

## 1 SUMMARY

During train GK 9223's crossing of the West Bridge from Sprogø in a moderate to fresh gale (average wind speeds between 15 and 20 m/s) from a northerly direction, motorists observed that an articulated semi-trailer was tilting and leaning in towards the adjacent track. After stopping at Nyborg Station, it was established that the kingpin on the semi-trailer at the very rear of the train's front pocket wagon was not in position in the saddle and the semi-trailer was inclining to the left (the train's direction of travel).

The train's eight double pocket wagons had been loaded at the Høje-Taastrup terminal with nine semi-trailers bound for Fredericia. At Ringsted, eleven empty double-deck car-carrier wagons had been added at the front of the train.

On account of recorded wind speeds of between 15 and 20 m/s, the train's speed on the West Bridge was restricted to 80 kph.

The video material of the train passing through the stations from Høje-Taastrup to Korsør and the tunnel shows that the semi-trailer was in the same position from the time of its departure from Høje-Taastrup until its exit from the tunnel on Sprogø.

Shortly after the abutment, the video recordings from the West Bridge indicate that the semi-trailer has risen from the saddle. Recordings from several cameras show that the rear of the semi-trailer has been lifted and twisted. Witnesses on the West Bridge had seen the semi-trailer in motion and estimated the incline towards the adjacent track to be 30–45 degrees, in addition to which it "was only a few centimetres (cm)" short of tipping over. The other semi-trailers in the train were in position in the pocket wagons.

Based on the investigations conducted, it is the Danish Accident Investigation Board's (AIB DK) assessment that the semi-trailer was correctly loaded with the kingpin in the saddle of the pocket wagon but the saddle's locking ability was either defective or not present.

The AIB DK considers the defective or limited locking, combined with a high wind at the time of the incident and mechanical stresses resulting from the motion of the pocket wagon in transit to be the primary causes of the empty and hence relatively light semi-trailer being blown out of position in the pocket wagon.

The AIB DK has issued the following recommendations:

### **Recommendation 1**

#### **DK.2022 R 1 of 13.01.2022**

The AIB recommends that the European Union Agency for Railways (ERA) ensure clear requirements for securing the vertical retention of semi-trailers loaded onto pocket wagons.

**Recommendation 2****DK.2022 R 2 of 13.01.2022**

The AIB DK recommends that, in light of the current and previous incidents referred to in the report, the NSA DK sufficiently ensure that the DBCSC safety management system identify relevant risks and that measures be appropriate for the operation. Likewise, the safety management system should ensure that experiences from incident handling and handling of periodic incidents/trends, such as the securing of goods and the handling of incidents in this connection, are included in the ongoing assessment of the overall risk picture.

**Recommendation 3****DK.2022 R 3 of 13.01.2022**

The AIB DK recommends that, in performing the task of safety authority, the Danish Civil Aviation and Railway Authority (NSA DK) ensure that documentation potentially critical to rail safety be satisfactory and adequate, so as also to cover safety-critical risks.

The recommendations may be viewed in full in section 7.

## 5 CONCLUSION

Based on the investigations conducted, it is the AIB DK's assessment that the semi-trailer was correctly loaded with the kingpin in the saddle of the pocket wagon but the saddle's locking ability was either defective or not present.

The AIB DK considers such defective or limited locking, combined with a high wind at the time of the incident and mechanical stresses resulting from the motion of the pocket wagon in transit to be the primary causes of the empty and hence relatively light semi-trailer being blown out of position in the pocket wagon.

The AIB DK finds that the following factors affected, or could have affected, the defective locking of both this and other saddles of the same type:

- It has not been possible to identify any statutory or standard requirements for the saddle's ability to retain the kingpin and thus the semi-trailer in the vertical position.
- Consequently, nor has it been possible to identify requirements or tests for the saddle's ability to retain the kingpin in the vertical position, i.e. the lock's ability to lock the kingpin in practice and hence act as a lock.

Having ascertained in its report on the Great Belt accident on 2 January 2019 that an unsecured semi-trailer loaded onto a pocket wagon, combined with a number of convergent circumstances (high wind, little or no load in the trailer, etc.) could blow off position on the pocket wagon, the AIB DK finds it indefensible that:

- despite knowing that there were no requirements governing vertical retention, and
- that there might be a risk of saddle type MAZ 80800 having limited holding force in the vertical position,

the DBCSC (DB Cargo Scandinavia) decided in January 2020 to resume operations with the MAZ 80800 saddle without sufficient safety barriers to secure semi-trailers on pocket wagons incorporating the MAZ 80800 saddle.

Having ascertained in its report on the Great Belt accident on 2 January 2019 that an unsecured semi-trailer loaded onto a pocket wagon, combined with a number of convergent circumstances (high wind, little or no load in the trailer, etc.) could blow off position on the pocket wagon, the AIB DK finds it indefensible that:

- despite knowing that there were no requirements governing vertical retention of semi-trailers loaded onto pocket wagons, and
- that there might be no or only limited vertical holding force on T3000 pocket wagons with saddle type MAZ 80800, which was used on the regular runs between Fredericia and Høje-Taastrup, and
- without having ensured that the documentation forwarded to the NSA DK was adequate in terms of ensuring retention of semi-trailers loaded onto the pocket wagons in operation, and without having received answers to the questions forwarded by the NSA DK,

the NSA DK concluded the inspection case of 12 January 2021 relating to this saddle type without stipulating the use of safety barriers to secure semi-trailers on pocket wagons incorporating the MAZ 80800 saddle.

## 7 RECOMMENDATIONS

### **Recommendation 1**

The AIB's investigations have shown that, in the EU generally, there are no standards or requirements governing vertical locking ability for saddles/locks designed to secure a lorry's semi-trailer in position on a pocket wagon. Similarly, the AIB DK's investigations into the Great Belt accident in 2019 have established that an unsecured semi-trailer in combination with other circumstances (for instance high wind and no or a limited load on a semi-trailer) can release a semi-trailer from its position in the pocket wagon.

#### **DK.2022 R 1 of 13.01.2022**

The AIB recommends that the European Union Agency for Railways (ERA) ensure clear requirements for securing the vertical retention of semi-trailers loaded onto pocket wagons.

### **Recommendation 2**

It is crucial to rail safety that all rail freight operators ensure that the loading of goods and securing of loads are appropriate for the conditions that may occur on the infrastructure (e.g. wind impacts), and that unintended events are investigated, also – and especially – several similar unintended events and that such investigations are recorded in the company's safety management system.

#### **DK.2022 R 2 of 13.01.2022**

The AIB recommends that, in light of the current and previous incidents referred to in the report, the NSA DK sufficiently ensure that the DBCSC safety management system identify relevant risks and that measures be appropriate for the operation. Likewise, the safety management system should ensure that experiences from incident handling and handling of periodic incidents/trends, such as the securing of goods and the handling of incidents in this connection, are included in the ongoing assessment of the overall risk picture.

### **Recommendation 3**

Despite knowing (a) that there were no requirements for vertical retention, (b) that there was limited vertical holding force on saddle type MAZ 80800, (c) that an unsecured semi-trailer in combination with other possible factors could lead to an accident similar to the Great Belt accident on 2 January 2019, and (d) without having received answers to questions forwarded about retention, the NSA DK concluded an inspection case on the lack of holding force on saddle type MAZ 80800 prior to the incident in January 2021 without having ensured that the documentation forwarded to the NSA DK was adequate in terms of ensuring retention of semi-trailers loaded onto the pocket wagons in operation.

#### **DK.2022 R 3 of 13.01.2022**

The AIB recommends that, in performing the task of safety authority, the NSA DK ensure that documentation submitted to the NSA DK and potentially critical to rail safety be satisfactory and adequate, so as also to cover safety-critical risks.

### **Supplementary remarks**

When an accident investigation board becomes aware of a potential safety risk within the European railway system, this knowledge must be passed on as quickly as possible to the relevant European authorities via the European Safety Information System (SIS), which is facilitated by the European Union Agency for Railways (ERA). The AIB DK has ascertained that this sharing of safety-relevant information does not happen automatically when registering with SIS, but only if employees at the individual authorities have actively signed up to receive such information. The ERA has stated that it is only possible to register as an individual, not as an organisation. It is the AIB DK's view that this means safety-relevant information may not be brought to the attention of the relevant authorities if, for example, employees change jobs or retire. It is the AIB DK's view that the ERA should facilitate that the list of recipients of information forwarded by the SIS is regularly updated to ensure that it is current.

As the NSA DK uses the term 'passenger safety' in its interpretation of immediate reporting of safety faults (which may be found on the NSA DK website), one might take it to mean that the reporting duty applies to passenger transport only and not freight transport. The NSA DK would do well to update the reporting duty to apply to rail safety in general and not passenger safety alone.

Note that the translation was made by a translator's agency, and that it is the Danish consultation report which is the current version.