



Translation of an excerpt of the investigation report

**“Train collision Worms central station on 16/04/2024”**

Status as of 12/02/2026, version 1.0.

**Note:**

In accordance with Article 3 of Implementing Regulation (EU) 2020/572, points 1, 5 and 6 of Annex I of an investigation report shall be written in a second official European language. This translation should be available no later than three months after the delivery of the report.

The following English translation is a corresponding excerpt of the investigation report. The German language version is authoritative.

**Excerpt translation:**

**1 Summary**

The first section contains a brief description of the event, as well as information on the consequences, primary causes and safety recommendations provided in the individual case.

**1.1 Brief description of the event**

On 16/04/2024 at around 8:54 am, in Worms main station a shunting unit passed light shunting signal (Ls) 199I, which was showing stop, without authorisation and subsequently collided with train movement ICE 614 on points W67 in a side collision.

**1.2 Consequences**

Four people suffered minor injuries in the event. Due to the collision, both the shunting movement and the train movement derailed with one bogie each. Property damage was caused to the vehicles involved and the infrastructure.

### 1.3 Causes

During the investigation of the event, the following actions, failures, incidents or circumstances were identified as safety-critical factors. These are differentiated into causal or contributing and systemic factors according to Implementing Regulation 2020/572.

A system with designations in square brackets is used to provide better clarity about the factors.

A detailed assessment of the event with classification as safety-critical factors is provided in the sections below.

What happened: Date/time, and action/failure/circumstance/incident	Causal factor	Contributing factor	Systemic factor
Time 8:50 am Action: Shunting agreement between driver and points operator		Imprecise communication between the people involved concerning the process for the shunting movement [F1]	
Time 8:52 am Action: Signaller approves shunting movement up to Ls 199 <sup>l</sup>		Risk of a side collision when passing signal Ls 199 <sup>l</sup> without authorisation due to the small flank protection area [F2]	No margin for error with small flank protection areas [S2]
Time 8:54 am Incident: Shunting movement passes Ls 199 <sup>l</sup> , which is indicating stop, without authorisation	Failure to observe Ls 199 <sup>l</sup> , which was indicating stop [F3]		

Table 1: Summary of influencing factors

## **1.4 Safety recommendations**

The following safety recommendation no 01/2026 is made in accordance with Section 6 EUV [German railway accident investigation regulation] and Article 26(2) of Directive (EU) 2016/798:

It is recommended that the risks of shunting movements that move in the direction of the track for a train movement must be reassessed in consideration of human capabilities and limitations in accordance with Regulation (EU) 2018/762 Annex II criterion 4.6.1 b).

## **5 Conclusions**

The following section contains a summary of the identified causal, contributing and systemic factors. In addition, two further subsections are provided containing information about measures already taken, and additional comments

### **5.1 Summary and conclusion**

From a causal perspective, the train collision was due to a mistake by the driver of the shunting movement during the running movement from track 10 via track 99 to track 9 in Worms main station. The driver passed Ls 199<sup>l</sup>, which was indicating stop, without authorisation [F3]. The facts that firstly the flank protection area between the Ls 199<sup>l</sup> and the clearance marker of W67 was too small [F2] and secondly there was imprecise communication between the people involved about the process of the shunting movement [F1] were contributing factors.

**In relation to the contributing factor “Imprecise communication between the people involved concerning the process of the shunting movement” [F1]:**

The employee at signaller 1, who was in training, repeated the announcement of the shunting movement by the driver without further information about the process of this movement intended by signaller 1 in his role as the points operator. There was a difference between how the people involved understood the working process triggered by the open position of the first light shunting signal. The driver expected that she could carry out the shunting movement without obstruction up to the balloon loop as she did every day. Due to this expectation based on routine operations, she failed to observe the track and the signals with the necessary care.

In relation to this, the authors of guideline 408.48 state that in general signals indicating stop would not be noteworthy in railway operations, and instead are a normal part of train and

shunting movements. In this respect, observing a signal indicating stop takes priority and does not need to be confirmed via verbal communication. The Federal Authority for Railway Accident Investigation can understand this argument.

Nonetheless, it must be stated that there is a certain likelihood that information from the signaller about his planned process for the shunting movement would have increased the driver's awareness of the signals on the track.

Observing signals indicating stop is a basic part of the railway system. The driver of the respective movement is solely responsible for this. As a result, observing signals indicating stop is a fundamental part of training and further education. It is the responsibility of training institutions and the railway undertaking to further increase driver awareness of their responsibility. It is therefore necessary to examine the extent to which training and further education could provide instruction on more in-depth communication, which is suitable to sufficiently convey key circumstances between the people involved in operations.

**In relation to the contributing factor “Risk of a side collision when passing signal Ls 199| without authorisation due to the small flank protection area” [F2]:**

The small flank protection area or distance to the danger area following the protected Ls 199<sup>l</sup> behind the clearance marker of points W67 in the track of the ICE 614, which needed to be protected, contributed to the event. This technical operational value selected for the topology of the site conceptually considered the influences on human capability. On the day of the event, however, this proved to not be sufficiently effective. Even if it could be assumed that in this case the driver believed that after failing to observe the Ls 199<sup>l</sup>, which was indicating stop, she could continue her movement until she saw another shunting signal indicating stop, the short length of the flank protection area behind the Ls 199<sup>l</sup> would not have allowed emergency braking initiated immediately due to an imminent hazard identified by the driver following her mistake or due to an emergency stop order to bring the shunting movement to a stop before the danger area. Furthermore, the untimely occupation of a larger flank protection area behind the Ls 199<sup>l</sup> by the shunting movement would have opened up the possibility of a premature automatic stop signal reset for the train movement to be protected and there is a certain likelihood that it would have triggered an intermittent train control system automatic train stop for the ICE 614 at the main signal further back.

The suitable design of the operating systems therefore has an importance beyond the individual situation on the day of the event. Reference is therefore also made to the conclusions concerning the systemic factor [S2].

**In relation to the causal factor: Failure to observe Ls 199I, which was indicating stop [F3]**

The driver made a mistake by not observing Ls 199<sup>I</sup>, which was indicating stop, in her track and continuing her shunting movement into a track section reserved for a concurrent train movement.

This failure to notice that the light shunting signal was indicating stop and to implement the required action accordingly shows that, in spite of familiarity with a task, even routine work can involve careless mistakes, and this can result in risks. However, increasing safety in relation to this kind of expectable human error cannot respond to every individual situation in a differentiated manner. The conclusions below relating to the systemic factor [S2] are therefore authoritative for avoiding possible damage.

**In relation to the systemic factor “No margin for error with small flank protection areas” [S2]:**

The low margin for error in the event of short safety distances from indirect flank protection devices to merging tracks can be seen as a systemic factor. As human error can never be excluded, this can directly result in hazardous events during railway operation. This event and previous events have shown that there is a certain likelihood of an event occurring due to human error when shunting movements point towards the flank of the track for a train movement and the respective safety distance is indeed valid but is not very long.

In relation to the validity of shunting movements of this kind in the direction of a train movement that needs protection, the infrastructure manager argues that the level of damage to be expected is low due to the slow speeds of the movements (shunting movement 25 km/h, train movement max. 60 km/h). Nonetheless, in spite of these speeds, side collisions do result in a risk of injuries or fatalities for passengers in the case of passenger trains in particular. In addition, the ICE 614 was travelling at a signalled speed of 40 km/h. It must be assumed that in principle there would be more damage in the event of a higher speed of 60 km/h as permitted according to the regulations.

Dealing with the consequences of human errors in the divided system of the railway undertaking and infrastructure manager must remain a joint task whilst the infrastructure manager has not upgraded its network with additional technical features, e.g. with additional intermittent train control systems at shunting signals or functionally sophisticated movement protection systems, as is supported, for example, by the European Train Control System (ETCS) for train and shunting movements.

The infrastructure manager is aware of various examples of measures against side collisions that increase safety, such as structurally longer safety distances, double light protection, operational expansion of the definition of prohibited shunting movements or technical signal measures such as destination blocks for dangerous shunting movement routes. Measures such as this will help to deal with the risks that an infrastructure manager must consider in relation to the design and use of equipment in accordance with the statutory requirements for safety management systems.

The Federal Authority for Railway Accident Investigation therefore recommends that the risks of shunting movements that move in the direction of the tracks for train movements must be reassessed in consideration of human capabilities and limitations in accordance with Regulation (EU) 2018/762 Annex II criterion 4.6.1b).

Informal reference is made to comparable risks relating to consequences of failing to observe subsidiary signal Ne14 during shunting under ETCS.

## **5.2 Measures taken since the event**

The railway undertaking provided the driver of the shunting movement with refresher training. In general, the correct conduct for signals indicating stop is still a fundamental part of the training and further education system, and of the railway undertaking's monitoring measures.

The infrastructure manager believed that no short-term measures were required because there were no deviations from the regulations. Nonetheless, it will consider the event in terms of human and organisational factors and monitor communication during railway operation. Any resulting opportunities for improvement will be drawn up.

Due to the train collision in Worms, the infrastructure manager intended to supplement the planning rules for shunting on main tracks in guideline 408.5841 section 63(1) to include

specific rules on distances for signals to be used as flank protection devices in line with guideline 819. In relation to the present event, this measure would not result in increased risk control in future comparable operating situations.

### **5.3 Additional observations**

The investigations conducted did not provide any contribution on this point.

## **6 Safety recommendations**

The following safety recommendation is made in accordance with Section 6 of the EUV and Article 26 of Directive (EU) 2016/798:

No	Addressee and safety recommendation	Relates to company
01/2026	Safety authority: It is recommended that the risks of shunting movements that move in the direction of the track for a train movement must be reassessed in consideration of human capabilities and limitations in accordance with Regulation (EU) 2018/762 Annex II criterion 4.6.1b).	Infrastructure manager