

These elements are position dependent.

4.4.2 Combined traction/brake controller (032b and 32c, pending specification)

32b is time dependent; for 32c position dependent is preferred.

4.4.3 Emergency stop valve push button (010)

It shall be easily accessible for drivers and for the optional second man (e. g. in the case of escaping into the engine room aisle before an accident collision). For a desk located on the right or on the left side it shall be located in the middle cab position.

4.4.4 Automatic speed control (019)

The automatic speed control (019) shall be close to the Traction / Dynamic Brake Controller (020).

4.4.5 Grouping of Door control (021, 022, 023)

It is recommended to leave these three buttons together. It is necessary to place them in a group alongside each other in that order because it means the same function of opening and closing doors.

4.4.6 Grouping of ATP (013, 014, 015)

These buttons shall be left together. It is necessary to place them in a group alongside each other in that order because they are related to the same functions ATP. It is advisable to devise a different shape for each button in order to facilitate the tactile recognition of the function of each button. See chapter 4.2.3.

4.4.7 Grouping of Travel direction (033, 034, 035)

These buttons shall be left together. It is necessary to place them in a group alongside each other in that order because it means the same function: the direction of the train (forward, neutral, backward).

4.5 Additional recommendations for the engine room or inside the rolling stock (informative)

The “switched on / shut down” configuration of the unit should be comfortable to be achieved. Therefore the battery and the air supply should be switched on/off by operating of only one switch.

Certain operating elements should be located together on the EMU/DMU, locomotives and driving coaches, such as fault switches (pos. 52x) or fault shut-off cocks (pos. 511 - 515). At the same location, the operation of the distributor (brake mode selection - pos. 507 -, isolating device and release device) should also be possible (see also point 3.5 - page 27. A brake mode selection should, in addition, be possible in the driver’s cab. All these elements should be easily accessible for the driver without disturbing passengers or moving luggage and they shall be protected against public access or use (e. g. in the engine room).

In case of concentrated power (traction units) and also (if applicable) for driving coaches the operating elements should be assembled on a switch panel in the engine room.

Operating elements such as line safety switches for protection of low voltage circuits (LSS) and engine protection switches for 3AC auxiliary power circuits (MSS) should be fitted in a clearly arranged way at a height of more than 0,50 m, but never higher than 1.80 m above the floor. They shall be clearly identified and should be concentrated on no more than two switch boards in the engine room.

There should be a 230 V / 50 Hz socket on at least one switch panel, which may be used when the main circuit breaker is closed or that an external power supply (pos. 412 and optionally the train power supply line) is active.

4.6 External positions of operating elements on the vehicle (informative)

EN15179 especially chapter 5.3.2.2 and 5.3.2.5 should be used in case of outside handling for outside located indicator and actuation devices.

If access by qualified staff can be ensured in any requested case and time, then operating elements may only be inside the traction unit (unlike wagons).

If requested, the following requirement applies:

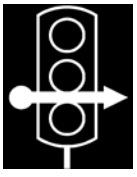
Operating elements that request operation in the case of a towed traction unit should be located – similar to a wagon – outside on the sole-bar / under-frame. They should be compatible with train-wide communication equipped coaches and should be protected against damage. Examples: brake mode position (pos. 406 – 408), brake distributor valve isolating cock (pos. 402) and release device for the distributor (pos. 401).

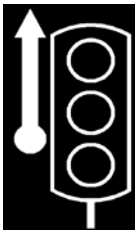
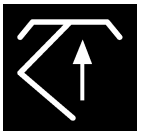
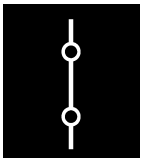
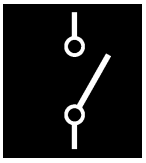
These elements should be easily accessible for the driver and protected from attracting public access or use.

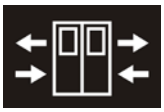
The operating equipment should be fitted at a height of 0.8 – 1.5 m above top of rail and immediately adjacent on both sides of the longitudinal sole-bar / under-frame. In the case of outside located operating elements “brake distributor valve isolation cock” (pos. 402) and “distributor release device” (pos. 401) it is not mandatory to have these additionally replicated inside the vehicle.

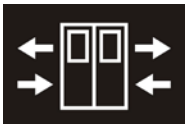
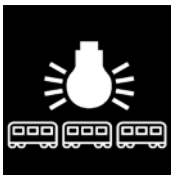
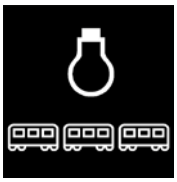
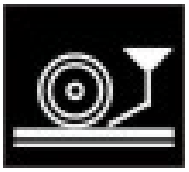
5 Operating Elements and Relationship with Pictograms

Independent of the placement, the following table lists all operating elements, which are subject of this technical recommendation. Pictograms shall be designed in such a way that they are readable by the driver.

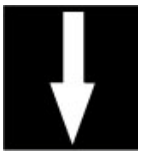
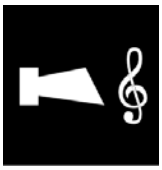
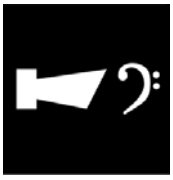
ID #	Name (Main target Function)	Comment / Pictogram
001	Train radio display (TRD)	
002	Technical & diagnostic display (TDD)	
004	Control command display (CCD)	
005	Emergency signals (warning lights)	
006	Electronic timetable display (ETD)	
007	BP (brake pipe) & MP (main air reservoir pipe) pressure gauge	(option: to be integrated in the TDD)
008	Brake-cylinder pressure gauges	(option: to be integrated in the TDD)
009	Brake pipe pressure adjuster (overcharge)	
010	Emergency stop valve with “Emergency stop” function	
012	Train radio emergency call	
013	ATP: override (e. g. EOA)	

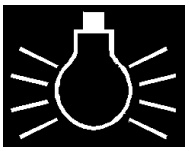
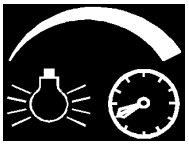
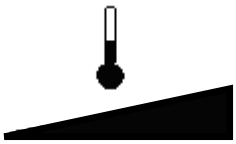
ID #	Name (Main target Function)	Comment / Pictogram
014	ATP: release intervention	
015	ATP: acknowledge	
016	Pantograph / Diesel Engine	  
017	Main Circuit Breaker / Power Transmission	  

ID #	Name (Main target Function)	Comment / Pictogram
018	Train Power Supply	 
019	Automatic Speed Control (ASC)	
020	Combined traction/ dynamic brake controller with integrated driver activity control push button	
021	Door control: left doors-release & cancel release	 
022	Door control: Forced closing	

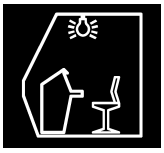
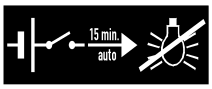
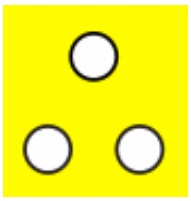
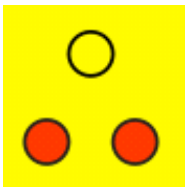
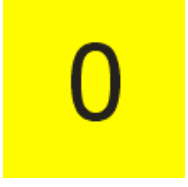
ID #	Name (Main target Function)	Comment / Pictogram
		
023	Door control: right doors-release & cancel release	 
024	Train lighting	“on”  “off”  (can be replaced in the target system due to TCMS providing the trigger information – see section 6)
025	Sanding	
026	Release brake	
027	External front light	 

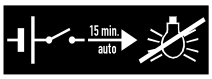
ID #	Name (Main target Function)	Comment / Pictogram
		  **0**
028	Instrument lighting	 (can be replaced in the target system due to TCMS providing the trigger information – see section 6)
029	Task (on desk) & driver's cab lighting	 
030	"Swan neck" microphone	
032a	Driver's automatic brake controller (automatic brake)	
032b or 32c	Combined traction-brake-controller	Emergency Brake

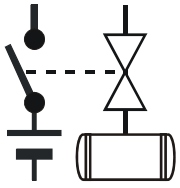
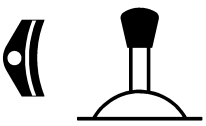
ID #	Name (Main target Function)	Comment / Pictogram
033	Travel Direction “Forwards”	
034	No Travel Direction “Neutral”	
035	Travel Direction “Backwards”	
036	Driver’s Identity card reader	
037	Direct brake	 
038	External warning horn	 
039	Desk light	 (Position according to section 6, depending on the location of the lamp)
040	Key board	

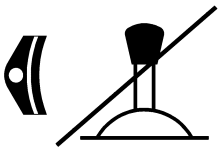
ID #	Name (Main target Function)	Comment / Pictogram
041	Document holders	
101	Train radio-handset	
102	Lamp centre console	
103	Centre console lighting	
104	Lighting strength of the instrument lighting	
105	Floor & knee space (knee hole) heating	
106	Cab air blower rotational speed	
107	Driver's cab temperature	
108	Air-conditioning/ventilation	 

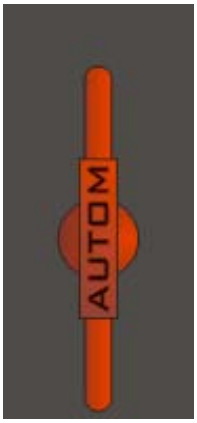
ID #	Name (Main target Function)	Comment / Pictogram
		0
109	Pressure protection driver's cab	 
111	Driver activity control (DAC) foot switch	
112	Foot switch for height adjustment of automatically lifting the foot rest	
113	Foot switch for external warning horn	
114	Windscreen wiper Off Interval Slow Fast Windscreen washer	 0    
115	Windscreen heating	
121	Diagnosis socket	
122	Electric Shock Proof socket 230 V/ 50 Hz	
211	Driver activity control button (DAC)	

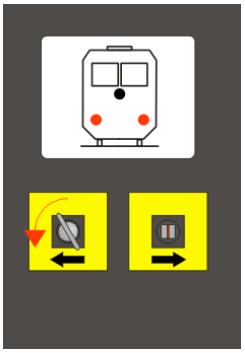
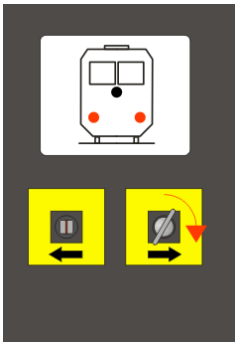
ID #	Name (Main target Function)	Comment / Pictogram
212	Cab lighting	
301	Override the driver's ID card reader	
302	Engine room lighting	 
303	Isolation of driver's automatic brake controller & ATP	
304	External light	  
305	EP-brake	 

ID #	Name (Main target Function)	Comment / Pictogram
306	Manual application of the holding brake	
307	Manual release of the holding brake	
308	Decoupling	
320	Thermo compartment (fridge/stove)	
321	Locker for thermo compartment	
501	Passenger Information System (PIS)	 
502	Engine room lighting	 
503	Fault switch for driver activity control (DAC)	

ID #	Name (Main target Function)	Comment / Pictogram
		
504	Mode selection: Train bus-selection	 
505	Fault switch “TCMS emergency brake”	 
506	Override of traction cut-off in case of an open door	 
507	Impulse valve “Brake Mode”	**R** **P** **G**
508	Preparation/shut-down	
509	Impulse valve “Isolate driver’s automatic brake controller”	

ID #	Name (Main target Function)	Comment / Pictogram
		
510	Key lock “Pantograph”	
511	Isolation cock “sanding”	
512	Isolation cock “automatic emergency brake valve 1”	
513	Isolation cock “automatic emergency brake valve 2”	
514	Isolation cock “Air Brake bogie 1”	
515	Isolation cock “Air Brake bogie2”	
516	Isolation switch for passenger alarm function	 
52x	Isolation of ATP	 

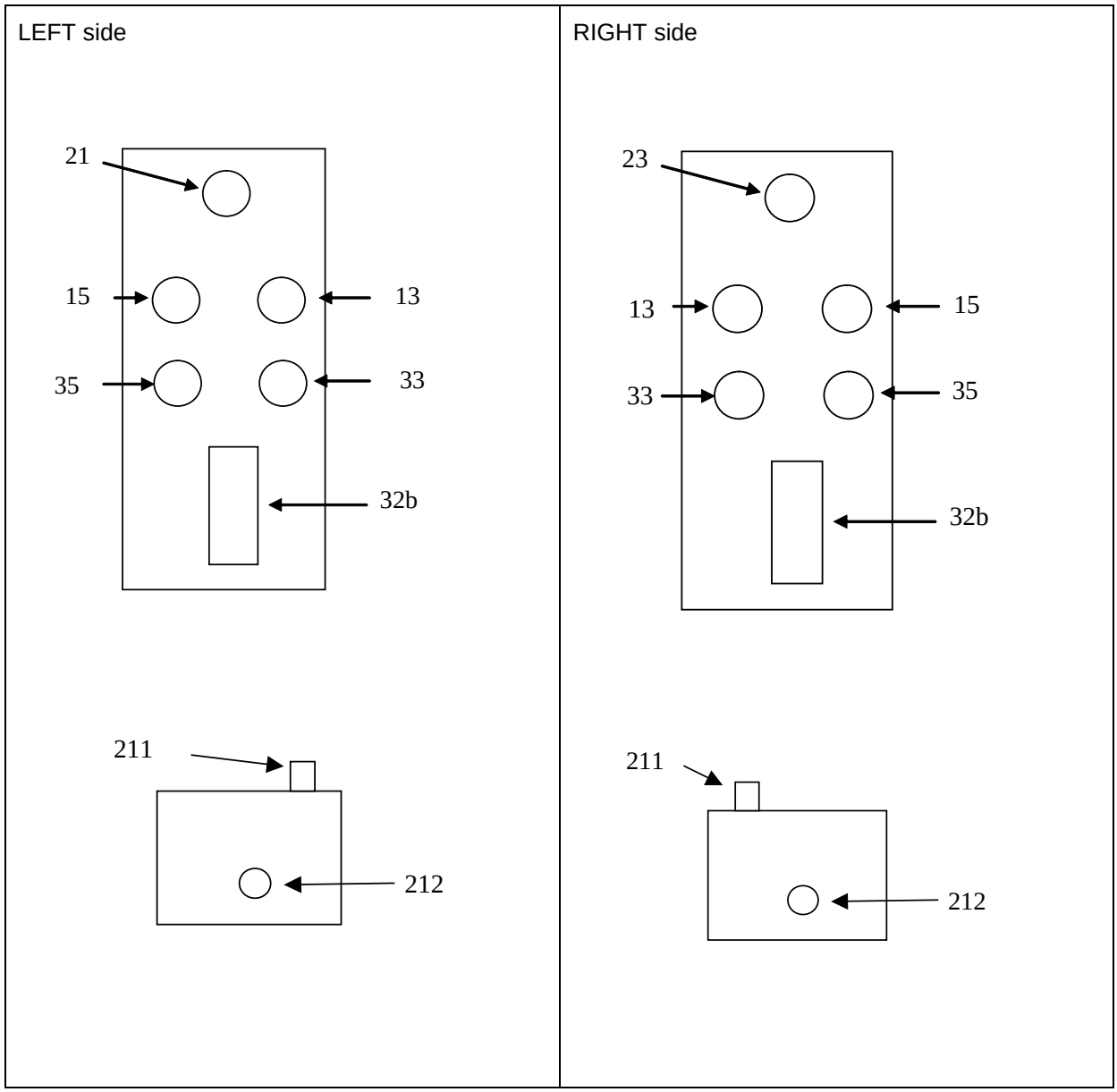
ID #	Name (Main target Function)	Comment / Pictogram
401	Automatic brake release device	
402	Brake isolating cock	 
403	Brake indicator	
405	Mg-brake or eddy current brake	
406	Brake changeover for brake mode “G”, “P”, “R”	G
407	Brake changeover for brake mode “P”	P
408	Brake changeover for brake mode “R”	R

ID #	Name (Main target Function)	Comment / Pictogram
409	Tail signal at the left end of the traction unit	
410	Tail signal at the right end of the traction unit	
411	Indicator for external power supply	

ID #	Name (Main target Function)	Comment / Pictogram
412	Socket for external power supply (shore supply)	
413	Rotary switch for external power supply	 

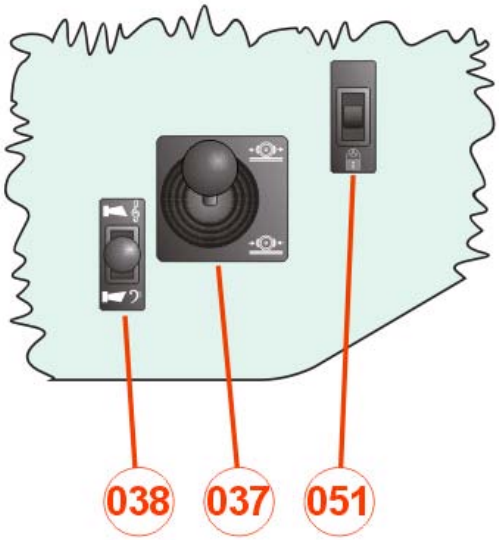
Annex A (Informative) System specifications for Driver-Machine-Interfaces

A.1 Position of operating elements on the auxiliary desks

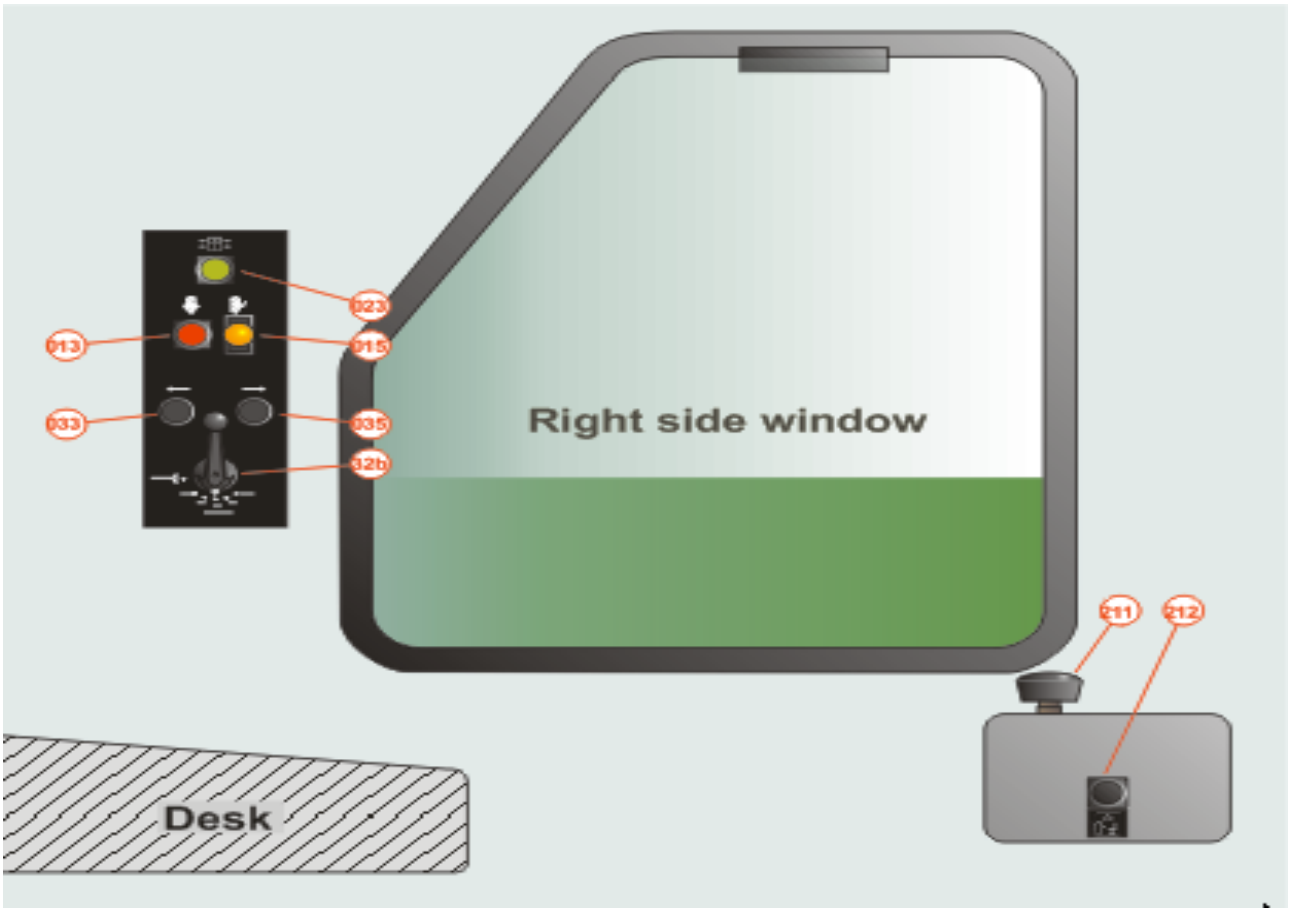


For 32b, forward position means increasing traction/releasing brake and backward is vice-versa, therefore those elements are mirrored.

Operating elements close to the auxiliary desk at the second-man side or if these main-desk elements are not reachable from the driving position at the side window (pos. 037, 038, see section 5).



Auxiliary desk (example for right side position)



013 ATP: Override (e. g. EOA)

015 ATP: Acknowledge

021 Doors on the left side (left auxiliary desk) – release and cancel release

023 Doors on the right side (right auxiliary desk) – release and cancel release

032b Combined traction/dynamic brake handle for auxiliary desk

033 Travel direction “forwards”

035 Travel direction “reverse”

037 Direct brake

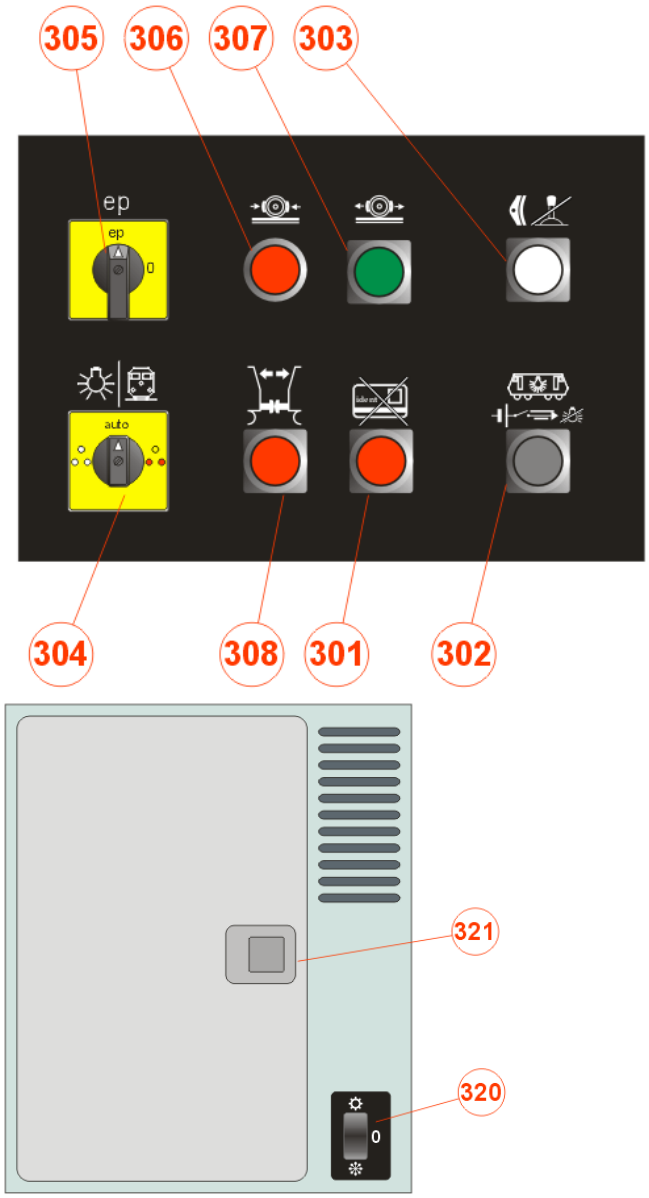
038 External warning horn

051 Second man task light (on desk)

211 Driver activity control button (DAC)

212 Cab lighting

A.2 Position of operating elements on the Driver's cab rear wall operation board



301 Override the driver's ID card reader

302 Engine room lighting

303 Isolation of driver's automatic brake controller & ATP

304 External light

305 ep-brake

306 Manual application of the holding brake

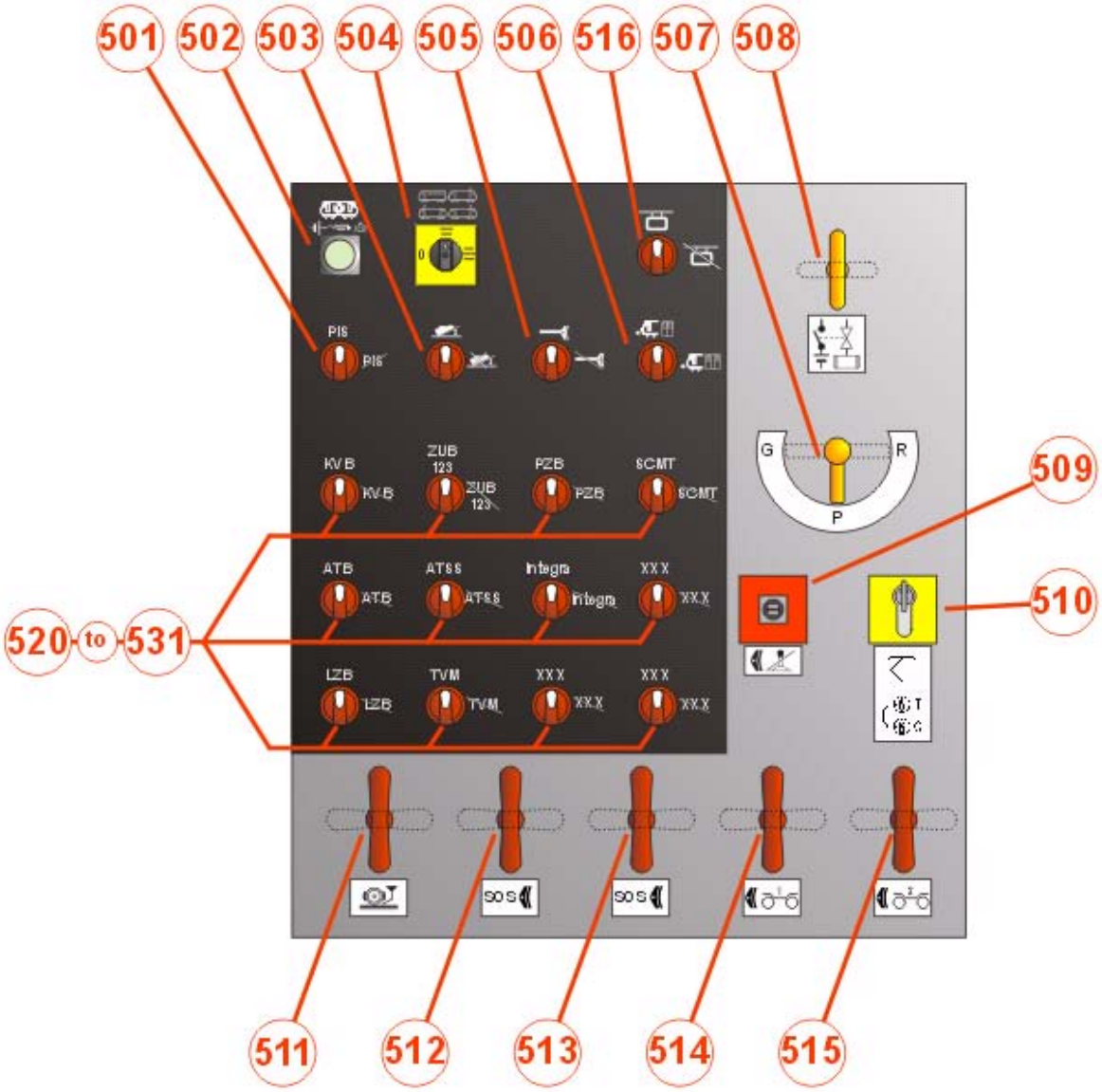
307 Manual release of the holding brake

308 Decoupling

320 Thermo compartment (fridge/stove)

321 Locker for thermo compartment

A.3 Position of operating elements in the engine room



501 Passenger Information System (PIS)

502 Engine room lighting

503 Fault switch for driver activity control (DAC)

504 Mode selection: Train bus-selection

505 Fault switch “TCMS emergency brake”

506 Override of traction cut-off in case of an open door

507 Impulse valve “Brake Mode”

508 Preparation/shut-down

509 Impulse valve “Isolate driver’s automatic brake controller”

510 Key lock “Pantograph”

511 Isolation cock “sanding”

512 Isolation cock “automatic emergency brake valve 1”

513 Isolation cock “automatic emergency brake valve 2”

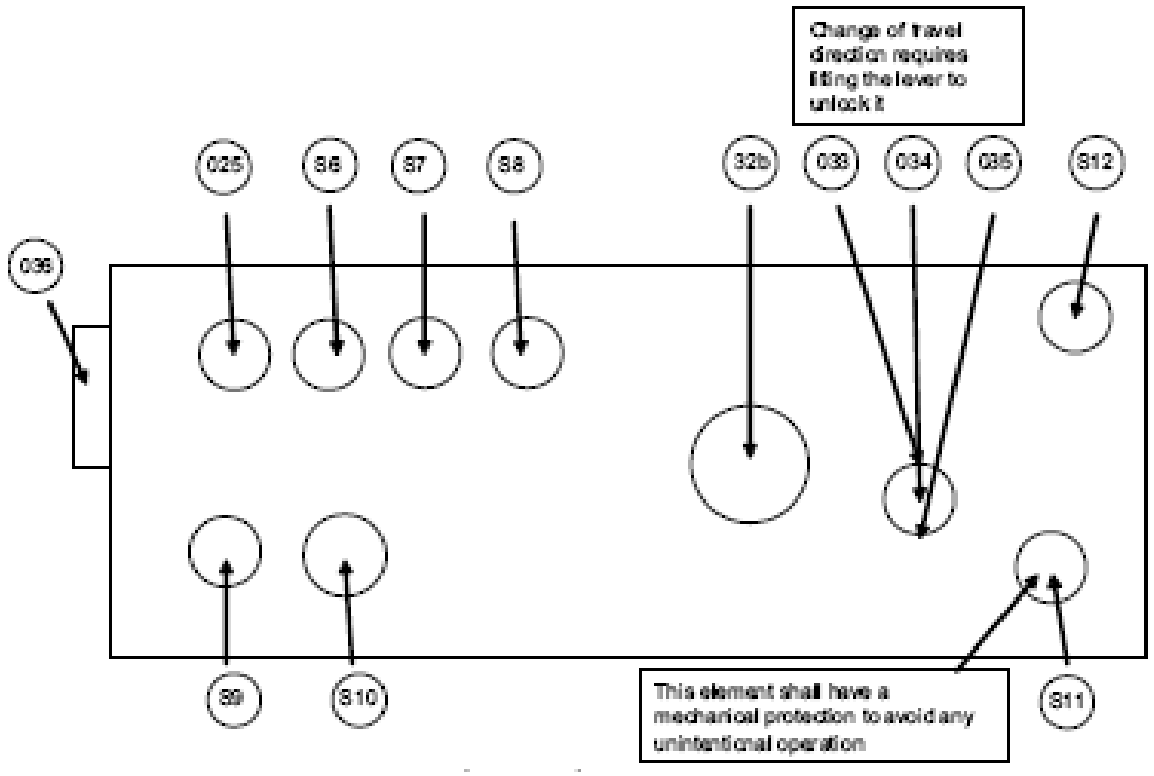
514 Isolation cock “Air Brake bogie 1”

515 Isolation cock “Air Brake bogie2”

516 Isolation switch for passenger alarm function

52x Isolation of ATP

A.4 Operating elements on the Radio remote control desk (option, only EMU/DMU or locomotives)



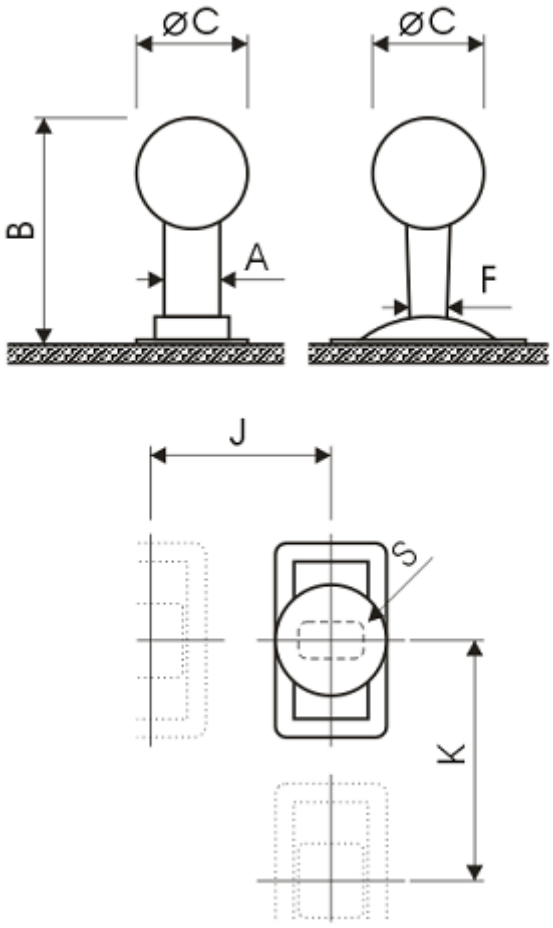
S 6 Slope starting
S 7 Maintain the current speed
S 8 Electric traction: Pantograph and Main circuit breaker
Diesel-units: Diesel motor and power-transmission
S 9 Brake pipe pressure adjuster (overcharge) and External warning horn
S 10 Type of air brake selection: Automatic brake/direct brake
S 11 Traction interlock
S 12 Decoupling

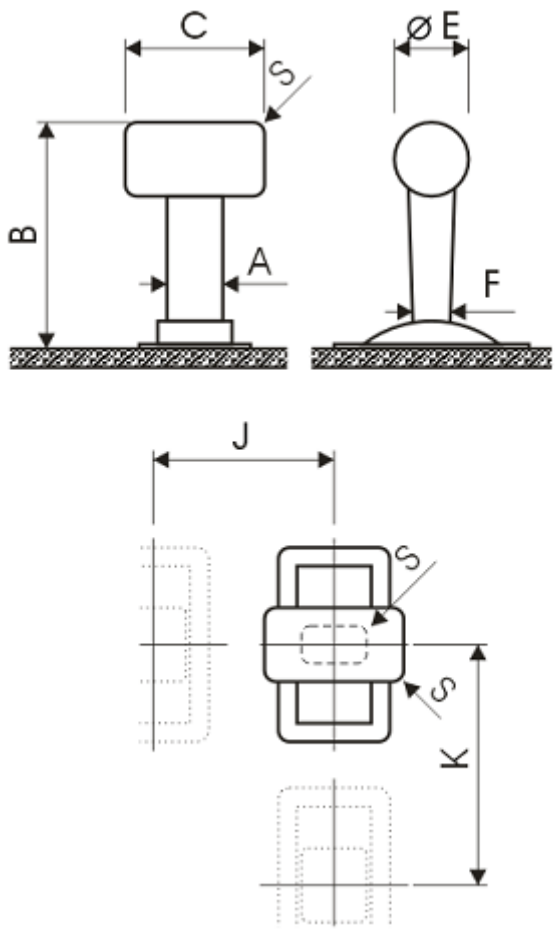
Note: this drawing doesn't intend to impose any standard location of elements.

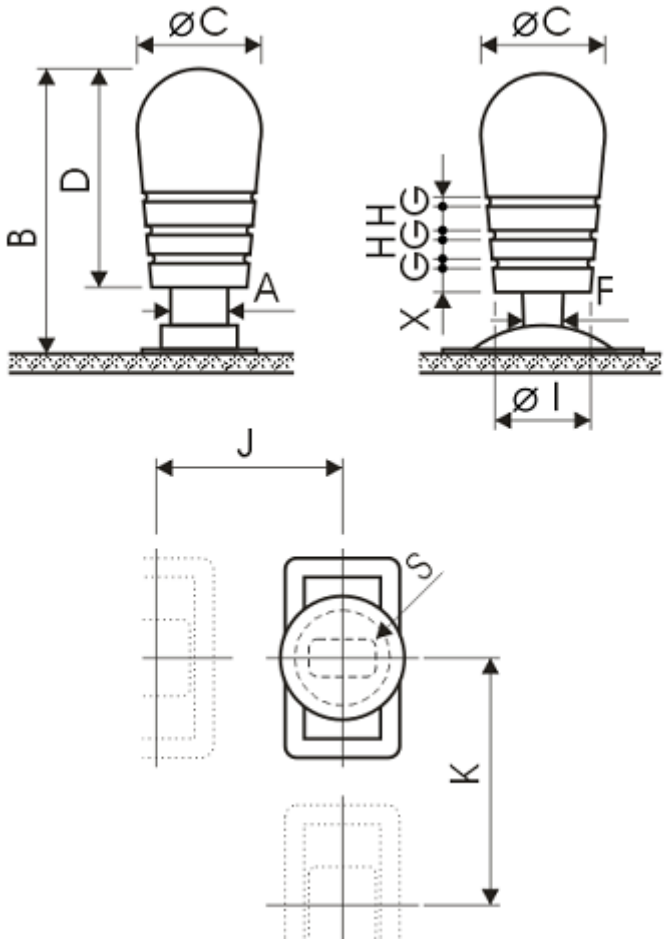
Annex B (informative) Shape

Levers:

Indicative shape of a lever of about 50 mm long




C
S
Ø E
B
A
F
J
S
S
K


øC
øC
B
D
A
HH
GGG
X
F
ø I
J
S
K

Push buttons and indicators

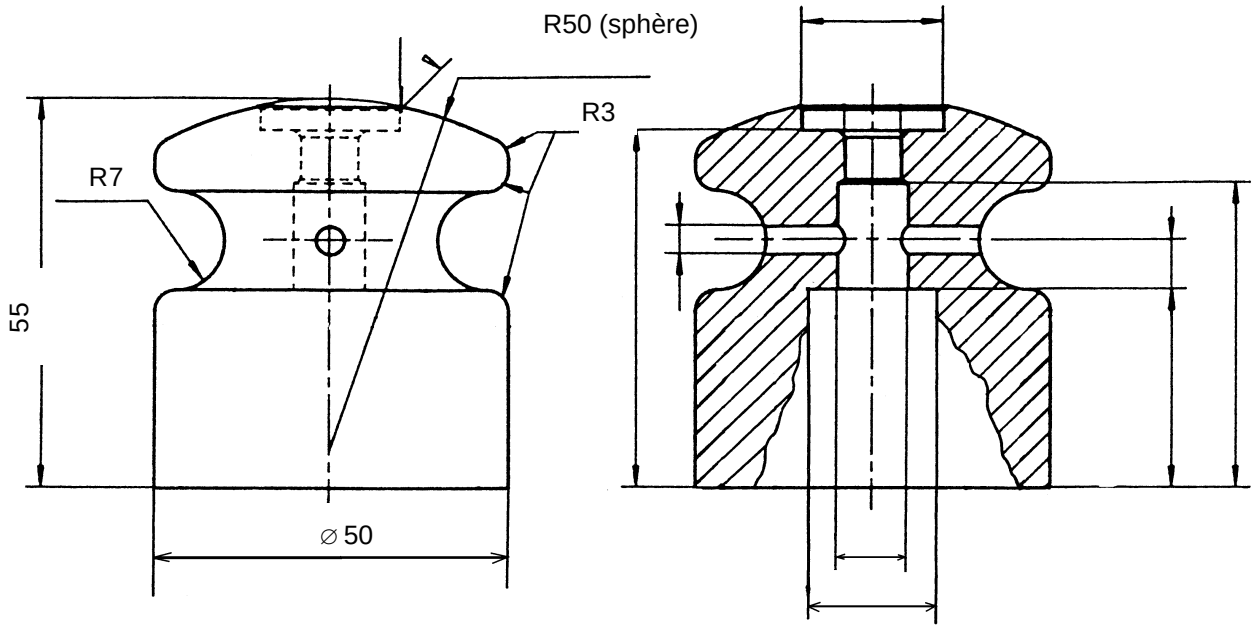
For ergonomic reasons all buttons shall have tactile feedback.

For safety reasons:

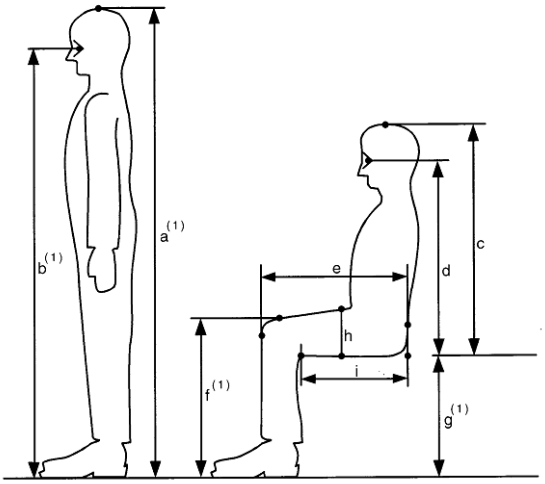
- The displacement of the push button shall be at least 3 mm.

- The collar shall protect the button from inadvertent operation

For position 010 the following shape shall apply:

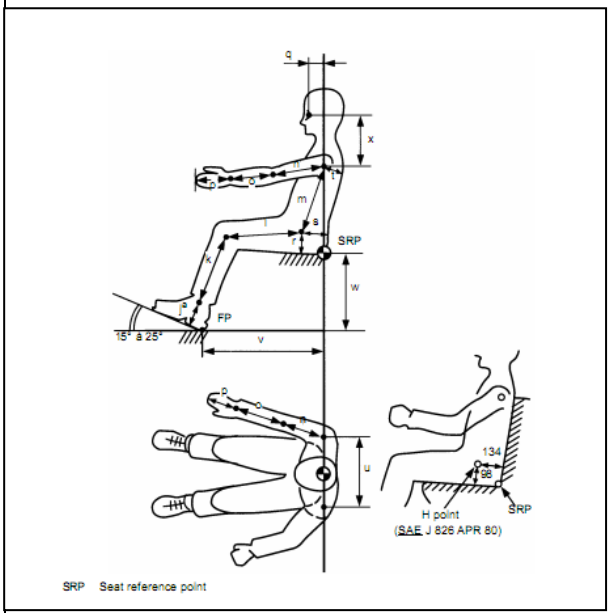


Annex C Anthropometric Measurements of the driver



	Min	Max
a	1550	1910
a 1	1580	1940
b 1	1480	1815
c	820	985
d	710	860
e	545	665
f1	510	635
g1	405	510
h	120	180
i	440	525

Dimension in mm



SRP Seat reference point

	Min	Max
a	1550	1910
j	107	126
k	353	457
l	380	473
m	410	498
n	257	312
o	223	266
p	170	221
q	78	90
r	70	101
s	105	121
t	104	131
u	295	387
x	230	261
v	450 to 550	600 to 700
w	390 to 420	470 to 510

Annex D Functional description of the 3 alternative options for the Driver's automatic brake controller

Reserved for later revision

Pos. 032a and 032b: See UIC 612-0

Pos. 032c: functional specification to be provided

Glossary

EN 547-3:1997: Safety of machinery - Human body measurements - Part 3: Anthropometric data, September 1997

EN 837-1:1997: Pressure gauges - Part 1: Bourdon tube pressure gauges - Dimensions, metrology, requirements and testing, March 1997

EN 894:2000: Safety of machinery - Ergonomics requirements for the design of displays and control actuators, 2000

EN 1005-1:2002: Safety of machinery - Human physical performance - Part 1: Terms and definitions, January 2002

EN 1005-2:2003: Safety of machinery - Human physical performance - Part 2: Manual handling of machinery and component parts of machinery, June 2003

EN 1005-3:2002: Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation, May 2002

EN 14067:2007: Railway applications - Aerodynamics, 2007

EN 15152:2007: Railway applications - Front windscreens for train cabs, 2007

EN 50021:1999: Electrical Apparatus for Potentially Explosive Atmospheres, Type of Protection "N", April 1999

EN 50121-3-2:2006: Railway applications - Electromagnetic compatibility -- Part 3-2: Rolling stock - Apparatus, July 2006

EN 50124:2001: Railway applications - Insulation coordination, 2001

EN 50125-1:1999: Railway applications. Environmental conditions for equipment. Equipment on board rolling stock, December 1999

EN 50153:2002: Railway applications. Rolling stock. Protective provisions relating to electrical hazards, January 2003

EN 50155:2001: Railway applications - Electronic equipment used on rolling stock, 2001

EN 60529:1992: Specification for degrees of protection provided by enclosures (IP code), 1992

EN 60721-3-5:1997: Classification of environmental conditions. Classification of groups of environmental parameters and their severities. Ground vehicle installations, August 1997

EN 61000-4-4:2004: Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test, 2004

EN 61373:1999: Railway applications. Rolling stock equipment. Shock and vibration tests, June 1999

EN 12663-1, Railway applications — Structural requirements of railway vehicle bodies — Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)

EN 14752:2005, Railway applications — Body side entrance systems

EN 15152, Railway applications — Front windscreens for train cabs

EN 15663, Railway applications — Definition of vehicle reference masses

FprEN 15892, Railway applications — Noise Emission — Measurement of noise inside driver's cabs

EN 14198: Railway applications - Braking - Requirements for the brake system of trains hauled by a locomotive, 08/2005

EN 15279: Workplace exposure - Measurement of dermal exposure - Principles and methods, 06/2006

PrEN 15595: Railway applications - Braking - Wheel slip prevention equipment, 01/2007

EN 15734-1: Railway applications - Braking systems of high speed trains - Part 1: requirements and definitions, 03/2008

EN 15734-2: Railway applications - Braking systems of high speed trains - Part 2: test methods, 03/2008

EN 50163: Railway applications. Supply voltages of traction systems, January 2005

EN 50206-1: Railway applications - Rolling stock - Pantographs: characteristics and tests - Part 1: pantographs for main line vehicles, 05/2000

EN 50206-2: Railway applications - Rolling stock - Pantographs: characteristics and tests - Part 2: pantographs for metro and light rail vehicles, 05/2000

EN 50388: Railway applications. Power supply and rolling stock. Technical criteria for the coordination between power supply (substation) and rolling stock to achieve interoperability, September 2005

EN 50463: Railway applications. Energy measurement on board trains, October 2005

UIC Leaflet 540: Brakes - Air Brakes for freight trains and passenger trains, 5th edition, November 2006

UIC Leaflet 541-03: Brakes - Regulations concerning manufacture of the different brake parts - Driver's brake valve, 1st edition of 1.1.84

UIC Leaflet 547: Brakes - Air brake - Standard programme of tests, 4th edition of 1.7.89

UIC Leaflet 556: Information transmission in the train (train-bus), 4th edition, August 2005 (available on CD-Rom only)

UIC Leaflet 612-0: Driver Machine Interfaces for EMU/DMU, Locomotives and driving coaches - Functional and system requirements associated with harmonised Driver Machine Interfaces, 1st edition June 2009

UIC Leaflet 612-1: Rolling stock configurations and main activated functions for EMU/DMU, locomotives and driving coaches, 1st edition, February 2009

UIC Leaflet 612-2: Specific sub-system requirements (traction, braking, etc.) for EMU/DMU, locomotives and driving coaches (Rolling stock sub-system requirements, requirements for economic purposes, requirements for railway standardisation), 1st edition, May 2009

UIC Leaflet 641: Conditions to be fulfilled by automatic vigilance devices used in international traffic, 4th edition, February 2001

UIC Leaflet 642: Special provisions concerning fire precautions and fire-fighting measures on motive power units and driving trailers in international traffic, 2nd edition, September 2001

UIC Leaflet 647: Functional model for the remote control of traction units, 1st edition, March 2006

UIC Leaflet 651: Layout of driver's cabs in locomotives, railcars, multiple-unit trains and driving trailers, 4th edition, July 2002

EU-project "EUDDplus": final report (2010), Project No: 031555 – EUDDplus "European Driver's Desk advanced concept implementation - contribution to foster interoperability", Specific Targeted Research or Innovation Project, Priority 6.2 - Sustainable Surface Transport, EU 6th framework programme

EU-project "Modtrain/Modlink/EUCAB": EUCAB: Report on functional test results (L6.6), Project nb. FP6-PLT-506652 / TIP3-CT-2003-506652, Priority 6.3 - Transport, EU 6th Framework Programme for Research and Technological Development