



**BSI Standards Publication**

# **Railway applications — Communication, signalling and processing systems — European Rail Traffic Management System**

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Part 3: Ergonomic arrangements of non ETCS information

## National foreword

This Published Document is the UK implementation of CLC/TS 50459-3:2021. It supersedes PD CLC/TS 50459-3:2016, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/9/1, Railway Electrotechnical Applications - Signalling and communications.

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

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English Version

**Railway applications - Communication, signalling and processing  
systems - European Rail Traffic Management System - Part 3:  
Ergonomic arrangements of non ETCS information**

Applications ferroviaires - Systèmes de signalisation, de  
télécommunications et de traitement - Système européen  
de gestion du trafic ferroviaire - Interface de conduite -  
Partie 3: Principes généraux pour la présentation des  
informations non ETCS

Bahnanwendungen - Telekommunikationstechnik,  
Signaltechnik und Datenverarbeitungssysteme -  
Europäisches Leitsystem für den Schienenverkehr - Teil 3:  
Ergonomische Anordnung der Nicht-ETCS Informationen

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## European foreword

This document (CLC/TS 50459-3:2021) has been prepared by CLC/SC 9XA “Communication, signalling and processing systems”, of Technical Committee CENELEC TC 9X “Electrical and electronic applications for railways”.

This document supersedes CLC/TS 50459-3:2016.

CLC/TS 50459-3:2021 includes the following significant technical changes with respect to CLC/TS 50459-3:2016:

- Update general principles for the presentation of non ETCS information correlated with ERA document ERA\_ERTMS\_015560.
- Update ergonomic arrangements with EN 16186 series.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

## Introduction

This document should be read in conjunction with ERA\_ERTMS\_015560:2016 “ETCS Driver Machine Interface” and EN 16186 series, “Railway applications — Driver's Cab”.

This document is Part 3 of a series with the following parts:

- CLC/TS 50459-1, *General principles for the presentation of ERTMS/ETCS/GSM-R information*
- CLC/TS 50459-2, *Ergonomic arrangements of ERTMS/GSM-R information*
- CLC/TS 50459-3, *Ergonomic arrangements of non ETCS information*

This part of the CLC/TS 50459 series contains the ergonomic arrangements of non ETCS information.

Annex A of this document shows examples of existing NTC DMI layouts.

Annex B of this document lists the sound examples for NTC and other train functions (not exhaustive).

## 1 Scope

This document describes from an ergonomic point of view how non ETCS information are arranged and displayed on the CCD. More specifically, it covers information that is not within the scope of ERA document ERA\_ERTMS\_015560.

This document describes two possible technologies for implementing the ETCS DMI namely touch screen and soft key.

National systems not integrated within ETCS DMI are not within the scope of this document.

Redundancy concepts are not within the scope of this document.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 16186-3:2016+A1:2018, *Railway applications - Driver's cab - Part 3: Design of displays*

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

## 3 Terms, definitions and abbreviated terms

### 3.1 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

#### 3.1.1

##### **ETCS DMI**

CCD that allows communication between ETCS on-board equipment and the driver

#### 3.1.2

##### **ETCS default window**

total image screen area with the allocation of objects, text messages and buttons as described in ERA ERTMS 015560 Chapter 8 and 9

#### 3.1.3

##### **NTC default window**

shown in NTC operation (Level NTC, modes SN or NL)

Note 1 to entry: The layout of an NTC default window could differ from an ETCS default window.

### 3.2 Abbreviated terms

For the purpose of this document, the following abbreviated terms apply.

|       |                                                        |
|-------|--------------------------------------------------------|
| ASC   | Automatic Speed Control                                |
| ATC2  | Swedish/Norwegian ATP system                           |
| ATP   | Automatic Train Protection                             |
| ATTO  | Activated Train Trip Override                          |
| AWS   | Automatic Warning System (UK)                          |
| CCD   | Control and Command Display                            |
| DAC   | Driver Activity Control                                |
| DMI   | Driver-Machine Interface                               |
| ERA   | European Union Agency for Railways                     |
| ERTMS | European Rail Traffic Management System                |
| ETCS  | European Train Control System                          |
| JKV   | Junien Kulunvalvonta (Finnish ATP system)              |
| LZB   | Linienzugbeeinflussung (German ATP system)             |
| NL    | Non Leading mode                                       |
| NTC   | National Train Control                                 |
| OM    | Operative Mode                                         |
| PZB   | Punktzugbeeinflussung (German ATP system)              |
| PLZB  | LZB/PZB or PZB                                         |
| RSC   | Ripetizione Segnali Continua, Italian national system  |
| SCMT  | Sistema Controllo Marcia Treno (Italian ATP system)    |
| SHP   | Samoczynne Hamowanie Pociągu (Polish ATP system)       |
| SN    | National System mode                                   |
| SSC   | Sistema di Supporto alla Condotta (Italian ATP System) |
| STM   | Specific Transmission Module                           |
| TPWS  | Train Protection and Warning System (UK)               |

## 4 General principles

### 4.1 Purpose of document

#### 4.1.1 General

A clear and consistent definition of the non ETCS driver machine interface helps the driver to better understand the tasks he has to perform. This increases the speed and the accuracy of interactions between the driver and the non ETCS on-board equipment (NTC and/or other on-board systems), hence reducing the probability of human errors.

Moreover, harmonizing the presentation of displayed information and the driver's interactions with the equipment, contributes to a unified operation of the trains regardless of which suppliers' products they are fitted with. This reduces further the potential for human errors, reduces the driver training requirement and facilitates cross-acceptance of equipment.

Annex A gives existing examples for the integration of NTC and/or other on-board systems.

Annex B gives existing examples of the sounds for NTC and other train functions.

The lists given in Annex A and Annex B are not exhaustive.

#### 4.1.2 Ergonomic arrangements of areas of the ETCS layout

For the definition of non ETCS screen layouts (NTC or other on-board systems) the basic layouts described in CLC/TS 50459-1 and ERA ERTMS 015560 should apply.

The basic layouts apply for a 'Unified DMI' as defined in ERA ERTMS 015560. For a 'Customized DMI' it is possible to modify these layouts for NTC operation.

The basic layouts for touch screen technology and soft key technology, shown in Figure 1 and Figure 2, are taken from document ERA ERTMS 015560. In the event of a conflict between this document and ERA ERTMS 015560, the ERA document shall prevail.

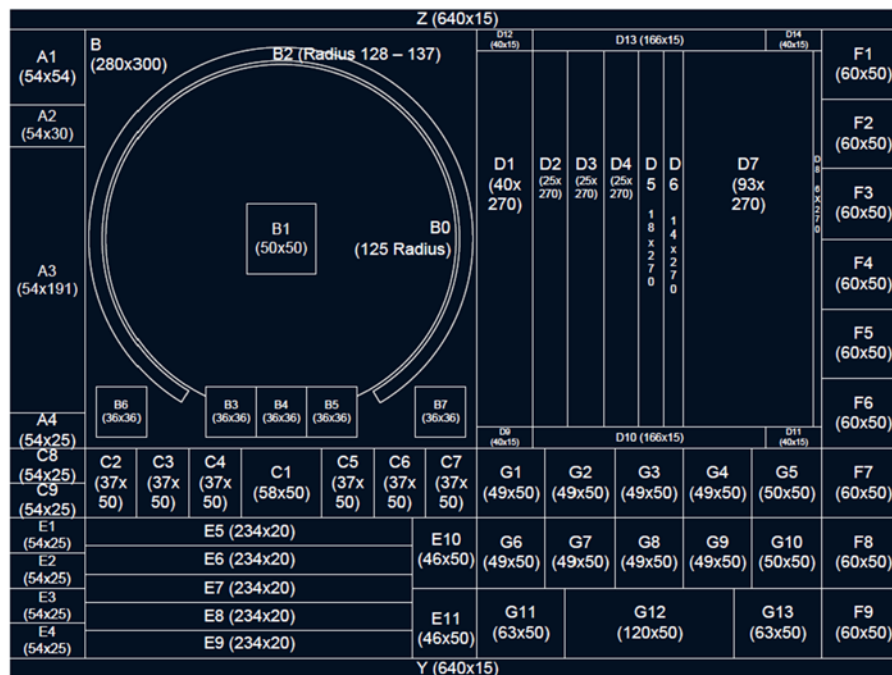


**Figure 1 — The sub areas of the ERTMS/ETCS layout (touch screen technology)**

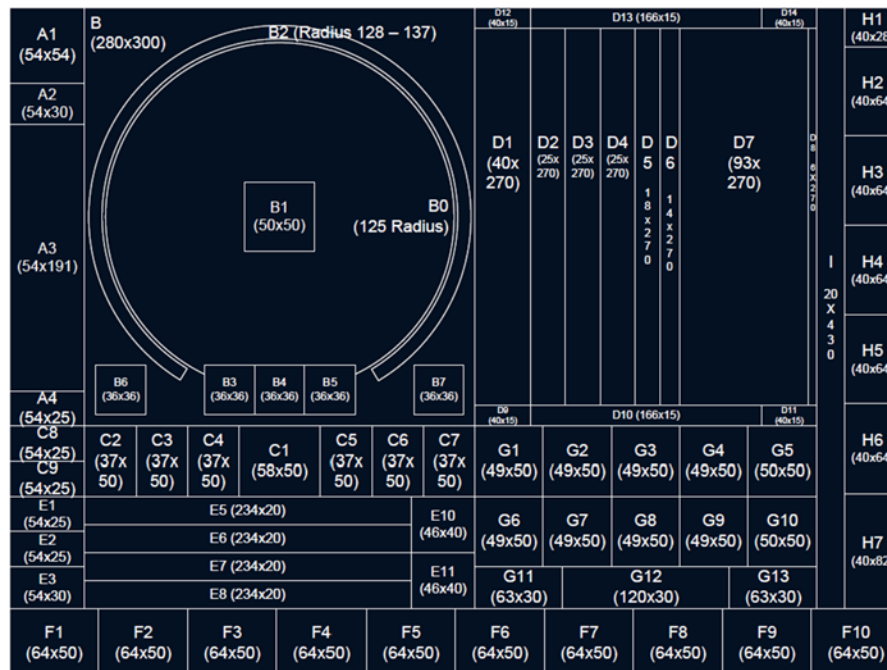


Figure 2 — The sub areas of the ERTMS/ETCS layout (soft key technology)

#### 4.1.3 ETCS objects

Even if authorized by national rules, for ergonomic reasons the size and location of ETCS objects should not be changed.

#### 4.1.4 Non ETCS objects

For displaying a NTC and other on-board systems (e.g. DAC) together, the position and size of the objects shall be arranged to prevent overlapping.

### 4.2 Audible information for non ETCS systems

According to ERA ERTMS 015560 audible information for a non ETCS system should be sent specified by a sequence of segments defined by a duration and an associated frequency sent to the ERTMS/ETCS on-board system (unified DMI).

For a customized DMI the audible information should be provided in wave form, e.g. as \*.wav files.

If a non ETCS system requires its own audible information this is mentioned in the corresponding section.

Examples of audible information mentioned in this document are described in Annex B.

### 4.3 Data entry

Data entry should follow the principles of ERA\_ERTMS\_015560. Repeated Entry of the same data should be avoided.

## 5 Non ETCS symbols

### 5.1 General requirements for unified DMI service

The available areas for NTC buttons and indicators are defined in ERA ERTMS 015560.

Speed and distance supervision information sent by the NTC shall be displayed by the ETCS DMI according to ERA ERTMS 015560.

NOTE For touch screen technology, some areas can be used for buttons or indicators, depending on the need of the National System.

## **5.2 Symbols for other train functions**

The symbols for other train functions (e.g. DAC, Passenger Alarm initiated brake application, Open Door Alarm, Main Circuit Breaker) shall be in accordance with EN 16186-3:2016+A1:2018, Annex A.

## **Annex A**

### **(informative)**

## **Integration of NTC and/or other on-board systems**

### **A.1 Usage of screen areas**

All areas marked in yellow colour within the following figures are used by NTC and/or other on-board systems.

All areas marked in orange colour within the following figures are used by ETCS and are moved with respect to the ETCS layout.

All areas marked in red colour within the following figures are used by NTC or other on-board systems and ETCS.

The ergonomics of the examples are based on the area arrangements for the ETCS layout (see Figure 1 and Figure 2).

### **A.2 NTC LZB/PZB**

#### **A.2.1 LZB/PZB - Scope and field of specification**

This example shows the interface between the driver and the LZB/PZB on-board regarding to the use in context with ERTMS/ETCS and as standalone system (LZB/PZB in fallback mode).

The specification describes two possible technologies for implementing the LZB/PZB DMI, namely touch screen or soft key.

The requirements regarding LZB/PZB are defined in PLZB\_DMI\_REQUIREMENTS [19], [20], [27] and [28].

#### **A.2.2 LZB/PZB - Overview**

Figure A.1 and Figure A.2 explain the usage of the ETCS DMI areas.

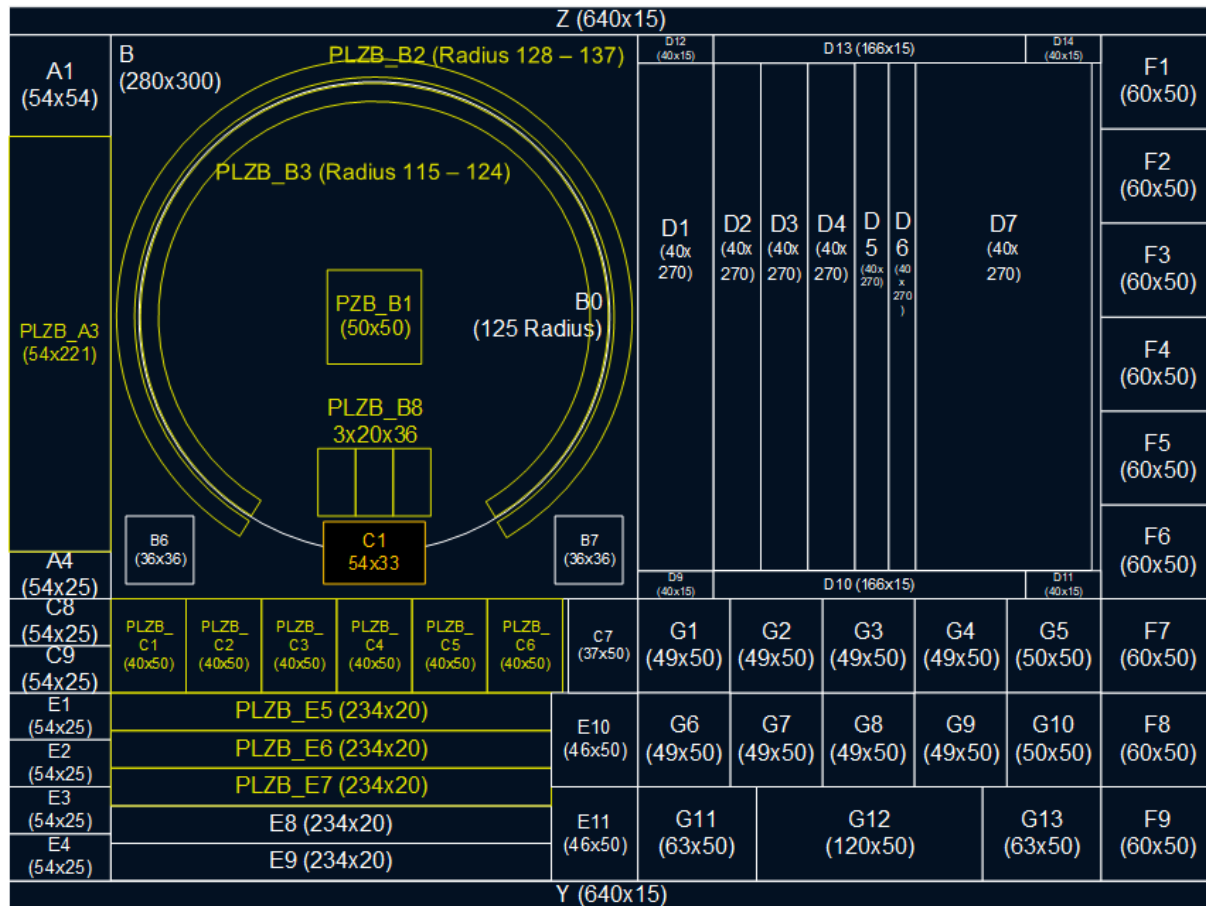


Figure A.1 — The sub areas of the LZB/PZB layout (touch screen technology)

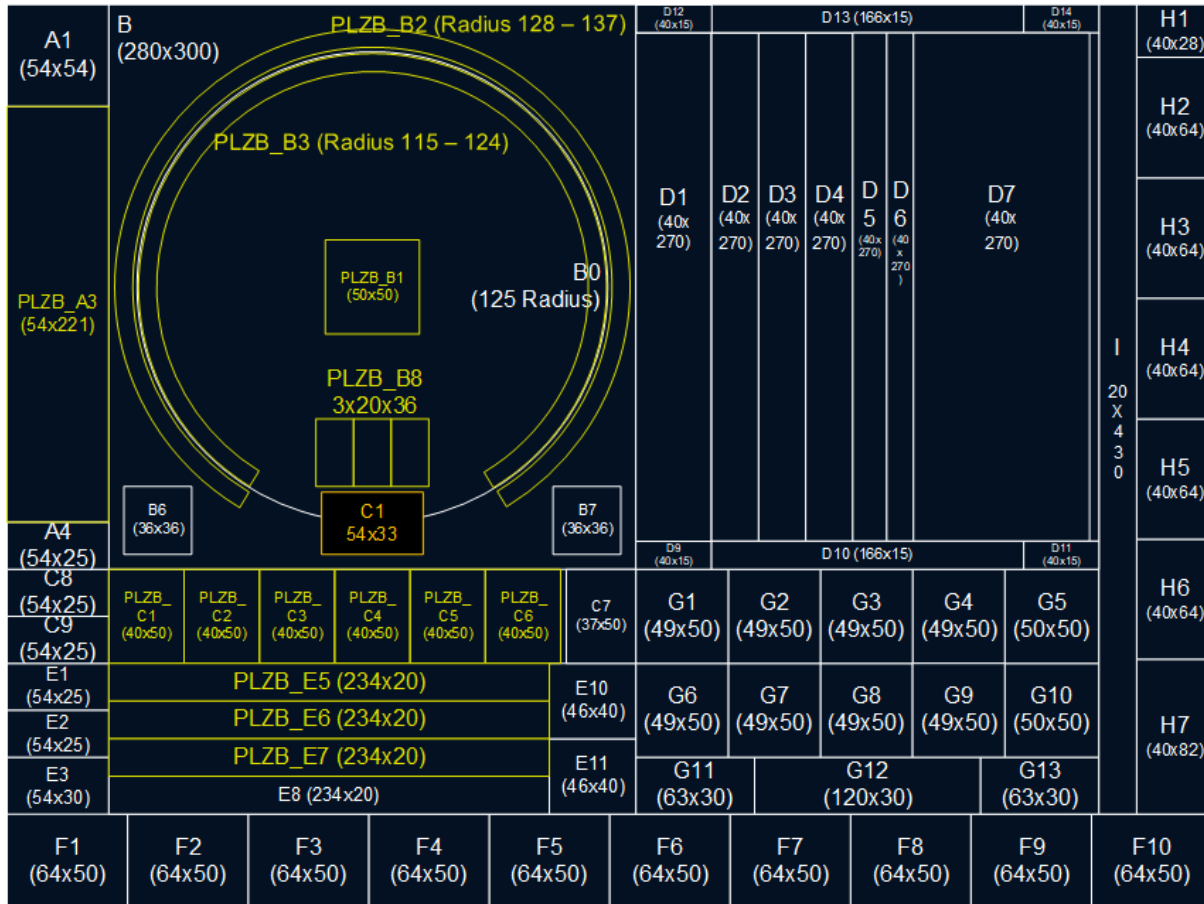


Figure A.2 — The sub areas of the LZB/PZB layout (soft key technology)

To avoid competitive use of the text area, the LZB/PZB text messages are displayed as private areas (PLZB\_E5/6/7) outside ETCS scrolling. For ETCS messages only areas E8/9 (touch screen technology) respectively area E8 (soft key technology) are available.

### A.2.3 LZB/PZB - Positioning onto the grid array

#### A.2.3.1 LZB/PZB - Area description

All areas not defined here are in positions and dimension according to ERA ERTMS 015560.

Area A (total size: 54 × 300 cells (w x h)) is composed of:

- PLZB\_A3 instead of A2 and A3 (54x221).

Area B (total size: 280 × 300 cells (w x h)) is composed of:

- PLZB\_B2 (radius 128 to 137);
- PLZB\_B3 (radius 115 to 124);
- PLZB\_B8 (60x36) (the centre of PLZB\_B8 is positioned (140,239));
- C1 (54x33) (the centre of C1 is positioned (140,277)).

NOTE B3/4/5 are not described in this layout because they are currently not used.

Area C (total size: 334 × 50 cells (w x h)) is composed of:

- C1 (58x50) not used in area C, is defined in area B;
- PLZB\_C1/2/3/4/5/6 (6x (40x50));
- C7 (37x50).

For touch screen technology:

Area E (total size 334 × 100 cells (w x h)) are composed of:

- PLZB\_E5/6/7 (3x (234x20)) placed instead of E5/6/7;
- E8/9 (2x (234x20)).

For soft key technology:

Area E (total size 334 × 80 cells (w x h)) are composed of:

- PLZB\_E5/6/7 (3x (234x20)) placed instead of E5/6/7;
- E8 (234x20).

#### **A.2.3.2 LZB/PZB - Speed and distance monitoring – supervision status**

For the speed and distance monitoring on touch screen and soft key technology the following areas are used:

- PLZB\_B1 (50x50) placed instead of B1 showing actual speed;
- PLZB\_B8 (3x20x36) placed above C1 showing the target speed of LZB;
- PLZB\_B2 (radius 128 to 137) showing the permitted speed of LZB;
- PLZB\_B3 (radius 115 to 124) showing the permitted speed of ASC or the permitted speed of Cruise Control.

#### **A.2.4 LZB/PZB - ETCS and NTC information shown on a LZB/PZB default window**

##### **A.2.4.1 LZB/PZB - Introduction**

The layers on the LZB/PZB default window have different or additional requirements to ERA ERTMS 015560 as follows:

- Layer 0: no change;
- Layer -1: PLZB\_A3, PLZB\_C1, PLZB\_C2, PLZB\_C3, PLZB\_C4, PLZB\_C5, PLZB\_C6;
- Layer -2: PLZB\_B8, C1 (in area B).

##### **A.2.4.2 LZB/PZB - ETCS objects**

The area C1 is moved to area B.

##### **A.2.4.3 LZB/PZB - NTC objects**

###### **A.2.4.3.1 LZB/PZB - General**

The LZB/PZB text messages are displayed in area PLZB\_E5/6/7.

The cursor buttons E10 and E11 are without effect to the area PLZB\_E5/6/7. The scrolling has only effect to the text messages in area E8/9 (touch screen technology) respectively in area E8 (soft key technology).

The LZB/PZB text messages have to remain different from ETCS text messages, because they always have to be seen in the context of the indicators in PLZB\_C1/2/3/4/5/6.

The text messages for LZB/PZB are defined in PLZB\_DMI\_REQUIREMENTS [19], [20], [27] and [28].

#### **A.2.4.3.2 LZB/PZB - Indicators PLZB\_C1/2/3/4/5/6**

The indicators PLZB\_C1/2/3/4/5/6 are displayed according to PLZB\_DMI\_REQUIREMENTS [20], [27] and [28].

#### **A.2.4.3.3 LZB/PZB - Supervision information**

##### **A.2.4.3.3.1 LZB/PZB - Current train speed pointer**

The current speed is displayed in area PLZB\_B1 as grey needle object. The dimension of the needle object is according to ERA ERTMS 015560.

##### **A.2.4.3.3.2 LZB/PZB - Vperm of LZB**

Vperm of LZB is displayed in area PLZB\_B2 as red equilateral triangle with needle in direction to the centre of PLZB\_B1.

##### **A.2.4.3.3.3 LZB/PZB - Vtarget of LZB**

Vtarget of LZB is displayed in PLZB\_B8 as three-digit value in yellow.

##### **A.2.4.3.3.4 LZB/PZB - Vperm of ASC**

Vperm of ASC is displayed in PLZB\_B3 as a yellow rhombus pointing to the centre of PLZB\_B1.

A yellow rhombus means: Dynamic brake and pneumatic brake are involved.

##### **A.2.4.3.3.5 LZB/PZB - Vperm of 'Cruise Control'**

Vperm of 'Cruise Control' is displayed in PLZB\_B3 as a magenta circle.

A magenta filled circle means: Only the dynamic brake is involved.

#### **A.2.5 LZB/PZB - Sub-level windows**

##### **A.2.5.1 LZB/PZB - Introduction**

For all equipment where the LZB and PZB function is implemented, all requirements in ERA ERTMS 015560 described with the label "NTC X" are described with the label "LZB/PZB".

For all equipment where the PZB function is implemented only, all requirements in ERA ERTMS 015560, described with the label "NTC X" are described with the label "PZB".

In the following Figures A.3 to A.27 of this annex for all equipment where the LZB and PZB function is implemented the replacements in Table A.1 are used:

**Table A.1 — LZB/PZB terms in figures**

| Term in Figures | Term in LZB/PZB |
|-----------------|-----------------|
| NTC X           | LZB/PZB         |
| label 1         | BRA             |
| label 2         | BRH             |
| label 3         | ZL              |