



**EEIG ERTMS Users Group**

123-133 Rue Froissart, 1040 Brussels, Belgium

Tel: +32 (0)2 673.99.33 - TVA BE0455.935.830

Website: [www.ertms.be](http://www.ertms.be) E-mail: [info@ertms.be](mailto:info@ertms.be)

**ERTMS USERS GROUP – ENGINEERING GUIDELINE**

**75. Management of Shunting  
Activities utilising SH**

Reference: 18E020

Version: 2-

Date: 2024-06-28

**Modification history**

Version	Date	Modification / Description	Editor
0.1	25 <sup>th</sup> May 2017	First draft	JBA/SMcF
0.2	18/1/2018	Combined documents	DC
0.3	25/01/2018	Restructured	JBA
0.4	22/02/2018	Restructure	DC
0.5	07/03/18	Interim clean copy for review	DC
0.6	11/04/18	Review at ESG66	GR
0.7	08/10/18	Updated to Prorail comments	JBA
1.0	10/01/19	Version 1.0	DC
1a	21/03/22	Note 4.2.3.7, clause 5.5.12.2 added	GR
1b	27/03/22	Reworded clause 5.5.12.2 after ESG98. Added note 1.1.1.10 and 3.2.2.2	GR
	12/07/22	Modified 5.5.12.1 and added note 5.5.12.2.1	GR
	13/09/22	Annex 1 added	GR
1c	2023-05-02	Doc reference updated	A. Bäämhielm
	2024-03-06	Chapters 4.6 & 5.6 created to cover issues from the Trackside Approval Issues Log. Three issues were added.	A. Bäämhielm
	2024-04-18	Updates following ESG115	ESG
1d	2024-04-29	Corrections to document style and layout and editorial corrections.	A. Bäämhielm
2-	2024-06-28	Official version	C. Zieleman

## Table of Contents

1.	Introduction .....	6
1.1	Foreword .....	6
1.2	Scope and Field of Application .....	7
1.3	Document structure .....	7
2.	References and Abbreviations .....	8
2.1	Abbreviations.....	8
2.2	References .....	8
3.	SH Activities.....	10
3.1	Entry into SH .....	10
3.1.1	NTC/L0 .....	10
3.1.2	L1 .....	10
3.1.3	L2/3 .....	10
3.2	Exit from SH .....	10
3.2.1	Introduction.....	10
3.2.2	L2/3 .....	10
3.3	Baseline 2 and 3.....	10
3.4	Use of Movement Authorities.....	11
4.	Issues .....	12
4.1	Protection of shunting activities .....	12
4.2	Protection of other train movements .....	12
4.2.1	Introduction.....	12
4.2.2	NTC and L0 .....	12
4.2.3	L1/2/3 .....	12
4.3	Management of shunting movements .....	12
4.4	Class B systems (Only in NTC).....	13
4.5	L2/3 Issues .....	13
4.5.1	Shunting in non-signalled areas.....	13
4.5.2	Movements into a non-signalled area with an SH mode profile .....	13
4.5.3	Shunting granted subject to controls .....	13
4.5.4	Shunting granted to specific trains .....	13
4.5.5	Moving between shunting areas .....	13
4.5.6	Mode profiles .....	14

4.5.7	Changing shunting area boundaries .....	14
4.5.8	Releasing shunting areas .....	14
4.5.9	Train movements after exiting SH.....	14
4.5.10	Level transitions and SH .....	15
4.5.11	Use of Passive Shunting.....	15
4.5.12	Establishment of National Values.....	15
4.5.13	Level 3 specific issues .....	15
4.5.14	Authorisation of SH.....	16
4.6	Trackside Approval Issues Log.....	16
4.6.1	Introduction.....	16
4.6.2	Level transitions to L0/NTC while in trip mode (issue 1.1.1).....	16
4.6.3	SH mode profile sent together with Immediate Level Transition Order (issue 1.1.8) 16	
4.6.4	Packet 49, “list of balises for SH area” sent or accepted alone (issue 7.1.1) ....	16
5.	Recommendations.....	18
5.1	Protection of shunting activities .....	18
5.2	Protection of other train movements .....	18
5.2.1	Introduction.....	18
5.2.2	L1/2/3 .....	18
5.3	Management of shunting movements.....	18
5.3.1	Introduction.....	18
5.3.2	L1 .....	19
5.4	Class B systems (Only for NTC).....	19
5.5	L2/3 Issues.....	19
5.5.1	Shunting in non-signalled areas.....	19
5.5.2	Movements into a non-signalled area with an SH mode profile.....	19
5.5.3	Shunting granted subject to controls.....	20
5.5.4	Shunting granted to specific trains .....	21
5.5.5	Moving between shunting areas .....	22
5.5.6	Mode profiles .....	22
5.5.7	Changing shunting area boundaries .....	22
5.5.8	Releasing shunting areas .....	22
5.5.9	Train movements after exiting SH.....	23
5.5.10	Level transitions and SH .....	23

5.5.11	Use of Passive Shunting .....	23
5.5.12	Establishment of National Values.....	23
5.5.13	Level 3 specific issues .....	24
5.5.14	Authorisation of SH .....	24
5.6	Trackside Approval Issues Log.....	24
5.6.1	Introduction.....	24
5.6.2	Level transitions to L0/NTC while in trip mode (issue 1.1.1).....	24
5.6.3	SH mode profile sent together with Immediate Level Transition Order (issue 1.1.8) 25	
5.6.4	Packet 49, “list of balises for SH area” sent or accepted alone (issue 7.1.1) ....	25
Appendix A	Examples of use of end of shunting area/route Marker Boards .....	26
A.1	Introduction.....	26
A.2	Examples per country .....	26
A.2.1	Denmark.....	26
A.2.2	The Netherlands .....	26
A.2.3	Switzerland.....	27
A.2.4	Belgium .....	30
A.2.5	France .....	31
A.2.6	Germany.....	31
A.2.7	Great Britain .....	32
A.2.8	Italy.....	33
A.2.9	Spain .....	34
A.2.10	Sweden.....	35

## **1. Introduction**

### **1.1 Foreword**

- 1.1.1.1 Shunting is an activity where trains are prepared, moved, split or combined in preparation for service. This can occur at a number of locations and for a number of operational reasons.
- 1.1.1.2 Where the train is operating in ETCS, the preferred method is to issue movement authorities to the train. However, there are operational situations where the train cannot be driven from a driving cab at the front of the train or where the activity needs to take place on lines not controlled from the signalling system (e.g. yards).
- 1.1.1.3 This guideline addresses the situations where the operation is not to be undertaken using movement authorities. Some applications utilise Shunt routes resulting in a Movement Authority being sent to the train (typically OS mode profile) which are out of scope.
- 1.1.1.4 ETCS includes a mode called SH which enables trains to be moved both forwards and backwards and without the need for the trackside to issue movement authorities. Having granted permission for the train to enter SH, the trackside has very restricted functionality available to manage the train movement or to restrict it from entering an operational line leading to collision.
- 1.1.1.5 SH has an operational advantage that it does not require the driver to enter full train data which can be an advantage when trains are being combined or split, when the driving desk has to be changed frequently and when parts of the train have brake systems isolated.
- 1.1.1.6 Following a workshop held in November 2016, this guideline has been prepared to describe the scenarios when shunting activities often occur and the trackside arrangements which can be used to safely manage such activities.
- 1.1.1.7 Shunting activities can take place at predictable locations where it is possible to establish shunting areas. In predictable locations it is desirable that the authorisation of SH is automated by the trackside (subject to appropriate controls).
- 1.1.1.8 Shunting activities may also take place anywhere on the network. Additionally, the trackside must support requests for shunting at predictable locations where the authorisation cannot be automated (e.g. on-board reports unknown position).
- 1.1.1.9 The management of the shunting activity (permission to move, extent of movement, confirmation of position of infrastructure, etc.) is outside the scope of this guideline and may involve operational rules, site personnel or the provision of lineside signals/indicators.
- 1.1.1.9.1 Note: Refer to Appendix A for an overview about current non-harmonised signals/indicators used to identify both the end of a shunting area and the end of a shunting route in a ERTMS controlled area.

- 1.1.1.10 Movements in SH are restricted in speed by the National Value V\_NVSHUNT except where the trackside sends a mode profile including SH and V\_MAMODE<>127.
- 1.1.1.11 The extent of movements in SH may be restricted by balise messages (Packet 132 – Danger for Shunting information) or balise lists.
- 1.1.1.12 This guideline is part of a bundle of guidelines with the Overall ETCS guideline [7] being the main guideline which will redirect the reader to the relevant guidelines. Be aware that the Overall ETCS guideline may also include recommendations which are related to the topics addressed in this guideline.

## **1.2 Scope and Field of Application**

- 1.2.1.1 This document is based on ERTMS/ETCS Baseline 2 and 3 (including MR1, R2 and R2 with ERA/OPI/2017-2 [6]) and applicable for ETCS Levels 0, 1, 2 and 3. This document also highlights some of the issues relative to Level NTC in Baseline 3.
- 1.2.1.2 It is strongly recommended that any entity using ERTMS/ETCS follows the recommendations defined in this document.
- 1.2.1.3 This guideline is applicable for a trackside where the System Version is 1.Y or 2.Y.
- 1.2.1.4 This guideline takes into consideration the following on-board systems:
  - On-board system with pure System Version 1.Y (i.e. they are not fitted with any other System Version)
  - On-board system supporting System Version 1.Y and 2.Y, with active System Version 1.Y or 2.Y

## **1.3 Document structure**

- 1.3.1.1 Chapter 1 introduces the document, defines the scope and the field of application.
- 1.3.1.2 Chapter 2 provides definitions, references, terms and abbreviations used in this document.
- 1.3.1.3 Chapter 3 describes the different activities that are usually performed while in SH.
- 1.3.1.4 Chapter 4 lists the issues that can be found when performing these activities.
- 1.3.1.5 Chapter 5 mirrors chapter 4 and proposes different recommendations to cope with the existing issues.

## 2. References and Abbreviations

### 2.1 Abbreviations

2.1.1.1 The following table includes acronyms and abbreviations which are used in the current document:

Abbreviation	Description
EOA	End of Authority
EVC	European Vital Computer
FS	Full Supervision Mode
L0/1/2/3	Level 0/1/2/3
LS	Limited Supervision Mode
NTC	National Train Control
OS	On Sight Mode
PS	Passive Shunting Mode
PT	Post Trip Mode
RBC	Radio Block Center
SB	Standby Mode
SN	National System Mode
SH	Shunting Mode
SR	Staff Responsible Mode
STM	Specific Transmission Module
TR	Trip Mode
UN	Unfitted Mode

### 2.2 References

2.2.1.1 The following documents and versions apply:

Ref. N°	Document Reference	Title	Version
[1]	SUBSET-026	System Requirements Specification	3.6.0
[2]	SUBSET-035	Specific Transmission Module FFFIS	3.2.0
[3]	SUBSET-040	Dimensioning and Engineering Rules	3.4.0
[4]	N/A	ERTMS Trackside Approval Issues Log	5
[5]	SUBSET-113	ETCS Hazard Log	1.5.0



<b>Ref. N°</b>	<b>Document Reference</b>	<b>Title</b>	<b>Version</b>
[6]	ERA/OPI/2017-2	Opinion of the European Union Agency for Railways to the European Commission regarding CCS TSI Error Corrections	2017-02-04
[7]	22E087	Overall ETCS	1-

### **3. SH Activities**

#### **3.1 Entry into SH**

##### **3.1.1 NTC/L0**

3.1.1.1 SH is always available for selection by the driver when at a stand in SB, SN and UN.

3.1.1.2 The ETCS trackside is not involved in the entry into SH.

##### **3.1.2 L1**

3.1.2.1 SH is always available for selection by the driver when at a stand in SB, FS, OS, LS, SR and PT.

3.1.2.2 The ETCS trackside may instruct the on-board to enter SH as part of a mode profile included in a Level 1 Movement Authority.

##### **3.1.3 L2/3**

3.1.3.1 SH is always available for selection by the driver when at a stand in SB, FS, OS, LS, SR and PT and the communication session is established. Entry into SH is dependent on authorisation from the RBC.

3.1.3.2 In the event of no response from the RBC the on-board will, after the fixed waiting time and the number of repetitions, as defined into appendix "List of Fixed Value Data" to chapter 3 of SUBSET-026 [1], inform the driver and not switch to SH.

3.1.3.3 The ETCS trackside may instruct the on-board to enter SH as part of a mode profile included in a Level 2/3 Movement Authority.

3.1.3.4 The change of mode is reported to the RBC and any session is terminated by the RBC (in accordance with SUBSET-026 [1], 5.6.2.2 (S100)).

#### **3.2 Exit from SH**

##### **3.2.1 Introduction**

3.2.1.1 Exit from SH is managed by the driver when at a stand.

3.2.1.2 The ETCS trackside is not involved in the exit from SH (except where a trackside message results in the train entering TR).

##### **3.2.2 L2/3**

3.2.2.1 The change of mode is reported to the RBC with the on-board establishing a connection when exit from SH if required.

3.2.2.1.1 Note: When a level transition to a non-radio level is received from trackside before exiting from SH, clause 3.5.3.4 c) of SUBSET-026 [1] to establish a communication session will not apply, because of the immediate cancelation due to the transition to a non-radio level.

#### **3.3 Baseline 2 and 3**

3.3.1.1 Level STM (Baseline 2) does not support SH.

3.3.1.2 Level NTC (Baseline 3) does support SH.

3.3.1.2.1 Note: Administrations need to consider the implications of the introduction of Baseline 3 trains on a baseline 2 trackside with the potential for SH to be selected in Level NTC. A Baseline 2 track side may not have considered the management of baseline 3 trains operating in Level NTC and SH.

### **3.4 Use of Movement Authorities**

3.4.1.1 Each administration should consider whether shunting activities can be undertaken using movement authorities. These limit the extent of the movement and provide the normal security of moveable infrastructure.

3.4.1.2 The use of movement authorities requires the driver to have completed data entry (and for the data to be available to the driver for that entry). This may add extra time where a driver needs to change cab which may be operationally unacceptable.

3.4.1.3 In order to enable the use of movement authorities for shunting activities, the trackside needs to be configured to enable all the relevant routes to be set and appropriate movement authorities issued – this may require extra facilities to those provided for normal operations. Each required route will require a signal and associated balise(s) and encoders.

## **4. Issues**

### **4.1 Protection of shunting activities**

4.1.1.1 Trains in SH are not normally in communication with the trackside and are unsupervised by the trackside. There is a risk that if other trains are allowed to enter the area of shunting collisions may occur.

### **4.2 Protection of other train movements**

#### **4.2.1 Introduction**

4.2.1.1 There is a risk that shunting movements can exceed the area of authorised shunting activity. This could lead to collision with another authorised train movement.

4.2.1.2 The ability of the trackside to control movements in SH is very limited and varies according to Level.

#### **4.2.2 NTC and L0**

4.2.2.1 In Levels NTC and 0 the ETCS on-board does not supervise the train for ETCS modes including SH with the exception of the ceiling speed.

4.2.2.2 Balise groups containing Packet 132 - “Danger for Shunting Information” are not accepted in Level 0 or NTC unless they are accompanied by an immediate level transition order to Levels 1,2 or 3.

#### **4.2.3 L1/2/3**

4.2.3.1 Entry into SH in Level 2/3 requires authorisation of the RBC which can be conditional on other controls being in place.

4.2.3.2 Movements in SH are restricted by the ceiling speed for the mode (either National Value or mode related speed restriction).

4.2.3.2.1 Note: When the on-board exits SH, the mode related speed restriction will be deleted (see SUBSET-026 [1] 4.5.2 and 4.6.2).

4.2.3.3 Balise groups containing Packet 132 - “Danger for Shunting Information” are accepted in Level 1 leading to train trip.

4.2.3.4 Packet 49 – “List of balises for SH area” may be sent with a Level 1/2/3 Movement Authority including a mode profile containing SH. Passing a balise group not in the list will lead to train trip.

4.2.3.4.1 Note: Unlike balise lists associated with movements in SR, Packet 132 – “Danger for Shunting Information” is always accepted and actioned irrespective of whether the balise group is included in the balise list.

4.2.3.4.2 Note: Balises included in the “List of balises for SH area” are expected to be passed in SH mode without triggering a train trip even if they are met more than once by the train moving in SH.

### **4.3 Management of shunting movements**

- 4.3.1.1 When in SH the driver receives no information from the system on the extent or direction of the authorised movement – this has to be provided by other means.
- 4.3.1.2 The status of moveable infrastructure needs to be communicated to the driver or person in charge to avoid derailment or infrastructure damage.
- 4.3.1.3 The driver is reliant on what they can see from the driving location (which may be in the cab or remote).

#### **4.4 Class B systems (Only in NTC)**

- 4.4.1.1 Where a class B system is interfaced to the on-board of a Baseline 3 train using an STM, on entry to SH in Level NTC, the class B system will be commanded to CS (Cold Standby) in accordance with SUBSET-035, v3.2.0 [2].
  - 4.4.1.1.1 Note: A non-STM interface may follow the principles applicable to an STM.

#### **4.5 L2/3 Issues**

##### **4.5.1 Shunting in non-signalled areas**

- 4.5.1.1 In these areas where no signalling system is in place the workload of the person in charge of the shunting zone must be considered.
- 4.5.1.2 No other interlocking controls are in place.

##### **4.5.2 Movements into a non-signalled area with an SH mode profile**

- 4.5.2.1 There is not a specific position or instant in which the SH mode is offered.

##### **4.5.3 Shunting granted subject to controls**

- 4.5.3.1 In areas where SH is often used, each administrator has to take into account the required controls to prevent movements into that area.
- 4.5.3.2 Those controls must contemplate the way SH is initiated.
- 4.5.3.3 Each administrator must set the rules on how the movements between different SH areas have to be performed.

##### **4.5.4 Shunting granted to specific trains**

- 4.5.4.1 Where shunting is required to take place outside an area which can be protected from other train movements or where the points need to be controlled by the dispatcher, the operational arrangements need to be considered.
- 4.5.4.2 The authorisation of the on-board to enter SH needs to be considered.
- 4.5.4.3 The potential for the dispatcher to set routes which authorise SH should be considered.
- 4.5.4.4 The rules for authorising each shunting movement between the person in charge, driver and dispatcher is administrator specific.

##### **4.5.5 Moving between shunting areas**

- 4.5.5.1 The movement between shunting areas using balise groups with Packet 132 – “Danger for Shunting Information” could lead to a train trip.

4.5.5.2 Moveable infrastructure may be moved when traveling from one shunting area to another one. The procedure to establish a protected route must be described.

#### **4.5.6 Mode profiles**

4.5.6.1 The issue of a movement authority into an area not controlled from the signalling system or activated pre-defined shunting area may require the controls to be released for the movement. Consideration should be given to how this is achieved, and the protection is re-established after the movement.

4.5.6.2 Where a mode profile is used, the location where the driver will be offered SH may not be consistent (depending on train speed) and allow the train to enter SH before it is partially or completely within the Shunting area. This reduces the effectiveness of controls to restrict train movements to the Shunting area.

4.5.6.3 Because the shunting mode related speed restrictions coming with the mode profile is deleted when exiting SH, the following issues may arise:

4.5.6.4 Different shunting speeds being supervised in the same area

4.5.6.5 For safety reasons, if the shunting speed is set under the NV, it cannot be guaranteed to remain applicable.

4.5.6.6 For operational or safety reasons, if the shunting speed is set above the NV, it cannot be guaranteed to remain applicable

4.5.6.7 Because the shunting mode related speed restrictions coming with the mode profile prevails over NV, a change in the NV for safety reasons (E.g. flank protection) will not be applied by the train.

#### **4.5.7 Changing shunting area boundaries**

4.5.7.1 Allowing trains to move between shunting areas or combining shunting areas into a larger area may be required operationally.

4.5.7.2 The use of a balise list is not practicable in these situations since once the train enters SH it disconnects, and it is not possible for the trackside to update the balise list.

4.5.7.3 Balise lists are retained where Passive Shunt is used and on re-entry to SH following desk opening will remain applicable.

#### **4.5.8 Releasing shunting areas**

4.5.8.1 Since once the train enters SH it is disconnected from the RBC, procedures to prevent that no train is moving in into or out of the area are necessary in order to deactivate a shunting area.

#### **4.5.9 Train movements after exiting SH**

4.5.9.1 Entry into SH amends the status but retains train data. The driver is required to enter new or revalidate train data prior to receiving a movement authority. Each administration will have its own operational rules.

4.5.9.2 The actual train position after exiting SH is not always known. Procedures or infrastructure to determine such position may be needed.

#### **4.5.10 Level transitions and SH**

4.5.10.1 With System Version X=1, Shunting should not be permitted in the vicinity of Level Transitions (or RBC handovers) in accordance with 6.1.1.1.1 of SUBSET-040 v3.4.0 [3].

4.5.10.2 A train operating in SH mode receiving a level transition order will not change level until SH is exited on board.

4.5.10.2.1 Note: A train operating in L2 SH entering a LNTC area and subsequently being tripped will change level as part of the trip procedure. When trip is acknowledged the train will enter LNTC SH.

4.5.10.3 The implication is that Packet 132 - "Danger for Shunting Information" protection will be ineffective when trains in L0 SH or LNTC SH enter a Level 1, 2 or 3 area, except if it is sent together with an immediate Level Transition Order (see SUBSET-026 [1], section 4.8.3).

#### **4.5.11 Use of Passive Shunting**

4.5.11.1 Passive Shunting is restricted to a locomotive with one EVC and two cabs or two separate locomotives mechanically but not electrically coupled. Selecting "Continue Shunting on desk closure" prior to desk closure suspends SH but retains relevant information.

4.5.11.2 The selection of Passive Shunting causes the system to retain the information such as balise lists which were applicable before entering PS. If the train is moved, using another active cab, into a different shunting area then, on reopening the first cab it will re-enter SH but the first balise passed over will lead to a trip.

4.5.11.3 A cab moved in Passive Shunting will retain the ability to re-enter SH when the cab is opened.

#### **4.5.12 Establishment of National Values**

4.5.12.1 In SH the ceiling speed of trains is managed by V\_NVSHUNT except where a speed was sent as part of a mode profile. Where the ceiling speed value is reduced, through National Value or mode profile for current location, there is a risk of the train receiving an intervention because the new ceiling speed value is immediately applicable.

#### **4.5.13 Level 3 specific issues**

4.5.13.1 Once a train enters SH it will be instructed to disconnect by the RBC and its location will become unknown. Subsequent movements will be "invisible" to the system (in the absence of trackside train detection) and the system needs to consider a wider area as unknown.

4.5.13.2 On reconnection to the RBC when the train leaves SH the information reported may be incomplete (e.g. no train data available so length unknown).

4.5.13.3 If a train is split or combined whilst operating in Level 3 and SH, the trackside needs to consider how the safe movement of other trains will be managed in the absence of train integrity information from the shunting train. There is no requirement for a loss of train integrity to be reported by a train in SH.

#### **4.5.14 Authorisation of SH**

4.5.14.1 In Level 2/3, Shunting is not an option to the driver unless a communication session exists.

4.5.14.2 Each administration must consider when to authorise SH and what conditions should apply.

### **4.6 Trackside Approval Issues Log**

#### **4.6.1 Introduction**

4.6.1.1 This chapter describes the shunting related issues listed in the ERA Trackside Approval Issues Log [4], with recommended mitigations found in chapter 5.6.

#### **4.6.2 Level transitions to L0/NTC while in trip mode (issue 1.1.1)**

4.6.2.1 If level transitions to level 0/NTC are planned to be implemented next to SH areas (see also SUBSET-040, 6.1.1 [3]), and a B2 train is being tripped close to the level transition, it needs to be prevented that the train crosses the level transition while in trip mode.

4.6.2.2 If the B2 train crosses the level transition while in TR mode and no valid Train Data is stored on-board, the train will end up in UN/SN mode with no valid Train Data, as neither condition [62] nor [63] in the transition table (see SUBSET-026 4.6.3 [1]) imposes the valid Train Data to be stored on-board.

4.6.2.2.1 Note: In L0/NTC, the PT mode is not used, so the mode transition from TR will not end up in PT.

4.6.2.3 CR548 and CR865 modified in B3 the conditions [62] and [63] for the transition table that valid Train Data needs to be stored on-board for the mode transition to UN/SN mode to be allowed, and introduced the mode transition to SH mode in the case where no valid Train Data is stored on-board with the new condition [68].

#### **4.6.3 SH mode profile sent together with Immediate Level Transition Order (issue 1.1.8)**

4.6.3.1 If an SH mode profile for the current location is sent together with an Immediate Level Transition Order (or conditional Level Transition Order) to level 0/NTC or from level 2/3 to level 1, it is not clear to the on-board which acknowledgement request to be presented first. This issue is described and solved in CR 1312, item 3.

4.6.3.2 This could lead to a confusing situation for the driver and should be avoided.

#### **4.6.4 Packet 49, “list of balises for SH area” sent or accepted alone (issue 7.1.1)**



- 4.6.4.1 As described in SUBSET-113, Appendix C [5], there are several potential hazardous situations related to the B2 on-board management of Packet 49, “List of balises for SH area”.
- 4.6.4.2 These hazardous situations are referred to in the Trackside Approval Issues Log, issue 7.1.1 [4].
- 4.6.4.3 With the introduction of CR 919 (B3), it is no longer possible for a trackside to send Packet 49 alone, and the on-board will also no longer accept Packet 49 alone and therefore, the potential hazardous situations related to an on-board accepting Packet 49 alone are avoided.
- 4.6.4.4 However, if the on-board and/or the trackside has not implemented CR 919, these hazardous situations may occur, and the trackside should be designed to mitigate these hazardous situations.
- 4.6.4.5 The risk is that the on-board may be authorised for SH, but not correctly supervise the list of balises, and therefore there is a risk that the train may enter the mainline while in SH mode.

## **5. Recommendations**

### **5.1 Protection of shunting activities**

- 5.1.1.1 Each administration must consider options for the positioning of moveable infrastructure to prevent the entry into the area of shunting of other train movements.
- 5.1.1.2 Each administration should consider the provision of controls, either trackside or in the control centre, to prevent other trains being routed into the area of shunting.
- 5.1.1.3 National operational rules should provide for the protection of shunting activities from other authorised train movements.

### **5.2 Protection of other train movements**

#### **5.2.1 Introduction**

- 5.2.1.1 Each administration must consider options for the positioning of moveable infrastructure to prevent shunting movements exiting the area of shunting.
- 5.2.1.2 National operational rules should provide for the protection of other authorised train movements from shunting activities. This may include the procedure for agreeing the limits of the shunting area with the driver and other on-site staff.

#### **5.2.2 L1/2/3**

- 5.2.2.1 When utilising balise protection, account must be taken of the fact that it is the passage of the active on-board over the balise group that leads to the trip and that on-board may not be at the front of the train movement.

### **5.3 Management of shunting movements**

#### **5.3.1 Introduction**

- 5.3.1.1 Each administration must establish operational rules for when SH may be selected and any associated processes/authorisation.
- 5.3.1.2 National operational rules must determine whether the movement can be undertaken by the driver alone or requires a person in charge on site.
- 5.3.1.3 Each administration must consider how moveable infrastructure within the shunting area will be managed particularly where it can be controlled remotely.
- 5.3.1.4 Each administration must consider how the position and status of moveable infrastructure controlled remotely will be conveyed to the driver or person in charge.
- 5.3.1.5 Each administration must consider how the authority to move the train (including the extent of the movement) will be conveyed to the driver and whether lineside signals are required.
- 5.3.1.6 National operational rules should address the choice of driving position of the driver for them to be able to observe the line ahead, hand and lineside signals and the movement of the train.

5.3.1.7 National operational rules must include how the driver is authorised to undertake the movement and the information required including the speed and extent of the movement to be undertaken.

### **5.3.2 L1**

5.3.2.1 Where the entry into SH occurs in response to a mode profile associated with a movement authority, each administration must consider what information the driver requires about the extent of movements once in SH.

## **5.4 Class B systems (Only for NTC)**

5.4.1.1 Each administration must analyse whether the risks of the use of SH without a Class B comply with their operational safety rules and targets. Some countries have legislation relating to the availability of Class B systems which must be considered.

5.4.1.2 Options which may be considered to maintain Class B protection in all modes include the inhibition of selection of SH in specific Levels NTC or the provision of an interface which does not suppress the Class B system when SH is entered. Each administration needs to consider the safety risks and whether operational restrictions are required which may be included in the authorisation of the vehicles. (The issue is described in CR1287).

## **5.5 L2/3 Issues**

### **5.5.1 Shunting in non-signalled areas**

5.5.1.1 The administration should identify areas where the use of SH does not require other interlocking controls to be in place and hence there is no signalling system.

5.5.1.2 The administration must decide whether the RBC will automatically respond to a request for SH with authorisation in such areas or whether the signaller or person in charge on site needs to confirm authorisation.

5.5.1.2.1 Note: Where frequent changes of driving cab are required it, the signaller or person in charge workload should be considered.

5.5.1.3 Such areas would typically be yards or depots where there are not signalling controls, but the position reported by the train is valid and within the area.

5.5.1.3.1 Note: Where the train position reported is invalid, the process for an unknown position applies (see 5.5.3.1), and consideration should be given to the provision of balise groups within the area for train positioning.

### **5.5.2 Movements into a non-signalled area with an SH mode profile**

5.5.2.1 Where the entry into SH occurs in response to a mode profile associated with a movement authority, each administration must consider what information the driver requires about the extent of movements once in SH.

5.5.2.2 Each administration must consider where the transition to SH will occur and how the driver will obtain information regarding the remainder of the required

movement. The location of the transition should consider other driver workload and distractions, and the need for the driver to acknowledge the transition.

### **5.5.3 Shunting granted subject to controls**

- 5.5.3.1 Each administration should identify areas where the use of SH will be regularly required subject to interlocking controls being in place.
- 5.5.3.2 Each administration must decide whether the RBC will automatically respond to a request for SH with authorisation in such areas or whether the signaller or person in charge on site needs to confirm authorisation.
  - 5.5.3.2.1 Note: Where frequent changes of driving cab are required it, the signaller or person in charge workload should be considered.
- 5.5.3.3 Such areas would typically be stations or sections of the line where trains need to undertake shunting activities and the cost of additional controls is justified. This can include where shunting activities extend out of a non-signalled area for certain movements.
  - 5.5.3.3.1 Note: Where the train position reported is invalid, the process for an unknown position applies (see 5.5.3.1).
- 5.5.3.4 An administration may provide facilities for shunting areas to be defined by the combination of a number of smaller areas prior to the issue of SH authorisation to the train.
- 5.5.3.5 For each area, the administration must identify the controls to be in place to prevent other movements into the area where shunting is taking place. This may require controls being applied to moveable infrastructure or the technical prohibition of route setting into the area.
  - 5.5.3.5.1 Note: Once a shunting area is activated, the controls should apply until the area is deactivated.
- 5.5.3.6 For each shunting area, the method of activating the authorisation of SH must be established. This could be by selection of a control by the signaller, the taking of control by a person on site or automatically upon request for SH. Activation should require all relevant controls to be in place or apply the controls automatically.
- 5.5.3.7 Each administration must consider options for the positioning of moveable infrastructure to prevent shunting movements exiting the area of shunting.
  - 5.5.3.7.1 Note: Arrangements may be required for moveable infrastructure to be moved to enable signalled movements into and out of the area.
- 5.5.3.8 Each administration must consider when to use balise groups containing Packet 132 - "Danger for Shunting Information" to manage the movement of the active cab.
  - 5.5.3.8.1 Note: Authorised movements out of the shunting area either need to be undertaken with a movement authority or a switchable balise group is required in order to disable Packet 132 and avoid the use of the override function.

- 5.5.3.8.2 Note: Only the active cab is supervised and where vehicles are being propelled they may leave the shunting area before a trip occurs.
- 5.5.3.9 Each administration must consider when Packet 49 – “List of balises for SH area” should be sent with a SH authorisation. Passing a balise group not in the list will lead to train trip.
- 5.5.3.9.1 Note: See 4.2.3.4.1.
- 5.5.3.9.2 Note: SUBSET-040, 4.3.2.1.1-b) [3] places restrictions on the number of balise identities (15) that can be included in a single balise list and stored on-board.
- 5.5.3.10 When utilising balise protection, account must be taken of the fact that it is the passage of the active on-board over the balise group that leads to the trip and that on-board may not be at the front of the train movement.
- 5.5.3.11 Where an activated shunting area adjoins a non-signalled area, consideration should be given to how movements between the two areas will be managed. This may require controls protecting either area to be released for the purposes of the movement.
- 5.5.3.12 In some locations there may be a number of potential shunting areas. Consideration should be given to the need to activate or deactivate an adjacent area and how the controls to protect the shunting area/other movements will be affected.

#### **5.5.4 Shunting granted to specific trains**

- 5.5.4.1 Where trains movements require the use of SH and may occur outside a preconfigured shunting area (non-signalled or pre-defined), the administration must define the conditions under which SH can be authorised.
- 5.5.4.2 Where a train is unable to report a valid position within a non-signalled area or an activated pre-defined shunting area, the administration must define the conditions under which SH can be authorised.
- 5.5.4.3 The use of SH in Level 2/3 areas requires the RBC to authorise the change to SH, where this cannot be undertaken automatically the administration must provide facilities for the signaller to instruct the RBC to authorise SH for specified train(s).
- 5.5.4.4 Where the shunting activity may require the cab to be changed a number of times, the administration may consider allowing the instruction to permit the RBC to authorise SH to remain active for multiple requests from the same train for a time period.
- 5.5.4.5 Each administration must consider what actions must be taken by the signaller to protect the shunting activity before the RBC could authorise SH including setting the position of moveable infrastructure to prevent the unauthorised entry into the area of shunting by other train movements.
- 5.5.4.6 When placing balise groups containing Packet 132 - “Danger for Shunting Information” for the purposes of managing shunting in pre-defined areas, the

impact on unplanned shunting should be considered. Operational rules may be required to enable trains in SH to pass such balise groups.

- 5.5.4.7 Where a “route set for shunting” is used then the risks of a train changing direction or exceeding the route limits need to be considered. Since a balise list cannot be updated once the train is in SH, it may not be practical to use balise groups containing Packet 132 if the route can subsequently be extended.

### **5.5.5 Moving between shunting areas**

- 5.5.5.1 Consideration should be given to the need for shunting movements to pass from one shunting area to an adjacent area. In order to make the movement it may be necessary to release the controls on moveable infrastructure. Consideration should be given to how this is achieved, and the protection is re-established after the movement.
- 5.5.5.2 Any balise groups containing Packet 132 - “Danger for Shunting Information” will need to be switchable to prevent the movements in SH leading to a trip.
- 5.5.5.3 There may be a requirement to exit shunting and request shunting again in order to update balise lists, etc. when moving between shunting areas. Where this is required operational rules and lineside signage may be required.

### **5.5.6 Mode profiles**

- 5.5.6.1 The mode profile to change to SH should consider where the mode change will be offered to the driver and any risks associated with the possibility that the train may enter SH before entering the shunting area.
- 5.5.6.1.1 Note: A mode profile needs to consider when the driver will be invited to acknowledge the change to SH. A longer distance before the start of the SH area allows more time for the driver however it means the train may be in SH within an area which is undesirable to the administration. A shorter distance forces the train to a lower speed (the mode profile to SH being treated as an EOA) and may be too restrictive.
- 5.5.6.2 Set V\_MAMODE parameter to 127, national speed value of the required mode, to avoid unpredictable shunting speeds due to 4.2.3.2.1, 4.5.6.3 and 4.5.6.7.

### **5.5.7 Changing shunting area boundaries**

- 5.5.7.1 No recommendations (see 4.5.7).

### **5.5.8 Releasing shunting areas**

- 5.5.8.1 Once trains have been authorised to enter SH, the on-board disconnects from the RBC. Each administration needs to establish when it is safe to deactivate a shunting area, to release controls protecting the shunting activity/other movements and for the signaller to enable normal train movements. This may use technical or operational means to confirm there are no trains in the shunting area.

- 5.5.8.2 Consideration should be given to how many on-boards may have been authorised to enter SH and whether a record can be kept when they report a mode change to SB.

### **5.5.9 Train movements after exiting SH**

- 5.5.9.1 Each administration must put in place processes for the driver to be supplied with the correct train data to be entered (where this cannot be readily determined).
- 5.5.9.2 Each administration must consider the likely location of trains having exited SH and the appropriate trackside facilities for issuing a movement authority. Where this requires the driver to select override or the trackside to offer SR, the potential to enable the train to start in OS should be considered.

### **5.5.10 Level transitions and SH**

- 5.5.10.1 A train operating in SH mode receiving a level transition order will not change level until SH is exited on board. The trackside design needs to take account of this scenario.
- 5.5.10.2 Where a non-signalled area is not managed by ETCS (e.g. a Level 0 yard) then the boundary between the area of shunting and the ETCS controlled area will coincide with a level transition.
- 5.5.10.3 When entering an area other than Level 2/3 in SH, the mode change may not be reported to the RBC when exiting SH. This will impede the use of mode change information to support the deactivation of a shunting area. Similarly, if the train enters the Level 2/3 area already in SH, there is no requirement for the on-board to notify the RBC until the mode is changed – this may require extra provision at entry to a Level 3 area.
- 5.5.10.4 When entering a Level NTC area in SH mode, the transition to Level NTC will not occur until SH is exited. This means that Class B protection within the Level NTC area will be ineffective.

### **5.5.11 Use of Passive Shunting**

- 5.5.11.1 A cab moved in Passive Shunting will retain the ability to re-enter SH when the cab is opened unless Packet 135 – “Stop shunting on desk opening” is included in balise groups at the boundary of the shunting area.

### **5.5.12 Establishment of National Values**

- 5.5.12.1 In SH, the ceiling speed of trains is managed by V\_NVSHUNT except when a mode related speed restriction is sent with V\_MAMODE different from 127 (= use the national speed value of the required mode). Where the ceiling speed value is reduced, through National Value or mode profile for current location, there is a risk of the train receiving an intervention because the new ceiling speed value is immediately applicable. Driver should be duly informed to avoid a system intervention.

5.5.12.2 With reference to the national SH ceiling speed value, in case a different value is needed (e.g. for specific areas used by freight trains, if SH speed needs to be different according to the ETCS Level or to prevent a train from moving in SH in a certain area or to reduce the speed at the border between non controlled and controlled areas), dedicated BGs should be installed to modify the standard V\_NVSHUNT; this to ensure the correct ceiling speed is used by the train during the movements in SH. ETCS Trackside should ensure the train receives the standard value of V\_NVSHUNT again once the need is no longer valid (the latest stored National Value will be retained).

5.5.12.2.1 Note: The content of this chapter also applies to L1 applications.

### **5.5.13 Level 3 specific issues**

5.5.13.1 No recommendations (see 4.5.13.1).

5.5.13.2 Note: Recommendations will be included in the next revision.

### **5.5.14 Authorisation of SH**

5.5.14.1 Radio coverage needs to be provided where shunting is required.

5.5.14.2 Authorisation of SH needs to take account of potential requests where:

- The train is in an ETCS area not controlled by the signalling system (e.g. a yard) and hence an MA cannot be utilised (see 4.5.1.1)
- The train is in a pre-defined area of ETCS signalling where it is required to permit SH subject to specified controls. Such areas can be activated or deactivated by the signaller or automatically (see 5.25.5.1),
- The train is not in an area where SH authorisation has been pre-configured as described in section 1.1 (see 5.5.3),
- The train reports an unknown or invalid position (see 5.5.3.1).

## **5.6 Trackside Approval Issues Log**

### **5.6.1 Introduction**

5.6.1.1 This chapter describes recommendations to mitigate the shunting related issues listed in the Trackside Approval Issues Log [4], which are described in chapter 4.6.

### **5.6.2 Level transitions to L0/NTC while in trip mode (issue 1.1.1)**

5.6.2.1 A B2 train with no valid Train Data stored on-board, that crosses a border from Level 2/3 to level 0/NTC while in TR mode will end up in UN/SN mode with no valid Train Data. This situation of undefined behaviour needs to be avoided and the trackside design needs to take account of this scenario if an SH area is planned to be implemented next to the transition border.

5.6.2.2 A possible mitigation is to ensure a sufficient safety distance between the SH area and the border.

5.6.2.3 In B2 areas where both L2/3 and LNTC are available, another mitigation could be to perform the shunting movements in the SN mode.



5.6.2.4 If it is not possible to avoid SH areas close to a transition border, another mitigation could be to require CR865 to be implemented on the on-board for access to the network.

5.6.2.5 The previous clauses answers issue 1.1.2 in the Trackside Approval Issues Log [4].

**5.6.3 SH mode profile sent together with Immediate Level Transition Order (issue 1.1.8)**

5.6.3.1 It should be avoided to send an SH mode profile for current location together with an Immediate Level Transition Order (or conditional Level Transition Order) to level 0/NTC or from level 2/3 to level 1, as it is ambiguous which acknowledgement request will be first displayed by the ETCS on-board.

5.6.3.2 The previous clause answers issue 1.1.8 in the Trackside Approval Issues Log [4].

**5.6.4 Packet 49, “list of balises for SH area” sent or accepted alone (issue 7.1.1)**

5.6.4.1 To avoid the issues described in SUBSET-113 [5], Appendix C (except case 8), it is recommended to not use Packet 49 in B2 implementations.

5.6.4.2 If Packet 49 will still be used in B2 implementations, these issues needs to be taken into consideration for the trackside design.

5.6.4.3 The previous clauses partially answer issue 7.1.1 in the Trackside Approval Issues Log [4].

## Appendix A Examples of use of end of shunting area/route Marker Boards

### A.1 Introduction

A.1.1.1 This Appendix aims to collect the different choices of some Infrastructure Manager to identify:

- the end of a shunting area
- the end of a shunting route

in an ERTMS controlled area.

A.1.1.2 Possible differences are highlighted compared to the case where ERTMS is overlapped with legacy signaling systems.

### A.2 Examples per country

#### A.2.1 Denmark

A.2.1.1 DK uses ETCS stop markers to delimit shunting (mainly temporary shunting areas TSAs). Information (the unique ID of the markers) is provided to the shunter via the Hand held terminal together with the shunting permission.

A.2.1.2 Management of TSAs and possessions are almost identical, so except for minor details, DK uses the same approach for both.

#### A.2.2 The Netherlands

A.2.2.1 In the Netherlands, it depends on the situation if/how to mark the end of the SH area/movement on Level 2 lines.

- Temporary shunting areas TSAs: inside a TSA area, ProRail plans to install lamps at SMBs which are lit when the TSA is active and could be passed. An SMB without a lamp or at which the lamp is not lit, is used to mark the end of the TSA.
- Route for shunting movement: at locations that are regularly used for shunting movements, ProRail plans to install lamps at SMBs which are lit when the shunting route is set and the driver is then allowed to pass the SMB in SH. An SMB without a lamp or at which the lamp is not lit, is used to mark the end of the shunting route. At other locations, using SMBs without lamp, the driver must stop at the SMB and ask the dispatcher for permission to pass the SMB in SH.
- Working areas: the end of the area is not specially marked

A.2.2.2 Example SMB with lamp:



A.2.2.3 On dual signalling lines in service (light signals without SMBs), ProRail applies the legacy approach however the national rollout will be with ERTMS L2 only.

### A.2.3 Switzerland

A.2.3.1 In ERTMS L2 area there are mainly three Marker Boards that can mark the end of a SH movement:

- ETCS Stop Marker Board (“ETCS-Haltsignal”) - see picture 3a
- ETCS Shunting Stop Marker Board (“ETCS Rangierhaltsignal”) - see picture 21a
- ETCS Shunting Signal with the signal aspect stop for a shunting manoeuvre (“Halt für Rf”) - see picture 26.1



3a		ETCS-Haltsignal (EHS)	Signalabschnittsende mit Ziel für SH, SR.	Lf: Bei allen Vorwärtszufahrten ohne FS oder OS: Genauer Ort des Endes einer vom Fdi erteilten Fahrerlaubnis. Bei FS und OS-Fahrten, wenn Release Speed aktiv ist: Haltepunkt am Ende der MA (ohne aktive Release Speed nicht zu beachten).	Umsetzung FDV: R 300.2, Abb. 604.  Diese Tafel ist immer das Ziel von fernmündlichen Zufahrten im Modus SR/IS und daran darf in SR/IS nur protokollpflichtig vorbeigefahren werden. Diese Tafel kann als Ziel einer fernmündlich erteilten Zustimmung zur Rangierfahrt definiert werden (in Bereichen ohne ETCS-Rangiersignale). Signalkennzeichnung mit weisser Hintergrundfarbe im EGB bzw. blauer Hintergrundfarbe im KGB.
----	---	-----------------------	---	---	---


21a		ETCS Rangierhaltssignal	Ende des Rangierbereichs. ETCS L2 Endpunkt einer Zustimmung zur Rangierbewegung.	Dieses Signal wird am Ende der Rangierbereiche platziert und ist das Ziel für signalisierte Rangierbewegungen. Rangierbewegungen sind über die Rangiergrenze hinaus mit mündlichem Befehl möglich.	Umsetzung FDV: R 300.2, Abb. 623.  Abkürzung für die Signalkennzeichnung: de: RG (Rangiergrenze) fr: LM (limite de manoeuvre) it: LM (limite per la manovra)
26.1		Halt für Rf	Halt für Rf Von Zügen nicht zu beachten		Umsetzung FDV: R 300.2, Abb. 614.

A.2.3.2 In theory there are other three signals which can mark the end of a shunting movement:

- the Crossing into not-centralized area MB (“Übergang in nicht zentralisierten Bereich») which is not very often used - see picture 46a
- the MB’s at the beginning and ending of L2 (“CAB-Anfang” and “CAB-Ende”). But these are not currently used for this purpose -see picture 1a and 2a.

46a		Übergang in nicht zentralisierten Bereich	Anfang des Bereiches im L2 ohne kontrollierte Rangierbewegungen.	Lt. Ende der vom ETCS-Rangiersignal erteilen Zustimmung zur Rangierbewegung. Weiterfahrt gemäss Regeln von nicht zentralisierten ETCS L2 Bereichen.	Umsetzung FDV: R 300.2, Abb. 617. In den FDV ist das Signal als 5-eckige Tafel abgebildet.  Abkürzung für die Signalkennzeichnung: de: NzB (nicht zentralisierter Bereich) fr: ZNC (zone non centralisée) it: SNC (settore non centralizzato)  Hinweise: An der Rückseite dieses Signals ist stets ein ETCS Rangiersignal platziert. OBU bleibt im L2.
-----	--	---	--	---	---

Nr.	Tafel	Name	Definition	Anwendungsfälle	Kommentar
1a	<b>CAB</b>	CAB-Anfang	Wechsel von Aussensignalisierung zu Führerstandsignalisierung (Übergang Aussensignalisierung – EGB oder KGB)	Lf: Alle Fahrten aus dem Bereich mit Aussensignalisierung in den Bereich mit Level 2	<p>Umsetzung FDV: R 300 2, Abb. 601.</p> <p><u>Abweichung zur FDV2020:</u>                      Gemäss FDV2020 kann die CAB-Anfang Tafel Start- und Zielpunkt von Rangierbewegungen sein. Gemäss vorliegendem Konzept ist dies (ausser an den Grenzen von Rangierbereichen) nicht vorgesehen, da damit Punkt 1.2.1.10 aus dem Dokument  <b>PROREG-1303 - #013</b> Festlegungen und Annahmen zu Sicherungsanlagen ETCS Level 2 KGB verletzt würde.</p> <p><u>Abweichung zu</u>  <b>PROREG-1303 - #013</b> Festlegungen und Annahmen zu Sicherungsanlagen ETCS Level 2 KGB, <u>§ 1.1.1.2</u>. Gestützt auf einen BAV-Entscheid wird vom Grundsatz abgewichen, dass die Zuordnung zum KGB oder zum EGB-Bereich für Erhaltungs- und das fahrende Personal jederzeit erkennbar ist.</p>

2a	 <p>CAB-Ende</p>	Wechsel von Führerstandssignalisierung (EGB oder KGB) zu Aussensignalisierung.	Lf. Ort ab welcher die Aussensignalisierung gilt	<p>Umsetzung FDV: R 300.2, Abb. 601.</p> <p><u>Abweichung zur FDV2020:</u> Gemäss FDV2020 kann die CAB-Anfang Tafel Start- und Zielpunkt von Rangierbewegungen sein. Gemäss vorliegendem Konzept ist dies (ausser an den Grenzen von Rangierbereichen) nicht vorgesehen, da damit Punkt 1.2.1.10 aus dem Dokument <sup>⇨⇨</sup></p> <p>PROREG-1303 - #013: Festlegungen und Annahmen zu Sicherungsanlagen ETCS Level 2 KGB verletzt würde.</p> <p><u>Abweichung zu</u> <sup>⇨⇨</sup> PROREG-1303 - #013: Festlegungen und Annahmen zu Sicherungsanlagen ETCS Level 2 KGB <u>§ 1.1.1.2:</u> Gestützt auf einen BAV-Entscheid wird vom Grundsatz abgewichen, dass die Zuordnung zum KGB oder zum EGB-Bereich für Erhaltungs- und das fahrende Personal jederzeit erkennbar ist</p>
----	---	--	--	--

A.2.3.3 Remark: The non-harmonized Marker Boards/signals for SH (ETCS Shunting Stop Marker Board, ETCS Shunting Signal with the signal aspect stop for a shunting manoeuvre, Crossing into not-centralized area MB) are only used in defined Shunting areas. Such areas are those where shunting is used often (e.g. stations).

## A.2.4 Belgium

A.2.4.1 In Belgium, the shunting areas are currently delimited by luminous signals or legacy “end of small movement” panels.

A.2.4.2 3 kinds of luminous signals are used:

- Main stop signals valid for all kind of movements and which can modify the type of movement such as starting/ending a shunting movement



- Simplified stop signals (only closed or open) valid for small (shunting) or large (train) movements without modifying the type of movements.



- Small stop signals (only closed or open) that only address small (shunting) movements.



A.2.4.3 When equipping an area with ETCS, the panels/signals remain the same to manage shunting movements and they also need to be considered in the configuration of the RBC.

### A.2.5 France

A.2.5.1 In France, on ETCS only lines, SNCF will keep the legacy marker board for “End of shunting”. SNCF will also keep the “shunting signals” currently in use on legacy Class B system.

### A.2.6 Germany

A.2.6.1 The end of the station is marked with a legacy signal which also indicates the end of the allowed shunting area.

#### 1 Signal Ra 10 – Rangierhalttafel

(1) **Über die Tafel hinaus darf nicht rangiert werden.**

**Bedeutung**

(2) Eine oben halbkreisförmig abgerundete weiße Tafel mit schwarzer Aufschrift “Halt für Rangierfahrten”.

**Beschreibung**



A.2.6.2 At the moment we use the same legacy shunting signals for shunting routes in ETCS and Class B system.

### 3 Signal Sh 1, Signal Ra 12 – Rangierfahrtsignal (DV 301)

<b>Bedeutung</b>	(1) <b>Signal Sh 1: Fahrverbot aufgehoben.</b> <b>Signal Ra 12 (DV 301): Rangierfahrt erlaubt.</b>
<b>Beschreibung Formsignal</b>	(2) Signal Sh 1 Formsignal: Ein nach rechts steigender schwarzer Streifen auf runder weißer Scheibe.



<b>Lichtsignal</b>	Signal Sh 1 Lichtsignal (DS 301), Signal Ra 12 (DV 301): Zwei weiße Lichter nach rechts steigend.
--------------------	---

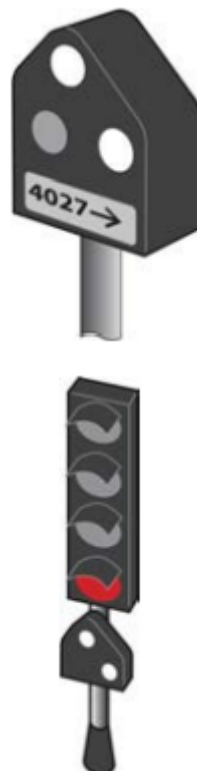


A.2.6.3 On ETCS level 2 lines, the ETCS stop marker board is also valid as signal for indicating the end of a shunting route (stop in mode SH). On stations with regular shunting movements the ETCS stop marker board is also combined with the legacy lighting shunting signal.

A.2.6.4 Solutions for the future are still in discussion and depend on CR1350, CR11367.

#### A.2.7 Great Britain

A.2.7.1 At present NR uses a small/miniature signal to control shunting activities, these small signals can be located below the main Colour Light Signal protecting an area or provided as a stand-alone signal as shown below.





A.2.7.2 When the position-light signal is showing two white lights at 45°, it authorises the driver to proceed at caution into the next section.

A.2.7.3 The limit of a shunting area is marked by a small signal showing two horizontal reds aspects or by a sign which may be illuminated as shown below.



A.2.7.4 For an ETCS area it is also possible for a shunt entry board to be used. This sign is a reflective board showing a white chevron on a violet background with the chevron pointing towards the line to which the shunt entry board applies.



A.2.7.5 Network Rail is currently considering marking the boundaries of Permanent Shunting Areas (PSAs) with a sign however the sign to be used is currently undecided.

A.2.7.6 Network Rail have detailed the approach to shunting in ETCS within their released ERTMS Reference Design, Topic P – Shunting; this can be found on the Network Rail public website at <https://www.networkrail.co.uk/industry-and-commercial/system-requirements-and-integration-gb-generic-requirements-suite/>

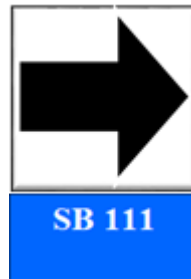
## A.2.8 Italy

A.2.8.1 Also for ERTMS only applications, RFI will continue to use the legacy marker to identify the boundary of the possible largest shunting area of a station (TSA). The shape of these markers is depicted here after.



A.2.8.2 These markers are placed at 100m from the station protection signals toward the direction of the station.

A.2.8.3 To identify the end of a shunting route, since RFI intends to make use of OS MA for these kind of movements, ETCS location markers with a blue plate will be used in case of shunting area controlled by ETCS (L2) only.



A.2.8.4 In case ETCS overlaps the legacy signalling systems and also trains not equipped by ETCS will be allowed to run, the legacy shunting signals will continue to be used. Picture hereafter represents an example of those signals.



A.2.8.5 The SH mode will be mainly used in areas non controlled by ETCS and in those areas only shunting legacy signals will be used.

### A.2.9 Spain

A.2.9.1 Adif uses luminous signals with a white light and a red light to indicate manoeuvre operations.

LUMINOSAS		
A	B	C
Señal FF8A	Señal FF8B	Señal FF8C
Color superior rojo, inferior blanco a destellos	Color superior rojo, inferior blanco	Color superior rojo, inferior blanco





A.2.9.2 The Marker Board used in Adif's network to indicate the limit of a manoeuvre area is the following:



**A.2.10 Sweden**

A.2.10.1 In ERTMS equipped areas Sweden will use the following boards/signals to mark an end of a shunting route or a TSA:

- ETCS stop markers
- Shunting signals with the aspects

	(name of) aspect	indication
	'horizontal'	"stop"
	'vertical'	"movement authorised – unoccupied route"
	'oblique left'	"movement authorised – occupied route"
	'oblique right'	"movement authorised – check turnouts and for obstructions"

- “End of shunting route board” (typically at the entrance of a PSA)
- Buffer stop
- Optical signal (only at border to legacy system)

A.2.10.2 Shunting signals and “End of shunting route” boards are used also in areas with legacy systems.