

Making the railway system  
work better for society.

# Technical Document

## *Harmonised ERTMS Marker Boards*

	<i>Drafted by</i>	<i>Validated by</i>	<i>Approved by</i>
<i>Name</i>	G.KOUPAROUSOS	F. FERRARI	P. GUIDO
<i>Position</i>	Railway Systems Unit Project Officer	ERTMS and Telematics Team Leader	Railway Systems Head of Unit
<i>Date</i>	Enter a date.	Enter a date.	Enter a date.
<i>Signature</i>			

### 1. AMENDMENT RECORD

#### *Document History*

<i>Version</i>	<i>Date</i>	<i>Section number</i>	<i>Modification/description</i>	<i>Author(s)</i>
0.1	29/06/12	all	First draft	OW
0.2	10/10/12	all	Second draft	OW
0.3	07/02/13	all	Third draft	OW
0.4	17/04/13	all	Fourth draft	OW
0.5	14/05/13	all	Comments received from OH	OH

0.6	05/06/13	all	Taking into account received comments	OW
0.7	25/06/13	all	Taking into account received comments	OW
0.8	02/10/13	3.2, 4, 5.2, 5.3, 7.1.2	Taking into account received comments	OW
0.9	17/06/14	5, 6 and 7	Identifying places where some illustrations are needed	OW
0.10	09/10/14	5.1, 5.2, 5.3, 6.1, 7, Annex	Adding the drawings in the documents	OW
0.11	10/12/14	4.1	Adding a reference to the EN document	OW
1.0	28/01/15		Validation of the document	OH
1.01	29/05/18	all	Taking into account of received comments	OH/EUG
1.02	20/07/18	all	Taking into account of additional EUG comments	OH/EUG
1.03	12/09/18	all	Taking into account discussion in OH and ERA comments	ERA
1.04	27/11/18	5.1, 5.2, 5.3.2	Taking into account of received comments and discussion in the OH	OH

## 2. TABLE OF CONTENTS

1.	AMENDMENT RECORD.....	1
2.	TABLE OF CONTENTS.....	3
3.	INTRODUCTION.....	4
3.1.	Purpose of the document.....	4
3.2.	Field of Application.....	4
3.3.	Document Description.....	4
4.	REFERENCES, TERMS AND ABBREVIATION.....	4
4.1.	Reference documents.....	4
4.2.	Terms & abbreviations.....	4
5.	ETCS MARKER BOARDS.....	5
5.1.	ETCS stop marker and ETCS location marker.....	5
5.1.1.	ETCS stop marker.....	5
5.1.2.	ETCS location marker.....	5
5.1.3.	Identification of the ETCS stop marker / ETCS location marker.....	6
5.2.	ETCS level transition board.....	6
5.2.1.	Purpose of the ETCS level transition (LT) boards.....	6
5.2.2.	Use of the ETCS level transition boards.....	6
5.3.	ETCS track conditions marker boards.....	6
5.3.1.	Purpose of the ETCS track conditions marker boards.....	6
5.3.2.	Presentation of the ETCS track conditions marker boards.....	7
5.3.3.	ETCS pantograph marker boards.....	7
5.3.4.	ETCS neutral section marker boards.....	7
5.3.5.	ETCS track conditions marker boards to be installed in a level transition area.....	8
6.	GSM-R MARKER BOARDS.....	8
6.1.	Marker board used for the selection of the GSM-R network.....	8
6.1.1.	Purpose of the board for the selection of the GSM-R network.....	8
6.1.2.	Use of the board for the selection of the GSM-R network.....	8
7.	ASSIGNMENT OF MARKER BOARDS TO TRACK.....	9
7.1.	ETCS stop marker and ETCS location marker.....	9
Annex 1	ETCS STOP MARKERS AND ETCS LOCATION MARKERS.....	10

### 3. INTRODUCTION

#### 3.1. Purpose of the document

3.1.1 - This document describes the purpose and the use of the harmonised ERTMS marker boards.

#### 3.2. Field of Application

3.2.1 - Field of application of this document are lines equipped with ERTMS/ETCS.

3.2.2 - The implementation of the harmonised ERTMS marker boards (e.g. location, distance from the track, spacing...) is out of scope of this document.

#### 3.3. Document Description

3.3.1 - Chapter 4 gives the list of reference documents, terms and abbreviations which are used.

3.3.2 - Chapter 5 refers to the ETCS marker boards.

3.3.3 - Chapter 6 refers to the GSM-R marker boards.

3.3.4 - Chapter 7 refers to the assignment of the marker boards to a track.

### 4. REFERENCES, TERMS AND ABBREVIATION

#### 4.1. Reference documents

Table 1 : Reference documents

<i>Ref. N°</i>	<i>Document Reference</i>	<i>Title</i>
[1]	ERA_ERTMS_	ERTMS Operational Principles and Rules version 5.
[2]	EN 16494/2015	Railway applications – Requirements for ERTMS Trackside Boards.
[3]	EEIG 06E068 version 2	ETCS stop marker definition.

4.1.1 - For further details on the marker board dimensioning, standard EN 16494 shall be used.

#### 4.2. Terms & abbreviations

4.2.1 - All terms and abbreviations contained in this document are defined in the Appendix A of the OPE TSI.

## 5. ETCS MARKER BOARDS

### 5.1. ETCS stop marker and ETCS location marker

#### 5.1.1. ETCS stop marker

5.1.1.1 - The ETCS stop marker shall be used on lines equipped with ETCS without any Class B or any other underlying signalling system(s).

5.1.1.2 - The ETCS stop marker may be used on lines equipped with ETCS and any Class B system(s) or any other underlying signalling system(s), where the same information is given to the train drivers by other means.

5.1.1.3 - The ETCS stop marker:

- › Shall be used to unambiguously identify an EOA which protects one or a group of safety-critical points such as a switch, a conflicting route as entrance of a station, junctions, etc. where the driver requires supplementary information to identify the exact stopping location in addition to the display on the DMI (for instance where a release speed is provided);
- › May be used to unambiguously identify the end of a block section as an EOA where the driver requires supplementary information to identify the exact stopping location in addition to the display on the DMI (for instance where a release speed is provided);
- › May be used to identify other points of the track the driver shall not overpass when an MA is not available, unless he has received a specific authorisation by the signaller;
- › Serves to mark the location up to which the driver needs to confirm that the line is clear (e.g. for TAF functionality) or he has to drive under his responsibility before a possible MA in FS/OS is received.

#### 5.1.2. ETCS location marker

5.1.2.1 - The ETCS location marker shall be used when required by IM operational concept on lines equipped with ETCS without any Class B or any other underlying signalling system(s).

5.1.2.2 - The ETCS location marker may be used on lines equipped with ETCS and any Class B system(s) or any other underlying signalling system(s), where the same information is given to the train drivers by other means.

5.1.2.3 - The ETCS location marker:

- › May be used to unambiguously identify the end of a block section as an EOA where the driver requires supplementary information to identify the exact stopping location in addition to the display on the DMI (for instance where a release speed is provided);
- › May be used to identify other points of the track the driver can overpass when an MA is not available;
- › Serves to mark the location up to which the driver needs to confirm that the line is clear (e.g. for TAF functionality) or he has to drive under his responsibility before a possible MA in FS/OS is received.

5.1.2.4 - Examples of implementation of the ETCS stop markers and the ETCS location markers are given in the Annex of this document.

### 5.1.3. Identification of the ETCS stop marker / ETCS location marker

5.1.3.1 - In order to enable the driver to refer to a specific marker board, each ETCS stop marker / ETCS location marker shall be provided with a clearly visible and unambiguous identification. The means to provide this identification is not harmonised.

5.1.3.2 - Both marker boards, ETCS stop marker and ETCS location marker, facilitate the identification of the location of a train.

## 5.2. ETCS level transition board

### 5.2.1. Purpose of the ETCS level transition (LT) boards

5.2.1.1 - The ETCS LT boards are used to indicate to the driver the location where a level transition should occur. This information is useful for the driver when a level transition fails.

### 5.2.2. Use of the ETCS level transition boards

5.2.2.1 - The ETCS LT board is used if required by the IM operational concept, to indicate the location of the level transition when entering into or exiting from lines equipped with ETCS (level 1, 2 or 3) with or without other Class B system(s).

5.2.2.2 - The figure below is an example of implementation:



## 5.3. ETCS track conditions marker boards

### 5.3.1. Purpose of the ETCS track conditions marker boards

5.3.1.1 - The ETCS track conditions marker boards are needed to indicate to the driver the location where a track condition applies. This information is useful for the driver in case the corresponding information cannot be displayed on the DMI (e.g. in SR mode).

### 5.3.2. Presentation of the ETCS track conditions marker boards

5.3.2.1 - The track conditions for which harmonised marker boards have been defined are the ones for a section to be passed with lowered pantograph(s) (ETCS pantograph marker boards) and the ones for a section to be passed with main power switch switched off (ETCS neutral section marker boards).

5.3.2.2 - The ETCS track condition marker boards shall be used on lines equipped with ETCS without any Class B or any other underlying signalling system(s).

5.3.2.3 - The ETCS track condition marker boards may be used on lines equipped with ETCS and any Class B system or any other underlying signalling system(s), where the same information is given to the train drivers by other means.

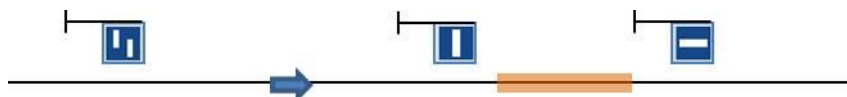
### 5.3.3. ETCS pantograph marker boards

5.3.3.1 - The “lower pantograph announcement” board shall be used to alert the driver that a section of the line has to be passed with the pantograph(s) lowered at the latest at the “lower pantograph” marker board.

5.3.3.2 - The “lower pantograph” board shall be used to indicate the beginning of a section of the line that has to be passed with lowered pantograph(s).

5.3.3.3 - The “raise pantograph” board shall be used to indicate the end of a section of the line that has to be passed with lowered pantograph(s).

5.3.3.4 - The figure below is an example of implementation.



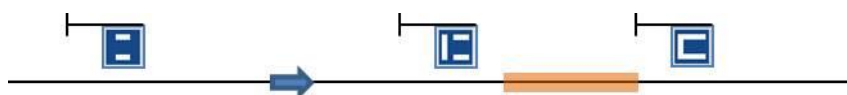
### 5.3.4. ETCS neutral section marker boards

5.3.4.1 - The “neutral section announcement” board shall be used to alert the driver that a section of the line has to be passed with main power switch switched off at the latest at the “neutral section” marker board.

5.3.4.2 - The “neutral section” board shall be used to indicate the beginning of a section of the line that has to be passed with main power switch switched off.

5.3.4.3 - The “end of neutral section” board shall be used to indicate the end of a section of the line that has to be passed with main power switch switched off.

5.3.4.4 - The figure below is an example of implementation:



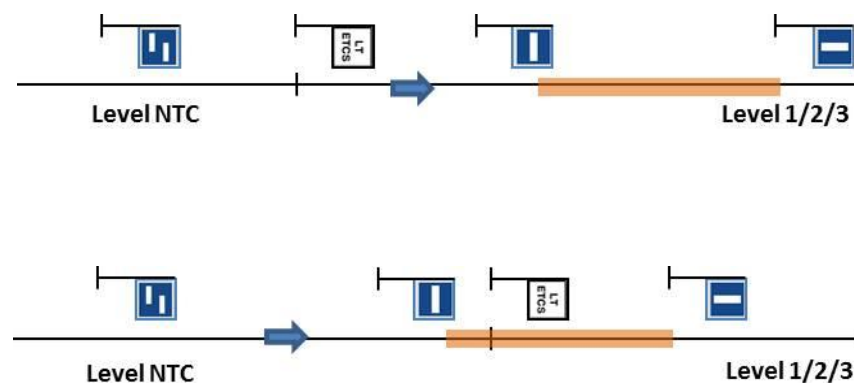
### 5.3.5. ETCS track conditions marker boards to be installed in a level transition area

5.3.5.1 - When track conditions announcement and beginning/end of the track condition are located on either side of the level transition point, ETCS harmonised marker boards and non harmonised marker boards shall not be mixed.

5.3.5.2 - In order to achieve consistency between the marker boards used for a level transition between ETCS and a Class B system (or vice versa) and the track conditions boards to be installed at the transition area, the following applies:

- › If the train is coming from a Class B line and approaching an ETCS only line the harmonised ETCS track conditions marker boards shall be used;
- › If the train is coming from an ETCS line and approaching a Class B line, the harmonised ETCS track conditions marker boards may be used.

5.3.5.3 - The two figures below show examples of implementation of a track condition (lowered pantographs section) located in a level transition area:



## 6. GSM-R MARKER BOARDS

### 6.1. Marker board used for the selection of the GSM-R network

#### 6.1.1. Purpose of the board for the selection of the GSM-R network

6.1.1.1 - This marker board is needed to indicate to the driver the location where the GSM-R network must be changed, and which network must be selected.

#### 6.1.2. Use of the board for the selection of the GSM-R network



6.1.2.1 - This marker board shall be used to indicate the new GSM-R network to be selected at the border.

6.1.2.2 - The GSM-R marker board may be used at all GSM-R network boundaries, in the direction entering the indicated GSM-R network.

6.1.2.3 - If the information is given to the train drivers by other means, the relevant GSM-R marker boards may not be installed.

6.1.2.4 - The figure below is an example of implementation:



## 7. ASSIGNMENT OF MARKER BOARDS TO TRACK

### 7.1. ETCS stop marker and ETCS location marker

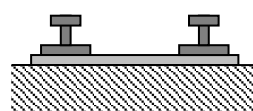
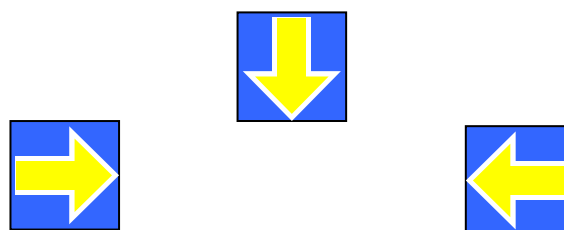
7.1.1 - The ETCS stop marker and the ETCS location marker shall be placed in such a way that it clearly indicates which track it applies to independently from their mounting.

7.1.2 - The arrow shall point to the track the ETCS stop marker / the ETCS location marker refers to.

Consequently:

- › When the marker board is installed on the left side of the track the arrow shall point to the right side (left side);
- › When the marker board is installed on the right side of the track the arrow shall point to the left side (right side);
- › When the marker board is installed above the center of the track the arrow shall point to the bottom (top side).

7.1.3 - The following figure shows the three different possibilities of installation of ETCS stop markers:



Left side

Top side

Right side

Annex 1 ETCS STOP MARKERS AND ETCS LOCATION MARKERS

In figure 1 below, all implemented EOAs are indicated:

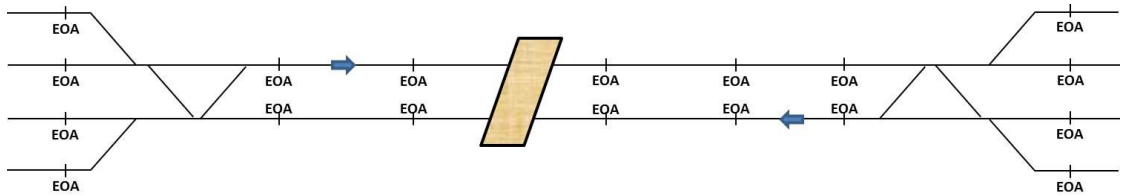


Figure 1

In figure 2 below, the minimum required ETCS stop markers are indicated. In this example, an object is supervised (e.g. a bridge, a falling down rocks area...) in the middle of the picture:

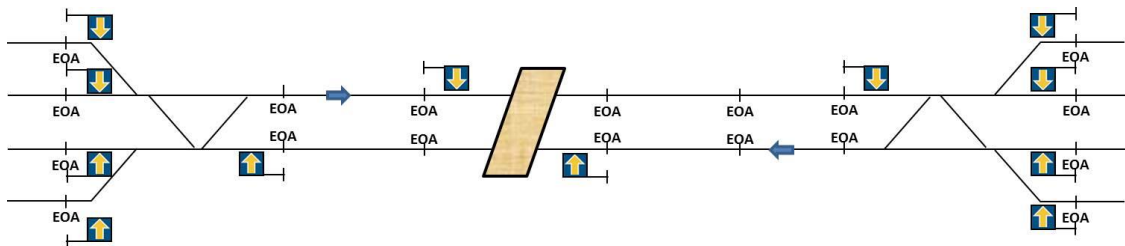


Figure 2

Figures 3a and 3b below show different possibilities of implementation of additional ETCS stop markers or ETCS location markers linked to the remaining EOAs:

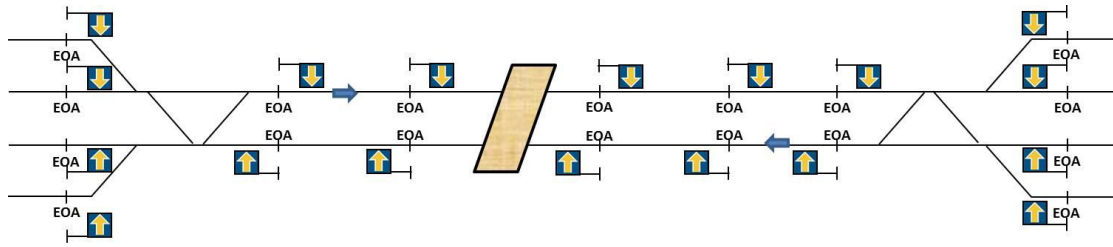


Figure 3a

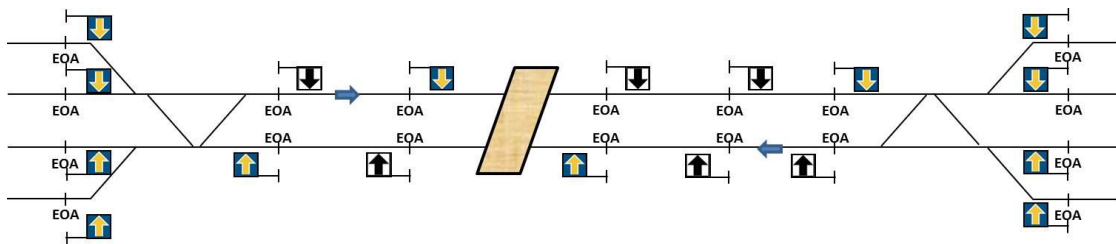


Figure 3b