Translation of an excerpt of the investigation report

"Train collision Lauenbrück station on 15/11/2013"

Status as of 19/05/2025, 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 15/11/2023 at around 4:18 pm, the ICE 615, which was travelling from Hamburg-Altona passenger station to Munich main station, collided with train DbZ 24259 at points 229 in Lauenbrück station.

1.2 Consequences

No people were injured during the event. Damage was caused to the railway vehicles involved and the infrastructure amounting to approx. EUR 2,750,000.

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 (EU) 2020/572. Identified shortcomings in the emergency management are also addressed.

A system with designations in square brackets is used to provide better clarity about the factors and aspects of emergency management.

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
15/11/2023 / from 4:02 pm GSM-R conversation between train driver of the DbZ 24259 and the responsible signaller.	No notification to the responsible signaller with specification of the location where sand was scattered [F1]	Speech discipline during GSM-R conversations [F2]	-
15/11/2023 / from 4:02 pm After sanding, DbZ 24259 is not correctly recognised by the clear track reporting system.	Functional reliability of detection in the event of ingress of sand [F3]	-	Procedure-based compensation for functional impairment of a clear track reporting system due to sand ingress [S3]
15/11/2023 / 4:17 PM Entry route for ICE 615 set by signaller.	Failure to check section by the signaller [F4]	-	Operational reliability of the signaller [S4]

Table 1 List of influencing factors

1.4 Safety recommendations

No	Addressee and safety recommendation	Relates to company
08/2025	Safety authority: It is recommended that supplementary regulation no. B 011 on “Sanding” and the operational procedures concerning the reporting procedure for sanding should be checked and developed further.	Infrastructure manager, railway undertaking, ECM, manufacturer
09/2025	Safety authority: It is recommended that in future clear track reporting equipment should be used in which the function cannot be impaired by e.g. sand ingress. (Regulation (EU) 2018/762, Annex II, point 5.2.2)	Infrastructure manager

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

The actions, failures, incidents and circumstances around the time of the event identified in this investigation report resulted in the train collision at Lauenbrück station.

The Federal Authority for Railway Accident Investigation identified three causal, one contributing and two systemic factors that influenced the event.

In relation to the causal factor “No notification to the responsible signaller with specification of the location where sand was scattered” [F1]:

In the first message via GSM-R to the responsible Lauenbrück signaller, the driver failed to immediately report the sanding that had happened on braking. The immediate reporting of sanding in this conversation, combined with reporting the location, would have meant that the signaller would have been directly informed of the specific location of the sanding on points 229 and consequently could have initiated the necessary measures as per guideline 408. The driver only reported the sanding during braking eight minutes later. A delay of several minutes as in the present case meant that the signaller no longer correctly connected the relationship between braking and sand ingress with the operational situation.

The signaller's mandate to act only results from the message about sanding, meaning that the immediate report from a driver about sand ingress is very important for safety during the performance of railway operations. As a result, this delayed message from the driver of the DbZ 24259 affected the correct application of the regulations from guideline 408, as the signaller could initially still assume that there was standard operation in Lauenbrück station until the message about sanding was received from the driver.

In relation to the contributing factor "Speech discipline during GSM-R conversations" [F2]:

The conversation held with the driver of the DbZ 24259 at 4:02:54 pm via GSM-R contributed to the signaller's further actions. This conversation did not comply with the requirements defined by the infrastructure manager for holding conversations via GSM-R. The fact that clear speech discipline was not used resulted in the misunderstanding about the DbZ 24259 stopping or continuing onward and ultimately to a lack of clarity about the location of the DbZ 24259 in Lauenbrück station. As a result, the train was detected incorrectly. After the GSM-R conversation, the signaller assumed that the driver of the DbZ 24259 would move forward with his train up to the platform. As the driver did not provide any further alternative information, she did not question the assumption she had made as the situation progressed before the event.

In relation to the causal factor "Functional reliability of detection in the event of ingress of sand" [F3]:

An automatic clear track reporting system is used for the automatic detection of trains. Normally this kind of automation is carried out at a higher safety level than is achieved, for example, via the involvement of people. Very high requirements are placed on the functional reliability of this kind of automation in railway safety technology, particularly as the operational information obtained in this way is used as input parameters for other automated safety functions of modern signal box systems.

The infrastructure manager was able to prove that the required maintenance measures had been performed at the intended regular intervals. However, this alone cannot prevent the fact that vehicles are not correctly detected after ingress of sand.

The clear track reporting system with track circuits used in the present event is an older technology in the development of railway safety technology for automatic detection of track sections being free. An alternative technology is the use of automatic clear track reporting

systems with axle counting technology. These register the number of railway vehicle wheelsets that travel in and out of a track section recorded by corresponding sensors. This comparison provides information about a track section being free or occupied, which can be used for other automated functions of a signal box. The functions of automatic clear track reporting systems with axle counting technology cannot be disrupted, for example, by sand ingress.

Due to dangerous events in the past, it is now recognised that track circuits may display incorrect information about track occupancy to the signaller due, among other things, to sand ingress. In this scenario, safety information recorded using the system and used in further processes is no longer correct, contrary to Delegated Regulation (EU) 2018/762 Annex II section 4.4.3. The intended safety-oriented performance level of the clear track reporting system as a fixed asset is then no longer available, contrary to Delegated Regulation (EU) 2018/762 Annex II criterion 5.2.2 a). As a result, compensation measures have been adopted in the railway sector in relation to operation, vehicle design and the maintenance of systems and rail vehicles. With safety recommendation No 09/2025, the Federal Authority for Railway Accident Investigation is therefore recommending that in future clear track reporting equipment should be used in which the function cannot be influenced by e.g. sand ingress.

In relation to the systemic factor "Procedure-based compensation for functional impairment of a clear track reporting system due to sand ingress" [S3]:

As the result of several events in the years 2008 to 2013, the German railway sector, under the guidance of the Federal Railway Authority, has introduced rules to ensure that the various stakeholders contribute, within their area of responsibility, to reducing the risk caused by sand ingress in areas with automatic clear track reporting systems with track circuits.

The procedure introduced due to instructions from the Federal Railway Authority, which was not effectively followed in the present event (see [F1]), between the driver and signaller as a result of stopping a vehicle with sanding was included in the operational regulations of the infrastructure manager and railway undertaking.

The regulations relevant for vehicles have been published in the status "acknowledged rules of technology" under the title supplementary regulation No B 011 on "Sanding" as an addendum to sector-related "Regulations for assessing railway vehicles in terms of braking technology".

Supplementary regulation No B 011 contains principles and procedures that are relevant for railways, maintenance authorities and manufacturers in order to keep the amount of sand released when the sanding system is operating appropriate for the purpose, but as low as possible.

In relation to the present event with a failure to observe compensating reporting procedures and the obvious continued existence of track circuits in German railways, the Federal Authority for Railway Accident Investigation believes that it is necessary to provide further advice to the stakeholders of the German railway system about the continued existence/further development of the rules. Risk reduction objectives are associated with improving the correctness of safety information and with improving the performance level of the clear track reporting systems. Due to the technical interaction of vehicles and infrastructure, in this case approaches to solving the problem extend to various stakeholders of the railway sector, including examining requirements relating to instructions to operating personnel. Accordingly, safety recommendation No 08/2025 is being issued in relation to this systemic factor [S3].

In relation to the causal factor "Failure to check section by the signaller" [F4]:

When the driver of the DbZ 24259 reported the use of sand when braking, it is highly likely that the signaller assumed that he was already at the level of the platform in track 231 in the direction of travel and must have released sand there, because the illumination on her control desk showed points 229 as "free". This occupancy status of the tracks displayed on the control desk corresponded to her assumption from the GSM-R conversation previously held with the driver and the agreement that she believed she had made with the driver that he should move forward to the platform of Lauenbrück station.

Consequently, due to the information displayed by the signal box system, to her it was technically possible to set a regular entry route for the ICE 615, which would probably have further reinforced her previously made assumption. The delayed report from the driver about the use of sand in Lauenbrück station did not result in a realisation about conducting a section inspection in the track sections with track circuits in Lauenbrück station. Even after this report, she incorrectly continued to assess the displays of her control desk in relation to the track occupation, even though this was no longer permitted without taking further measures as per guideline 408.

In relation to the systemic factor "Operational reliability of the signaller" [S4]:

The investigations by the Federal Authority for Railway Accident Investigation showed that the signaller's operational reliability was a systemic factor within the event. It became clear that the measures implemented for training and monitoring of safety-relevant actions at the operator station had been carried out without reference to the issue of sanding on track sections with track circuits and conducting a section inspection.

As a result of this approach, the infrastructure manager did not ensure that the basic, mandatory knowledge and skills imparted to the signaller in relation to dealing with high-risk actions were permanently available according to the requirements for the classification of her job in functional level "A" as per guideline 412.9111 section 4(3). In the organisation of the infrastructure manager, there was no way of ensuring that a loss of previously acquired competences would be identified in good time in order to take measures.

The findings made in section 4.3.1 in relation to education, training and monitoring of the signaller show that the infrastructure manager was not able to provide evidence to the Federal Authority for Railway Accident Investigation of the number of operational inspections of the signaller required for the calendar year 2023 according to guideline 412.9111 section 4(5).

During the investigations into the train collision on 17/11/2022 between Meinersen station and Leiferde (b Gifhorn) halt, the Federal Authority for Railway Accident Investigation had already identified deficiencies in the infrastructure manager's entire risk-oriented approach to competence management.

The Federal Authority for Railway Accident Investigation issued safety recommendation No 04/2025 with the following content:

> *"In order to reinforce the risk-oriented approach in all phases of competence management, it is recommended that the procedures for maintaining and updating safety-related knowledge and skills should be inspected in a workplace-specific manner and improved if necessary. This must include the activities of employees with safety-related roles and managerial tasks at all relevant levels (Regulation (EU) 2018/762, Annex II, points 4.2.1 and 6.1.1 a))."*

As this safety recommendation has already been issued, no further safety recommendation will be issued on the findings concerning deficiencies in the infrastructure manager's competence management relating to the train collision on 15/11/2023 in Lauenbrück station.

5.2 Measures taken since the event

Following the event in Lauenbrück, DB InfraGO AG held an employee meeting with the signaller. In future, she will no longer be employed in the role of a signaller. Due to the event, the railway undertaking Bentheimer Eisenbahn AG issued instructions entitled "Location reports in the event of faults and unplanned stopping of trains". In the case of unplanned stopping involving the use of sand, drivers must send an additional message to the signaller stating that the location of the rear of the train is unknown. In addition, the drivers must have the track closed for reasons relating to accident prevention in order to identify the rear of the train.

The railway undertaking also provided the information that the driver involved in this event will no longer be employed in the company.

5.3 Additional observations

Not applicable.

6 Safety recommendations

The following safety recommendation is made in accordance with Section 6 of the EUV [German railway accident investigation regulation] and Article 26(2) of Directive (EU) 2016/798:

No	Addressee and safety recommendation	Relates to company
08/2025	Safety authority: It is recommended that supplementary regulation no. B 011 on “Sanding” and the operational procedures concerning the reporting procedure for sanding should be checked and developed further.	Infrastructure manager, railway undertaking, ECM, manufacturer
09/2025	Safety authority: It is recommended that in future clear track reporting equipment should be used in which the function cannot be impaired by e.g. sand ingress. (Regulation (EU) 2018/762, Annex II, point 5.2.2)	Infrastructure manager