
Železniške naprave – Komunikacijski, signalni in procesni sistemi – Evropski sistem za vodenje železniškega prometa – Vmesnik človek-stroj – 2. del: Ergonomska razporeditev informacij ERTMS/ETCS/GSM-R

(istoveten CLC/TS 50459-2:2005)

Railway applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 2: Ergonomic arrangements of ERTMS/ETCS information

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English version

**Railway applications –
Communication, signalling and processing systems –
European Rail Traffic Management System –
Driver-Machine Interface
Part 2: Ergonomic arrangements of ERTMS/ETCS information**

Applications ferroviaires –
Systèmes de signalisation, de
télécommunications et de traitement –
Système européen de gestion du trafic
ferroviaire –
Interface de conduite
Partie 2: Aménagement ergonomique
des informations ERTMS/ETCS

Bahnanwendungen –
Telekommunikationstechnik, Signal-
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Europäisches Leitsystem für den
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Teil 2: Ergonomische Anordnung
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This Technical Specification was approved by CENELEC on 2005-05-07.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This Technical Specification was prepared by SC 9XA, Communication, signalling and processing systems, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

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has to be announced at national level (doa) 2005-11-07

This Technical Specification has been prepared under mandates M/024 and M/334 given to CENELEC by the European Commission and the European Free Trade Association.

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Contents

	Page
Introduction	6
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 Symbols and abbreviations	8
5 Characteristics of the screen layout	10
5.1 Presentation philosophy	10
5.1.1 Area description.....	10
5.1.2 The use of areas.....	11
5.1.3 Examples of screen management.....	12
5.2 Colour and sound philosophy	12
5.2.1 Ceiling speed monitoring (CSM)	13
5.2.2 Target speed monitoring (TSM)	15
5.2.3 Release speed monitoring (RSM)	17
5.2.4 Other supervisions or protections.....	17
6 ERTMS/ETCS driving information shown on the DMI.....	17
6.1 Principles	17
6.2 Speed and Supervision information	18
6.2.1 Speed Information	19
6.2.2 Brake Information	31
6.2.3 Supplementary Driving Information	41
6.3 Planning Information.....	52
6.3.1 General description	53
6.3.2 Distance scale	53
6.3.3 Orders and announcements	55
6.3.4 Gradient profile	56
6.3.5 Speed profile related information	56
6.3.6 Most restricted speed profile (MRSP)	58
6.3.7 Indication starting point.....	60
6.3.8 Train position and geographical location.....	61
6.3.9 Show and hide Planning area	62
6.3.10 Second layer information.....	62
6.4 Monitoring Information.....	63
6.4.1 TIU monitoring	63
6.4.2 STM monitoring	64
6.4.3 GSM-R monitoring.....	65
6.4.4 Actual time	66
6.4.5 Prompt information for the driver	66
6.4.6 Train running number	67
6.5 Driver menu selection.....	67
6.5.1 Main menu	67
6.5.2 Mode menu.....	68
6.5.3 Override menu	69
6.5.4 Data menu	69
6.5.5 Special menu	70
Annex A (normative) Conditions for display and colour philosophy.....	72
Annex B (informative) Example of area and screen dimensions when using a touch device.....	73
Annex C (informative) Example of area and screen dimensions when using soft keys	74
Annex D (informative) Other example of area and screen dimensions when using soft keys.....	75

Annex E (informative) DMI example with only necessary information and with soft keys and hard keys	76
Annex F (informative) Other DMI example with soft keys and hard keys	77
Bibliography	78
Figure 1 — The main areas of the DMI	10
Figure 2 — The sub areas of the DMI	10
Figure 3 — The use of areas of the DMI	11
Figure 4 — Colour philosophy and DMI brake monitoring	14
Figure 5 — Speed and supervision areas	18
Figure 6 — Overview of the main elements in the speed and supervision areas	18
Figure 7 — Screen location of the speed dial	19
Figure 8 — 400 km/h indication for the DMI	19
Figure 9 — 250 km/h indication for the DMI	19
Figure 10 — Screen location for the current train speed pointer	20
Figure 11 — Size of the current train speed pointer	21
Figure 12 — Current train speed pointer	21
Figure 13 — Screen location for the current train speed digital	22
Figure 14 — Current train speed digital	23
Figure 15 — Screen location of the Circular Speed Gauge (CSG)	23
Figure 16 — Size of the Circular Speed Gauge (CSG); all dimensions in cells	24
Figure 17 — Circular Speed Gauge (CSG), when the Pre-indication Status is active	24
Figure 18 — Circular Speed Gauge (CSG), when the Over-speed Status is active	24
Figure 19 — Screen location of the maximum supervised speed indication	25
Figure 20 — Maximum supervised speed indication	26
Figure 21 — Screen location of the Set speed indication	27
Figure 22 — Set speed indication at V_{perm}	27
Figure 23 — Set speed indication at V_{target}	27
Figure 24 — Screen location of the Release speed	28
Figure 25 — Release speed, when $V_{perm} > V_{release}$	28
Figure 26 — Release speed, when $V_{perm} < V_{release}$	28
Figure 27 — Screen location for advice speed	29
Figure 28 — Advice speed	30
Figure 29 — Screen location for distance to target	31
Figure 30 — Distance to target	31
Figure 31 — Screen location for warning time to intervention	32
Figure 32 — Warning time to intervention	33
Figure 33 — Screen location for predicted distance to standstill location	34
Figure 34 — Predicted distance to standstill location	35
Figure 35 — Predicted distance to standstill location	35
Figure 36 — Screen location for predicted speed at target	36
Figure 37 — Predicted speed at target	36
Figure 38 — Screen location for brake intervention symbol	38
Figure 39 — Brake intervention	38
Figure 40 — Screen location for passenger emergency intervention	39
Figure 41 — Screen location for braking train symbol	40
Figure 42 — Braking train	40
Figure 43 — Screen location for mode information (active and acknowledgment)	41
Figure 44 — Mode information	42
Figure 45 — Screen location for level information	42
Figure 46 — Level information	43
Figure 47 — Acknowledgement of a transition	44
Figure 48 — Screen location for text messages	44
Figure 49 — Text messages	45
Figure 50 — Screen location for actual orders	46
Figure 51 — Actual orders	47
Figure 52 — Screen location for supervision of driver activity	48
Figure 53 — Screen location for emergency signal to/from trains	49
Figure 54 — Screen location for time schedule difference	50

Figure 55 — Screen location for time table 50

Figure 56 — Time table 51

Figure 57 — Screen location for additional information 51

Figure 58 — Planning area 52

Figure 59 — Main elements of the planning area 52

Figure 60 — Screen location for the distance scale 54

Figure 61 — Distance scale 54

Figure 62 — Screen location for the orders and announcements 55

Figure 63 — Screen location for the gradient profile 56

Figure 64 — Screen location for the speed profile related information 57

Figure 65 — Speed profile related information 57

Figure 66 — Screen location for the most restricted speed profile 58

Figure 67 — Most restricted speed profile 58

Figure 68 — Relationship between MRSP of the track and the actual MRSP for the driver 59

Figure 69 — Screen location for the indication starting point 60

Figure 70 — Relationship between MRSP of the track and the indication starting point
for the driver 60

Figure 71 — Screen location for the train position and geographical location 61

Figure 72 — Train position and geographical location 61

Figure 73 — Second layer information for orders and announcements 62

Figure 74 — Second layer information for speed profile related information 62

Figure 75 — Monitoring area, right part 63

Figure 76 — Screen location for the TIU monitoring 63

Figure 77 — TIU monitoring 64

Figure 78 — Screen location for the STM mode monitoring 65

Figure 79 — GSM-R Network Indication 65

Figure 80 — Screen location for the actual time 66

Figure 81 — Actual time 66

Figure 82 — Main menu input area 67

Figure 83 — Mode menu 68

Figure 84 — Override menu 69

Figure 85 — Data menu 70

Figure 86 — Special menu 71

Figure B.1 — Screen dimensions when using a touch device (units in cells) 73

Figure C.1 — Screen dimensions when using soft keys (units in cells) 74

Figure D.1 — Screen dimensions when using soft keys (units in cells) 75

Figure E.1 — DMI Example with only necessary information and with soft keys and hard keys 76

Figure F.1 — DMI example with soft keys and hard keys 77

Table 1 — Order and precedence of Status information under CSM 15

Table 2 — Order and precedence of Status information under TSM 16

Table 3 — Conditions for display and colour philosophy of the current train speed pointer 22

Table 4 — Conditions for display and colour philosophy of the circular speed gauge 25

Table 5 — Conditions for display and colour philosophy of the maximum supervised speed 26

Table 6 — Conditions for display and colour philosophy of the Release speed 29

Table 7 — Conditions for display of the distance to target 32

Table 8 — Conditions for display and colour philosophy of the warning time to intervention 34

Table 9 — Conditions for display of the predicted distance to standstill 36

Table 10 — Conditions for display of the predicted speed at target 37

Table 11 — Conditions for display of the brake intervention symbol 39

Table 12 — Conditions for display of the passenger emergency brake 39

Table 13 — Conditions for display of the braking train symbol 41

Table 14 — Condition for display of orders with and without feedback 47

Table 15 — Conditions for display of the driver activity supervision 49

Table 16 — Condition for display of the emergency signal 49

Table 17 — Conditions for display of the Planning area 53

Table 18 — Colour philosophy of the orders and announcements 56

Table 19 — Area and menu 68

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Introduction

This Technical Specification forms Part 2 of a series, the other parts being:

- CLC/TS 50459-1 for ergonomic principles for the presentation of ERTMS/ETCS/GSM-R information
- CLC/TS 50459-3 for ergonomic arrangements of ERTMS/GSM-R information
- CLC/TS 50459-4 for data entry procedure for ERTMS/ETCS/GSM-R
- CLC/TS 50459-5 for symbols for ERTMS/ETCS/GSM-R
- CLC/TS 50459-6 for audible information for ERTMS/ETCS/GSM-R

These Technical Specifications contain the ergonomic arrangements of information on the ERTMS DMI Display. Most items are illustrated with an example.

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1 Scope

This Technical Specification describes from an ergonomic point of view how ERTMS information shall be arranged and displayed. This Technical Specification describes more ergonomic details than currently provided by the ERTMS/ETCS/GSM-R specifications.

This Technical Specification defines the ergonomics for the Driver-Machine Interface (DMI) for the ERTMS/ETCS Train Control System, and for the integrated ERTMS/GSM-R Train Control and Train Radio Systems, and for the stand alone ERTMS/GSM-R Train Radio Systems and for other technical systems currently provided on the engines.

The ergonomics covers the

- general arrangements (dialogue structure, sequences, layout philosophy, colour philosophy),
- symbols,
- audible information,
- data entry arrangements.

The aims of the ERTMS/ETCS/GSM-R Train Control and Train Radio Systems are standardised systems facilitating interoperable movement of trains and permitting economies of scale in procurement and operations. The objective of this Technical Specification is to define the minimum requirements on the DMI that are necessary to enable these objectives to be achieved. Hence the Technical Specification is limited to ergonomic considerations and does not define the technology to be used for the implementation.

The reasons for defining the ergonomics of the DMI are as follows:

- achieving harmonised and coherent presentation for ERTMS/ETCS and STM information. Given the large number of STM's requiring the use of the ERTMS/ETCS DMI, only a harmonised approach is feasible;
- defining Driver-Machine Interface ergonomics that is compatible with agreed interoperable ERTMS specifications;
- to reduce the risk of incorrect operation by a driver working with different trains fitted with ERTMS/ETCS and ERTMS/GSM-R;
- facilitating train operation with a unified ergonomics, hence reducing the cost of driver training.

This Technical Specification is applicable on all trains fitted with the ERTMS/ETCS and also for trains fitted with train radio (GSM-R) DMI.

The scope of Part 2 of the Technical Specification CLC/TS 50459 series is to define ergonomic arrangements of ERTMS/ETCS information.

This specification gives guidelines how to implement different technology (soft keys, touch screen device, LCD, cathode tube, etc.)

2 Normative references

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

Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system, Official Journal L 235 , 17/09/1996 P. 0006 – 0024

CLC/TS 50459-1, *Railways applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 1: Ergonomic principles for the presentation of ERTMS/ETCS/GSM-R information*

CLC/TS 50459-3, *Railways applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 3: Ergonomic arrangement of ERTMS/GSM-R information*

CLC/TS 50459-4, *Railways applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 4: Data entry for the ERTMS/ETCS/GSM-R systems*

CLC/TS 50459-5, *Railways applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 5: Symbols*

CLC/TS 50459-6, *Railways applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface – Part 6: Audible information*

UIC 651, *Layout of driver's cabs in locomotives, railcars, multiple-unit trains and driving trailers*

3 Terms and definitions

For the purposes of this document, the definitions given in CLC/TS 50459-1 apply.

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4 Symbols and abbreviations (standards.iteh.ai)

AIIS	All Status
ATD	Automatic Train Driving
ATO	Automatic Train Operation
CSG	Circular Speed Gauge
CSM	Ceiling Speed Monitoring
dgry	dark grey
DSD	Driver Safety Device
EOA	End Of Authority
EVC	European Vital Computer
IndS	Indication Status
IntS	Intervention speed Status
LCD	Liquid Crystal Display
LED	Light Emitting Diodes
LXG	Level Crossing
MA	Movement Authority
mgry	medium grey

MRSP	Most Restrictive Speed Profile
NL	Non Leading mode
NoFS	Not in Full Supervision Mode
NoS	No Status active
or	orange
OS	On Sight mode
OvS	Over-speed Status
PreS	Pre-indication Status
PTT	Push To Talk
RBC	Radio Block Centre
RSM	Release Speed Monitoring
SR	Staff Responsible mode
STM	Specific Transmission Module
TIU	Train Interface Unit
T_{int}	Time before intervention
TSM	Target Speed Monitoring
T_{square}	Time at which 'warning time to intervention' is displayed
UIC	Union Internationale des Chemins de Fer
UN	Unfitted
V_{int}	Intervention speed
V_{perm}	Permitted speed
$V_{release}$	Release speed
V_{target}	Target speed
V_{train}	Current speed of the train
WaS	Warning speed Status
w x h	width by height
yel	yellow

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5 Characteristics of the screen layout

5.1 Presentation philosophy

The information shown to the driver on the ERTMS/ETCS DMI is grouped into different areas depending on the nature of the information: speed related information, distance related information, driver inputs, etc. Figure 1 and Figure 2 show the definition and the allocation of the different areas. It shows the DMI when all information is combined into one screen.

Whilst most of the examples are based on touch screen technology for input actions, it is not the intention of this standard to restrict implementation solely to this technology. Soft key arrangements are discussed, they have the same status as touch screen arrangements, but they are not explicitly shown in an example. The areas for navigation of soft keys (e.g. the dedicated control or navigation buttons) are not shown either.

Annex B gives an overview of area and screen dimensions when using a touch device. Annexes C, D, E and F give examples of area and screen dimensions when using soft keys.

This specification and the shown figures describe what information shall be presented on the screen, regardless of its technical implementation. Clause 6 explains in detail how the different areas shall be used.



Figure 1 — The main areas of the DMI

Figure 2 — The sub areas of the DMI

5.1.1 Area description

The total size of all information areas shown on the DMI is 640 x 450 cells (w x h).

These dimensions are chosen because all areas will then properly fit into the total size. The height of 450 cells is the graphical compromise between the 9 vertical oriented buttons of equal size in the F area and a clear separation between the A, B and D area on one hand and the C and E area on the other hand. The 30 cells in the heights of the display are not needed in the touch screen option, but they can be used in the soft key option to show along the width of the display the soft key reference to hard keys along the display (see Annexes C and D).

5.1.1.1 Speed and Supervision area

- A Supervised distance information (A1, A2 and A3; total size: 54 x 300 cells (w x h))
- B Speed Information (B0, B1, B2, B3/4/5, B6 and B7; total size: 280 x 300 cells (w x h))
- C Supplementary Driving Information (C1, C2/3/4, C5/6/7, C8 and C9; total size: 334 x 50 cells (w x h)); the size of the areas C1 – C7 can vary within the range of the area C

5.1.1.2 Planning area

D Planning Information (D1, D2, D3/4/5, D6, D7, D8 and D9; total size 246 x 300 cells (w x h))

5.1.1.3 Monitoring area

Eleft Monitoring (E1, E3, E4, E5, E19/20/21/22/23 and E24/25; E2 and E18 are intentionally missing; total size 334 x 100 cells (w x h))

Eright Monitoring (E6/7/8/9/10/11/12/13/14/15, E16a/b, E17; E2 and E18 are intentionally missing; total size 246 x 150 cells (w x h))

5.1.1.4 Driver input area

F Input (F1, F2, F3, F4 and F5/6/7/8/9; total size: 60 x 450 (w x h))

5.1.2 The use of areas



Figure 3 — The use of areas of the DMI

Preference may be given to show all areas on the same display screen, as shown in the examples in this specification.

If the information is displayed on more than one screen the way the information is presented in each area shall not be affected. A change of resolution or screen size shall not affect the general appearance of each area; but only the accuracy of the details shown.

5.1.2.1 The use of the areas A, B, C and Eleft

The main information is shown on area A, B, C and Eleft

The areas A, B, C and Eleft shall be displayed, shall be adjacent to one another and shall be within central forward field of the driver's vision.

5.1.2.2 The use of the areas D and Eright

The areas D and Eright should be shown as described in this document; however they need not be adjacent to each other or to A, B, C and Eleft.

5.1.2.3 The use of area F

The content of area F does not need to be adjacent to the other areas.

5.1.2.4 The use of areas with STM

All areas can be used for STM visualisation, as long as the required ERTMS/ETCS information can be clearly displayed.

5.1.3 Examples of screen management

To control the attention of the driver, either the driver or the ERTMS/ETCS system or the Railway Operator can decide to show or hide information. This can be achieved using several screen layers.

NOTE 1 The combination of layers with a touch screen device enables fast dialogues and an integrated interface. The same can be applied for soft keys, by pointing to a few keys along the screen, which activates the other layers.

A level crossing 10 km ahead might be known to the system (within the movement authority (MA)) but the driver only wants to be informed in advance of events within a distance of 4 km. By setting the planning scale on area D to 4 km, the driver hides information outside this range.

When the train is running too close to intervention or is running in target speed monitoring (TSM, see 5.2.2) the system shall automatically dim the planning information; the driver has to reduce speed first before the hidden or dimmed information is shown again in the original presentation. In this example, the system controls the attention of the driver by hiding certain categories of information, e.g. advisory or timetable information.

Another example of the ERTMS/ETCS DMI helping to control the driver's attention, is showing and hiding the supervised distance information (area A) and dimming the Planning area (area D), depending on whether the train is inside or outside the TSM. Dimming the Planning area ensures that route information is still visible but less conspicuous.

Some information is available in the ERTMS/ETCS system, but is only needed in special situations or in case of disturbance or malfunction, e.g. test functions, diagnostics, train data, geographical information, explanations of orders and announcements and (non-) ERTMS/ETCS information (e.g. door systems). These kinds of detail are generally available on an underlying screen layer.

NOTE 2 When using a touch screen device, the driver can reveal them by touching the screen on the appropriate area, or activating the dedicated key of the soft key arrangement. After a second driver's action or after a certain time delay, the information will be hidden again.

5.2 Colour and sound philosophy

The principle (illustrated in Figure 4) is used extensively in the description of this specification (CLC/TS 50459-2). The principle is based on the general explanation of the colour philosophy described in CLC/TS 50459-1.

For explanatory reasons Figure 4 is divided in the following sections:

- one ceiling speed monitoring section (CSM);
- two target speed monitoring sections (TSM) to explain how to manage the colour philosophy when two targets are defined;
- one release monitoring section (RSM)¹⁾.

¹⁾ RSM is a special case of TSM

NOTE 1 Figure 4 is used only to explain the DMI objects presentation in the other clauses of this specification. Figure 4 is showing the situation when ERTMS/ETCS is in Full Supervision (FS) mode.

NOTE 2 Annex A gives a complete overview of the colour philosophy for all related areas and objects.

Undesired oscillation between colour schemes and audible information shall be avoided by the appropriate means (e.g. with a delay time of 2 seconds to switch off the current colour scheme).

5.2.1 Ceiling speed monitoring (CSM)

5.2.1.1 Permitted speed

The Permitted Speed is the speed the driver is allowed to follow in Figure 4. The Permitted speed is shown to the driver by the CSG (see 6.2.1.4) and is defined by the MRSP.

5.2.1.2 Over-speed Status information

If the current train speed (V_{train}) exceeds the Permitted Speed (V_{perm}) the Over-speed Status information is activated.

Each time the Over-speed Status is activated an audible information (S1, see CLC/TS 50459-6) shall be activated

5.2.1.3 Warning Status information

The Warning Status information shall be activated whilst the On-Board system activates a Warning.

While the Warning Status information is activated an audible information (S2, see CLC/TS 50459-6) shall be activated.

5.2.1.4 Intervention Status information

The Intervention Status information shall be activated whilst the On-Board system activates an Intervention.

The Intervention Status information overwrites the Over-speed Status and Warning Status information.

When the Intervention Status is no more active an audible information (S3 see CLC/TS 50459-6) shall be activated.

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