BS EN 15380-4:2013

BSI Standards Publication

Railway applications — Classification system for railway vehicles

Part 4: Function groups

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5 km/h has an equivalent value of 3 mile/h

The UK participation in its preparation was entrusted to Technical Committee RAE/1, Railway Applications.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Contents

Page

Figures

Tables

Foreword

This document (EN 15380-4:2013) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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This series of European Standards “*Railway applications — Classification system for railway vehicles*" consists of the following parts:

— *Part 1: General principles*;

— *Part 2: Product groups*;

— *Part 3: Designation of installation sites and locations*;

— *Part 4: Function groups* (the present document);

— *Part 5: Systems, System groups — System requirements*.

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Introduction

The Functional Breakdown Structure is used by all parties involved in the rolling stock product definition phase and the following processes to structure the functional requirements and use cases according to a standardized list of functions. It starts with the concept and spreads across the whole product life cycle. During this period, the level of detail of the structure could be adapted according to the project progress. This means that functions in a product concept catalogue mainly are described by requirements. The transfer into implementable hardware and software takes place later.

The Product Breakdown Structure (PBS) shown in EN 15380-2 and the Functional Breakdown Structure (FBS) shown in EN 15380-4 complement each other. While the PBS, consisting of the standardized list of subsystems and devices, is used for structuring system requirements and related use cases, the FBS standard describes the functions of a vehicle and is used to obtain a correlation between functional requirements and the structure of functions and the related use cases. These structures describe different views on the rolling stock product. The importance of the two structures may be different according to the users' tasks as well the project stage (see also EN 15380-1:2006, Annex C).

The FBS can also be used for specifying tasks as well as for analysing tasks.

The functional assessment supports the whole engineering process and the field of RAMS/LCC (Reliability, Availability, Maintainability, Safety/Life-Cycle Costs). Often during the project process RAMS/LCC values have to be given at a stage when insufficient information regarding the technical solution is available. (At this stage of a project, EN 15380-2 is not applicable.)

In all cases in which functionality is a key issue (e.g. safety and reliability analyses, inspections and testing, maintenance programmes, field data acquisition and related documentation), communication is based on a functional vehicle structure composed of functional groups – particularly when cross-system or interdisciplinary considerations are important.

Functions are grouped into levels regardless of their vehicle specific technical realisation. Hence the function groups and function descriptions were developed without considering how each function may be achieved in practice. This is consistent with the EN 81346 series. This also applies when the functional vehicle breakdown structure is met in tracing vehicle properties, for example during the validation phase. Many of the required properties fixed in the product concept catalogue are realised, diagnosed and rated as functioning or malfunctioning during operation. Only afterwards is the link made to the physical structure and then to the assessment of the function of technical solutions.

There is not necessarily a simple one to one relationship between each function and its technical realisation. A system or item of equipment can contribute to different functions at the same time or in sequence. This means that an entity can be related to different functions and even from different levels (see Annex A).

Assignment of examples for well known function carriers are given for easier understanding.

1 Scope

This European Standard is concerned with the functions associated with general railway vehicles or their assemblies. It covers functionality associated with systems and equipment such as wheelsets and bogies, doors, brakes and traction.

This standard may also be applied to railway vehicles with very specific functions like track machines and snow ploughs. However, while the functions that are common with general railway vehicles are included, the functions which are specific to their work processes are not included in this standard. They will be added for these individual projects.

2 Normative references

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

EN 15663, *Railway applications — Definition of vehicle reference masses*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
function
specific purpose or objective to be accomplished, that can be specified or described without reference to the physical means of achieving it

[SOURCE: IEC 61226:2009]

Note 1 to entry: A function transfers (considered as a black-box) input parameters (material, energy, information) into aim related output parameters (material, energy, information) performed by technical means and/or human beings.

3.2
transverse function
sub function which may apply to more than one higher level function

Note 1 to entry: For example, providing diagnostics or displaying information.

3.3
Functional Breakdown Structure (FBS)
hierarchical structure summarising a set of functions leading to the same general focus or service

Note 1 to entry: To define the level of a function within a FBS, see Clause 5.

3.4
function level
level of group functions of equal purpose

Note 1 to entry: Assignment to the appropriate level is described in the rules.

3.4.1
1st level function
functional domain or general focus or service for the considered (rolling stock) system

Note 1 to entry: In general, the first level function encompasses a set of functions related to a same general focus or service for the considered (rolling stock) system.

EXAMPLE Provide appropriate conditions to passengers, train crew and load.

3.4.2
2nd level function
main function which contributes to complete the first level

Note 1 to entry: In general, the 2nd level function encompasses a set of sub functions and contributes to the completion of the first level.

Note 2 to entry: If the next level of the functional domain is not related to a main function there could be a direct relation to a lower level function.

3.4.3
3rd level function
sub function which contributes to complete the 2nd level

Note 1 to entry: In general, the 3rd level function encompasses a set level 4 functions (usually tasks) and contributes to the completion of the second level.

Note 2 to entry: If the next level of the main function is not related to a sub function there could be a direct relation to a lower level function.

3.4.4
4th level function
function related to a task which contributes to complete the third level

Note 1 to entry: In general, the 4th level function encompasses a set of level 5 functions (usually activities) and contributes to the completion of the third level.

Note 2 to entry: If the next level of the sub function is not related to a task there could be a direct relation to lower level function (activity).

3.4.5
5th level function
function related to an activity necessary for performing the 4th level function

3.5
requirement
necessary condition or ability to constrain the solutions of a task or an aim

Note 1 to entry: A requirement describes for example, performance characteristics, operational conditions and quality attributes, expressed as measurable and testable technical parameters or indicators.

Note 2 to entry: Requirements are usually summarised in a specification.

Note 3 to entry: Beside requirements allocated to functions are additional requirements allocated to other features (e.g. design, manufacturing).

3.5.1
functional requirements
specific need or capability of a FBS function

Note 1 to entry: Functional requirements and use cases first come from passenger/payload and operator requests. Later in the engineering process, functional requirements from integrators and suppliers are added. They express the requirements on a certain functionality given in the FBS regarding interoperability (with other functions), safety, operation, function/behaviour, or functional architecture/design constraints.
The functional designation is usually stated more precisely by detail properties (see also Annex D) that provide more information referring to reliability, availability, performance, quality, documentation, input, output, realtime.

These stated higher-level functional goals for ambient conditions, design features and selected target groups/target objects are “requirements to a function”.

Note 2 to entry: In the FRS associated to a function at level 2 or below, the functional requirements met by the transverse functions are listed for each transverse function.

3.5.2
system requirement
requirement on a subsystem or device

Note 1 to entry: Requirement on a subsystem or device regarding the requested technical capability, reliability, availability, maintainability, environmental impact/conditions (recyclables, emissions, EMC, climate, vibration), safety, LCC, performance, quality, documentation, realtime behaviour, physical limits (dimension, weight), electrical interface (plugs, voltage, physical layer), or mechanical interface (fixing points, fixing method).

3.6
scenario
possible transient, unsteady or steady states of the regarded system or of system-user interaction including environmental or other influences

Note 1 to entry: Operational and environmental conditions under which the system is intended to or actually functions.

3.7
use case
summary of scenarios for a single task or goal from the view of an exterior observer under defined conditions

3.8
object (unit of observation)
component, element, device, subsystem, functional unit, operating medium or system that can be observed in its own right

[SOURCE: EN 15380-2:2006]

3.9
error
deviation from the intended design which could result in unintended system behaviour or failure

[SOURCE: EN 50129:2003]

Note 1 to entry: An error needs corrective action. It is caused by defect component and can be displayed to the driver or workshop. An error can lead to a failure.

Note 2 to entry: An error also is a discrepancy between a computed, observed or measured value or condition and the true, specified or theoretically correct value or condition, e.g. a computing error made by faulty computer equipment.

3.10
fault
abnormal condition which could lead to an error in the system

Note 1 to entry: A fault can be random or systematic.

[SOURCE: EN 50129:2003, modified]

3.11
failure
deviation from the specified performance of a system

[SOURCE: EN 50129:2003]

Note 1 to entry: A failure also is a deviation from specified performance of a function.

Note 2 to entry: A failure may be the consequence of a fault or error in the system.

3.12
event
occurrence of a state at a defined precondition and time

3.13
monitoring
independent real-time observation of system, consist and train states (in cases also based on combinatory logic) for manual or automatic operation

Note 1 to entry: Monitoring is often safety related, partly mission critical.

3.14
protocol event
recorded event which is not the result of a fault, failure or error

Note 1 to entry: A protocol event is often used to store driver actions.

3.15
alarm
event requiring driver interaction, with a defined priority

Note 1 to entry: The event may be generated by man or machine.

Note 2 to entry: "Man" in this specific context means passenger, train crew or maybe control operator.

3.16
elementary function
basic function which cannot be sub-divided

Note 1 to entry: An elementary function is not specific to a particular rail vehicle.

3.17
function carrier
physical unit of observation to fulfil or partly fulfil one or more required functions

Note 1 to entry: Function carriers need to be considered as black box while describing the function.

4 Symbols and abbreviations

FBS Functional Breakdown Structure

FRS Functional Requirement Specification

HMI Human-Machine-Interface

PBS Product Breakdown Structure

RAMS Reliability, Availability, Maintainability and Safety

ATC Automatic Train Control

ATO Automatic Train Operation

ATP Automatic Train Protection

DC Direct Current

EMC Electromagnetic Compatibility

HVAC Heating, Ventilation and Air Conditioning

LCC Life Cycle Costs

RFID Radio Frequency Identification

UWC Universal Water Closet

5 Functional structure

5.1 General remarks

The hierarchy of the functional groups serves as a guideline when creating functional structures. Functions are realised at the technical level as hardware and software within hierarchically structured units. Although the units interact at the functional level, they may be spatially separated from one another.

Expanding the functions, elementary functions and characteristic features is possible within the scope of this standard. Whether it is necessary to make use of this option will depend on the specific application being considered.

Changing the existing functional levels shall be avoided.

Functional units can be associated with several functions. A single function can be distributed over several functional units.

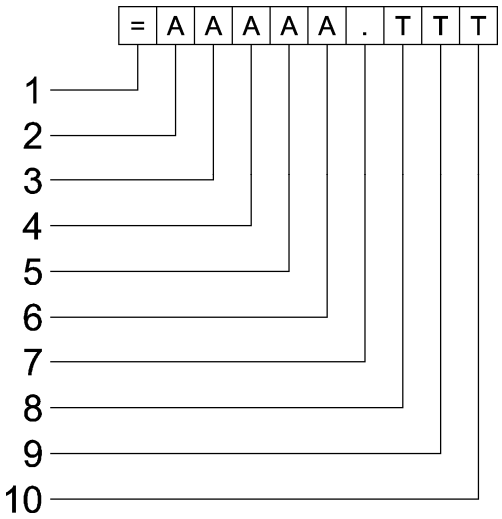
The FBS is organised in such a way that the whole driver interface functionality is described under HE "Allow proper control". This driver interface functionality does not contain any control functionality itself. It only provides information to the driver, including the status signals from other functionalities.

5.2 Classification system used for functions

Functions are designated using letters of the alphabet only, as set out in Table 1, Table 2 and Table 3. The use of the letters I and O, as well as special characters and separators, have not been used.

The first level functions, functions on lower levels and transverse functions are coded in their respective levels using a single letter. If transverse functions are applicable for each function several lines with related transverse function can be added in following way = AAAAA.TTT, AAAAA.TTT, where AAA is the identifier for FBS and TTT is the identifier for transverse function found in Table 3. If a transverse function is not used the identifier for FBS is = AAAAA.

The classification systems can be used either in whole or in part. As a minimum it is recommended to use it from level 1 to level 5.



Key

1 sign ”function“ according to EN 81346-1
2 level 1 function according to 5.3.1
3 level 2 function according to 5.3.2
4 level 3 function according to 5.3.2
5 level 4 function according to Annex A
6 level 5 function according to Annex A
7 seperator between function and transverse function
8 level 1 transverse function according to 5.4
9 level 2 transverse function according to 5.4
10 level 3 transverse function according to 5.4

Figure 1 — Precept of function group indication

5.3 Code letters

5.3.1 Code letters used to designate 1st level function groups

The first level functions are specified using the letters as listed in Table 1.

Table 1 — Overview of 1st level functions

Indication of 1st level function	1st level function
B	Carry and protect passenger, train crew and load
C	Provide appropriate conditions to passenger, train crew and load
D	Provide access and loading
E	Connect vehicles and/or consists
F	Provide energy
G	Accelerate, maintain speed, brake and stop
H	Provide train communication, monitoring and control
J	Support and guide the train on the track
K	Integrate the vehicle into the complete system railway

5.3.2 Code letters used to designate function groups from the 1st to the 3rd level

The functions and function levels are specified using the letters as shown in Table 2.

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(1 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
B				Carry and protect passengers, train crew and load	ride comfort is not considered here; the load shall be defined according to design mass calculation in EN 15663
B	B			Arrange interior space	interior design
B	B	B		Provide floor and flooring	non slip floor covering
B	B	C		Provide roof and roofing	
B	B	D		Provide partitioning	interior and exterior walls or screens, interior doors
B	B	E		Provide lining and panelling	ceilings and wall coverings
B	B	F		Provide acoustic/thermal insulation	
B	B	G		Provide luggage storage space in the vehicle	space for hand luggage, travel luggage, bicycles, prams and pushchairs and cloakroom facilities
B	B	H		Carry and secure accompanying object	luggage racks, cycle rack stands, lockers
B	B	J		Provide access to upper levels and user zones	staircases
B	C			Carry and enclose the load	(including people and equipment)
B	C	B		Fasten equipment / load	attachments
B	C	C		Enclose the load	encase the load to be transported
B	C	D		Carry and Protect the load	carbody structure to support normal structural loads
B	C	E		Protect installed equipment / components	
B	D			Protect in case of crash	
B	D	B		Absorb crash energy	energy dissipation in vehicle structure, crash safety
B	D	C		Protect driver, crew and passengers inside their compartments	against intrusions, against pitch on the desk, against structural deformations
B	D	D		Limit deceleration	
B	D	E		Prevent vehicle override	equipment to prevent vehicle override during head-on collisions
B	E			Protect against fire	
B	E	B		Manage / Provide smoke detection	by smoke detectors
B	E	C		Manage / Provide fire detection	
B	E	D		Manage signalling of fire	management of fire alert (system), fire warning (system), notification of fire
B	E	E	a	Manage / Provide-fire extinguishment	
B	E	E	a	Manage automatical fire extinguish system	
B	E	E	a	Monitor volume of extinguishing agent	
B	E	E	a	Provide manual fire extinguish facilities	
C				Provide appropriate conditions to passenger, train crew and load	includes equipment for service, comfort and climatisation; the load shall be defined according to design mass calculation in EN 15663
C	B			Provide safe and comfortable sitting, lying and standing positions	seats, couchettes, measures taken to ensure safe standing room
C	B	B		Provide support for standing	support straps, handles and rails, occupant restraint systems
C	B	C	a	Provide seating possibilities	seats, benches, stools
C	B	C	a	Provide ergonomic seating conditions	
C	B	C	a	Provide adjustments of position	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(2 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
C	B	C	a	Provide storage space in the back of the seat	
C	B	C	a	Provide tables	
C	B	D	a	Provide lying possibilities	
C	B	D	a	Provide ergonomic lying conditions	
C	B	D	a	Provide adjustments of lying positions	
C	B	D	a	Provide storage space at the table position	
C	C			Provide external view	
C	C	B	a	Ensure outside passenger view	by windows
C	C	B	a	Ensure outside view	
C	C	B	a	Protect passenger against sun	
C	C	C	a	Provide external view for train operation	by outside mirror or cameras (in any weather / light conditions)
C	C	C	a	Clean the windscreen	
C	C	C	a	Defrost the windscreen	
C	C	C	a	Protect against blinding	
C	C	C	a	Avoid condensation	
C	C	C	a	Provide rear view	
C	C	C	a	Provide view in the darkness	by illumination of the track and reflective signals by headlights
C	D			Provide interior lighting	
C	D	B	a	Provide workplace lighting	
C	D	B	a	Provide desk lighting	
C	D	B	a	Provide timetable lighting	
C	D	B	a	Provide "background" lighting	
C	D	C	a	Provide common interior lighting	
C	D	C	a	Provide interior standard lighting	
C	D	C	a	Provide reduced mode lighting	
C	D	C	a	Provide atmosphere lighting	
C	D	D	a	Provide emergency lighting	
C	D	D	a	Provide guidance to exit	
C	D	D	a	Provide backup lighting	
C	D	E	a	Provide special/individual lighting	
C	D	E	a	Provide reading lighting	lighting at the seat
C	D	E	a	Provide working lighting	
C	D	E	a	Provide sanitary (make-up) lighting	
C	D	E	a	Provide advertisment lighting	
C	E			Provide proper climate	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(3 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
C	E	B	a	Manage HVAC mode	
C	E	B	a	Manage HVAC Automatic mode	
C	E	B	a	Manage HVAC Fire outside mode	
C	E	B	a	Manage HVAC Pressure protection mode	
C	E	B	a	Manage HVAC Frost protection mode	
C	E	B	a	Manage HVAC Recirculation mode	
C	E	B	a	Manage HVAC Platform mode	
C	E	B	a	Manage HVAC Cool keeping mode	
C	E	B	a	Manage HVAC Warm keeping mode	
C	E	B	a	Manage HVAC Pre-conditioning mode	
C	E	B	a	Manage HVAC Washing mode	
C	E	B	a	Manage HVAC Flush mode	
C	E	B	a	Manage HVAC Fire inside mode	
C	E	C	a	Supply the desired temperature	
C	E	C	a	Provide adjustment of desired temperature	
C	E	C	a	Heat the air	
C	E	C	a	Cool the air	
C	E	D	a	Supply the desired air flow	
C	E	D	a	Distribute the air	
C	E	D	a	Provide adjustments for individual airflow	
C	E	D	a	Treat air quality / filter the air	
C	E	D	a	Provide emergency ventilation	
C	E	D	a	Ensure cab clear front window (by airflow)	
C	E	E	a	Supply the desired humidity	
C	E	E	a	Moisture the air	
C	E	E	a	Dry the air	
C	E	F	a	Supply clean fresh air	
C	E	F	a	Filter the air from outside	
C	E	F	a	Supply with fresh air	
C	E	F	a	Exhaust air	
C	E	F	a	Provide possibility to open windows	
C	E	G	a	Protect against pressure waves	
C	E	G	a	Provide active sealing	
C	E	G	a	Provide passive sealing	
C	E	H		Signal inside and outside temperature	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(4 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
C	F			Provide public address, passenger information, intercommunication and entertainment	
C	F	B		Manage priority of information and announcements	
C	F	C	a	Provide Public Address	
C	F	C	a	Provide manual public address	
C	F	C	a	Provide public address from the crew	
C	F	C	a	Provide public address from the control centre	
C	F	C	a	Provide automatic public address	
C	F	C	a	Provide selective address to internal zone or train	
C	F	C	a	Provide selective address to external zone	
C	F	D	a	Manage emergency alarm from passengers	
C	F	D	a	Manage passenger emergency request	
C	F	D	a	Manage toilet emergency request	
C	F	D	a	Manage other emergency request	
C	F	E	a	Provide passenger information	
C	F	E	a	Provide travel assistance	
C	F	E	a	Provide dynamic train connection info	
C	F	E	a	Provide comfort info	
C	F	E	a	Provide tourist info	
C	F	E	a	Provide route information	
C	F	E	a	Select route	
C	F	E	a	Upload route	
C	F	E	a	Upload route manually	
C	F	E	a	Adjust route manually	
C	F	E	a	Display route information	
C	F	E	a	Announcement silent forward	
C	F	E	a	Announcement silent backwards	
C	F	F	a	Provide intercom	
C	F	F	a	Provide intercom between driver cabs	
C	F	F	a	Provide passenger emergency intercommunication	
C	F	G	a	Provide seat reservation	
C	F	G	a	Enter seat information	
C	F	G	a	Read seat information data medium	
C	F	G	a	Enter seat information manually	
C	F	G	a	Display seat information in passenger compartment	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(5 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
C	F	H	a	Provide and support multimedia for passenger entertainment	
C	F	H	a	Provide content sources	
C	F	H	a	Manage and distribute multimedia information	
C	F	H	a	Provide interfaces to passengers	
C	F	J		Support and provide external multimedia communication	
C	G			Provide surveillance (for passenger or load)	
C	G	B		Manage surveillance sources	
C	G	C	a	Collect surveillance information	
C	G	C	a	Collect surveillance mode in normal conditions	
C	G	C	a	Enhance surveillance data aquisition	
C	G	D		Analyse surveillance functions	
C	G	E	a	Display surveillance information	
C	G	E	a	Display operator selected source	
C	G	E	a	Display source of triggered alarm	
C	G	E	a	Scroll manually or automatically between display sources	
C	G	F	a	Record surveillance information	
C	G	F	a	Record surveillance information in normal mode	
C	G	F	a	Manage overfill of storage capacity	
C	G	F	a	Download locally or remotely surveillance data	
C	H			Provide sanitary services	
C	H	B	a	Manage sanitary system	
C	H	B	a	Control toilet door	
C	H	B	a	Indicate toilet occupied status	
C	H	B	a	Toilet service request	
C	H	B	a	Open / close / lock function (UWC)	
C	H	C	a	Provide fresh water	
C	H	C	a	Supply and store fresh water	
C	H	C	a	Indicate fresh water level	
C	H	C	a	Distribute fresh water	
C	H	D	a	Collect and dispose waste water	
C	H	D	a	collect waste water	
C	H	D	a	Store waste water	
C	H	D	a	Indicate waste water level	
C	H	D	a	Dispose of waste water	
C	H	E	a	Collect and dispose grey water	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(6 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	**2**	**3**			
C	H	E	a	Collect grey water	
C	H	E	a	Store grey water	
C	H	E	a	Indicate grey water level	
C	H	E	a	Dispose of grey water	
C	H	G	a	Provide antifreeze protection	
C	H	G	a	Heat plumbing and tanks	
C	H	G	a	Drain plumbing and tanks	
C	H	H	a	Provide hygiene	for baby and individual hygienics
C	H	H	a	Provide baby care facilities	
C	H	H	a	Provide waste disposal	
C	H	H	a	Provide make-up facilities	
C	H	H	a	Provide assistance to handicapped	
C	J			Provide catering	
C	J	B	a	Provide proper environment for catering	
C	J	B	a	Provide hygienic "working space"	
C	J	B	a	Provide cleaning facilities	
C	J	B	a	Provide water and dispose greywater	
C	J	B	a	Collect and dispose waste	
C	J	B	a	Provide exhaust auxiliaries	
C	J	C	a	Store drinks and food	
C	J	C	a	Provide space	
C	J	C	a	Provide cooling / freezing	
C	J	D		Provide marketing, service and payment facilities	
C	J	E		Prepare drinks and food	equipment to prepare food and drinks
C	J	F	a	Serve drinks and food	service equipment
C	J	F	a	Serve drinks and food in the restaurant coach	
C	J	F	a	Provide mobile catering services	
C	K			Provide additional service related functions	
C	K	B	a	Provide ticketing	
C	K	B	a	Sell ticket	
C	K	B	a	Provide timetable and price info	
C	K	B	a	Select ticket	
C	K	B	a	Provide online accounting	
C	K	B	a	Print ticket	
C	K	B	a	Punch ticket	
C	K	C	a	Provide miscellaneous service functions	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(7 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	**2**	**3**			
C	K	C	a	Provide automatic vending of goods and services	
C	K	D		Count passengers	
C	L			Provide ride comfort	control carbody accelerations
C	L	B		Control carbody x-acceleration	by buffers and link to brake and propulsion control
C	L	C		Control carbody y-acceleration	e. g. tilting and suspension
C	L	C	a	Tilt the vehicle	including pantograph guiding while tilting
D				Provide access and loading	
D	B			Provide external access	functions associated with the management of the external doors
D	B	B	a	Release external doors	enable the doors to be opened by passengers
D	B	B	a	Release external door by driver	authorise the opening on the left or right side of the door by a command of the driver
D	B	B	a	Release external doors by beacon/ATC	train level command of the doors by a beacon:
D	B	B	a	Enable release external doors	velocity of vehicle shall be lower than … (5) km/h, for door release
D	B	B	a	Cancel release external doors	
D	B	B	a	Indicate external doors released	indications to the driver in the cab and to the passengers in the coach
D	B	C	a	Open external doors	use of a handle or push button by a passenger to make the door open
D	B	C	a	Open external doors by local control (mechanical handle or push button)	mechanical lever with cutout for drive and door control, but registering opening and derive signal to train control to start emergency brake
D	B	C	a	Open external doors following driver or crew activation	to start opening system, door drive
D	B	C	a	Open external doors automatically	opening order coming from atc
D	B	C	a	Open external doors by actuating ramp	after special demand via special signal button, acting after actuating button or key switch, special sequence
D	B	C	a	Open external doors by actuating lift	after special demand via signal button, acting after actuating button or key switch, special sequence
D	B	C	a	Enable selective external door opening	in order to make unaccessible some vehicles of the train
D	B	D	a	Close external doors	command lock of doors 2 sides; command a sound signalling before the lock of doors
D	B	D	a	Close external doors automatically	close doors automatically if no person is moving within defined time, using light barier, movement detector necessary preconditions: - cancel of door open enable by driver or crew a) by driver - doors close if no passenger movement within 3 s b) by staff - doors close if staff cancels enable - local automatic close closing of doors by ATC command
D	B	D	a	Close the external doors upon exceeding a speed threshold	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(8 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
D	B	D	a	Enable selective external door closing	
D	B	D	a	Close external doors by driver or the staff command	
D	B	D	a	Close external doors by passenger request	
D	B	E	a	Manage door system upon obstacle	
D	B	E	a	Detect obstacle	
D	B	E	a	Manage the door according to obstacle detection	
D	B	F	a	Lock external doors	
D	B	F	a	Lock external doors mechanically	
D	B	F	a	Lock external doors mechanically automatically	pneumatic control deactivated, locked by actuators, is a part of the door closing sequence
D	B	F	a	Lock external doors mechanically manually	in case of failure or malfunction pneumatic: control cut out by crew indicate isolation to driver and optionally to passengers
D	B	F	a	Lock external doors electrically	
D	B	F	a	Lock external doors electrically automatically	cut out of door drive, is a part of the door closing sequence
D	B	F	a	Lock external doors electrically manually	in case of failure or malfunction: cut out by crew indicate isolation to driver and optionally to passengers
D	B	G		Unlock external doors	
D	B	H	a	Enable selective external door opening	in order to make certain vehicles of the train unaccessible
D	B	H	a	Enable individual door opening	
D	B	H	a	Enable side selective door opening	
D	B	H	a	Enable section selective door opening	
D	B	H	a	Allow a local door to remain open under crew control	
D	B	J		Provide entrance lighting	
D	B	K		Isolate external doors	
D	B	L		Signal all external door closed and locked state	
D	B	M	a	Signal external door status change/open/close	signalling by buzzer, jingles, lights: door in motion (opening or closing), failure or isolated status
D	B	M	a	Signal external door status change internal and or external to the vehicle	
D	B	M	a	Signal external door status to the crew	
D	B	N	a	Enable external door opening in emergency	mechanical lever with cutout for drive and door control, but registering opening and derive signal to train control to start emergency brake sequence/prevent start
D	B	N	a	Enable external door opening in emergency while driving	mechanical lever with cutout for drive and door control, but registering opening and derive signal to train control to start emergency brake sequence/prevent start

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(9 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
D	B	N	a	Enable external door opening in emergency while standing	mechanical lever to couple out door leaves from drive, open directly
D	B	P	a	Reduce the gap between vehicle and platform	as well distance reduction as height reduction between platform and train floor level
D	B	P	a	Manage steps	control system for movable steps
D	B	P	a	Enable steps deployment	
D	B	P	a	Enable step withdrawal	
D	B	P	a	Enable manual step locking	
D	B	P	a	Adapt step height to the platform	
D	B	Q	a	Ensure passenger access by external doors for people with reduced mobility	
D	B	Q	a	Manage ramp	
D	B	Q	a	Detect opening request	by push button
D	B	Q	a	Enable ramp deployment	release ramp after opening request
D	B	Q	a	Enable ramp withdrawal	release after weight sensor, light barrier or movement detector detected nothing after defined time
D	B	Q	a	Detect obstacle in ramp	needed current or force is measured. If too high then reverse
D	B	Q	a	Detect obstruction in ramp	if malfunction or failure in mechanism/control is diagnosed
D	B	Q	a	Enable manual ramp locking	
D	B	R		Provide access for driver and crew	seperate driver and crew access to the train
D	B	S	a	Provide access by special emergency exits	functions associated with the management of the emergency front doors and other emergency exits (i.e. windows)
D	B	S	a	Provide passenger emergency exits via front evacuation doors	
D	B	S	a	Provide ramps for access	
D	C			Provide access by internal doors	doors between vehicles enabling passengers to circulate in the train
D	C	B		Detect internal door opening request	
D	C	C		Detect obstacle in internal door	
D	C	D		Close internal door automatically	
D	C	E		Open internal door (automatically)	
D	C	F		Ensure driver and crew access in the cab	within the train (e. g. internal doors)
D	C	G		Isolate Internal door	
D	D			Ensure goods loading and unloading	hatches, loading compartment doors, filling systems, emptying systems, gravity unloading
D	D	B		Permit goods loading and unloading	
D	D	C	a	Provide proper conditions for loading/unloading	
D	D	C	a	Provide lighting for load unload	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(10 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
E				Connect vehicles and/or consists	
E	B			Enable coupling and uncoupling	allow free operational configuration of the consists to built up a train
E	B	B	a	Manage coupling	
E	B	B	a	Prepare the coupling	
E	B	B	a	Open cover	
E	B	B	a	Configure for coupling mode	
E	B	B	a	Manage exterior lights in coupled mode	
E	B	B	a	Execute the coupling	
E	B	B	a	Execute the coupling automatically	
E	B	B	a	Execute the coupling manually	
E	B	B	a	Complete the coupling	
E	B	C	a	Manage uncoupling	
E	B	C	a	Prepare the uncoupling	
E	B	C	a	Execute the uncoupling	
E	B	C	a	Execute the uncoupling automatically	
E	B	C	a	Execute the uncoupling manually	
E	B	C	a	Complete the uncoupling	
E	B	C	a	Close cover	
E	B	C	a	Check uncoupling is completed	
E	B	D	a	Transmit forces via coupler	
E	B	D	a	Transmit drawing forces	
E	B	D	a	Transmit buffing forces	
E	B	D	a	Dissipate impact energy	
E	B	D	a	Protect force transmission elements	
E	B	E	a	Connect signals, utilities and power service lines	
E	B	E	a	Connect signals, utilities and power service lines for semipermanent coupling	
E	B	E	a	Connect signals, utilities and power service lines for consists	
E	B	F	a	Ensure adequate reaction on unintended uncoupling	
E	B	F	a	Detect uncoupling	
E	B	F	a	Provide reaction on uncoupling	e. g. braking
E	C			Allow intercar passenger and goods circulation	
E	C	B		Provide shelter from exterior conditions during transfer	
E	C	C		Enable transition	
E	C	D		Manage intercar circulation	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(11 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
F				Provide energy	
F	B			Provide electrical energy for traction	
F	B	B	a	Manage electrical energy for traction	configure high voltage system with respect to the line voltage
F	B	B	a	Sense catenary current	
F	B	B	a	Sense catenary voltage	
F	B	B	a	Configure input energy system	
F	B	C		Acquire energy demand for traction system	transmission of the power set value from the propulsion system to the supply system
F	B	D	a	Generate electrical energy for traction on board	
F	B	D	a	Transform fuel cell energy into electrical energy	
F	B	E	a	Collect electrical energy for traction	energy collection via pantograph
F	B	E	a	Manage collection device	
F	B	E	a	Ensure good electrical contact on high voltage side	
F	B	E	a	Ensure good electrical contact on current return	
F	B	E	a	Protect collection devices and catenary	
F	B	E	a	Prevent damage to the catenary	
F	B	F	a	Transform electrical energy for traction	transformer and input converter (rectifier)
F	B	F	a	Manage transformation and conversion system	
F	B	F	a	Protect transformation devices	
F	B	F	a	Protect high voltage electrical devices against overvoltage	
F	B	F	a	Protect high voltage electrical devices against overcurrent	
F	B	G	a	Distribute electrical energy for traction	distribution facility for parallel intermediate circuits
F	B	G	a	Manage distribution of electrical energy for traction	
F	B	G	a	Protect distribution devices	
F	B	G	a	Protect high voltage electrical devices against overvoltage	
F	B	G	a	Protect high voltage electrical devices against overcurrent	
F	B	G	a	Enable discharching, short circuiting and grounding	
F	B	H		Store electrical energy onboard for traction	fly-wheel system or double-layer capacitors
F	B	J		Dissipate losses of electrical traction energy provision	cooling systems for transformer and input converter
F	C			Provide electrical energy for auxiliaries	
F	C	B	a	Manage electrical auxiliary energy provisioning	configure the auxiliary power supply system
F	C	B	a	Manage auxiliary redundancies	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(12 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	**2**	**3**			
F	C	C	a	Adapt electrical auxiliary energy provisioning according to load	
F	C	C	a	Provide self protection configuration for storage system	
F	C	D		Generate electrical energy for auxiliaries on board	diesel-electric generated auxiliary power
F	C	E	a	Collect electrical auxiliary energy	workshop supply
F	C	E	a	Use Shop Power Supply	
F	C	F	a	Transform electrical energy to auxiliary energy	energy transformation from the line voltage to 3 AC auxiliary supply voltage
F	C	F	a	Transform electrical energy from DC link to auxiliary energy	
F	C	F	a	Transform electrical energy from traction transformer to auxiliary energy	
F	C	F	a	Transform electrical energy from workshop supply to auxiliary energy	
F	C	G	a	Distribute electrical auxiliary energy	distribution facility in a train including protection devices contactors etc.
F	C	G	a	Manage distribution of electrical energy for auxiliaries	
F	C	G	a	Protect distribution devices	
F	C	G	a	Protect electrical devices against overvoltage	
F	C	G	a	Protect electrical devices against overcurrent	
F	C	G	a	Detects grounds or short circuits in the Auxiliary energy distribution network	
F	C	G	a	Enable discharching, short circuiting and grounding	
F	C	H	a	Store electrical auxiliary energy	energy storage with battery
F	C	H	a	Provide Charging	
F	C	H	a	Provide Discharging	
F	C	H	a	Provide low voltage control status information	
F	C	H	a	Provide low voltage DC supply	
F	C	H	a	Ensure electrical protection	
F	C	J		Dissipate losses of electrical auxiliary energy provision	cooling system for the auxiliary converter
F	D			Provide fluid energy for traction	e. g. pressured steam and pressured gas
F	D	B		Manage fluid energy for traction	
F	D	C		Acquire fluid energy demand for traction system	
F	D	D		Generate fluid energy for traction	diesel-hydraulic energy generation
F	D	E		Collect fluid energy for traction	seldom used: refill facility
F	D	F		Store fluid energy for traction	tank
F	D	G		Transform fluid energy for traction	hydraulic drive
F	D	H		Distribute fluid energy for traction	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(13 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
F	D	J		Dissipate losses of fluid traction energy provision	
F	E			Provide fluid energy for auxiliaries	fluid energy refers to hydraulic / pneumatic media
F	E	B	a	Manage fluid energy for auxiliaries	
F	E	C	a	Generate fluid energy for auxiliaries	pneumatic energy generation for brake system, doors, pantograph
F	E	C	a	Manage generation process	
F	E	C	a	Protect against over pressure	
F	E	C	a	Ensure air quality	
F	E	D		Collect fluid energy for auxiliaries	seldom used: pneumatic energy taken from work shop storage
F	E	E		Store fluid energy for auxiliaries	pneumatic energy storage vessel for air suspension
F	E	F		Transform fluid energy for auxiliaries	
F	E	G		Distribute fluid energy for auxiliaries	
F	E	H		Dissipate losses of fluid auxiliary energy provision	
F	F			Provide mechanical energy for traction	
F	F	B		Manage mechanical energy for traction	
F	F	C		Acquire mechanical energy demand for traction system	
F	F	D	a	Generate mechanical energy for traction	diesel-mechanical energy generation
F	F	D	a	Transform fossil energy into mechanical energy	
F	F	D	a	Engine control	
F	F	D	a	Alternator control	
F	F	E		Transform mechanical energy for traction	adaptation of speed and torque
F	F	F		Distribute mechanical energy for traction	
F	F	G		Dissipate losses of mechanical traction energy provision	
F	G			Provide mechanical energy for auxiliaries	
F	G	B		Manage mechanical energy for auxiliaries	
F	G	C	a	Generate mechanical energy for auxiliaries	mechanical energy generation by a combustion machine
F	G	C	a	Transform fossil energy into mechanical energy	
F	G	C	a	Engine control	
F	G	C	a	Alternator control	
F	G	D		Transform mechanical energy for auxiliaries	v-belt transmission from a diesel motor
F	G	E		Distribute mechanical energy for auxiliaries	
F	G	F		Dissipate losses of mechanical auxiliary energy provision	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(14 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
F	H			Provide chemical energy for traction	
F	H	B		Manage chemical energy for traction	
F	H	C		Acquire chemical energy demand for traction system	
F	H	D		Store chemical energy for traction	vessels for diesel or natural gas
F	H	E		Collect chemical energy for traction	fuel refill facility
F	H	F		Distribute chemical energy for traction	
F	J			Provide chemical energy for auxiliaries	
F	J	B		Manage chemical energy for auxiliaries	
F	J	C		Store chemical energy for auxiliaries	
F	J	D		Collect chemical energy for auxiliaries	
F	J	E		Distribute chemical energy for auxiliaries	
G				Accelerate, maintain speed, brake and stop	
G	B			Provide acceleration	
G	B	B	a	Configure propulsion system	
G	B	B	a	Configure propulsion system according to operational modes/ limits	
G	B	B	a	Configure propulsion system according to internal status	
G	B	B	a	Apply power limits	
G	B	C	a	Acquire propulsion demand	
G	B	C	a	Acquire propulsion demand from the driver	
G	B	C	a	Acquire propulsion demand from the ATO	
G	B	C	a	Acquire propulsion demand from internal speed control	
G	B	C	a	Acquire demand for dynamic brake force from brake control	
G	B	C	a	Acquire traction cut-off	
G	B	D	a	Manage traction system within mode	
G	B	D	a	Control motor speed and torque	
G	B	D	a	Control the torque transmission (gear)	
G	B	D	a	Isolate traction elements	
G	B	D	a	Cut-off traction on demand	
G	B	E		Provide demand for energy supply	
G	B	F		Control wheel slipping	
G	B	G	a	Generate tractive effort	
G	B	G	a	Convert electrical energy into traction force and vice versa	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(15 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
G	B	G	a	Control conversion process	
G	B	G	a	Convert electrical energy into variable electrical energy output	
G	B	G	a	Convert electrical energy into mechanical torque and vice versa (generator operation)	
G	B	G	a	Dissipate heat	
G	B	G	a	Convert fluid energy into traction force and vice versa	
G	B	G	a	Control conversion process	
G	B	G	a	Convert fluid energy into variable energy output	
G	B	G	a	Convert energy into mechanical torque	
G	B	G	a	Dissipate heat	
G	B	G	a	Convert mechanical energy into traction force and vice versa	
G	B	G	a	Control conversion process	
G	B	G	a	Convert mechanical energy into fluid energy output	
G	B	G	a	Convert mechanical energy into variable mechanicall energy output	
G	B	G	a	Convert energy into mechanical torque	
G	B	G	a	Dissipate heat	
G	B	G	a	Convert chemical energy into traction force and vice versa	
G	B	G	a	Control conversion process	
G	B	G	a	Convert chemical energy into energy output	
G	B	G	a	Convert energy into mechanical torque	
G	B	G	a	Dissipate heat	
G	B	H	a	Reuse braking energy	
G	B	H	a	Condition braking energy for reuse	
G	B	H	a	Controlled dissipation of braking energy onboard	
G	B	H	a	Return regenerated energy to auxiliary systems	
G	B	H	a	Transfer regenerated energy into storages/line power supply	
G	C			Provide deceleration and keep the train at standstill	dynamic brake force included
G	C	B	a	Configure brake system	
G	C	B	a	Configure brake system according to train configuration	
G	C	B	a	Configure brake system according to activated cabin	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(16 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
G	C	B	a	Configure brake system according to operational restrictions and degraded mode conditions	
G	C	B	a	Get status of brake systems	
G	C	B	a	Get status of automatic brake system	
G	C	B	a	Get status of direct brake system	
G	C	B	a	Get status of electrodynamic brake system	
G	C	B	a	Get status of hydrodynamic brake system	
G	C	B	a	Get status of eddy current brake system	
G	C	B	a	Get status of magnetic track brake system	
G	C	B	a	Isolate brake systems / devices	
G	C	B	a	Isolate brake systems at train level	
G	C	B	a	Isolate brake systems / devices at consist level	
G	C	B	a	Isolate brake systems / devices at car level	
G	C	B	a	Isolate brake systems / devices at bogie level	
G	C	B	a	Isolate brake systems / devices at axle level	
G	C	C	a	Acquire brake demand	
G	C	C	a	Acquire brake demand from the driver	
G	C	C	a	Acquire brake demand from the driver's automatic brake controller	
G	C	C	a	Acquire brake demand from the traction brake controller	
G	C	C	a	Acquire brake demand from direct brake controller	
G	C	C	a	Acquire brake demand from emergency devices	not only push buttons but also other kinds of emergency brake application devices
G	C	C	a	Acquire brake demand from the train protection functions	
G	C	C	a	Acquire brake demand from the driver activity control	
G	C	C	a	Acquire brake demand from ATP	
G	C	C	a	Acquire brake demand from brake signal transmission	
G	C	C	a	Acquire brake demand from internal speed control	
G	C	C	a	Acquire brake demand from passengers and crew	
G	C	D	a	Prioritise brake demand and select braking mode	
G	C	D	a	Set up service brake mode	
G	C	D	a	Set up emergency brake mode	
G	C	D	a	Set up holding brake mode	
G	C	D	a	Set up holding brake mode automatically	
G	C	D	a	Set up holding brake mode manually	
G	C	D	a	Set up parking brake mode	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(17 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
G	C	E	a	Allocate braking effort	
G	C	E	a	Calculate needed braking effort	precalculation
G	C	E	a	Calculate needed brake effort at train level	
G	C	E	a	Calculate needed brake effort at consist level	
G	C	E	a	Calculate needed brake effort at vehicle level	
G	C	E	a	Calculate needed brake effort at bogie level	
G	C	E	a	Prioritise executing braking systems	
G	C	E	a	Acquire available braking effort	
G	C	F	a	Handle braking due to train configuration, brake mode and brake demand	this function takes into account the train as chain of vehicles
G	C	F	a	Handle braking at higher levels	
G	C	F	a	Handle braking at train level	
G	C	F	a	Handle braking at consist level	
G	C	F	a	Handle braking at vehicle level	
G	C	F	a	Handle braking at bogie level	
G	C	F	a	Determine set points and control depending on brake mode at local level	
G	C	F	a	Provide Brake Command for parking Braking	
G	C	F	a	Provide Brake Command for Holding Braking	
G	C	F	a	Provide Brake Command for Service Braking	
G	C	F	a	Provide Brake Command for Emergency Braking	
G	C	F	a	Manage brake blending at local level	
G	C	F	a	Request traction cut-off	
G	C	F	a	Acquire realised braking effort	
G	C	G	a	Apply and release braking forces	
G	C	G	a	Generate and reduce braking forces	
G	C	G	a	Generate braking forces by friction brake	
G	C	G	a	Generate braking forces by eddy-current brake	
G	C	G	a	Generate braking forces by magnetic track brake	
G	C	G	a	Command electrodynamic brake	
G	C	G	a	Release braking forces (manually and emergency release)	
G	C	G	a	Dissipate heat	
G	C	G	a	Provide storage of energy for braking (at train level)	
G	C	G	a	Provide intermediate storage of energy for braking	
G	C	G	a	Control storage level and energy flow	
G	C	G	a	Protect stored energy for braking	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(18 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	**2**	**3**			
G	C	G	a	Detect non-release of braking forces	
G	C	H	a	Provide Wheel Slide Protection	
G	C	H	a	Detect sliding	
G	C	H	a	Control sliding	
G	C	H	a	Manage brake release	
G	D		a	Improve adhesion	
G	D	B	a	Manage sanding	
G	D	B	a	Select direction	
G	D	B	a	Select axle	
G	D	B	a	Dry sand	
G	D	B	a	Heat sand	
G	D	B	a	Provide sand level	
G	D	B	a	Command sanding	
G	D	C		Condition the wheel surface	
H				Provide train communication, monitoring and control	
H	B			Keep the train staff informed	all functionality to inform the train crew about the actual state of the train and its systems
H	B	B		Manage information access	this is not a direct functionality here since it is part of the configuration of the systems and train network
H	B	C		Acquire information to be displayed	
H	B	D	a	Ensure display of information	functions to control displays, lamps, acoustical signals
H	B	D	a	Prioritise information	
H	B	D	a	Enable the switching between different types of displays / views	
H	B	D	a	Ensure visibility of information under degraded conditions	
H	B	E	a	Provide operation relevant information	additional combinatorial logic to create the operational information out of different signals provided from the systems
H	B	E	a	Provide train status information to the crew	
H	B	E	a	Provide train radio information	
H	B	E	a	Provide control command information	
H	B	E	a	Provide passenger information system information	
H	B	E	a	Provide maintenance information	
H	B	E	a	Provide Train Operator with driving information	
H	B	E	a	Provide timetable information	
H	B	E	a	Provide diagnostic information	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(19 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
H	C			Provide trainwide communication	
H	C	B	a	Inaugurate train network	train inauguration to determine train configuration (count, order, direction and capabilities of the consists)
H	C	B	a	Determine train topology and configuration	
H	C	B	a	Provide orientation information for coupled elements	
H	C	B	a	Manage leading vehicle information	
H	C	B	a	Distribute train topology and configuration	
H	C	B	a	Confirm train configuration	
H	C	C	a	Manage train network operation	access, priorisation, QoS
H	C	C	a	Manage train network access	
H	C	C	a	Transmit data	
H	D			Manage train modes	see UIC 612
H	D	B	a	Manage operation mode	general operational modes depending on the defined access rights of the operating staff
H	D	B	a	Manage normal operation mode	
H	D	B	a	Manage maintenance mode	
H	D	B	a	Manage commissioning mode	
H	D	C	a	Manage shut down mode	battery main switch is open ("off"); only WSP and battery protection is supplied
H	D	C	a	Manage parking mode	
H	D	C	a	Manage pulled mode	
H	D	D	a	Manage switched on-mode	battery main switch is closed ("on"); no cab is activated.
H	D	D	a	Manage starting from charged battery	
H	D	D	a	Manage starting from flat battery	
H	D	E		Manage service retention mode	standstill; train operable; no cab acticated
H	D	F		Manage in service mode	standstill; train operable; cab acticated
H	D	G	a	Manage driving mode	all functions available
H	D	G	a	Manage normal driving mode	
H	D	G	a	Manage coupling mode	
H	D	G	a	Manage washing mode	
H	D	G	a	Manage shunting mode	
H	D	G	a	Manage transition mode	
H	D	G	a	Manage emergency mode	
H	D	H		Manage energy saving mode	parking with energy-supply and preparation ability, standstill, low voltage supplied, train power line supplied (HV or external), no driver cab activated, energy saving

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(20 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
H	D	J		Manage battery protection mode	battery-protection has switched off all electrical consumers after giving time for a controlled shutdown
H	E			Allow proper control	see 5.1 (General remarks)
H	E	B	a	Manage cab control	functions to control the cab and its functionality
H	E	B	a	Ensure access control in the cab	
H	E	B	a	Manage cab activation	
H	E	B	a	Select language	
H	E	B	a	Manage cab deactivation	
H	E	B	a	Prevent master conflict due to more than one activated cab	
H	E	C	a	Manage propulsion and brake demand	central functions to control propulsion and brakes
H	E	C	a	Preset and monitor speed	
H	E	C	a	Manage top level demand electrically	
H	E	C	a	Compute data	
H	E	C	a	Transmit	
H	E	C	a	Manage top level demand mechanically	
H	E	C	a	Compute data	
H	E	C	a	Transmit	
H	E	C	a	Manage sanding	
H	E	D	a	Manage energy supply	central functions to control battery main switch, main circuit breaker, pantographs …
H	E	D	a	Manage energy supply for traction	
H	E	D	a	Manage energy supply for auxiliaries	
H	E	E	a	Manage appropriate and safe conditions	central functions to control comfort and safety functionality
H	E	E	a	Influence for fire protection	
H	E	E	a	Manage tilting system	
H	E	E	a	Manage windscreen cleaning	
H	E	E	a	Manage windscreen defrosting	
H	E	E	a	Manage interior lighting	
H	E	E	a	Manage climatisation	
H	E	E	a	Manage passenger information, public address and intercom	
H	E	E	a	Manage surveillance system	
H	E	F	a	Manage access and loading	central functions to control access via external doors
H	E	F	a	Manage exterior door system	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(21 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
H	E	G	a	Manage connecting of vehicles	central functions to control coupling of consists
H	E	G	a	Manage coupling	
H	E	H	a	Manage control of the train parameters	central functions to control train parameters like time, route, …
H	E	H	a	Manage time information	
H	E	H	a	Enter train number	
H	E	H	a	Enter wheel diameter	
H	E	H	a	Enter mission parameters	
H	E	H	a	Manage isolation of devices	
H	E	H	a	Provide remote control	
H	E	J	a	Manage integration of the vehicle in the complete railway system	central functions to control exterior lighting, signalling, traffic lights …
H	E	J	a	Manage exterior lighting	
H	E	J	a	Manage route selection system	
H	E	J	a	Manage traffic lights	
H	E	J	a	Manage signalling system	
H	E	J	a	Manage acoustic warning system	
H	F			Manage checks before train departure	
H	F	B		Manage automatic test	
H	F	C		Manage manual test	
H	F	D		Manage test results	
H	G			Provide diagnostics	
H	G	B	a	Initiate diagnostics	
H	G	B	a	Clear database	
H	G	B	a	Create new database	
H	G	B	a	Update database	
H	G	B	a	Set event state	
H	G	B	a	Get event state	
H	G	B	a	Initialise parameter (state update request)	
H	G	C	a	Store diagnostic data	store event and condition data
H	G	C	a	Store events	
H	G	C	a	Store fault	
H	G	C	a	Store failure	
H	G	C	a	Store error	
H	G	C	a	Store protocol event	
H	G	C	a	Store condition data	
H	G	C	a	Store counter	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(22 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
H	G	C	a	Store parameter	
H	G	C	a	Enable and disable storage of event data	
H	G	C	a	Create diagnostic data set	
H	G	C	a	Manage database overflow	
H	G	D	a	Access diagnostics data	access event and condition data as well as diagnostic database information
H	G	D	a	Manage access to diagnostic database	
H	G	D	a	Provide database status information	
H	G	D	a	Provide database life sign signal	
H	G	D	a	Provide database version	
H	G	D	a	Provide vehicle name	
H	G	D	a	Provide database filling level signal	
H	G	D	a	Provide UIC state information	
H	G	D	a	Provide protocol version	
H	G	D	a	Provide database service info	
H	G	D	a	Provide creation time	
H	G	D	a	Provide initialisation time	
H	G	D	a	Provide operating hours	
H	G	D	a	Read event data	also in UIC format
H	G	D	a	Read fault	
H	G	D	a	Read failure	
H	G	D	a	Read error	
H	G	D	a	Read protocol event	
H	G	D	a	Read condition data	also in UIC format
H	G	D	a	Read counter	
H	G	D	a	Read parameter	
H	G	D	a	Upload events	all actions to upload events
H	G	D	a	Delete events	
H	G	D	a	Upload / download parameters	all actions to upload/download parameters
H	G	E	a	Process diagnostic data	process event and condition data for indication and monitoring
H	G	E	a	Process condition data	regarding vehicle configurations/operational limits
H	G	E	a	Monitor train status	
H	G	E	a	Indicate events	indicate events using filters regarding active/passive, acknowledgement, …
H	G	E	a	Prioritise events	
H	G	E	a	Filter and sort events	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(23 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
H	H			Assist troubleshooting	
H	H	B		Manage events according to their priority	
H	H	C	a	Allow detailed event analysis	
H	H	C	a	Provide cause of event	
H	H	C	a	Provide consequence of event	
H	H	D		Provide guidance to the driver to continue the mission	
H	H	E		Manage troubleshooting text	
H	H	F		Manage statistical analysis	
H	J			Control driver activity	
H	J	B		Configure parameters of Control driver activity device	
H	J	C		Provide test of Control driver activity before departure	
H	J	D		Isolate driver activity device	
H	K			Provide juridical data recording	
J				Support and guide the train on the track	
J	B			Guide the train	
J	B	B	a	Manage bogie stability	verify and ensure the stability conditions
J	B	B	a	Ensure bogie stability	ensure stability with active control on the longitudinal stiffness
J	B	B	a	Monitor bogie stability	provide recording events
J	B	B	a	Detect bogie instability	capture the external signals from sensors to close the feedback with actuators
J	B	B	a	Signal bogie instability	signal the faults to the external monitoring system
J	B	C		Provide derailment information	detect derailment occurring on a trainset by monitoring relevant on board parameters with an acceptable reliability in any allowable service condition
J	B	D	a	Monitor obstacles within track	monitor the possible presence of obstacles on the track during the running service of the vehicle
J	B	D	a	Detect obstacles within clearance gauge	capture the external signals by sensors
J	B	D	a	Signal obstacles within clearance gauge	signal to the external monitoring system the obstacle
J	B	E		Remove obstacle on the track	protect the bogie and its equipment from damage caused by a collision with obstacles lying on top of the rails remove snow from the area in front of the train
J	B	F		Lubricate wheel flange	lubricate wheel flange for excessive wheel wear and signal wheel flange lubricator information status
J	B	G	a	Ride at specified track conditions	allow free motion of the bogies in respect to the carbody by riding in all configurations of the track that can be encountered in the operation complying with the gauge concerned

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(24 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
J	B	G	a	Negotiate horizontal curves	
J	B	G	a	Negotiate vertical curves	
J	B	G	a	Run on a twisted track	
J	B	G	a	Run across special trackwork	
J	B	G	a	Negotiate S curves	
J	B	H	a	Monitor wheelset bearing status	define criteria, corresponding threshold and response time to define necessity of maintenance or operating measures
J	B	H	a	Detect hot axle box bearing temperature	detect unusual temperature increase of an axle box
J	B	H	a	Signal hot axle box bearing temperature	send to the driver reliable information or alert message in order to trigger a speed reduction or a stop according to heating values
J	B	J	a	Monitor gearbox status	
J	B	J	a	Detect gear box hot oil temperature	
J	B	J	a	Signal gear box hot oil temperature	
J	B	K		Provide a suspension diagnostic	
J	B	L		Enable rail gauge switching	
J	B	M		Prevent derailment	
J	B	N		Provide Detection of Non Rotating Axle	
J	C			Transmit forces	
J	C	B	a	Transmit longitudinal forces	
J	C	B	a	Transmit longitudinal forces at secondary level	transmit traction, braking and shunting effort between carbody and bogie frame
J	C	B	a	Transmit longitudinal forces at primary level	transmit traction, braking and shunting effort between bogie frame and wheelset
J	C	B	a	Transmit longitudinal forces at track level	transmit traction, braking and shunting effort between wheelset and track
J	C	C	a	Transmit transversal forces	
J	C	C	a	Transmit transversal forces at secondary level	transmit transversal effort (curve, trackwork, track irregularity) between carbody and bogie frame
J	C	C	a	Transmit transversal forces at primary level	transmit transversal effort (curve, trackwork, track irregularity) between bogie frame and wheelset
J	C	C	a	Transmit transversal forces at track level	transmit transversal effort (curve, trackwork, track irregularity) between wheelset and track
J	C	D	a	Support vertical dynamic and static load	
J	C	D	a	Support vertical dynamic and static load at secondary level	transmit vertical load (curve, track irregularity, trackwork, passenger load) between carbody and bogie frame
J	C	D	a	Support vertical dynamic and static load at primary level	transmit vertical load (curve, track irregularity, trackwork, passenger load) between bogie frame and wheelset
J	C	D	a	Support vertical dynamic and static load at track level	transmit vertical load (curve, track irregularity, trackwork, passenger load) between wheelset and track

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(25 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	2	3			
J	C	E	a	Transmit traction and brake effort	transfer the mechanical torque/force from the vehicle to the track and viceversa during traction and braking condition
J	C	E	a	Transmit traction forces to the rail	
J	C	E	a	Transmit torque to the motor in electric brake	
J	C	E	a	Transmit reaction forces of the motor on its support	
J	C	E	a	Transmit reaction forces of the gearbox on its support	
J	C	E	a	Transmit electromagnetic brake effort	
J	D			Limit acceleration	assessment of the running characteristics (safety, load forces) "ride quality" of the vehicle in conformity with the EN 14363 (or UIC 518) assessment of the passenger comfort in conformity with EN 12299 (or UIC 513)
J	D	B	a	Limit acceleration	
J	D	B	a	Limit x acceleration	
J	D	B	a	Limit y acceleration	
J	D	B	a	Limit z acceleration	
J	D	C		Limit jerk	
J	E			Keep vehicle inside gauge envelope	ensure that the rolling stock used comply with the gauge concerned in all running service condition
J	E	B		Limit roll and sway	
J	E	C		Limit lateral movement	
J	E	D		Limit vertical movement	
K				Integrate the vehicle into the complete system railway	also trainset or vehicle (smallest unit)
K	B			Indicate the presence of the vehicle to others	persons and other vehicles (e. g. pedestrians, car drivers)
K	B	B		Indicate presence by acoustic means	
K	B	C		Indicate presence by reflective optic means	
K	B	D		Indicate the presence by external lights	
K	C			Provide identification	
K	C	B		Provide identification by optic Labelling (e.g. Car_No.).	
K	C	C		Provide identification by electronic elements (e.g. RFID)	
K	D			Provide operational communication and train/ground data transmission	
K	D	B		Ensure data interface to trackside signalling system	
K	D	C	a	Provide train to ground communication	
K	D	C	a	Alarming mechanism to the ground	

Table 2 — Listing of the level functions from the 1st level to the 3rd level *(26 of 26)*

Level				Function (level 1 to level 3)	Example / explanation
1	**2**	**3**			
K	D	C	a	Provide administration service for communication to the ground	
K	D	C	a	Send diagnostic data to the ground	
K	D	C	a	Send condition data to the ground	
K	D	C	a	Send train position to the ground	
K	D	C	a	Send train status to the ground	
K	D	C	a	Send voice data to the ground	
K	D	C	a	Send video data to the ground	
K	D	D	a	Provide ground to train communication	
K	D	D	a	Provide alarming service to the train	
K	D	D	a	Provide administration service for communication to the train	
K	D	D	a	Download software to the train	
K	D	D	a	Send train configuration data to the train	
K	D	D	a	Send diagnostic data to the train	
K	D	D	a	Send PIS data to the train	
K	D	D	a	Send voice data to the train	
K	D	D	a	Send video data to the train	
K	D	E		Antitheft alarm (from outside)	
K	E			Provide Automatic Train Control (ATC)	
K	E	B		Provide Automatic Train Protection (ATP)	
K	E	C		Provide Automatic Train Operation (ATO)	
K	F			Ensure proper route selection and route signalling	
K	F	B		Switch route	
K	F	C		Control signals	

[a] For this sub function, further sub functions on lower level are defined in Annex A.

5.4 Transverse functions

Transverse functions affect many of the level 2 and level 3 functions of the FBS at the same time. To avoid a lot of repetition in the FBS, transverse functions are not listed in the FBS. However, they are considered to be part of this standard and are therefore listed below.

The requirements relating to these transverse functions for a given function will have an attribute stating the relationship.

In a FRS, there should be a description of the relevant transverse functions, including the details of the associated requirements.

The standardised transverse functions are listed in Table 3.

Table 3 — Listing of the transverse functions and their levelling *(1 of 2)*

Level			Transverse function	Description / remark
1	**2**	**3**		
U			Display information	
U	**A**		Display diagrams	used for a function to provide the list of data or parameters related to the function to be displayed to the train staff (train driver, train agent)
U	**A**	**A**	Display information for control	the type of information is control
U	**A**	**B**	Display information for monitoring	the type of information is monitoring
U	**A**	**C**	Display information for diagnostics	the type of information is diagnostic
U	**A**	**D**	Display information for maintenance	the type of information is maintenance
U	**B**		Signal information	the information is presented at the train staff on real time to draw their attention
V			Provide control	used for a function to describe the human machine interface for the control command related to the function
W			Provide diagnostic	used for a function to provide the list of diagnostics related to the function
W	**A**		Provide test	used for a function to provide the list of tests related to the function
W	**B**		Process faults	used for a function to provide the list of faults related to the function
W	**C**		Store information	used for a function to provide the list of information to be stored related to the function
W	**D**		Assist troubleshooting	used for a function to provide the list of troubleshooting messages related to the function

Table 3 — Listing of the transverse functions and their levelling *(2 of 2)*

Level			Transverse function	Description / remark
1	**2**	**3**		
W	**E**		Provide maintenance	used for a function to provide the list of information for maintenance staff related to the function
X			Communicate with the train bus	used for a function to provide the list of information to forward and to receive from the train bus related to the function
X	**A**		Transmit information to the train bus	used for a function to provide the list of information to forward on the train bus related to the function
X	**B**		Receive information from the train bus	used for a function to provide the list of information to receive from the train bus related to the function
Y			Communicate with the consist bus	used for a function to provide the list of information to forward on and receive from the vehicle bus related to the function
Y	**A**		Transmit information to the vehicle bus	used for a function to provide the list of information to forward on the train bus related to the function
Y	**B**		Receive information from the vehicle bus	used for a function to provide the list of information to be received on the vehicle bus related to the function
Z			Communicate with the ground level	used for a function to provide the list of information to forward and receive from the ground related to the function
Z	**A**		Transmit information to the ground	used for a function to provide the list of information to forward to the ground related to the function
Z	**B**		Receive information of the ground	used for a function to provide the list of information to be received from the ground related to the function

Annex A
(informative)

Functions on level 4 and level 5

To promote a better common understanding of the upper functions, further sub functions at lower levels have been provided. It is strongly recommended to use these further sub functions before defining new sub functions which are not listed in this annex. In cases where this annex does not provide any further sub functions at the relevant level, the table cells are empty.

If new functions are to be defined, then the rules defined in Annex E should be applied.

Table A.1 — Functions on level 4 and level 5 *(1 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
B						Carry and protect passengers, train crew and load	ride comfort is not considered here
.....							
B	E	D				Manage signalling of fire	management of fire alert (system), fire warning (system), notification of fire
B	E	E	a	B		Manage / provide fire extinguishment	
B	E	E	a	C		Manage automatical fire extinguish system	
B	E	E	a	D		Monitor volume of extinguishing agent	
B	E	E	a	E		Provide manual fire extinguish facilities	
C						Provide appropriate conditions to passenger, train crew and load	includes equipment for service, comfort and climatisation
.....							
C	B	B				Provide support for standing	support straps, handles and rails, occupant restraint systems
C	B	C	a			Provide seating possibilities	seats, benches, stools
C	B	C	a	B		Provide ergonomic seating conditions	
C	B	C	a	C		Provide adjustments of position	
C	B	C	a	D		Provide storage space in the back of the seat	
C	B	C	a	E		Provide tables	
C	B	D	a			Provide lying possibilities	
C	B	D	a	B		Provide ergonomic lying conditions	
C	B	D	a	C		Provide adjustments of lying positions	
C	B	D	a	D		Provide storage space at the table position	
C	C					Provide external view	
C	C	B	a			Ensure outside passenger view	by windows
C	C	B	a	B		Ensure outside view	

Table A.1 — Functions on level 4 and level 5 *(2 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
C	C	B	a	C		Protect passenger against sun	
C	C	C	a			Provide external view for train operation	by outside mirror or cameras (in any weather / light conditions)
C	C	C	a	B		Clean the windscreen	
C	C	C	a	C		Defrost the windscreen	
C	C	C	a	D		Protect against blinding	
C	C	C	a	E		Avoid condensation	
C	C	C	a	F		Provide rear view	
C	C	C	a	G		Provide view in the darkness	by illumination of the track and reflective signals by headlights
C	D					Provide interior lighting	
C	D	B	a			Provide workplace lighting	
C	D	B	a	B		Provide desk lighting	
C	D	B	a	C		Provide timetable lighting	
C	D	B	a	D		Provide "background" lighting	
C	D	C	a	C		Provide common interior lighting	
C	D	C	a	D		Provide interior standard lighting	
C	D	C	a	E		Provide reduced mode lighting	
C	D	C	a			Provide atmosphere lighting	
C	D	D	a	B		Provide emergency lighting	
C	D	D	a	C		Provide guidance to exit	
C	D	D	a	D		Provide backup lighting	
C	D	E	a			Provide special/individual lighting	
C	D	E	a			Provide reading lighting	lighting at the seat
C	D	E	a	B		Provide working lighting	
C	D	E	a	C		Provide sanitary (make-up) lighting	
C	D	E	a			Provide advertisment lighting	
C	E					Provide proper climate	
C	E	B	a			Manage HVAC mode	
C	E	B	a	B		Manage HVAC Automatic mode	
C	E	B	a	L		Manage HVAC Fire outside mode	
C	E	B	a	M		Manage HVAC Pressure protection mode	
C	E	B	a	N		Manage HVAC Frost protection mode	
C	E	B	a	C		Manage HVAC Recirculation mode	
C	E	B	a	D		Manage HVAC Platform mode	
C	E	B	a	E		Manage HVAC Cool keeping mode	
C	E	B	a	F		Manage HVAC Warm keeping mode	
C	E	B	a	G		Manage HVAC Pre-conditioning mode	

Table A.1 — Functions on level 4 and level 5 *(3 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
C	E	B	a	H		Manage HVAC Washing mode	
C	E	B	a	J		Manage HVAC Flush mode	
C	E	B	a	K		Manage HVAC Fire inside mode	
C	E	C	a			Supply the desired temperature	
C	E	C	a	B		Provide adjustment of desired temperature	
C	E	C	a	C		Heat the air	
C	E	C	a	D		Cool the air	
C	E	D	a			Supply the desired air flow	
C	E	D	a	B		Distribute the air	
C	E	D	a	C		Provide adjustments for individual airflow	
C	E	D	a	D		Treat air quality / filter the air	
C	E	D	a	E		Provide emergency ventilation	
C	E	D	a	F		Ensure cab clear front window (by airflow)	
C	E	E	a			Supply the desired humidity	
C	E	E	a	B		Moisture the air	
C	E	E	a	C		Dry the air	
C	E	F	a			Supply clean fresh air	
C	E	F	a	B		Filter the air from outside	
C	E	F	a	C		Supply with fresh air	
C	E	F	a	D		Exhaust air	
C	E	F	a	E		Provide possibility to open windows	
C	E	G	a			Protect against pressure waves	
C	E	G	a	B		Provide active sealing	
C	E	G	a	C		Provide passive sealing	
C	E	H				Signal inside and outside temperature	
C	F					Provide public address, passenger information, intercommunication and entertainment	
C	F	B				Manage priority of information and announcements	
C	F	C	a			Provide Public Address	
C	F	C	a	B		Provide manual public address	
C	F	C	a	B	B	Provide Public address from the crew	
C	F	C	a	B	C	Provide Public address from the control centre	
C	F	C	a	C		Provide automatic public address	

Table A.1 — Functions on level 4 and level 5 *(4 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
C	F	C	a	C	B	Provide selective address to internal zone or train	
C	F	C	a	C	C	Provide selective address to external zone	
C	F	D	a			Manage emergency alarm from passengers	
C	F	D	a	B		Manage passenger emergency request	
C	F	D	a	C		Manage toilet emergency request	
C	F	D	a	D		Manage other emergency request	
C	F	E	a			Provide passenger information	
C	F	E	a	B		Provide travel assistance	
C	F	E	a	B	B	Provide dynamic train connection info	
C	F	E	a	B	C	Provide comfort info	
C	F	E	a	B	D	Provide tourist info	
C	F	E	a	C		Provide route information	
C	F	E	a	C	B	Select route	
C	F	E	a	C	C	Upload route	
C	F	E	a	C	D	Upload route manually	
C	F	E	a	C	E	Adjust route manually	
C	F	E	a	C	F	Display route information	
C	F	E	a	C	G	Announcement silent forward	
C	F	E	a	C	H	Announcement silent backwards	
C	F	F	a			Provide intercom	
C	F	F	a	B		Provide intercom between driver cabs	
C	F	F	a	C		Provide passenger emergency intercommunication	
C	F	G	a			Provide seat reservation	
C	F	G	a	B		Enter seat information	
C	F	G	a	B	B	Read seat information data medium	
C	F	G	a	B	C	Enter seat information manually	
C	F	G	a	C		Display seat information in passenger compartment	
C	F	H	a			Provide and support multimedia for passenger entertainment	
C	F	H	a	B		Provide content sources	
C	F	H	a	C		Manage and distribute multimedia information	
C	F	H	a	D		Provide interfaces to passsengers	
C	F	J				Support and provide external multimedia communication	
C	G					Provide surveillance (for passenger or load)	
C	G	B				Manage surveillance sources	

Table A.1 — Functions on level 4 and level 5 *(5 of 25)*

						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
C	G	C	a			Collect surveillance information	
C	G	C	a	B		Collect surveillance mode in normal conditions	
C	G	C	a	C		Enhance surveillance data aquisition	
C	G	D				Analyse surveillance functions	
C	G	E	a			Display surveillance information	
C	G	E	a	B		Display operator selected source	
C	G	E	a	C		Display source of triggered alarm	
C	G	E	a	D		Scroll manually or automatically between display sources	
C	G	F	a			Record surveillance information	
C	G	F	a	B		Record surveillance information in normal mode	
C	G	F	a	C		Manage overfill of storage capacity	
C	G	F	a	D		Download locally or remotely surveillance data	
C	H					Provide sanitary services	
C	H	B	a			Manage sanitary system	
C	H	B	a	B		Control toilet door	
C	H	B	a	B	B	Indicate toilet occupied status	
C	H	B	a	C		Toilet service request	
C	H	B	a	B	C	Open / close / lock function (UWC)	
C	H	C	a			Provide fresh water	
C	H	C	a	B		Supply and store fresh water	
C	H	C	a	C		Indicate fresh water level	
C	H	C	a	D		Distribute fresh water	
C	H	D	a			Collect and dispose waste water	
C	H	D	a	B		collect waste water	
C	H	D	a	C		Store waste water	
C	H	D	a	D		Indicate waste water level	
C	H	D	a	E		Dispose of waste water	
C	H	E	a			Collect and dispose grey water	
C	H	E	a	B		Collect grey water	
C	H	E	a	C		Store grey water	
C	H	E	a	D		Indicate grey water level	
C	H	E	a	E		Dispose of grey water	
C	H	G	a			Provide antifreeze protection	

Table A.1 — Functions on level 4 and level 5 *(6 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
C	H	G	a	B		Heat plumbing and tanks	
C	H	G	a	C		Drain plumbing and tanks	
C	H	H	a			Provide hygiene	for baby and individual hygienics
C	H	H	a	B		Provide baby care facilities	
C	H	H	a	C		Provide waste disposal	
C	H	H	a	D		Provide make-up facilities	
C	H	H	a	E		Provide assistance to handicapped	
C	J					Provide catering	
C	J	B	a			Provide proper environment for catering	
C	J	B	a	B		Provide hygienic "workingspace"	
C	J	B	a	C		Provide cleaning facilities	
C	J	B	a	D		Provide water and dispose greywater	
C	J	B	a	E		Collect and dispose waste	
C	J	B	a	F		Provide exhaust auxilaries	
C	J	C	a			Store drinks and food	
C	J	C	a	B		Provide space	
C	J	C	a	C		Provide cooling/freezing	
C	J	D				Provide marketing, service and payment facilities	
C	J	E				Prepare drinks and food	equipment to prepare food and drinks
C	J	F	a			Serve drinks and food	service equipment
C	J	F	a	B		Serve drinks and food in the restaurant coach	
C	J	F	a	C		Provide mobile catering services	
C	K					Provide additional service related functions	
C	K	B	a			Provide ticketing	
C	K	B	a	B		Sell ticket	
C	K	B	a	B	B	Provide timetable and price info	
C	K	B	a	B	C	Select ticket	
C	K	B	a	B	D	Provide online accounting	
C	K	B	a	B	E	Print ticket	
C	K	B	a	C		Punch ticket	
C	K	C	a			Provide miscellaneous service functions	
C	K	C	a	B		Provide automatic vending of goods and services	
C	K	D				Count passengers	
C	L					Provide ride comfort	control carbody accelerations

Table A.1 — Functions on level 4 and level 5 *(7 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
C	L	B				Control carbody x-acceleration	by buffers and link to brake and propulsion control
C	L	C				Control carbody y-acceleration	e. g. tilting and suspension
C	L	C	a	B		Tilt the vehicle	including pantograph guiding while tilting
D						Provide access and loading	
D	B					Provide external access	functions associated with the management of the external doors
D	B	B	a			Release external doors	enable the doors to be opened by passengers
D	B	B	a	B		Release external door by driver	authorise the opening on the left or right side of the door by a command of the driver
D	B	B	a	C		Release external doors by beacon/ATC	train level command of the doors by a beacon
D	B	B	a	D		Enable release external doors	velocity of vehicle shall be lower than (5) km/h, for door release
D	B	B	a	E		Cancel release external doors	
D	B	B	a	F		Indicate external doors released	indications to the driver in the cab and to the passengers in the coach.
D	B	C	a			Open external doors	use of a handle or push button by a passenger to make the door open
D	B	C	a	B		Open external doors by local control (mechanical handle or push button)	mechanical lever with cutout for drive and door control, but registering opening and derive signal to train control to start emergency brake
D	B	C	a	C		Open external doors following driver or crew activation	to start opening system, door drive
D	B	C	a	D		Open external doors automatically	opening order coming from atc
D	B	C	a	E		Open external doors by actuating ramp	after special demand via special signal button, acting after actuating button or key switch, special sequence
D	B	C	a	F		Open external doors by actuating lift	after special demand via signal button, acting after actuating button or key switch, special sequence
D	B	C	a	G		Enable selective external door opening	in order to make unaccessible some vehicles of the train
D	B	D	a			Close external doors	command lock of doors 2 sides; command a sound signaling before the lock of doors

Table A.1 — Functions on level 4 and level 5 *(8 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
D	B	D	a	B		Close external doors automatically	close doors automatically if no person is moving within defined time, using light barier, movement detector necessary preconditions: - cancel of door open enable by driver or crew a) by driver - doors close if no passenger movement within 3 s b) by staff - doors close if staff cancels enable - local automatic close closing of doors by ATC command
D	B	D	a	C		Close the external doors upon exceeding a speed threshold	
D	B	D	a	D		Enable selective external door closing	
D	B	D	a	E		Close external doors by driver or the staff command	
D	B	D	a	F		Close external doors by passenger request	
D	B	E	a			Manage door system upon obstacle	
D	B	E	a	B		Detect obstacle	
D	B	E	a	C		Manage the door according to obstacle detection	
D	B	F	a			Lock external doors	
D	B	F	a	B		Lock external doors mechanically	
D	B	F	a	B	B	Lock external doors mechanically automatically	pneumatic control deactivated, locked by actuators, is a part of the door closing sequence
D	B	F	a	B	C	Lock external doors mechanically manually	in case of failure or malfunction pneumatic: control cut out by crew indicate isolation to driver and optionally to passengers
D	B	F	a	C		Lock external doors electrically	
D	B	F	a	C	B	Lock external doors electrically automatically	cut out of door drive, is a part of the door closing sequence
D	B	F	a	C	C	Lock external doors electrically manually	in case of failure or malfunction: Cut out by crew indicate isolation to driver and optionally to passengers
D	B	G				Unlock external doors	
D	B	H	a			Enable selective external door opening	in order to make certain vehicles of the train unaccessible
D	B	H	a	B		Enable individual door opening	
D	B	H	a	C		Enable side selective door opening	
D	B	H	a	D		Enable section selective door opening	
D	B	H	a	E		Allow a local door to remain open under crew control	
D	B	J				Provide entrance lighting	
D	B	K				Isolate external doors	
.....							

Table A.1 — Functions on level 4 and level 5 *(9 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
D	B	L				Signal all external door closed and locked state	
D	B	M	a			Signal external door status change/open/close	signaling by buzzer, jingles, lights: Door in motion (opening or closing), failure or isolated status
D	B	M	a	B		Signal external door status change internal and or external to the vehicle	
D	B	M	a	C		Signal external door status to the crew	
D	B	N	a			Enable external door opening in emergency	mechanical lever with cutout for drive and door control, but registering opening and derive signal to train control to start emergency brake sequence/prevent start
D	B	N	a	B		Enable external door opening in emergency while driving	mechanical lever with cutout for drive and door control, but registering opening and derive signal to train control to start emergency brake sequence/prevent start
D	B	N	a	C		Enable external door opening in emergency while standing	mechanical lever to couple out door leaves from drive, open directly
D	B	P	a			Reduce the gap between vehicle and platform	as well distance reduction as height reduction between platform and train floor level
D	B	P	a	B		Manage steps	control system for movable steps
D	B	P	a	B	B	Enable steps deployment	
D	B	P	a	B	C	Enable step withdrawal	
D	B	P	a	B	D	Enable manual step locking	
D	B	P	a	B	E	Adapt step hight to the platform	
D	B	Q	a			Ensure passenger access by external doors for people with reduced mobility	
D	B	Q	a	B		Manage ramp	
D	B	Q	a	B	B	Detect opening request	by push button
D	B	Q	a	B	C	Enable ramp deployment	release ramp after opening request
D	B	Q	a	B	D	Enable ramp withdrawal	release after weight sensor, light barrier or movement detector detected nothing after defined time
D	B	Q	a	B	E	Detect obstacle in ramp	needed current or force is measured. If too high then reverse
D	B	Q	a	B	F	Detect obstruction in ramp	if malfunction or failure in mechanism/control is diagnosed
D	B	Q	a	B	G	Enable manual ramp locking	
D	B	R				Provide access for driver and crew	seperate driver and crew access to the train
D	B	S	a			Provide accesss by special emergency exits	functions associated with the management of the emergency front doors and other emergency exits (i.e. windows)
D	B	S	a	B		Provide passenger emergency exits via front evacuation doors	
D	B	S	a	C		Provide ramps for access	
D	C					Provide access by internal doors	doors between vehicles enabling passengers to circulate in the train
.....							

Table A.1 — Functions on level 4 and level 5 *(10 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
D	D					Ensure goods loading and unloading	hatches, loading compartment doors, filling systems, emptying systems, gravity unloading
D	D	B				Permit goods loading and unloading	
D	D	C	a			Provide proper conditions for loading/unloading	
D	D	C	a	B		Provide lighting for load unload	
E						Connect vehicles and/or consists	
E	B					Enable coupling and uncoupling	allow free operational configuration of the consists to built up a train
E	B	B	a			Manage coupling	
E	B	B	a	B		Prepare the coupling	
E	B	B	a	C		Open cover	
E	B	B	a	D		Configure for coupling mode	
E	B	B	a	E		Manage exterior lights in couled mode	
E	B	B	a	F		Execute the coupling	
E	B	B	a	G		Execute the coupling automatically	
E	B	B	a	H		Execute the coupling manually	
E	B	B	a	J		Complete the coupling	
E	B	C	a			Manage uncoupling	
E	B	C	a	B		Prepare the uncoupling	
E	B	C	a	C		Execute the uncoupling	
E	B	C	a	D		Execute the uncoupling automatically	
E	B	C	a	E		Execute the uncoupling manually	
E	B	C	a	F		Complete the uncoupling	
E	B	C	a	G		Close cover	
E	B	C	a	H		Check uncoupling is completed	
E	B	D	a			Transmit forces via coupler	drawing and buffing forces
E	B	D	a	B		Transmit drawing forces	
E	B	D	a	C		Transmit buffing forces	
E	B	D	a	D		Dissipate impact energy	
E	B	D	a	E		Protect force transmission elements	
E	B	E	a			Connect signals, utilities and power service lines	
E	B	E	a	B		Connect signals, utilities and power service lines for semipermanent coupling	
E	B	E	a	C		Connect signals, utilities and power service lines for consists	
E	B	F	a			Ensure adequate reaction on unintended uncoupling	

Table A.1 — Functions on level 4 and level 5 *(11 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
E	B	F	a	B		Detect uncoupling	
E	B	F	a	C		Provide reaction on uncoupling	e. g. braking
E	C					Allow intercar passenger and goods circulation	
E	C	B				Provide shelter from exterior conditions during transfer	
E	C	C				Enable transition	
E	C	D				Manage intercar circulation	
F						Provide energy	
F	B					Provide electrical energy for traction	
F	B	B	a			Manage electrical energy for traction	configure high voltage system with respect to the line voltage
F	B	B	a	B		Sense catenary current	
F	B	B	a	C		Sense catenary voltage	
F	B	B	a	D		Configure input energy system	
F	B	C				Acquire energy demand for traction system	transmission of the power set value from the propulsion system to the supply system
F	B	D	a			Generate electrical energy for traction on board	
F	B	D	a	B		Transform fuel cell energy into electrical energy	
F	B	E	a			Collect electrical energy for traction	energy collection via pantograph
F	B	E	a	B		Manage collection device	
F	B	E	a	B	B	Ensure good electrical contact on high voltage side	
F	B	E	a	B	C	Ensure good electrical contact on current return	
F	B	E	a	C		Protect collection devices and catenary	
F	B	E	a	C	B	Prevent damage to the catenary	
F	B	F	a			Transform electrical energy for traction	transformer and input converter (rectifier)
F	B	F	a	B		Manage Transformation and Conversion system	
F	B	F	a	C		Protect transformation devices	
F	B	F	a	C	B	Protect high voltage electrical devices against overvoltage	
F	B	F	a	C	C	Protect high voltage electrical devices against overcurrent	
F	B	G	a			Distribute electrical energy for traction	distribution facility for parallel intermediate circuits
F	B	G	a	B		Manage distribution of electrical energy for traction	
F	B	G	a	C		Protect distribution devices	
F	B	G	a	C	B	Protect high voltage electrical devices against overvoltage	

Table A.1 — Functions on level 4 and level 5 *(12 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
F	B	G	a	C	C	Protect high voltage electrical devices against overcurrent	
F	B	G	a	D		Enable discharching, short circuiting and grounding	
F	B	H				Store electrical energy onboard for traction	fly-wheel system or double-layer capacitors
F	B	J				Dissipate losses of electrical traction energy provision	cooling systems for transformer and input converter
F	C					Provide electrical energy for auxiliaries	
F	C	B	a			Manage electrical auxiliary energy provisioning	configure the auxiliary power supply system
F	C	B	a	B		Manage auxiliary redundancies	
F	C	C	a			Adapt electrical auxiliary energy provisioning according to load	
F	C	C	a	B		Provide self protection configuration for storage system	
F	C	D				Generate electrical energy for auxiliaries on board	diesel-electric generated auxiliary power
F	C	E	a			Collect electrical auxiliary energy	workshop supply
F	C	E	a	B		Use Shop Power Supply	
F	C	F	a			Transform electrical energy to auxiliary energy	energy transformation from the line voltage to 3 AC auxiliary supply voltage
F	C	F	a	B		Transform electrical energy from DC link to auxiliary energy	
F	C	F	a	C		Transform electrical energy from traction transformer to auxiliary energy	
F	C	F	a	D		Transform electrical energy from workshop supply to auxiliary energy	
F	C	G	a			Distribute electrical auxiliary energy	distribution facility in a train including protection devices contactors etc.
F	C	G	a	B		Manage distribution of electrical energy for auxiliaries	
F	C	G	a	C		Protect distribution devices	
F	C	G	a	C	B	Protect electrical devices against overvoltage	
F	C	G	a	C	C	Protect electrical devices against overcurrent	
F	C	G	a	C	D	Detects grounds or short circuits in the Auxiliary energy distribution network	
F	C	G	a	D		Enable discharching, short circuiting and grounding	
F	C	H	a			Store electrical auxiliary energy	energy storage with battery
F	C	H	a	B		Provide Charging	
F	C	H	a	C		Provide Discharging	
F	C	H	a	D		Provide low voltage control status information	
F	C	H	a	E		Provide low voltage DC supply	
F	C	H	a	F		Ensure electrical protection	

Table A.1 — Functions on level 4 and level 5 *(13 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
F	C	J				Dissipate losses of electrical auxiliary energy provision	cooling system for the auxiliary converter
…….							
F	E					Provide fluid energy for auxiliaries	fluid energy refers to hydraulic/pneumatic media
F	E	B	a			Manage fluid energy for auxiliaries	
F	E	C	a			Generate fluid energy for auxiliaries	pneumatic energy generation for brake system, doors, pantograph
F	E	C	a	B		Manage generation process	
F	E	C	a	C		Protect against over pressure	
F	E	C	a	D		Ensure air quality	
…….							
F	F	C				Acquire mechanical energy demand for traction system	
F	F	D	a			Generate mechanical energy for traction	diesel-mechanical energy generation
F	F	D	a	B		Transform fossil energy into mechanical energy	
F	F	D	a	B	B	Engine control	
F	F	D	a	B	C	Alternator control	
…….							
F	G	C	a			Generate mechanical energy for auxiliaries	mechanical energy generation by a combustion machine
F	G	C	a	B		Transform fossil energy into mechanical energy	
F	G	C	a	B	B	Engine control	
F	G	C	a	B	C	Alternator control	

G						Accelerate, maintain speed, brake and stop	
G	B					Provide acceleration	
G	B	B	a			Configure propulsion system	
G	B	B	a	B		Configure propulsion system according to operational modes/limits	
G	B	B	a	C		Configure propulsion system according to internal status	
G	B	B	a	D		Apply power limits	
G	B	C	a			Acquire propulsion demand	
G	B	C	a	B		Acquire propulsion demand from the driver	
G	B	C	a	C		Acquire propulsion demand from the ATO	
G	B	C	a	D		Acquire propulsion demand from internal speed control	
G	B	C	a	E		Acquire demand for dynamic brake force from brake control	
G	B	C	a	F		Acquire traction cut-off	

Table A.1 — Functions on level 4 and level 5 *(14 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
G	B	D	a			Manage traction system within mode	
G	B	D	a	B		Control motor speed and torque	
G	B	D	a	C		Control the torque transmission (gear)	
G	B	D	a	D		Isolate traction elements	
G	B	D	a	E		Cut-off traction on demand	
G	B	E				Provide demand for energy supply	
G	B	F				Control wheel slipping	
G	B	G	a			Generate tractive effort	
G	B	G	a	B		Convert electrical energy into traction force and vice versa	
G	B	G	a	B	B	Control conversion process	
G	B	G	a	B	C	Convert electrical energy into variable electrical energy output	
G	B	G	a	B	D	Convert electrical energy into mechanical torque and vice versa (generator operation)	
G	B	G	a	B	E	Dissipate heat	
G	B	G	a	C		Convert fluid energy into traction force and vice versa	
G	B	G	a	C	B	Control conversion process	
G	B	G	a	C	C	Convert fluid energy into variable energy output	
G	B	G	a	C	D	Convert energy into mechanical torque	
G	B	G	a	C	E	Dissipate heat	
G	B	G	a	D		Convert mechanical energy into traction force and vice versa	
G	B	G	a	D	B	Control conversion process	
G	B	G	a	D	C	Convert mechanical energy into fluid energy output	
G	B	G	a	D	D	Convert mechanical energy into variable mechanical energy output	
G	B	G	a	D	E	Convert energy into mechanical torque	
G	B	G	a	D	F	Dissipate heat	
G	B	G	a	E		Convert chemical energy into traction force and vice versa	
G	B	G	a	E	B	Control conversion process	
G	B	G	a	E	C	Convert chemical energy into energy output	
G	B	G	a	E	D	Convert energy into mechanical torque	
G	B	G	a	E	E	Dissipate heat	
G	B	H	a			Reuse braking energy	
G	B	H	a	B		Condition braking energy for reuse	
G	B	H	a	C		Controlled dissipation of braking energy onboard	

Table A.1 — Functions on level 4 and level 5 *(15 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
G	B	H	a	D		Return regenerated energy to auxiliary systems	
G	B	H	a	E		Transfer regenerated energy into storages/line power supply	
G	C					Provide deceleration and keep the train at standstill	dynamic brake force included
G	C	B	a			Configure brake system	
G	C	B	a	B		Configure brake system according to train configuration	
G	C	B	a	C		Configure brake system according to activated cabin	
G	C	B	a	D		Configure brake system according to operational restrictions and degraded mode conditions	
G	C	B	a	E		Get status of brake systems	
G	C	B	a	E	B	Get status of automatic brake system	
G	C	B	a	E	C	Get status of direct brake system	
G	C	B	a	E	D	Get status of electrodynamic brake system	
G	C	B	a	E	E	Get status of hydrodynamic brake system	
G	C	B	a	E	F	Get status of eddy current brake system	
G	C	B	a	E	G	Get status of magnetic track brake system	
G	C	B	a	F		Isolate brake systems/devices	
G	C	B	a	F	B	Isolate brake systems at train level	
G	C	B	a	F	C	Isolate brake systems/devices at consist level	
G	C	B	a	F	D	Isolate brake systems/devices at car level	
G	C	B	a	F	E	Isolate brake systems/devices at bogie level	
G	C	B	a	F	F	Isolate brake systems/devices at axle level	
G	C	C	a			Acquire brake demand	
G	C	C	a	B		Acquire brake demand from the driver	
G	C	C	a	B	B	Acquire brake demand from the driver's automatic brake controller	
G	C	C	a	B	C	Acquire brake demand from the traction brake controller	
G	C	C	a	B	D	Acquire brake demand from direct brake controller	
G	C	C	a	B	E	Acquire brake demand from emergency devices	not only push buttons but also other kinds of emergency brake application devices
G	C	C	a	C		Acquire brake demand from the train protection functions	
G	C	C	a	C	B	Acquire brake demand from the driver activity control	
G	C	C	a	C	C	Acquire brake demand from ATP	
G	C	C	a	C	D	Acquire brake demand from brake signal transmission	

Table A.1 — Functions on level 4 and level 5 *(16 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
G	C	C	a	D		Acquire brake demand from internal speed control	
G	C	C	a	E		Acquire brake demand from passengers and crew	
G	C	D	a			Prioritise brake demand and select braking mode	
G	C	D	a	B		Set up service brake mode	
G	C	D	a	C		Set up emergency brake mode	
G	C	D	a	D		Set up holding brake mode	
G	C	D	a	D	B	Set up holding brake mode automatically	
G	C	D	a	D	C	Set up holding brake mode manually	
G	C	D	a	E		Set up parking brake mode	
G	C	E	a			Allocate braking effort	
G	C	E	a	B		Calculate needed braking effort	precalculation
G	C	E	a	B	B	Calculate needed brake effort at train level	
G	C	E	a	B	C	Calculate needed brake effort at consist level	
G	C	E	a	B	D	Calculate needed brake effort at vehicle level	
G	C	E	a	B	E	Calculate needed brake effort at bogie level	
G	C	E	a	C		Prioritise executing braking systems	
G	C	E	a	D		Acquire available braking effort	
G	C	F	a			Handle braking due to train configuration, brake mode and brake demand	this function takes into account the train as chain of vehicles
G	C	F	a	B		Handle braking at higher levels	
G	C	F	a	B	B	Handle braking at train level	
G	C	F	a	B	C	Handle braking at consist level	
G	C	F	a	B	D	Handle braking at vehicle level	
G	C	F	a	B	E	Handle braking at bogie level	
G	C	F	a	C		Determine set points and control depending on brake mode at local level	
G	C	F	a	C	B	Provide Brake Command for parking Braking	
G	C	F	a	C	C	Provide Brake Command for Holding Braking	
G	C	F	a	C	D	Provide Brake Command for Service Braking	
G	C	F	a	C	E	Provide Brake Command for Emergency Braking	
G	C	F	a	D		Manage brake blending at local level	
G	C	F	a	E		Request traction cut-off	
G	C	F	a	F		Acquire realised braking effort	
G	C	G	a			Apply and release braking forces	

Table A.1 — Functions on level 4 and level 5 *(17 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
G	C	G	a	B		Generate and reduce braking forces	
G	C	G	a	B	B	Generate braking forces by friction brake	
G	C	G	a	B	C	Generate braking forces by eddy-current brake	
G	C	G	a	B	D	Generate braking forces by magnetic track brake	
G	C	G	a	B	E	Command electrodynamic brake	
G	C	G	a	B	F	Release braking forces (manually and emergency release)	
G	C	G	a	C		Dissipate heat	
G	C	G	a	D		Provide storage of energy for braking (at train level)	
G	C	G	a	D	B	Provide intermediate storage of energy for braking	
G	C	G	a	D	C	Control storage level and energy flow	
G	C	G	a	D	D	Protect stored energy for braking	
G	C	G	a	E		Detect non-release of braking forces	
G	C	H	a			Provide Wheel Slide Protection	
G	C	H	a	B		Detect sliding	
G	C	H	a	C		Control sliding	
G	C	H	a	D		Manage brake release	
G	D		a			Improve adhesion	
G	D	B	a			Manage sanding	
G	D	B	a	B		Select direction	
G	D	B	a	C		Select axle	
G	D	B	a	D		Dry sand	
G	D	B	a	E		Heat sand	
G	D	B	a	F		Provide sand level	
G	D	B	a	G		Command sanding	
G	D	C				Condition the wheel surface	

H						Provide train communication, monitoring and control	
…….							
H	B					Keep the train staff informed	all functionality to inform the train crew about the actual state of the train and its systems
H	B	B				Manage information access	this is not a direct functionality here since it is part of the configuration of the systems and train network
H	B	C				Acquire information to be displayed	
H	B	D	a			Ensure display of information	functions to control displays, lamps, acoustical signals

Table A.1 — Functions on level 4 and level 5 *(18 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
H	B	D	a	B		Prioritise information	
H	B	D	a	C		Enable the switching between different types of displays/views	
H	B	D	a	D		Ensure visibility of information under degraded conditions	
H	B	E	a			Provide operation relevant information	additional combinatorial logic to create the operational information out of different signals provided from the systems
H	B	E	a	B		Provide train status information to the crew	
H	B	E	a	C		Provide train radio information	
H	B	E	a	D		Provide control command information	
H	B	E	a	E		Provide passenger information system information	
H	B	E	a	F		Provide maintenance information	
H	B	E	a	G		Provide train operator with driving information	
H	B	E	a	H		Provide timetable information	
H	B	E	a	J		Provide diagnostic information	
H	C					Provide trainwide communication	
H	C	B	a			Inaugurate train network	train inauguration to determine train configuration (count, order, direction and capabilities of the consists)
H	C	B	a	B		Determine train topology and configuration	
H	C	B	a	B	B	Provide orientation information for coupled elements	
H	C	B	a	B	C	Manage leading vehicle information	
H	C	B	a	C		Distribute train topology and configuration	
H	C	B	a	D		Confirm train configuration	
H	C	C	a			Manage train network operation	access, priorisation, QoS
H	C	C	a	B		Manage train network access	
H	C	C	a	C		Transmit data	
H	D					Manage train modes	see UIC 612
H	D	B	a			Manage operation mode	general operational modes depending on the defined access rights of the operating staff
H	D	B	a	B		Manage normal operation mode	
H	D	B	a	C		Manage maintenance mode	
H	D	B	a	D		Manage commissioning mode	
H	D	C	a			Manage shut down mode	battery main switch is open ("off"); only WSP and battery protection is supplied
H	D	C	a	B		Manage parking mode	
H	D	C	a	C		Manage pulled mode	
H	D	D	a			Manage switched on-mode	battery main switch is closed ("on"); no cab is activated

Table A.1 — Functions on level 4 and level 5 *(19 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
H	D	D	a	B		Manage starting from charged battery	
H	D	D	a	C		Manage starting from flat battery	
H	D	E				Manage service retention mode	standstill; train operable; no cab acticated
H	D	F				Manage in service mode	standstill; train operable; cab acticated
H	D	G	a			Manage driving mode	all functions available
H	D	G	a	B		Manage normal driving mode	
H	D	G	a	C		Manage coupling mode	
H	D	G	a	D		Manage washing mode	
H	D	G	a	E		Manage shunting mode	
H	D	G	a	F		Manage transition mode	
H	D	G	a	G		Manage emergency mode	
H	D	H				Manage energy saving mode	parking with energy-supply and preparation ability, standstill, low voltage supplied, train power line supplied (HV or external), no driver cab activated, energy saving
H	D	J				Manage battery protection mode	battery-protection has switched off all electrical consumers after giving time for a controlled shutdown
H	E					Allow proper control	see 5.1
H	E	B	a			Manage cab control	functions to control the cab and its functionality
H	E	B	a	B		Ensure access control in the cab	
H	E	B	a	C		Manage cab activation	
H	E	B	a	D		Select language	
H	E	B	a	E		Manage cab deactivation	
H	E	B	a	F		Prevent master conflict due to more than one activated cab	
H	E	C	a			Manage propulsion and brake demand	central functions to control propulsion and brakes
H	E	C	a	B		Preset and monitor speed	
H	E	C	a	C		Manage top level demand electrically	
H	E	C	a	C	B	Compute data	
H	E	C	a	C	C	Transmit	
H	E	C	a	D		Manage top level demand mechanically	
H	E	C	a	D	B	Compute data	
H	E	C	a	D	C	Transmit	
H	E	C	a	E		Manage sanding	
H	E	D	a			Manage energy supply	central functions to control battery main switch, main circuit breaker, pantographs …

Table A.1 — Functions on level 4 and level 5 *(20 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
H	E	D	a	B		Manage energy supply for traction	
H	E	D	a	C		Manage energy supply for auxiliaries	
H	E	E	a			Manage appropriate and safe conditions	central functions to control comfort and safety functionality
H	E	E	a	B		Influence for fire protection	
H	E	E	a	C		Manage tilting system	
H	E	E	a	D		Manage windscreen cleaning	
H	E	E	a	E		Manage windscreen defrosting	
H	E	E	a	F		Manage interior lighting	
H	E	E	a	G		Manage climatisation	
H	E	E	a	H		Manage passenger information, public adress and intercom	
H	E	E	a	J		Manage surveillance system	
H	E	F	a			Manage access and loading	central functions to control access via external doors
H	E	F	a	B		Manage exterior door system	
H	E	G	a			Manage connecting of vehicles	central functions to control coupling of consists
H	E	G	a	B		Manage coupling	
H	E	H	a			Manage control of the train parameters	central functions to control train parameters like time, route, …
H	E	H	a	B		Manage time information	
H	E	H	a	C		Enter train number	
H	E	H	a	D		Enter wheel diameter	
H	E	H	a	E		Enter mission parameters	
H	E	H	a	F		Manage isolation of devices	
H	E	H	a	G		Provide remote control	
H	E	J	a			Manage integration of the vehicle in the complete railway system	central functions to control exterior lighting, signalling, traffic lights …
H	E	J	a	B		Manage exterior lighting	
H	E	J	a	C		Manage route selection system	
H	E	J	a	D		Manage traffic lights	
H	E	J	a	E		Manage signalling system	
H	E	J	a	F		Manage acoustic warning system	
…….							
H	G					Provide diagnostics	
H	G	B	a			Initiate diagnostics	
H	G	B	a	B		Clear database	
H	G	B	a	C		Create new database	

Table A.1 — Functions on level 4 and level 5 *(21 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
H	G	B	a	D		Update database	
H	G	B	a	D	B	Set event state	
H	G	B	a	D	C	Get event state	
H	G	B	a	D	D	Initialise parameter (state update request)	
H	G	C	a			Store diagnostic data	store event and condition data
H	G	C	a	B		Store events	
H	G	C	a	B	B	Store fault	
H	G	C	a	B	C	Store failure	
H	G	C	a	B	D	Store error	
H	G	C	a	B	E	Store protocol event	
H	G	C	a	C		Store condition data	
H	G	C	a	C	B	Store counter	
H	G	C	a	C	C	Store parameter	
H	G	C	a	D		Enable and disable storage of event data	
H	G	C	a	E		Create diagnostic data set	
H	G	C	a	F		Manage database overflow	
H	G	D	a			Access diagnostics data	access event and condition data as well as diagnostic database informations
H	G	D	a	B		Manage access to diagnostic database	
H	G	D	a	C		Provide database status information	
H	G	D	a	C	B	Provide database life sign signal	
H	G	D	a	C	C	Provide database version	
H	G	D	a	C	D	Provide vehicle name	
H	G	D	a	C	E	Provide database filling level signal	
H	G	D	a	C	F	Provide UIC state information	
H	G	D	a	C	G	Provide protocol version	
H	G	D	a	D		Provide database service info	
H	G	D	a	D	B	Provide creation time	
H	G	D	a	D	C	Provide initialisation time	
H	G	D	a	D	D	Provide operating hours	
H	G	D	a	E		Read event data	also in UIC format
H	G	D	a	E	B	Read fault	
H	G	D	a	E	C	Read failure	
H	G	D	a	E	D	Read error	
H	G	D	a	E	E	Read protocol event	
H	G	D	a	F		Read condition data	also in UIC format

Table A.1 — Functions on level 4 and level 5 *(22 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
H	G	D	a	F	B	Read counter	
H	G	D	a	F	C	Read parameter	
H	G	D	a	G		Upload events	all actions to upload events
H	G	D	a	H		Delete events	
H	G	D	a	J		Upload/download parameters	all actions to upload/download parameters
H	G	E	a			Process diagnostic data	process event and condition data for indication and monitoring
H	G	E	a	B		Process condition data	regarding vehicle configurations/operational limits
H	G	E	a	C		Monitor train status	
H	G	E	a	D		Indicate events	indicate events using filters regarding active/passive, acknowledgement, …
H	G	E	a	E		Prioritise events	
H	G	E	a	F		Filter and sort events	
H	H					Assist troubleshooting	
H	H	B				Manage events according to their priority	
H	H	C	a			Allow detailed event analysis	
H	H	C	a	B		Provide cause of event	
H	H	C	a	C		Provide consequence of event	
J						Support and guide the train on the track	
J	B					Guide the train	
J	B	B	a			Manage bogie stability	verify and ensure the stability conditions
J	B	B	a	B		Ensure bogie stability	ensure stability with active control on the longitudinal stifness
J	B	B	a	C		Monitor bogie stability	provide recording events
J	B	B	a	D		Detect bogie instability	capture the external signals from sensors to close the feedback with actuators
J	B	B	a	E		Signal bogie instability	signal the faults to the external monitoring system
J	B	C				Provide derailment information	detect derailment occurring on a trainset by monitoring relevant on board parameters with an acceptable reliability in any allowable service condition
J	B	D	a			Monitor obstacles within track	monitor the possible presence of obstacles on the track during the running service of the vehicle
J	B	D	a	B		Detect obstacles within clearance gauge	capture the external signals by sensors
J	B	D	a	C		Signal obstacles within clearance gauge	signal to the external monitoring system the obstacle
J	B	E				Remove obstacle on the track	protect the bogie and its equipment from damage caused by a collision with obstacles lying on top of the rails remove snow from the area in front of the train

Table A.1 — Functions on level 4 and level 5 *(23 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
J	B	F				Lubricate wheel flange	lubricate wheel flange for excessive wheel wear and signal wheel flange lubricator information status
J	B	G	a			Ride at specified track conditions	allow free motion of the bogies in respect to the carbody by riding in all configurations of the track that can be encountered in the operation complying with the gauge concerned
J	B	G	a	B		Negotiate horizontal curves	
J	B	G	a	C		Negotiate vertical curves	
J	B	G	a	D		Run on a twisted track	
J	B	G	a	E		Run accross special trackwork	
J	B	G	a	F		Negotiate S curves	
J	B	H	a			Monitor wheelset bearing status	define criteria, corresponding threshold and response time to define necessity of maintenance or operating measures
J	B	H	a	B		Detect hot axle box bearing temperature	detect unusual temperature increase of an axle box
J	B	H	a	C		Signal hot axle box bearing temperature	send to the driver reliable information or alert message in order to trigger a speed reduction or a stop according to heating values
J	B	J	a			Monitor gearbox status	
J	B	J	a	B		Detect gear box hot oil temperature	
J	B	J	a	C		Signal gear box hot oil temperature	
.....							
J	C					Transmit forces	
J	C	B	a			Transmit longitudinal forces	
J	C	B	a	B		Transmit longitudinal forces at secondary level	transmit traction, braking and shunting effort between carbody and bogie frame
J	C	B	a	C		Transmit longitudinal forces at primary level	transmit traction, braking and shunting effort between bogie frame and wheelset
J	C	B	a	D		Transmit longitudinal forces at track level	transmit traction, braking and shunting effort between wheelset and track
J	C	C	a			Transmit transversal forces	
J	C	C	a	B		Transmit transversal forces at secondary level	transmit transversal effort (curve, trackwork, track irregularity) between carbody and bogie frame
J	C	C	a	C		Transmit transversal forces at primary level	transmit transversal effort (curve, trackwork, track irregularity) between bogie frame and wheelset

Table A.1 — Functions on level 4 and level 5 *(24 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	**2**	**3**		**4**	**5**		
J	C	C	a	D		Transmit transversal forces at track level	transmit transversal effort (curve, trackwork, track irregularity) between wheelset and track
J	C	D	a			Support vertical dynamic and static load	
J	C	D	a	B		Support vertical dynamic and static load at secondary level	transmit vertical load (curve, track irregularity, trackwork, passenger load) between carbody and bogie frame
J	C	D	a	C		Support vertical dynamic and static load at primary level	transmit vertical load (curve, track irregularity, trackwork, passenger load) between bogie frame and wheelset
J	C	D	a	D		Support vertical dynamic and static load at track level	transmit vertical load (curve, track irregularity, trackwork, passenger load) between wheelset and track
J	C	E	a			Transmit traction and brake effort	transfer the mechanical torque/force from the vehicle to the track and viceversa during traction and braking condition
J	C	E	a	B		Transmit traction forces to the rail	
J	C	E	a	C		Transmit torque to the motor in electric brake	
J	C	E	a	D		Transmit reaction forces of the motor on its support	
J	C	E	a	E		Transmit reaction forces of the gearbox on its support	
J	C	E	a	F		Transmit electromagnetic brake effort	
J	D					Limit acceleration	assessment of the running characteristics (safety, load forces) "ride quality" of the vehicle in conformity with the EN 14363 (or UIC 518) assessment of the passenger comfort in conformity with EN 12299 (or UIC 513)
J	D	B	a			Limit x-y-z acceleration	
J	D	B	a	B		Limit x acceleration	
J	D	B	a	C		Limit y acceleration	
J	D	B	a	D		Limit z acceleration	
J	D	C				Limit jerk	
J	E					Keep vehicle inside gauge envelope	ensure that the rolling stock used comply with the gauge concerned in all running service condition
J	E	B				Limit roll and sway	
J	E	C				Limit lateral movement	
J	E	D				Limit vertical movement	
K						Integrate the vehicle into the complete system railway	also trainset or vehicle (smallest unit)
.....							

Table A.1 — Functions on level 4 and level 5 *(25 of 25)*

Level						Function (level 1 to level 5)	Example / explanation
1	2	3		4	5		
K	D	C	a			Provide train to ground communication	
K	D	C	a	B		Alarming mechanism to the ground	
K	D	C	a	C		Provide administration service for communication to the ground	
K	D	C	a	D		Send diagnostic data to the ground	
K	D	C	a	E		Send condition data to the ground	
K	D	C	a	F		Send train position to the ground	
K	D	C	a	G		Send train status to the ground	
K	D	C	a	H		Send voice data to the ground	
K	D	C	a	J		Send video data to the ground	
K	D	D	a			Provide ground to train communication	
K	D	D	a	B		Provide alarming service to the train	
K	D	D	a	C		Provide administration service for communication to the train	
K	D	D	a	D		Download software to the train	
K	D	D	a	E		Send train configuration data to the train	
K	D	D	a	F		Send diagnostic data to the train	
K	D	D	a	G		Send PIS data to the train	
K	D	D	a	H		Send voice data to the train	
K	D	D	a	J		Send video data to the train	

[a] A sub function with further sub functions on lower level.

Annex B
(informative)

Interrelation between EN 15380-2 and EN 15380-4

Figure B.1 is a schematic representation that shows how the functional structure and the product structure relate to one another. It also indicates the interaction between the functional-structure perspective specified in EN 15380-4 and the product-structure view in EN 15380-2.

Generally, the specifications for establishing EN 15380-4-compliant structures are summarised in a requirements document that sets out the required functionality of the specified system and details the permitted consequences if the functional requirements are not met.

Using this approach, the functional structure of a vehicle can be created without having to specify its technical realisation in any detail. The resulting structure can then be used, for instance, to conduct initial (functionally related) reliability and safety analyses.

At the end of design phase within the engineering process the specified functions of the FBS are assigned to specific components according to the product-structure view in EN 15380-2.

It should be noted that several functions can be assigned to a single component and that a single function can be realised by several different components. It is therefore particularly important that all relevant interrelationships are taken into account if the perspective from which the system is viewed (functional aspect or product aspect) is changed.

It should also be noted that field data for RAMS/LCC analyses are always assigned to the component structure (in the form of a quality parameter such as a failure rate). If certain data needs to be assigned to the functional structure as part of a quantitative functional analysis, it is important to realise that the sum of the quantitative data is not necessarily equal to the corresponding value for the overall system (as one component can perform several functions and vice versa). For example, the sum of the life-cycle costs of the individual functions (systems) will not normally equal the life-cycle cost of the overall function (i.e. the vehicle).

As the structuring set out in this standard allows properties to be assigned to functions, appropriate coding allows users to carry out very specific analyses (e.g. thermal load analyses, analyses in terms of specific passenger groups, etc.).

The product structure results from the physical implementation of the functional structure:

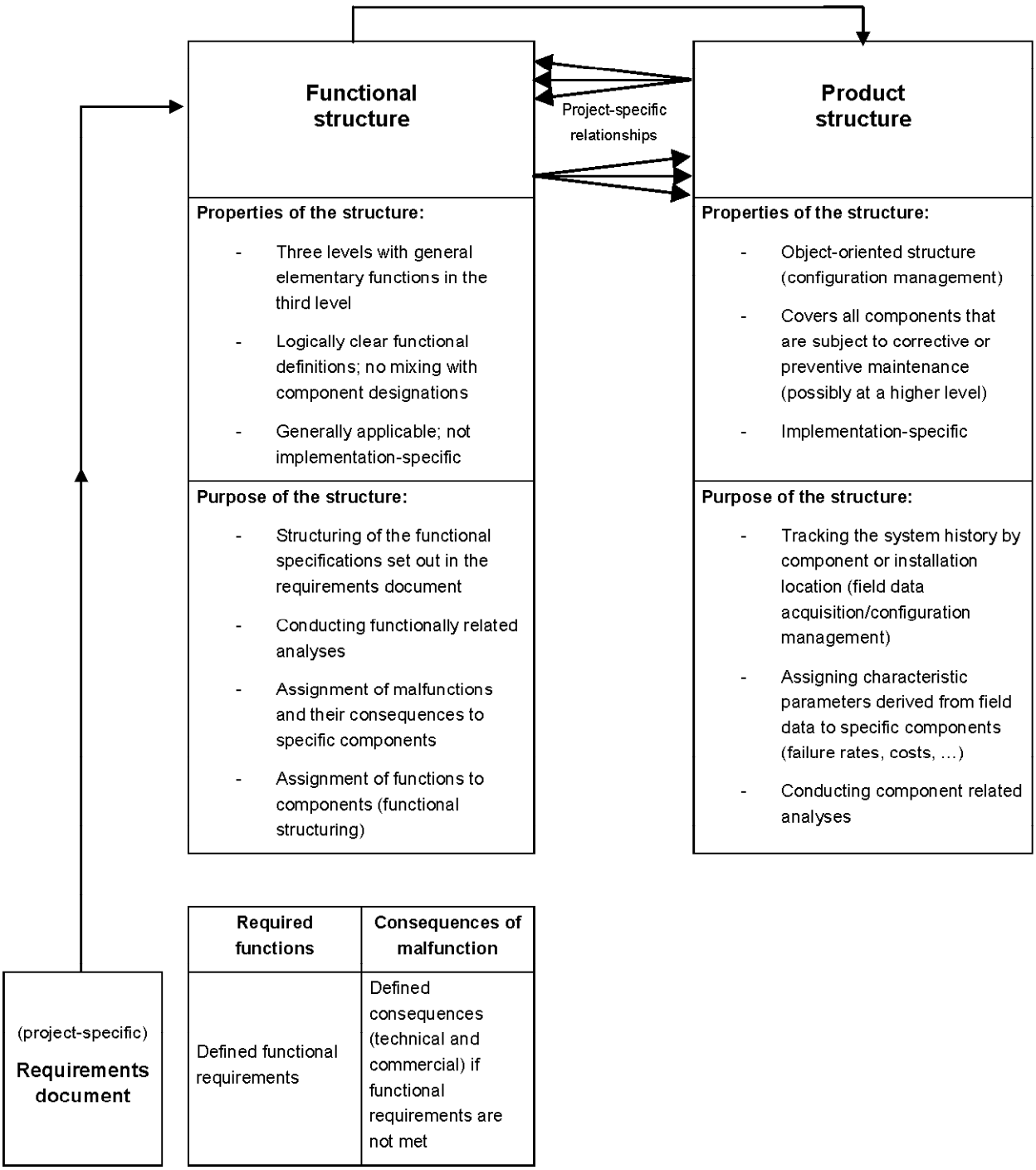


Figure B.1 — Interrelation between Function Breakdown Structure according to EN 15380-4 and Product Breakdown Structure according to EN 15380-2

Annex C
(informative)

Code letters used to designate detail properties

The achievement of certain functions often depends on properties (demands) the function carrier has to meet. This is the reason why a list of properties has been defined that shall be used before redefining or adding other properties or attributes.

The arrangement of detailed properties has to follow the intention to define the functions from an abstract level to a detailed level. Furthermore, the definition of functional requirements has to start with more common specifications before being defined more precisely aiming for detailed specifications.

The following arrangement shows five classes of detailed properties. Further detailed classification of these properties is shown in Table C.1. The detail classifications could be used as support for structuring and analysing tasks. It is shown below how the properties listed in Table C.1 could be arranged to the proposed classes of detail properties. The classifications are listed as follows:

1) relevance for superordinated (higher level) functional goals (based on customers/operators-/or interoperabilty requests or other design features);

2) tolerance against ambient conditions, influences and interferences from operating and surroundings (what is influencing the function carrier);

3) relevance to target group /target object /interaction (is the function relevant for the target group because of special demands);

4) impact characteristics of the function associated mechanism with regard to the function carrier (classification of impact characteristics);

5) characteristics for the physical construction/design features/interfaces.

NOTE The two classifications mentioned previously are used for detailing the properties of the function carriers within the development process. Functions are described more precisely by using detail properties and attributes in general; these properties are related to functional goals e.g. superior goals like design. The same attribute can be used for different classes/aspects of describing detail properties.

The attributes inTable C.1 are used for RAM/LCC and engineering purposes. A set of attributes from Table C.1 can be assigned to each function. This allows the functions to be filtered and sorted accordingly.

Table C.1 — Classification of detail properties *(1 of 2)*

A		B		C		D		E	
Relevance for superordinated (higher level) functional goals		**Stability/tolerance against ambient conditions, influences and interferences from operating and surrounding**		**Relevance to target group/target object/interaction**		**Impact characteristics of the function associated mechanism with regard to the function carrier**		**Characteristics of the physical construction/ design features/interfaces**	
Restrictions for design concepts (should be implemented by software engineering...)	E			locomotive driver	C	acoustical	B	interferency resistance against /interferency limits …(chem./therm./electro-magnetical/noncorrosive, …)	B
Operability/automatisation	B	biological/chemical influences	C	passenger with special requests (e.g. disabled passengers)	D	chemical/biological	C	mechanical/dynamical properties (grade of fixation, ...)	D
Design/aesthetics	D	dynamical/statical impacts (forces/load)	D	passenger, generally	F	electrical/electronical	E	energy consumption, voltage supply interfaces	E
Hygiene	H	electrical/electro-magnetical interferencies	E	passenger with bulky goods	G	radio-based / communication-technology-based	F	production characteristics (mountability, form closure…)	F
Interoperability (with other subsystems e.g. track, catenary, station ..)	I	radio-based interferencies/ constraints	F	passenger, child	K	hydraulic	H	geometrical characteristics (design aspects, quality of cover/ external dimensions…)	G
Comfort	K	process characteristics (missing realtime information)	P	load/freight	L	ventilation-based/ aerodynamical	L	software-/datatransfer characteristics/ interfaces	J
Emissions (exhaust, noise, electro-magnetic smog)	M	radiation (UV, RA, thermal)	R	crew, staff in general	P	mechanical (dynamical/statical)	M	cost (of parts/constructional elements)	K
Immission	N	safety relevant surrounding conditions	S	interaction passenger/crew	Q	optical	O	maintainability (period, requirements, accessibility for service/mounting)	M

Table C.1 — Classification of detail properties *(2 of 2)*

A		B		C		D		E	
Relevance for superordinated (higher level) functional goals		**Stability/tolerance against ambient conditions, influences and interferences from operating and surrounding**		**Relevance to target group/target object /interaction**		**Impact characteristics of the function associated mechanism with regard to the function carrier**		**Characteristics of the physical construction/ design features/interfaces**	
Operator needs/requests (spec. operating tasks/field, maintenance cycles, range, interfaces to infrastructure, voltage supply, ...)	O	tribological stress (abrasion/ friction)	V	software related realisation of functions	s	pneumatical	p	operational, process, control technology parameters (realtime, continuous, tunable, adjustable)	O
Performance and quality of function/construction (including aspects like stability, redundancy, fall back-levels and performance aspects like stereo, power...)	P	weather and operating conditions/climate (incl. thermal/aerodynamical/ hydraulical load or forces)	W	function carrier (e.g. hardware)	t	radiation/thermal	r	performance characteristics	P
Cleaning	R			function (directly/indirectly effecting)	u	software-/signal-/ data-based	s	reliability/availability requests	R
Safety/safety at work/fire protection	S			interaction (between functions)	z	tribological/abrasion-mechanical	t	safety requests	S
Environmental impact/ sustainability/choice of materials/ecological objectives, …)	U							integrated transversal function/ function characteristics (cooling/ voltage transformation/ control parameters/…)	T
Cost (of a function)	X							implemented validation possibilities/traceability	V
								other interface/interaction related characteristics (for hard and software)	Z

Annex D
(informative)

Rules to define the function level

Each function shall be considered regarding its generality. The most general functions are located at level 1. These functions may be split into sub functions, which may be further split into sub functions of the next lower level.

To determine which level a function has to be assigned, in order to meet the adequate level within the function hierarchy, the following rules apply:

Rule 1:

At level 1, the focus of the functional domain shall be the intended functional purpose, not the means by which it is achieved. Several verbs and object complements may be used in the description of such a functional area.

Rule 2:

The specification of a first level function is called the Main Rolling Stock Requirement Specification. A second level function can be specified by a Functional Requirement Specification. The preferred level for the definition of an FRS document is level 2 but there could be FRS for level 3 functions.

Rule 3:

A new level 2 or level 3 function shall not be created if the only difference is the affected object (like a system or a person) and the function already exists.

Rule 4:

Within a given FBS level, functions shall not overlap.

Rule 5:

The functions shall be defined in order to reduce the interfaces between them, particularly at level 2 and level 3.

Rule 6:

A function shall be defined independently from the architecture.

Rule 7:

A function is not a requirement. An example for the difference between a function and a requirement is as follows: A function is to accelerate the train, while a requirement is to accelerate at 1,5 m/s^2.

Rule 8:

Each function shall be fully defined by its sub functions.

Rule 9:

There shall be no placeholder (dummy) functions at level 2 and level 3. Each function shall have more than one sub function (otherwise the sub function is the function on the level above).

Annex E
(informative)

Rules to create function names

E.1 General

To ensure an unambiguous definition of each function it is necessary to define rules for creating the function terms and their abbreviations. These processes are realised in English language only, independent from the mother tongue of this standard's user.

A list of functions on lowest level (elementary functions) is given in EN 81346-2.

E.2 Function terms

For the creation of function terms the following rules apply:

Rule 1:

Each function shall consist of at least one verb in its verbal form and an object complement.

Rule 2:

The verb is defined in a dictionary. Preferred verbs are: to provide, to enable, to ensure, to command, to access.

Rule 3:

The function name shall start with the verb.

Rule 4:

Negative definition shall be avoided.

Rule 5:

The function name shall be unambiguous.

Rule 6:

Function names shall have an unambiguous abbreviation unless it is unavoidable.

EXAMPLE 1 communication -> cmn

EXAMPLE 2 command -> cmd

E.3 Rules for creating function short names

To ensure a unique and unambiguous identification of each function term, metadata identifiers were created. The rules basically follow the general rules as defined in EN 82045-2:2005, 4.4.1 and 4.4.2:

The identifier of the metadata element is a string of characters, based on the English language. The identifier shall be unambiguous in the document management context.

The identifier is composed of one or more terms, each starting with an upper case letter followed by lower case letters. Characters are limited to upper case and lower-case Latin letters (A to Z, a to z). The different terms are concatenated without any intermediate character.

The information model provides entities with associated attributes. In order to reflect the different context dependent semantics , the metadata identifier is in most cases composed of the entity name followed by the relevant attribute name, concatenated without any intermediate character. Each term starts with an upper cases letter.

Based on these general rules the following detailed conventions apply:

Rule 1:

If there are common international abbreviations (speed: v, electric: el, acceleration: a, force: F, passenger: pax, transmit: tx, …) these shall be used. The series of ISO 80000 shall apply.

Rule 2:

Binding words like and, or, with, ... shall be suppressed.

Rule 3:

For terms consisting of different words, each individual word will be treated according to the defined rules.

Rule 4:

Words and abbreviations shall be used consistently. Whenever possible, different terms shall be used for different meanings.

Rule 5:

Words not covered by rule 1 and having less than six letters shall not be abbreviated.

EXAMPLE Light -> Light

Rule 6:

Each function shall be abbreviated by the first letter and the following two consonants of each word.

EXAMPLE Ensure -> Ens, communication -> cmn, command ->cmd

Rule 7:

If there is no unique or clear identification possible with rule 6 the third consonant shall also be used.

EXAMPLE Provide -> Prvd, Inside -> Insd, Supply -> Sply, Access -> Accs, Accelerate -> Accl, Accumulate -> Accm

Rule 8:

If there is no unique or clear identification possible with rule 7 additionally the first different consonant of the word shall be used.

EXAMPLE Presence-> Prsnc (Person->Prsn), Acoustic -> Acstc (acustom -> acstm), Protect -> Prtct (protocol -> prtcl).

Rule 9:

If there is no unique or clear identification possible with rule 7 or rule 8 additionally to rule 6 the first one or two vowels/additionally to rule 7 the first vowel of the word shall be used.

Listing of function term abbreviations

Table E.1 lists all function term abbreviations of functions from level 1 to level 5 as shown in this document.

Table E.1 — List of function abbreviations *(1 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
B						CarryPrtctPaxTrainCrewLoad	Carry and protect passengers, train crew and load
B	B					ArrngIntSpace	Arrange interior space
B	B	B				PrvdFloorFloorng	Provide floor and flooring
B	B	C				PrvdRoofRoofng	Provide roof and roofing
B	B	D				PrvdPrttng	Provide partitioning
B	B	E				PrvdLngPnl	Provide lining and panelling
B	B	F				PrvdAcstcThermIns	Provide acoustic/thermal insulation
B	B	G				PrvdLggStrgSpaceVeh	Provide luggage storage space in the vehicle
B	B	H				CarrySec/AcmpObject	Carry and secure accompanying object
B	B	J				PrvdAccsUppLevelUserZone	Provide access to upper levels and user zones
B	C					CarryEncLoad	Carry and enclose the load
B	C	B				FastenEquipmLoad	Fasten equipment/load
B	C	C				EncLoad	Enclose the load
B	C	D				CarryPrtctLoad	Carry and protect the load
B	C	E				PrtctInstEquipmComp	Protect installed equipment/components
B	D					PrtctCrash	Protect in case of crash
B	D	B				AbsrbCrashEnergy	Absorb crash energy
B	D	C				PrtctDrverCrewPaxCmp	Protect driver, crew and passengers inside their compartments
B	D	D				LimitDeccl	Limit deceleration
B	D	E				PrvtVehOverr	Prevent vehicle override
B	E					PrtctFire	Protect against fire
B	E	B				MngPrvdSmokeDetc	Manage/Provide smoke detection
B	E	C				MngPrvdFireDetc	Manage/Provide fire detection
B	E	D				MngSgnlFire	Manage signalling of fire
B	E	E	a			MngPrvdFireExtng	Manage/Provide fire extinguishment
B	E	E	a	B		MngPrvdAutomFireExtngSystm	Manage automatical fire extinguish system
B	E	E	a	C		MntVolmExtngAgent	Monitor volume of extinguishing agent
B	E	E	a	D		PrvdManuFireExtngFacilty	Provide manual fire extinguish facilities
C						PrvdAppropCndtPaxTrainCrewLoad	Provide appropriate conditions to passenger, train crew and load
C	B					PrvdSafeCmfPos	Provide safe and comfortable sitting, lying and standing positions
C	B	B				PrvdSppStand	Provide support for standing
C	B	C	a			PrvdSeatPss	Provide seating possibilities
C	B	C	a	B		PrvdErgSeatCndt	Provide ergonomic seating conditions

Table E.1 — List of function abbreviations *(2 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
C	B	C	a	C		PrvdAdjPos	Provide adjustments of position
C	B	C	a	D		PrvdStorSpaceBackSeat	Provide storage space in the back of the seat
C	B	C	a	E		PrvdTables	Provide tables
C	B	D	a			PrvdLyinPss	Provide lying possibilities
C	B	D	a	B		PrvdErgLyinCndt	Provide ergonomic lying conditions
C	B	D	a	C		PrvdAdjLyinPos	Provide adjustments of lying positions
C	B	D	a	D		PrvdStoreSpaceTable	Provide storage space at the table position
C	C					PrvdExtView	Provide external view
C	C	B	a			EnsOutPaxView	Ensure outside passenger view
C	C	B	a	B		EnsOutView	Ensure outside view
C	C	B	a	C		PrtctPaxSun	Protect passenger against sun
C	C	C	a			PrvdExtViewTrainOpr	Provide external view for train operation
C	C	C	a	B		CleanWndsr	Clean the windscreen
C	C	C	a	C		DfrstWndscr	Defrost the windscreen
C	C	C	a	D		PrtctBlind	Protect against blinding
C	C	C	a	E		AvdCndst	Avoid condensation
C	C	C	a	F		PrvdRearView	Provide rear view
C	C	C	a	G		PrvdViewDarknss	Provide view in the darkness
C	D					PrvdIntLight	Provide interior lighting
C	D	B	a			PrvdWrkLight	Provide workplace lighting
C	D	B	a	B		PrvdDeskLight	Provide desk lighting
C	D	B	a	C		PrvdTmtLight	Provide timetable lighting
C	D	B	a	D		PrvdBackgrdLight	Provide "background" lighting
C	D	C	a			PrvdCmmIntLight	Provide common interior lighting
C	D	C	a	B		PrvdIntStnLight	Provide interior standard lighting
C	D	C	a	C		PrvdRedModeLight	Provide reduced mode lighting
C	D	C	a	D		PrvdAtmLight	Provide atmosphere lighting
C	D	D	a			PrvdEmrLight	Provide emergency lighting
C	D	D	a	B		PrvdGdnExit	Provide guidance to exit
C	D	D	a	C		PrvdBackLight	Provide backup lighting
C	D	E	a			PrvdSpecIndLight	Provide special/individual lighting
C	D	E	a	B		PrvdReadLight	Provide reading lighting
C	D	E	a	C		PrvdWorkLight	Provide working lighting
C	D	E	a	D		PrvdSanLight	Provide sanitary (make-up) lighting

Table E.1 — List of function abbreviations *(3 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
C	D	E	a	E		PrvdAdvLight	Provide advertisment lighting
C	E					PrvdPrprClmt	Provide proper climate
C	E	B	a			MngHVACMode	Manage HVAC mode
C	E	B	a	B		MngHVACAutomMode	Manage HVAC Automatic mode
C	E	B	a	L		MngHVACFireOutMode	Manage HVAC Fire outside mode
C	E	B	a	M		MngHVACPressPrtctMode	Manage HVAC Pressure protection mode
C	E	B	a	N		MngHVACFrostPrtctMode	Manage HVAC Frost protection mode
C	E	B	a	C		MngHVACRecMode	Manage HVAC Recirculation mode
C	E	B	a	D		MngHVACPltMode	Manage HVAC Platform mode
C	E	B	a	E		MngHVACCoolKpnMode	Manage HVAC Cool keeping mode
C	E	B	a	F		MngHVACWarmMode	Manage HVAC Warm keeping mode
C	E	B	a	G		MngHVACPreCndMode	Manage HVAC Pre-conditioning mode
C	E	B	a	H		MngHVACWshMode	Manage HVAC Washing mode
C	E	B	a	J		MngHVACFlushMode	Manage HVAC Flush mode
C	E	B	a	K		MngHVACFireInsMode	Manage HVAC Fire inside mode
C	E	C	a			SplyDsrTmp	Supply the desired temperature
C	E	C	a	B		PrvdAdjDsrTmp	Provide adjustment of desired temperature
C	E	C	a	C		HeatAir	Heat the air
C	E	C	a	D		CoolAir	Cool the air
C	E	D	a			SplyDsrAirFlow	Supply the desired air flow
C	E	D	a	B		DstAir	Distribute the air
C	E	D	a	C		PrvdAdjIndivAirFlow	Provide adjustments for individual airflow
C	E	D	a	D		TreatAirQltFilterAir	Treat air quality/filter the air
C	E	D	a	E		PrvdEmrVent	Provide emergency ventilation
C	E	D	a	F		EnsCabClearWnd	Ensure cab clear front window (by airflow)
C	E	E	a			SplyDsrHmd	Supply the desired humidity
C	E	E	a	B		MstrAir	Moisture the air
C	E	E	a	C		DryAir	Dry the air
C	E	F	a			SplyCleanFreshAir	Supply clean fresh air
C	E	F	a	B		FltAirOut	Filter the air from outside
C	E	F	a	C		SplyFreshAir	Supply with fresh air
C	E	F	a	D		ExhAir	Exhaust air
C	E	F	a	E		PrvdPssOpenWin	Provide possibility to open windows
C	E	G	a			PrtctPressWaves	Protect against pressure waves
C	E	G	a	B		PrvdActvSeal	Provide active sealing

Table E.1 — List of function abbreviations *(4 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
C	E	G	a	C		PrvdPssvSeal	Provide passive sealing
C	E	H				SgnInsOutTmp	Signal inside and outside temperature
C	F					PrvdPAPisIntrcEntnt	Provide public address, passenger information, intercomunication and entertainment
C	F	B				MngPrrtInfAnn	Manage priority of information and announcements
C	F	C	a			PrvdPA	Provide public address
C	F	C	a	B		PrvdManPA	Provide manual public adress
C	F	C	a	B	B	PrvdPACrew	Provide public adress from the crew
C	F	C	a	B	C	PrvdPACtrlCenter	Provide public adress from the control center
C	F	C	a	C		PrvdAutomPA	Provide automatic public adress
C	F	C	a	C	B	PrvdSlctAdrIntZonTrain	Provide selective adress to internal zone or train
C	F	C	a	C	C	PrvdSlctAdrExtZonTrain	Provide selective adress to external zone
C	F	D	a			MngEmrAlarmPax	Manage emergency alarm from passengers
C	F	D	a	B		MngPaxEmrRqst	Manage passenger emergency request
C	F	D	a	C		MngToilEmrRqst	Manage toilet emergency request
C	F	D	a	D		MngOtherEmrRqst	Manage other emergency request
C	F	E	a			PrvdPIS	Provide passenger information
C	F	E	a	B		PrvdTrvAss	Provide travel assistance
C	F	E	a	B	B	PrvdDynTrainCnctInf	Provide dynamic train connection info
C	F	E	a	B	C	PrvdCmfInf	Provide comfort info
C	F	E	a	B	D	PrvdTouristInf	Provide tourist info
C	F	E	a	C		PrvdRouteInf	Provide route information
C	F	E	a	C	B	SelRoute	Select route
C	F	E	a	C	C	UpldRoute	Upload route
C	F	E	a	C	D	UpldRouteMnlly	Upload route manually
C	F	E	a	C	E	AdjRouteMnlly	Adjust route manually
C	F	E	a	C	F	DspRouteInf	Display route information
C	F	E	a	C	G	AnnSilentFrw	Announcement silent forward
C	F	E	a	C	H	AnnSilentBck	Announcement silent backwards
C	F	F	a			PrvdIntrc	Provide intercom
C	F	F	a	B		PrvdIntrcDriverCabs	Provide intercom between driver cabs
C	F	F	a	C		PrvdPaxEmrIntrc	Provide passenger emergency intercomunication
C	F	G	a			PrvdSeatRsr	Provide seat reservation
C	F	G	a	B		EnterSeatInf	Enter seat information
C	F	G	a	B	B	ReadSeatInfDataMedium	Read seat information data medium

Table E.1 — List of function abbreviations *(5 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
C	F	G	a	B	C	EnterSeatInfMnlly	Enter seat information manually
C	F	G	a	C		DspSeatInfPaxCmp	Display seat information in passenger compartment
C	F	H	a			PrvdSppMltPaxEnt	Provide and support multimedia for passenger entertainment
C	F	H	a	B		PrvdCntSourc	Provide content sources
C	F	H	a	C		MngDstrMltInf	Manage and distribute multimedia information
C	F	H	a	D		PrvdIntfPax	Provide interfaces to passsengers
C	F	J				SppPrvdExtMltCmn	Support and provide external multimedia communication
C	G					PrvdSrvl	Provide surveillance (for passenger or load)
C	G	B				MngSrvlSourc	Manage surveillance sources
C	G	C	a			CllcSrvlInf	Collect surveillance information
C	G	C	a	B		CllcSrvlModeNrmCndt	Collect surveillance mode in normal conditions
C	G	C	a	C		EnhSrvlDataAquis	Enhance surveillance data aquisition
C	G	D				AnlySrvlFnct	Analyse surveillance functions
C	G	E	a			DspSrvlInf	Display surveillance information
C	G	E	a	B		DspOperSelSourc	Display operator selected source
C	G	E	a	C		DspSourcTrgAlarm	Display source of triggered alarm
C	G	E	a	D		ScrlMnllyAutomDspSourc	Scroll manually or automatically between display sources
C	G	F	a			RecSrvlInf	Record surveillance information
C	G	F	a	B		RecSrvlInfNrmMode	Record surveillance information in normal mode
C	G	F	a	C		MngOverfilStrCap	Manage overfill of storage capacity
C	G	F	a	D		DwnlLocRemSrvlData	Download locally or remotely surveillance data
C	H					PrvdSntry	Provide sanitary services
C	H	B	a			MngSntrySys	Manage sanitary system
C	H	B	a	B		CntrToilDoor	Control toilet door
C	H	B	a	B	B	IndToilOccStat	Indicate toilet occupied status
C	H	B	a	C		ToilServRqst	Toilet service request
C	H	B	a	B	C	OpenCloseLockFctn	Open/close/lock function (UWC)
C	H	C	a			PrvdFreshWater	Provide fresh water
C	H	C	a	B		SpplStrFreshWater	Supply and store fresh water
C	H	C	a	C		IndFreshWaterLevel	Indicate fresh water level
C	H	C	a	D		DstFreshWater	Distribute fresh water
C	H	D	a			CllcDspWasteWater	Collect and dispose waste water
C	H	D	a	B		CllcWastWater	collect waste water

Table E.1 — List of function abbreviations *(6 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
C	**H**	**D**	a	**C**		StrWasteWater	Store waste water
C	**H**	**D**	a	**D**		IndWasteWaterLev	Indicate waste water level
C	**H**	**D**	a	**E**		DispWasteWater	Dispose of waste water
C	**H**	**E**	a			CllcDispGreyWater	Collect and dispose grey water
C	**H**	**E**	a	**B**		CllcGreyWater	Collect grey water
C	**H**	**E**	a	**C**		StrGreyWater	Store grey water
C	**H**	**E**	a	**D**		IndGreyWaterLev	Indicate grey water level
C	**H**	**E**	a	**E**		DispGreyWater	Dispose of grey water
C	**H**	**G**	a			PrvdFreezPrtct	Provide antifreeze protection
C	**H**	**G**	a	**B**		HeatPlmbTank	Heat plumbing and tanks
C	**H**	**G**	a	**C**		DrnPlmbTank	Drain plumbing and tanks
C	**H**	**H**	a			PrvdHyg	Provide hygiene
C	**H**	**H**	a	**B**		PrvdBabyCareFacilty	Provide baby care facilities
C	**H**	**H**	a	**C**		PrvdWasteDisp	Provide waste disposal
C	**H**	**H**	a	**D**		PrvdMakeUpFacilty	Provide make-up facilities
C	**H**	**H**	a	**E**		PrvdAssHndcp	Provide assistance to handicapped
C	**J**					PrvdCtrng	Provide catering
C	**J**	**B**	a			PrvdPrprEnvCat	Provide proper environment for catering
C	**J**	**B**	a	**B**		PrvdHygWrkSpace	Provide hygienic "workingspace"
C	**J**	**B**	a	**C**		PrvdCleanFacilty	Provide cleaning facilities
C	**J**	**B**	a	**D**		PrvdWaterDispGreyWater	Provide water and dispose greywater
C	**J**	**B**	a	**E**		CllcDispWaste	Collect and dispose waste
C	**J**	**B**	a	**F**		PrvdExhAux	Provide exhaust auxilaries
C	**J**	**C**	a			StrDrinkFood	Store drinks and food
C	**J**	**C**	a	**B**		PrvdSpace	Provide space
C	**J**	**C**	a	**C**		PrvdCoolFreez	Provide cooling/freezing
C	**J**	**D**				PrvdMrktServPayFacilty	Provide marketing, service and payment facilities
C	**J**	**E**				PrepDrinkFood	Prepare drinks and food
C	**J**	**F**	a			ServeDrinkFood	Serve drinks and food
C	**J**	**F**	a	**B**		ServeDrinkFoodCoach	Serve drinks and food in the restaurant coach
C	**J**	**F**	a	**C**		PrvdMobCatServ	Provide mobile catering services
C	**K**					PrvdMiscFctn	Provide additional service related functions
C	**K**	**B**	a			PrvdTckt	Provide ticketing
C	**K**	**B**	a	**B**		SellTckt	Sell ticket

Table E.1 — List of function abbreviations *(7 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
C	K	B	a	B	B	PrvdTimePriceInf	Provide timetable and price info
C	K	B	a	B	C	SelTckt	Select ticket
C	K	B	a	B	D	PrvdOnlineAccount	Provide online accounting
C	K	B	a	B	E	PrintTckt	Print ticket
C	K	B	a	C		PunchTckt	Punch ticket
C	K	C	a			PrvdMscServFcnt	Provide miscellaneous service functions
C	K	C	a	B		PrvdAutomVending	Provide automatic vending of goods and services
C	K	D				CountPax	Count passengers
C	L					PrvdRideCmft	Provide ride comfort
C	L	B				CtrlCarBodyXAccl	Control carbody x-acceleration
C	L	C				CtrlCarBodyYAccl	Control carbody y-acceleration
C	L	C	a	B		TiltVeh	Tilt the vehicle
D						PrvdAccssLoad	Provide access and loading
D	B					PrvdAccssExtDoor	Provide external access
D	B	B	a			RelExtDoor	Release external doors
D	B	B	a	B		RelExtDoorDriver	Release external door by driver
D	B	B	a	C		RelExtDoorATC	Release external doors by beacon/ATC
D	B	B	a	D		EnblRelExtDoor	Enable release external doors
D	B	B	a	E		CancelRelExtDoor	Cancel release external doors
D	B	B	a	F		IndExtDoorRel	Indicate external doors released
D	B	C	a			OpenExtDoor	Open external doors
D	B	C	a	B		OpenExtDoorLocCtrl	Open external doors by local control (mechanical handle or push button)
D	B	C	a	C		OpenExtDoorDrverCrewAct	Open external doors following driver or crew activation
D	B	C	a	D		OpenExtDoorAut	Open external doors automatically
D	B	C	a	E		OpenExtDoorRamp	Open external doors by actuating ramp
D	B	C	a	F		OpenExtDoorLift	Open external doors by actuating lift
D	B	C	a	G		EnblSelectExtDorrOpen	Enable selective external door opening
D	B	D	a			CloseExtDoor	Close external doors
D	B	D	a	B		CloseExtDoorAut	Close external doors automatically
D	B	D	a	C		CloseExtDoorExcedSpeed	Close the external doors upon exceeding a speed threshold
D	B	D	a	D		EnblSelectExtDoorClose	Enable selective external door closing
D	B	D	a	E		CloseExtDoorDrverStattCmd	Close external doors by driver or the staff command
D	B	D	a	F		CloseExtDoorPaxRqst	Close external doors by passenger request

Table E.1 — List of function abbreviations *(8 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
D	B	E	a			MngDoorSysObstcl	Manage door system upon obstacle
D	B	E	a	B		DetObstcl	Detect obstacle
D	B	E	a	C		MngDoorAccordObstclDet	Manage the door according to obstacle detection
D	B	F	a			LockExtDoor	Lock external doors
D	B	F	a	B		LockExtDoorMech	Lock external doors mechanically
D	B	F	a	B	B	LockExtDoorAutom	Lock external doors mechanically automatically
D	B	F	a	B	C	LockExtDoorMechMnlly	Lock external doors mechanically manually
D	B	F	a	C		LockExtDoorElctr	Lock external doors electrically
D	B	F	a	C	B	LockExtDoorElctrAutom	Lock external doors electrically automatically
D	B	F	a	C	C	LockExtDoorElctrMnlly	Lock external doors electrically manually
D	B	G				UnlockExtDoor	Unlock external doors
D	B	H	a			EnblSelDoorOpen	Enable selective external door opening
D	B	H	a	B		EnblIndivDoorOpen	Enable individual door opening
D	B	H	a	C		EnblSideSelDoorOpen	Enable side selective door opening
D	B	H	a	D		EnblSectSelDoorOpen	Enable section selective door opening
D	B	H	a	E		AllowLocalDoorOpenCrewCntrl	Allow a local door to remain open under crew control
D	B	J				PrvdEntrLight	Provide entrance lighting
D	B	K				IsltExtDoor	Isolate external doors
D	B	L				SgnlExtDoorCloseLockState	Signal all external door closed and locked state
D	B	M	a			SgnlExtDoorStatChngOpenClose	Signal external door status change/open/close
D	B	M	a	B		SgnlExtDoorSatChng	Signal external door status change internal and or external to the vehicle
D	B	M	a	C		SgnlExtDoorStatCrew	Signal external door status to the crew
D	B	N	a			EnblExtDoorOpenEmr	Enable external door opening in emergency
D	B	N	a	B		EnblExtDoorOpenEmrDrving	Enable external door opening in emergency while driving
D	B	N	a	C		EnblExtDoorOpenEmrStand	Enable external door opening in emergency while standing
D	B	P	a			RedGapVehPltfrm	Reduce the gap between vehicle and platform
D	B	P	a	B		MngStep	Manage steps
D	B	P	a	B	B	EnblStepDeploym	Enable steps deployment
D	B	P	a	B	C	EnblStepWthdrwl	Enable step withdrawal
D	B	P	a	B	D	EnblManStepLock	Enable manual step locking
D	B	P	a	B	E	AdptStepHight	Adapt step hight to the platform
D	B	Q	a			EnsPaxAccssExtDoorRedMob	Ensure passenger access by external doors for people with reduced mobility

Table E.1 — List of function abbreviations *(9 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
D	B	Q	a	B		MngRamp	Manage ramp
D	B	Q	a	B	B	DetOpenRqst	Detect opening request
D	B	Q	a	B	C	EnblRampDelpoym	Enable ramp deployment
D	B	Q	a	B	D	EnblRampWthdrwl	Enable ramp withdrawal
D	B	Q	a	B	E	DetObstclRamp	Detect obstacle in ramp
D	B	Q	a	B	F	DetObstrRamp	Detect obstruction in ramp
D	B	Q	a	B	G	EnblManRampLock	Enable manual ramp locking
D	B	R				PrvdAccssDrverCrew	Provide access for driver and crew
D	B	S	a			PrvdAccssSpecEmrExit	Provide accesss by special emergency exits
D	B	S	a	B		PrvdPaxEmrExitFrontEvacDoor	Provide passenger emergency exits via front evacuation doors
D	B	S	a	C		PrvdRampAccss	Provide ramps for access
D	C					PrvdAccssIntDoors	Provide access by internal doors
D	C	B				DetIntDoorOpenRqst	Detect internal door opening request
D	C	C				DetObstclIntDoor	Detect obstacle in internal door
D	C	D				CloseIntDoorAutom	Close internal door automatically
D	C	E				OpenIntDoorAutom	Open internal door (automatically)
D	C	F				EnsDrverCrewAccssCab	Ensure driver and crew access in the cab
D	C	G				IsltIntDoor	Isolate internal door
D	D					EnsGoodLoad	Ensure goods loading and unloading
D	D	B				PrmtGoodLoad	Permit goods loading and unloading
D	D	C	a			PrvdPrpCndtLoad	Provide proper conditions for loading/unloading
D	D	C	a	B		PrvdLightLoad	Provide lighting for load unload
E						CnctVehCnsts	Connect vehicles and/or consists
E	B					EnblCplUncpl	Enable coupling and uncoupling
E	B	B	a			MngCpl	Manage coupling
E	B	B	a	B		PrepCpl	Prepare the coupling
E	B	B	a	C		OpenCover	Open cover
E	B	B	a	D		CnfgCplMode	Configure for coupling mode
E	B	B	a	E		MngExtLightCplMode	Manage exterior lights in couled mode
E	B	B	a	F		ExecCpl	Execute the coupling
E	B	B	a	G		ExecCplAutom	Execute the coupling automatically
E	B	B	a	H		ExecCplMnlly	Execute the coupling manually
E	B	B	a	J		ComplCpl	Complete the coupling
E	B	C	a			MngUncpl	Manage uncoupling

Table E.1 — List of function abbreviations *(10 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
E	**B**	**C**	a	**B**		PrepUncpl	Prepare the uncoupling
E	**B**	**C**	a	**C**		ExecUncpl	Execute the uncoupling
E	**B**	**C**	a	**D**		ExecUncplAutom	Execute the uncoupling automatically
E	**B**	**C**	a	**E**		ExecUncplMnlly	Execute the uncoupling manually
E	**B**	**C**	a	**F**		ComplUncpl	Complete the uncoupling
E	**B**	**C**	a	**G**		CloseCover	Close cover
E	**B**	**C**	a	**H**		ChckUncplCompl	Check uncoupling is completed
E	**B**	**D**	a			TxCplF	Transmit forces via coupler
E	**B**	**D**	a	**B**		TxDrwF	Transmit drawing forces
E	**B**	**D**	a	**C**		TxBuffF	Transmit buffing forces
E	**B**	**D**	a	**D**		DissImpctEnerg	Dissipate impact energy
E	**B**	**D**	a	**E**		PtrctFTxElem	Protect force transmission elements
E	**B**	**E**	a			CnctSngl	Connect signals, utilities and power service lines
E	**B**	**E**	a	**B**		CnctSnglSmpCpl	Connect signals, utilities and power service lines for semipermanent coupling
E	**B**	**E**	a	**C**		CnctSnglSmpCnsts	Connect signals, utilities and power service lines for consists
E	**B**	**F**	a			EnsReacUntdUncpl	Ensure adequate reaction on unintended uncoupling
E	**B**	**F**	a	**B**		DetUncpl	Detect uncoupling
E	**B**	**F**	a	**C**		PrvdReacUncpl	Provide reaction on uncoupling
E	**C**					PrvdIntcarCrclt	Allow intercar passenger and goods circulation
E	**C**	**B**				PrvdShltrExtCntd	Provide shelter from exterior conditions during transfer
E	**C**	**C**				EnblTrnst	Enable transition
E	**C**	**D**				MngIntcarCrclt	Manage intercar circulation
F						PrvdNrg	Provide energy
F	**B**					PrvdElNrgTrcn	Provide electrical energy for traction
F	**B**	**B**	a			MngElNrgTrcn	Manage electrical energy for traction
F	**B**	**B**	a	**B**		SenseCtnryCur	Sense catenary current
F	**B**	**B**	a	**C**		SenseCtnryU	Sense catenary voltage
F	**B**	**B**	a	**D**		CnfgInputNrgSys	Configure input energy system
F	**B**	**C**				AcqrNrgDmnTrcnSys	Acquire energy demand for traction system

Table E.1 — List of function abbreviations *(11 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
F	B	D	a			GenElNrgTrcnBoard	Generate electrical energy for traction on board
F	B	D	a	B		TrnsfFuelCellNrgElNrg	Transform fuel cell energy into electrical energy
F	B	E	a			CllcElNrgTrcn	Collect electrical energy for traction
F	B	E	a	B		MngCollDev	Manage collection device
F	B	E	a	B	B	EnsElContUSide	Ensure good electrical contact on high voltage side
F	B	E	a	B	C	EnsElContCurRtrn	Ensure good electrical contact on current return
F	B	E	a	C		PrtctCollDevCatry	Protect collection devices and catenary
F	B	E	a	C	B	PrvtDmgCatry	Prevent damage to the catenary
F	B	F	a			TrnsfElNrgTrcn	Transform electrical energy for traction
F	B	F	a	B		MngTrnsfCnvSys	Manage transformation and conversion system
F	B	F	a	C		PrtctTrnsfDev	Protect transformation devices
F	B	F	a	C	B	PrtctHighUElDevOverU	Protect high voltage electrical devices against overvoltage
F	B	F	a	C	C	PrtctHighUElDevOverCur	Protect high voltage electrical devices against overcurrent
F	B	G	a			DstElNrgTrcn	Distribute electrical energy for traction
F	B	G	a	B		MngDstElNrgTrcn	Manage distribution of electrical energy for traction
F	B	G	a	C		PrtctDstDev	Protect distribution devices
F	B	G	a	C	B	PrtctHighUElDevOverVltg	Protect high voltage electrical devices against overvoltage
F	B	G	a	C	C	PrtctHighUElDevOverCrrnt	Protect high voltage electrical devices against overcurrent
F	B	G	a	D		EnblDisChrgShortCircGrond	Enable discharching, short circuiting and grounding
F	B	H				StrElNrgOnBoardTrcn	Store electrical energy onboard for traction
F	B	J				DissLossElTrcnNrgPrvdis	Dissipate losses of electrical traction energy provision
F	C					PrvdElNrgAux	Provide electrical energy for auxiliaries
F	C	B	a			MngElAuxNrgProvis	Manage electrical auxiliary energy provisioning
F	C	B	a	B		MngAuxRed	Manage auxiliary redundancies
F	C	C	a			AdaptElAuxNrgProvisAccordLoad	Adapt electrical auxiliary energy provisioning according to load

Table E.1 — List of function abbreviations *(12 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
F	**C**	**C**	[a]	**B**		PrvdSelfPrtctCnfgStrgSys	Provide self protection configuration for storage system
F	**C**	**D**				GenElNrgAuxBoard	Generate electrical energy for auxiliaries on board
F	**C**	**E**	[a]			CllcElAuxNrg	Collect electrical auxiliary energy
F	**C**	**E**	[a]	**B**		ShopPSply	Use Shop Power Supply
F	**C**	**F**	[a]			TrnsfElNrgAuxNrg	Transform electrical energy to auxiliary energy
F	**C**	**F**	[a]	**B**		TrnsfElNrgDCLinkAuxNrg	Transform electrical energy from DC link to auxiliary energy
F	**C**	**F**	[a]	**C**		TrnsfElNrgTrcnAuxNrg	Transform electrical energy from traction transformer to auxiliary energy
F	**C**	**F**	[a]	**D**		TrnsfElNrgWorkShopSplyAuxNrg	Transform electrical energy from workshop supply to auxiliary energy
F	**C**	**G**	[a]			DstElAuxNrg	Distribute electrical auxiliary energy
F	**C**	**G**	[a]	**B**		MngDstElNrgAux	Manage distribution of electrical energy for auxiliaries
F	**C**	**G**	[a]	**C**		PrtctDistDevcs	Protect distribution devices
F	**C**	**G**	[a]	**C**	**B**	PrtctElDevOverU	Protect electrical devices against overvoltage
F	**C**	**G**	[a]	**C**	**C**	PrtctElDevOverCur	Protect electrical devices against overcurrent
F	**C**	**G**	[a]	**C**	**D**	DetcGrondShortCircAuxNrgDstNetw	Detects grounds or short circuits in the Auxiliary energy distribution network
F	**C**	**G**	[a]	**D**		EnblDisChrgShortCirctGroundng	Enable discharching, short circuiting and grounding
F	**C**	**H**	[a]			StrElNrgAuxNrg	Store electrical auxiliary energy
F	**C**	**H**	[a]	**B**		PrvdChrg	Provide Charging
F	**C**	**H**	[a]	**C**		PrvdDisChrg	Provide Discharging
F	**C**	**H**	[a]	**D**		PrvdLowUCtrlStatInf	Provide low voltage control status information
F	**C**	**H**	[a]	**E**		PrvdLowUDCSply	Provide low voltage DC supply
F	**C**	**H**	[a]	**F**		EnsElPrtct	Ensure electrical protection
F	**C**	**J**				DissLossElAuxNrgProvis	Dissipate losses of electrical auxiliary energy provision
F	**D**					PrvdPnNrg	Provide fluid energy for traction
F	**D**	**B**				MngFluidNrgTrcn	Manage fluid energy for traction
F	**D**	**C**				AcqrFluidNrgDmnTrctnSystem	Acquire fluid energy demand for traction system

Table E.1 — List of function abbreviations *(13 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
F	**D**	**D**				GenFluidNrgTrcn	Generate fluid energy for traction
F	**D**	**E**				CllcFluidNrgTrcn	Collect fluid energy for traction
F	**D**	**F**				StoreFluidNrgTrcn	Store fluid energy for traction
F	**D**	**G**				TrnsfFluidNrgTrcn	Transform fluid energy for traction
F	**D**	**H**				DstFluidNrgTrcn	Distribute fluid energy for traction
F	**D**	**J**				DissLossFluidTrcnNrgProvis	Dissipate losses of fluid traction energy provision
F	**E**					PrvdFluidNrgAux	Provide fluid energy for auxiliaries
F	**E**	**B**	[a]			MngFluidNrgAux	Manage fluid energy for auxiliaries
F	**E**	**C**	[a]			GenFluidNrgAux	Generate fluid energy for auxiliaries
F	**E**	**C**	[a]	**B**		MngGenProc	Manage generation process
F	**E**	**C**	[a]	**C**		PrtctOverPress	Protect against over pressure
F	**E**	**C**	[a]	**D**		EnsAirQlt	Ensure air quality
F	**E**	**D**				CllcFluidNrgAux	Collect fluid energy for auxiliaries
F	**E**	**E**				StoreFluidNrgAux	Store fluid energy for auxiliaries
F	**E**	**F**				TrnsfFluidNrgAux	Transform fluid energy for auxiliaries
F	**E**	**G**				DstFluidNrgAux	Distribute fluid energy for auxiliaries
F	**E**	**H**				DissLossFluidAuxNrgProvis	Dissipate losses of fluid auxiliary energy provision
F	**F**					PrvdMechNrgTrcn	Provide mechanical energy for traction
F	**F**	**B**				MngMechNrgTrcn	Manage mechanical energy for traction
F	**F**	**C**				AcqrMechEDmnTrctnSys	Acquire mechanical energy demand for traction system
F	**F**	**D**	[a]			GenMechNrgTrcn	Generate mechanical energy for traction
F	**F**	**D**	[a]	**B**		TrnsfFossilNrgMechNrg	Transform fossil energy into mechanical energy
F	**F**	**D**	[a]	**B**	**B**	EngnCntrl	Engine control
F	**F**	**D**	[a]	**B**	**C**	AltCtrl	Alternator control
F	**F**	**E**				TrnsfMechNrgTrcn	Transform mechanical energy for traction
F	**F**	**F**				DstMechNrgTrcn	Distribute mechanical energy for traction

Table E.1 — List of function abbreviations *(14 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
F	F	G				DissLossMechTrcnNrgProvis	Dissipate losses of mechanical traction energy provision
F	G					PrvdChmclNrg	Provide mechanical energy for auxiliaries
F	G	B				MngMechNrgAux	Manage mechanical energy for auxiliaries
F	G	C	[a]			GenMechNrgAux	Generate mechanical energy for auxiliaries
F	G	C	[a]	B		TrnsfFossilEMechE	Transform fossil energy into mechanical energy
F	G	C	[a]	B	B	EngnCntrl	Engine control
F	G	C	[a]	B	C	AltrntrCntrl	Alternator control
F	G	D	[a]			TrnsfMechNrgAux	Transform mechanical energy for auxiliaries
F	G	E				DstMechNrgAux	Distribute mechanical energy for auxiliaries
F	G	F				DissLossMechAuxNrgProvis	Dissipate losses of mechanical auxiliary energy provision
F	H					PrvdChemNrgTrcn	Provide chemical energy for traction
F	H	B				MngChemNrgTrcn	Manage chemical energy for traction
F	H	C				AcqrChemEDemndTrctnSystem	Acquire chemical energy demand for traction system
F	H	D				StoreChemNrgTrcn	Store chemical energy for traction
F	H	E				CllcChemNrgTrcn	Collect chemical energy for traction
F	H	F				DstChemNrgTrcn	Distribute chemical energy for traction
F	J					PrvdChemNrgAux	Provide chemical energy for auxiliaries
F	J	B				MngChemNrgAux	Manage chemical energy for auxiliaries
F	J	C				StoreChemNrgAux	Store chemical energy for auxiliaries
F	J	D				CllcChemNrgAux	Collect chemical energy for auxiliaries
F	J	E				DstChemNrgAux	Distribute chemical energy for auxiliaries
G						AMainVBrakeStop	Accelerate, maintain speed, brake and stop
G	B					PrvdTrcn	Provide acceleration
G	B	B	[a]			CnfgPrplsSys	Configure propulsion system
G	B	B	[a]	B		CnfgPrplsSysOprModesLimits	Configure propulsion system according to operational modes/limits

Table E.1 — List of function abbreviations *(15 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
G	B	B	a	C		CnfgPrpls	Configure propulsion system according to internal status
G	B	B	a	D		ApplyPLimit	Apply power limits
G	B	C	a			AcqrPrplsDmn	Acquire propulsion demand
G	B	C	a	B		AcqrPrplsDmnDrvr	Acquire propulsion demand from the driver
G	B	C	a	C		AcqrPrplsDmnATO	Acquire propulsion demand from the ATO
G	B	C	a	D		AcqrPropulsDmnIntVCtrl	Acquire propulsion demand from internal speed control
G	B	C	a	E		AcqrDmnDynBrakeFBrakeCtrl	Acquire demand for dynamic brake force from brake control
G	B	C	a	F		AcqrTrcnCutOff	Acquire traction cut-off
G	B	D	a			Mng	Manage traction system within mode
G	B	D	a	B		CtrlMotorVTrq	Control motor speed and torque
G	B	D	a	C		CtrlTrqTx	Control the torque transmission (gear)
G	B	D	a	D		IsltTrcnElem	Isolate traction elements
G	B	D	a	E		CutOffTrcnDmn	Cut-off traction on demand
G	B	E				PrvdDmnNrgSply	Provide demand for energy supply
G	B	F				CtrlWheelSlpp	Control wheel slipping
G	B	G	a			GenTrctvEffrt	Generate tractive effort
G	B	G	a	B		CnvElNrgTrcnFViceVersa	Convert electrical energy into traction force and vice versa
G	B	G	a	B	B	CtrlCnvProc	Control conversion process
G	B	G	a	B	C	CnvElNrgVrblElNrgOtpt	Convert electrical energy into variable electrical energy output
G	B	G	a	B	D	CnvElNrgMechTrqViceVersa	Convert electrical energy into mechanical torque and vice versa (generator operation)
G	B	G	a	B	E	DissHeat	Dissipate heat
G	B	G	a	C		CnvFluidNrgTrcnFViceVisa	Convert fluid energy into traction force and vice versa
G	B	G	a	C	B	CntrlCnvrsnProcss	Control conversion process
G	B	G	a	C	C	CnvFluidNrgVrblNrgOtpt	Convert fluid energy into variable energy output
G	B	G	a	C	D	CnvNrgMechTrq	Convert energy into mechanical torque

Table E.1 — List of function abbreviations *(16 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
G	B	G	[a]	C	E	DisspHeat	Dissipate heat
G	B	G	[a]	D		CnvMechNrgTrcnFViceVersa	Convert mechanical energy into traction force and vice versa
G	B	G	[a]	D	B	ContrlCnversnProcess	Control conversion process
G	B	G	[a]	D	C	CnvMechNrgFluidNrgOtpt	Convert mechanical energy into fluid energy output
G	B	G	[a]	D	D	CnvMechNrgVrblMechNrgOtpt	Convert mechanical energy into variable mechanical energy output
G	B	G	[a]	D	E	CnvEMechnclTorq	Convert energy into mechanical torque
G	B	G	[a]	D	F	DissptHeat	Dissipate heat
G	B	G	[a]	E		CnvChemNrgTrcnFViceVersa	Convert chemical energy into traction force and vice versa
G	B	G	[a]	E	B	ControlCnversonProcss	Control conversion process
G	B	G	[a]	E	C	CnvChemNrgNrgOtpt	Convert chemical energy into energy output
G	B	G	[a]	E	D	CnvEMechTorq	Convert energy into mechanical torque
G	B	G	[a]	E	E	DisspatHeat	Dissipate heat
G	B	H	[a]			ReUseBrakeNrg	Reuse braking energy
G	B	H	[a]	B		CndtBrakeNrgReUse	Condition braking energy for reuse
G	B	H	[a]	C		CtrlDissBrakeNrgOnBoard	Controlled dissipation of braking energy onboard
G	B	H	[a]	D		RtrnRgnrtNrgAuxSys	Return regenerated energy to auxiliary systems
G	B	H	[a]	E		TrnsRegNrgStoreLinePSply	Transfer regenerated energy into storages/line power supply
G	C					PrvdDeccl	Provide deceleration and keep the train at standstill
G	C	B	[a]			CnfgBrakeSys	Configure brake system
G	C	B	[a]	B		CnfgBrakeSysTrianConf	Configure brake system according to train configuration
G	C	B	[a]	C		CnfgBrakeSysActiveCabin	Configure brake system according to activated cabin
G	C	B	[a]	D		CnfgBrakeSysOprRestrct	Configure brake system according to operational restrictions and degraded mode conditions
G	C	B	[a]	E		StatBrakeSys	Get status of brake systems
G	C	B	[a]	E	B	StatAutomBrakeSys	Get status of automatic brake system
G	C	B	[a]	E	C	StatDrctBrakeSys	Get status of direct brake system

Table E.1 — List of function abbreviations *(17 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
G	C	B	a	E	D	StatElDynBrakeSys	Get status of electrodynamic brake system
G	C	B	a	E	E	StatHydroDynBrakeSys	Get status of hydrodynamic brake system
G	C	B	a	E	F	StatEddyCurBrakeSys	Get status of eddy current brake system
G	C	B	a	E	G	StatMgntTrackBrakeSys	Get status of magnetic track brake system
G	C	B	a	F		IsltBrakeSysDev	Isolate brake systems/devices
G	C	B	a	F	B	IsltBrakeSysTrainLevel	Isolate brake systems at train level
G	C	B	a	F	C	IsltBrakeSysDevCnstsLevel	Isolate brake systems/devices at consist level
G	C	B	a	F	D	IsltBrakeSysDevCarLevel	Isolate brake systems/devices at car level
G	C	B	a	F	E	IsltBrakeSysDevBogieLevel	Isolate brake systems/devices at bogie level
G	C	B	a	F	F	IsltBrakeSysDevAxleLevel	Isolate brake systems/devices at axle level
G	C	C	a			AcqrBrakeDmn	Acquire brake demand
G	C	C	a	B		AcqBrakeDmnDrvr	Acquire brake demand from the driver
G	C	C	a	B	B	AcqrBrakeDmnDrvrAutomBrakeCtrl	Acquire brake demand from the driver's automatic brake controller
G	C	C	a	B	C	AcqrBrakeDmnTrcnBrakeCtrl	Acquire brake demand from the traction brake controller
G	C	C	a	B	D	AcqrBrakeDmnDrctBrakeCtrl	Acquire brake demand from direct brake controller
G	C	C	a	B	E	AcqrBrakeDmnEmrDev	Acquire brake demand from emergency devices
G	C	C	a	C		AcqrBrakeDmnTrainPrtctFunc	Acquire brake demand from the train protection functions
G	C	C	a	C	B	AcqrBrakeDmnDrvrActCtrl	Acquire brake demand from the driver activity control
G	C	C	a	C	C	AcqBrakeDmnATP	Acquire brake demand from ATP
G	C	C	a	C	D	AcqrBrakeDmnBrakeSgnlTx	Acquire brake demand from brake signal transmission
G	C	C	a	D		AcqrBrakeDmnIntVCtrl	Acquire brake demand from internal speed control
G	C	C	a	E		AcqrBrakeDmnPaxCrew	Acquire brake demand from passengers and crew
G	C	D	a			PrioBrakeDmnSlctBrakeMode	Prioritise brake demand and select braking mode
G	C	D	a	B		SetUpServBrakeMode	Set up service brake mode
G	C	D	a	C		SetUpEmrBrakeMode	Set up emergency brake mode

Table E.1 — List of function abbreviations *(18 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
G	C	D	[a]	D		SetUpHldBrakeMode	Set up holding brake mode
G	C	D	[a]	D	B	SetUpHldBrakeModeAutom	Set up holding brake mode automatically
G	C	D	[a]	D	C	SetUpHldBrakeModeMnlly	Set up holding brake mode manually
G	C	D	[a]	E		SetUpPrkBrakeMode	Set up parking brake mode
G	C	E	[a]			AllctBrakeEffrt	Allocate braking effort
G	C	E	[a]	B		ClcBrakeEffrt	Calculate needed braking effort
G	C	E	[a]	B	B	ClcBrakeEffrtTrainLevel	Calculate needed brake effort at train level
G	C	E	[a]	B	C	ClcBrakeEffrtCnstsLevel	Calculate needed brake effort at consist level
G	C	E	[a]	B	D	ClcBrakeEffrtVehLvl	Calculate needed brake effort at vehicle level
G	C	E	[a]	B	E	ClcBrakeEffrtBogieLevel	Calculate needed brake effort at bogie level
G	C	E	[a]	C		PrioExec	Prioritise executing braking systems
G	C	E	[a]	D		AcqrAvlblBrakeEffrt	Acquire available braking effort
G	C	F	[a]			HndlBrakeTrainCnfgBrakeModeBrakeDmn	Handle braking due to train configuration, brake mode and brake demand
G	C	F	[a]	B		HndlBrakeHghrlevel	Handle braking at higher levels
G	C	F	[a]	B	B	HndlBrakeTrainLevel	Handle braking at train level
G	C	F	[a]	B	C	HndlBrakeCnstsLevel	Handle braking at consist level
G	C	F	[a]	B	D	HndlBrakeVehLevel	Handle braking at vehicle level
G	C	F	[a]	B	E	HndlBrakeBogieLevel	Handle braking at bogie level
G	C	F	[a]	C		DtrmPointCtrlDepBrakeModeLocalLevel	Determine set points and control depending on brake mode at local level
G	C	F	[a]	C	B	PrvdBrakeCmdPrkBrake	Provide Brake Command for parking Braking
G	C	F	[a]	C	C	PrvdBrakeCmdHldBrake	Provide Brake Command for Holding Braking
G	C	F	[a]	C	D	PrvdBrakeCmdServ	Provide Brake Command for Service Braking
G	C	F	[a]	C	E	PrvdBrakeCmdEmrBrake	Provide Brake Command for Emergency Braking
G	C	F	[a]	D		MngBrakeBlndLocLevel	Manage brake blending at local level
G	C	F	[a]	E		RqstTrcnCutOff	Request traction cut-off

Table E.1 — List of function abbreviations *(19 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
G	C	F	a	F		AcqrRlzdBrakeEffrt	Acquire realised braking effort
G	C	G	a			ApplyRelBrakeEffrt	Apply and release braking forces
G	C	G	a	B		GenRedBrakeF	Generate and reduce braking forces
G	C	G	a	B	B	GenBrakeFrctBrake	Generate braking forces by friction brake
G	C	G	a	B	C	GenBrakeFEddyCurBrake	Generate braking forces by eddy-current brake
G	C	G	a	B	D	GenBrakeFMgntTrackBrake	Generate braking forces by magnetic track brake
G	C	G	a	B	E	CmdElDynBrake	Command electrodynamic brake
G	C	G	a	B	F	RelBrakeF	Release braking forces (manually and emergency release)
G	C	G	a	C		DissipateHeat	Dissipate heat
G	C	G	a	D		PrvdStoreNrgBreak	Provide storage of energy for braking (at train level)
G	C	G	a	D	B	PrvdIntMdtStoreNrgBrake	Provide intermediate storage of energy for braking
G	C	G	a	D	C	CtrlStoreLevelNrgFlow	Control storage level and energy flow
G	C	G	a	D	D	PrtctStoreNrgBrake	Protect stored energy for braking
G	C	G	a	E		DtctNonRelBrakeF	Detect non-release of braking forces
G	C	H	a			PrvdWheelSlidePrtct	Provide Wheel Slide Protection
G	C	H	a	B		DtctSlide	Detect sliding
G	C	H	a	C		CtrlSlide	Control sliding
G	C	H	a	D		MngBrakeRel	Manage brake release
G	D		a			ImpAdh	Improve adhesion
G	D	B	a			MngSand	Manage sanding
G	D	B	a	B		SlctDirect	Select direction
G	D	B	a	C		SlctAxle	Select axle
G	D	B	a	D		DrySand	Dry sand
G	D	B	a	E		HeatSand	Heat sand
G	D	B	a	F		PrvdSandLevel	Provide sand level
G	D	B	a	G		CmdSand	Command sanding

Table E.1 — List of function abbreviations *(20 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
G	D	C				CndtWheelSrfc	Condition the wheel surface
H						PrvdTrainCmnMntrCtrl	Provide train communication, monitoring and control
H	B					KeepStaffInf	Keep the train staff informed
H	B	B				MngInfAccs	Manage information access
H	B	C				AcqrInfDsp	Acquire information to be displayed
H	B	D	[a]			EnsDspInf	Ensure display of information
H	B	D	[a]	B		PrioInf	Prioritise information
H	B	D	[a]	C		EnblSwtchTypDspViews	Enable the switching between different types of displays/views
H	B	D	[a]	D		EnsVsblInfDgrdCndt	Ensure visibility of information under degraded conditions
H	B	E	[a]			PrvdOprRlvntInf	Provide operation relevant information
H	B	E	[a]	B		PrvdTrainStatInfCrew	Provide train status information to the crew
H	B	E	[a]	C		PrvdTrainRadioInf	Provide train radio information
H	B	E	[a]	D		PrvdCtrlCmdInf	Provide control command information
H	B	E	[a]	E		PrvdPaxInfSysInf	Provide passenger information system information
H	B	E	[a]	F		PrvdMntnc	Provide maintenance information
H	B	E	[a]	G		PrvdTrainOperDrvngInf	Provide train operator with driving information
H	B	E	[a]	H		PrvdTmtInf	Provide timetable information
H	B	E	[a]	J		PrvdDiagInf	Provide diagnostic information
H	C					PrvdTrainCmn	Provide trainwide communication
H	C	B	[a]			InaugTrainNetw	Inaugurate train network
H	C	B	[a]	B		DtrmTrainTplgCnfg	Determine train topology and configuration
H	C	B	[a]	B	B	PrvdOrientInfCplElem	Provide orientation information for coupled elements
H	C	B	[a]	B	C	MngLeadVehInf	Manage leading vehicle information
H	C	B	[a]	C		DstTrianTplgCnfg	Distribute train topology and configuration
H	C	B	[a]	D		ConfirmTrainCnfg	Confirm train configuration

Table E.1 — List of function abbreviations *(21 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
H	C	C	a			MngTrainNetwOpr	Manage train network operation
H	C	C	a	B		MngTrainNetwAccs	Manage train network access
H	C	C	a	C		TxData	Transmit data
H	D					MngTrainMode	Manage train modes
H	D	B	a			MngOprMode	Manage operation mode
H	D	B	a	B		MngNrmOprMode	Manage normal operation mode
H	D	B	a	C		MngMntncMode	Manage maintenance mode
H	D	B	a	D		MngCmissnMode	Manage commissioning mode
H	D	C	a			MngShutDownMode	Manage shut down mode
H	D	C	a	B		MngPrk	Manage parking mode
H	D	C	a	C		MngPullMode	Manage pulled mode
H	D	D	a			MngSwtchMode	Manage switched on-mode
H	D	D	a	B		MngStartChrgBtry	Manage starting from charged battery
H	D	D	a	C		MngStartFlatBtry	Manage starting from flat battery
H	D	E				MngServRetntMode	Manage service retention mode
H	D	F				MngServMode	Manage in service mode
H	D	G	a			MngDrvingMode	Manage driving mode
H	D	G	a	B		MngNrmDrvingMode	Manage normal driving mode
H	D	G	a	C		MngCplMode	Manage coupling mode
H	D	G	a	D		MngWshMode	Manage washing mode
H	D	G	a	E		MngShntMode	Manage shunting mode
H	D	G	a	F		MngTransMode	Manage transition mode
H	D	G	a	G		MngEmrMode	Manage emergency mode
H	D	H				MngNrgSaveMode	Manage energy saving mode
H	D	J				MngBtryPrtctMode	Manage battery protection mode
H	E					AllwPrprCtrl	Allow proper control

Table E.1 — List of function abbreviations *(22 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
H	E	B	a			MngCabCtrl	Manage cab control
H	E	B	a	B		EnsAccsCtrlCab	Ensure access control in the cab
H	E	B	a	C		MngCabAct	Manage cab activation
H	E	B	a	D		SelLang	Select language
H	E	B	a	E		MngCabDeAct	Manage cab deactivation
H	E	B	a	F		PrvtMstrCnflctMoreThanOneActCab	Prevent master conflict due to more than one activated cab
H	E	C	a			MngPrplsBrakeDmn	Manage propulsion and brake demand
H	E	C	a	B		PrstMntV	Preset and monitor speed
H	E	C	a	C		MngTopLevelDmnEl	Manage top level demand electrically
H	E	C	a	C	B	CmpteData	Compute data
H	E	C	a	C	C	Tx	Transmit
H	E	C	a	D		MngTopLevelDmnMech	Manage top level demand mechanically
H	E	C	a	D	B	ComputData	Compute data
H	E	C	a	D	C	Trnsmt	Transmit
H	E	C	a	E		MngSandng	Manage sanding
H	E	D	a			MngNrgSply	Manage energy supply
H	E	D	a	B		MngNrgSplyTrcn	Manage energy supply for traction
H	E	D	a	C		MngNrgSplyAux	Manage energy supply for auxiliaries
H	E	E	a			MngAppropSaveCndt	Manage appropriate and safe conditions
H	E	E	a	B		InflFirePrtct	Influence for fire protection
H	E	E	a	C		MngTiltSys	Manage tilting system
H	E	E	a	D		MngWindScrClean	Manage windscreen cleaning
H	E	E	a	E		MngWindScrDfrst	Manage windscreen defrosting
H	E	E	a	F		MngIntLight	Manage interior lighting
H	E	E	a	G		MngClmt	Manage climatisation

Table E.1 — List of function abbreviations *(23 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
H	E	E	a	H		MngPAPisIntrc	Manage passenger information, public adress and intercom
H	E	E	a	J		MngSrvlSys	Manage surveillance system
H	E	F	a			MngAccsLoad	Manage access and loading
H	E	F	a	B		MngExtDoorSys	Manage exterior door system
H	E	G	a			MngCnctVeh	Manage connecting of vehicles
H	E	G	a	B		MngCoupl	Manage coupling
H	E	H	a			MngCtrlPrmtr	Manage control of the train parameters
H	E	H	a	B		MngTimeInf	Manage time information
H	E	H	a	C		EnterTrainNmbr	Enter train number
H	E	H	a	D		EnterWheelDiamtr	Enter wheel diameter
H	E	H	a	E		EnterMssnPrmtr	Enter mission parameters
H	E	H	a	F		MngIsltDev	Manage isolation of devices
H	E	H	a	G		PrvdRemCtrl	Provide remote control
H	E	J	a			MngIntgrVehComplRailWaySys	Manage integration of the vehicle in the complete railway system
H	E	J	a	B		MngExtLight	Manage exterior lighting
H	E	J	a	C		MngRouteSlctSys	Manage route selection system
H	E	J	a	D		MngTrffcLight	Manage traffic lights
H	E	J	a	E		MngSgnlSys	Manage signalling system
H	E	J	a	F		MngAccstcWarnSys	Manage acoustic warning system
H	F					MngCheckTrainDeprt	Manage checks before train departure
H	F	B				MngAutomTest	Manage automatic test
H	F	C				MngManuTest	Manage manual test
H	F	D				MngTestRes	Manage test results
H	G					PrvdDiag	Provide diagnostics
H	G	B	a			InitDiag	Initiate diagnostics

Table E.1 — List of function abbreviations *(24 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
H	G	B	[a]	B		ClearDb	Clear database
H	G	B	[a]	C		CrteNewDb	Create new database
H	G	B	[a]	D		UpdDb	Update database
H	G	B	[a]	D	B	SetEventState	Set event state
H	G	B	[a]	D	C	GetEventState	Get event state
H	G	B	[a]	D	D	IntlPrmtr	Initialise parameter (state update request)
H	G	C	[a]			StoreDiagData	Store diagnostic data
H	G	C	[a]	B		StoreEvent	Store events
H	G	C	[a]	B	B	StoreFault	Store fault
H	G	C	[a]	B	C	StoreFail	Store failure
H	G	C	[a]	B	D	StoreErr	Store error
H	G	C	[a]	B	E	StoreProtocEvent	Store protocol event
H	G	C	[a]	C		StorCndtData	Store condition data
H	G	C	[a]	C	B	StoreCount	Store counter
H	G	C	[a]	C	C	StorePrmtr	Store parameter
H	G	C	[a]	D		EnblDsblStrgEventData	Enable and disable storage of event data
H	G	C	[a]	E		CrteDiagDataSet	Create diagnostic data set
H	G	C	[a]	F		MngDbOverFlow	Manage database overflow
H	G	D	[a]			AccsDiagData	Access diagnostics data
H	G	D	[a]	B		MngAccsDiagDb	Manage access to diagnostic database
H	G	D	[a]	C		PrvdDataBaseStatInf	Provide database status information
H	G	D	[a]	C	B	PrvdDbLifeSignSgnl	Provide database life sign signal
H	G	D	[a]	C	C	PrvdDbVrs	Provide database version
H	G	D	[a]	C	D	PrvdVehName	Provide vehicle name
H	G	D	[a]	C	E	PrvdDbFllLevelSgnl	Provide database filling level signal
H	G	D	[a]	C	F	PrvdUICStateInf	Provide UIC state information

Table E.1 — List of function abbreviations *(25 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
H	G	D	[a]	C	G	PrvdProtocVrs	Provide protocol version
H	G	D	[a]	D		PrvdDbServInf	Provide database service info
H	G	D	[a]	D	B	PrvdCrteTime	Provide creation time
H	G	D	[a]	D	C	PrvdInitTime	Provide initialisation time
H	G	D	[a]	D	D	PrvdOprHours	Provide operating hours
H	G	D	[a]	E		ReadEventData	Read event data
H	G	D	[a]	E	B	ReadFault	Read fault
H	G	D	[a]	E	C	ReadFail	Read failure
H	G	D	[a]	E	D	ReadError	Read error
H	G	D	[a]	E	E	ReadProtocEvent	Read protocol event
H	G	D	[a]	F		ReadCndt	Read condition data
H	G	D	[a]	F	B	ReadCount	Read counter
H	G	D	[a]	F	C	ReadPrmtr	Read parameter
H	G	D	[a]	G		UpldEvent	Upload events
H	G	D	[a]	H		DelEvent	Delete events
H	G	D	[a]	J		UpldDwnlPrmtr	Upload/download parameters
H	G	E	[a]			ProcDiagData	Process diagnostic data
H	G	E	[a]	B		ProcCndtData	Process condition data
H	G	E	[a]	C		MntTrainStat	Monitor train status
H	G	E	[a]	D		IndEvent	Indicate events
H	G	E	[a]	E		PrioEvent	Prioritise events
H	G	E	[a]	F		FilterSortEvent	Filter and sort events
H	H					AssTrblsht	Assist troubleshooting
H	H	B				MngEventAccordPrrt	Manage events according to their priority
H	H	C	[a]			AllowDtldEventAnlys	Allow detailed event analysis
H	H	C	[a]	B		PrvdCauseEvent	Provide cause of event

Table E.1 — List of function abbreviations *(26 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
H	**H**	**C**	[a]	**C**		PrvdCnsqncEvent	Provide consequence of event
H	**H**	**D**				PrvdGdnDrvrContnuMssn	Provide guideance to the driver to continue the mission
H	**H**	**E**				MngTrblshtText	Manage troubleshooting text
H	**H**	**F**				MngStaticAnlys	Manage statistical analysis
H	**J**					CtrlDrvrAct	Control driver activity
H	**J**	**B**				CnfgPrmtrCtrlDrvrActDev	Configure parameters of control driver activity device
H	**J**	**C**				PrvdTestCtrlDrvrActDeprt	Provide test of control driver activity before departure
H	**J**	**D**				IsltDrvrActDev	Isolate driver activity device
H	**K**					PrvdJurDataRec	Provide juridical data recording
J						SppGuideTrainTrack	Support and guide the train on the track
J	**B**					GuideTrain	Guide the train
J	**B**	**B**	[a]			MngBogieStab	Manage bogie stability
J	**B**	**B**	[a]	**B**		EnsBogieStab	Ensure bogie stability
J	**B**	**B**	[a]	**C**		MntBogieStab	Monitor bogie stability
J	**B**	**B**	[a]	**D**		DectBogieInStab	Detect bogie instability
J	**B**	**B**	[a]	**E**		SgnlBogieInStab	Signal bogie instability
J	**B**	**C**				PrvdvDrlmnt	Provide derailment information
J	**B**	**D**	[a]			MntObstcl	Monitor obstacles within track
J	**B**	**D**	[a]	**B**		DectObstclClrancGauge	Detect obstacles within clearance gauge
J	**B**	**D**	[a]	**C**		SgnlObstclClrncGauge	Signal obstacles within clearance gauge
J	**B**	**E**				RemObstclTrack	Remove obstacle on the track
J	**B**	**F**				LbrctWheelFlng	Lubricate wheel flange
J	**B**	**G**	**a**			RideSpecfdTrackCond	Ride at specified track conditions
J	**B**	**G**	**a**	**B**		NgtHrzCrv	Negotiate horizontal curves
J	**B**	**G**	[a]	**C**		NgtVertCrv	Negotiate vertical curves

Table E.1 — List of function abbreviations *(27 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
J	**B**	**G**	[a]	**D**		RunTwsTrack	Run on a twisted track
J	**B**	**G**	[a]	**E**		RunAccrsSpecTrackWork	Run accross special trackwork
J	**B**	**G**	[a]	**F**		NgtSCrv	Negotiate S curves
J	**B**	**H**	[a]			MntWhlstBearStat	Monitor wheelset bearing status
J	**B**	**H**	[a]	**B**		DetcHotAxleBoxBearTmp	Detect hot axle box bearing temperature
J	**B**	**H**	[a]	**C**		SgnlHotAxleBoxBearTmp	Signal hot axle box bearing temperature
J	**B**	**J**	[a]			MntGrbxStat	Monitor gearbox status
J	**B**	**J**	[a]	**B**		DetcGearBoxHotOilTmp	Detect gear box hot oil temperature
J	**B**	**J**	[a]	**C**		SgnlGearBoxHotOilTmp	Signal gear box hot oil temperature
J	**B**	**K**				PrvdSspnsDiag	Provide a suspension diagnostic
J	**B**	**L**				EnblRailGaugeSwtch	Enable rail gauge switching
J	**B**	**M**				PrvtDrlmnt	Prevent derailment
J	**B**	**N**				PrvdDetcNonRottAxle	Provide Detection of Non Rotating Axle
J	**C**					TxF	Transmit forces
J	**C**	**B**	[a]			TxLongtdF	Transmit longitudinal forces
J	**C**	**B**	[a]	**B**		TxLongtdFSecndLevel	Transmit longitudinal forces at secondary level
J	**C**	**B**	[a]	**C**		TxLongtdFPrimLevel	Transmit longitudinal forces at primary level
J	**C**	**B**	[a]	**D**		TxLongtdFTrackLevel	Transmit longitudinal forces at track level
J	**C**	**C**	[a]			TxTrnsvr	Transmit transversal forces
J	**C**	**C**	[a]	**B**		TxTrnsvrFSecndLevel	Transmit transversal forces at secondary level
J	**C**	**C**	[a]	**C**		TxTrnsrvrFPrimLevel	Transmit transversal forces at primary level
J	**C**	**C**	[a]	**D**		TxTrnsrvrFTrackLevel	Transmit transversal forces at track level
J	**C**	**D**	[a]			SppVehDynStticLoad	Support vertical dynamic and static load
J	**C**	**D**	[a]	**B**		SppVertDynStticLoadSecndLevel	Support vertical dynamic and static load at secondary level
J	**C**	**D**	[a]	**C**		SppVertDynStticLoadPrimLevel	Support vertical dynamic and static load at primary level

Table E.1 — List of function abbreviations *(28 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
J	C	D	[a]	D		SppVertDynStticLoadTrackLevel	Support vertical dynamic and static load at track level
J	C	E	[a]			TxTrcnBrakeEffrt	Transmit traction and brake effort
J	C	E	[a]	B		TxTrcnFRail	Transmit traction forces to the rail
J	C	E	[a]	C		TxTrqMotorElBrake	Transmit torque to the motor in electric brake
J	C	E	[a]	D		TxReacFMotorSpp	Transmit reaction forces of the motor on its support
J	C	E	[a]	E		TxReacFGrbxSpp	Transmit reaction forces of the gearbox on its support
J	C	E	[a]	F		TxElMgntBrakeEffrt	Transmit electromagnetic brake effort
J	D					LmtAccl	Limit acceleration
J	D	B	[a]			LmtXYZAccl	Limit x-y-z acceleration
J	D	B	[a]	B		LmtXAccl	Limit x acceleration
J	D	B	[a]	C		LmtYAccl	Limit y acceleration
J	D	B	[a]	D		LmtZAccl	Limit z acceleration
J	D	C				LimitJerk	Limit jerk
J	E					KeepVhclInsdGauge	Keep vehicle inside gauge envelope
J	E	B				LimitRollSway	Limit roll and sway
J	E	C				LimitLatrMvmnt	Limit lateral movement
J	E	D				LimitVertMvmnt	Limit vertical movement
K						IntgrVehComplSysRailWay	Integrate the vehicle into the complete system railway
K	B					IndPresVehOther	Indicate the presence of the vehicle to others
K	B	B				IndctPresAccstc	Indicate presence by acoustic means
K	B	C				IndPresOptc	Indicate presence by reflective optic means
K	B	D				IndicPresncExtLights	Indicate the presence by external lights
K	C					PrvdIdnt	Provide identification
K	C	B				PrvdIndPresExtLight	Provide identification by optic Labeling (z.B.Car_Nr).
K	C	C				PrvdIdntElElem	Provide identification by electronic elements (z.B. RFID)

Table E.1 — List of function abbreviations *(29 of 29)*

Level				Level		Abbreviation	Function (level 1 to level 5)
1	2	3		4	5		
K	**D**					PrvdTrainGroundCmn	Provide operational communication and train/ground data transmission
K	**D**	**B**				EnsDataIntfTrackSideSgnlSys	Ensure data interface to trackside signaling system
K	**D**	**C**	[a]			PrvdTrainGroundCmn	Provide train to ground communication
K	**D**	**C**	[a]	**B**		AlarmMechGround	Alarming mechanism to the ground
K	**D**	**C**	[a]	**C**		PrvdAdminServCmnGround	Provide administration service for communication to the ground
K	**D**	**C**	[a]	**D**		SendDiagDataGround	Send diagnostic data to the ground
K	**D**	**C**	[a]	**E**		SendCondDataGround	Send condition data to the ground
K	**D**	**C**	[a]	**F**		SendTrainPosGround	Send train position to the ground
K	**D**	**C**	[a]	**G**		SendTrainStatGround	Send train status to the ground
K	**D**	**C**	[a]	**H**		SendVoiceDataGround	Send voice data to the ground
K	**D**	**C**	[a]	**J**		SendVideoDataGround	Send video data to the ground
K	**D**	**D**	[a]			PrvdGroundTrainCmn	Provide ground to train communication
K	**D**	**D**	[a]	**B**		PrvdAlarmServTrain	Provide alarming service to the train
K	**D**	**D**	[a]	**C**		PrvdAdminServCmnTrain	Provide administration service for communication to the train
K	**D**	**D**	[a]	**D**		DwnlSftwrTrain	Download software to the train
K	**D**	**D**	[a]	**E**		SendTrainCnfgDataTrain	Send train configuration data to the train
K	**D**	**D**	[a]	**F**		SendDiagDataTrain	Send diagnostic data to the train
K	**D**	**D**	[a]	**G**		SendPisDataTrain	Send PIS data to the train
K	**D**	**D**	[a]	**H**		SendVoiceDataTrain	Send voice data to the train
K	**D**	**D**	[a]	**J**		SendVideoDataTrain	Send video data to the train
K	**D**	**E**				AnthftAlarm	Antitheft alarm (from outside)
K	**E**					PrvdATC	Provide Automatic Train Control (ATC)
K	**E**	**B**				PrvdATP	Provide Automatic Train Protection (ATP)
K	**E**	**C**				PrvdATO	Provide Automatic Train Operation (ATO)
K	**F**					EnsRouteSel	Ensure proper route selection and route signalling
K	**F**	**B**				SwtchRoute	Switch route
K	**F**	**C**				CtrlSgnl	Control signals

[a] A sub function with further sub functions on lower level according to Annex A.

Bibliography

[1] EN 12299, *Railway applications — Ride comfort for passengers — Measurement and evaluation*

[2] EN 13460:2009, *Maintenance — Documentation for maintenance*

[3] EN 14363, *Railway applications — Testing for the acceptance of running characteristics of railway vehicles — Testing of running behaviour and stationary tests*

[4] EN 15380-1:2006, *Railway applications — Designation system for railway vehicles — Part 1: General principles*

[5] EN 15380-2:2006, *Railway applications — Designation system for railway vehicles — Part 2: Product groups*

[6] EN 50128:2011, *Railway applications — Communications, signalling and processing systems — Software for railway control and protection systems*

[7] EN 50129:2003, *Railway applications — Communication, signalling and processing systems — Safety related electronic systems for signalling*

[8] EN 81346-1, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 1: Basic rules*

[9] EN 81346-2, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 2: Classification of objects and codes for classes*

[10] EN 82045-2:2005, *Document management — Part 2: Metadata elements and information reference model*

[11] ISO 80000 (all parts), *Quantities and units*

[12] IEC 61226:2009, *Nuclear power plants — Instrumentation and control important to safety — Classification of instrumentation and control functions*

[13] UIC 513, *Guidelines for evaluating passenger comfort in relation to vibration in railway vehicles*

[14] UIC 518, *Testing and approval of railway vehicles from the point of view of their dynamic behaviour — Safety — Track fatigue — Ride quality*

[15] UIC 612-0:2009, *Driver Machines Intefaces for EMU/DMU, locomotives and driving coaches — Functional and system requirements associated with harmonised Driver Machine Interfaces*

[16] UIC 612-1:2009, *Rolling stock configurations and main activated functions for EMU/DMU, locomotives and driving coaches*

[17] UIC 612-2:2010, *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)*

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