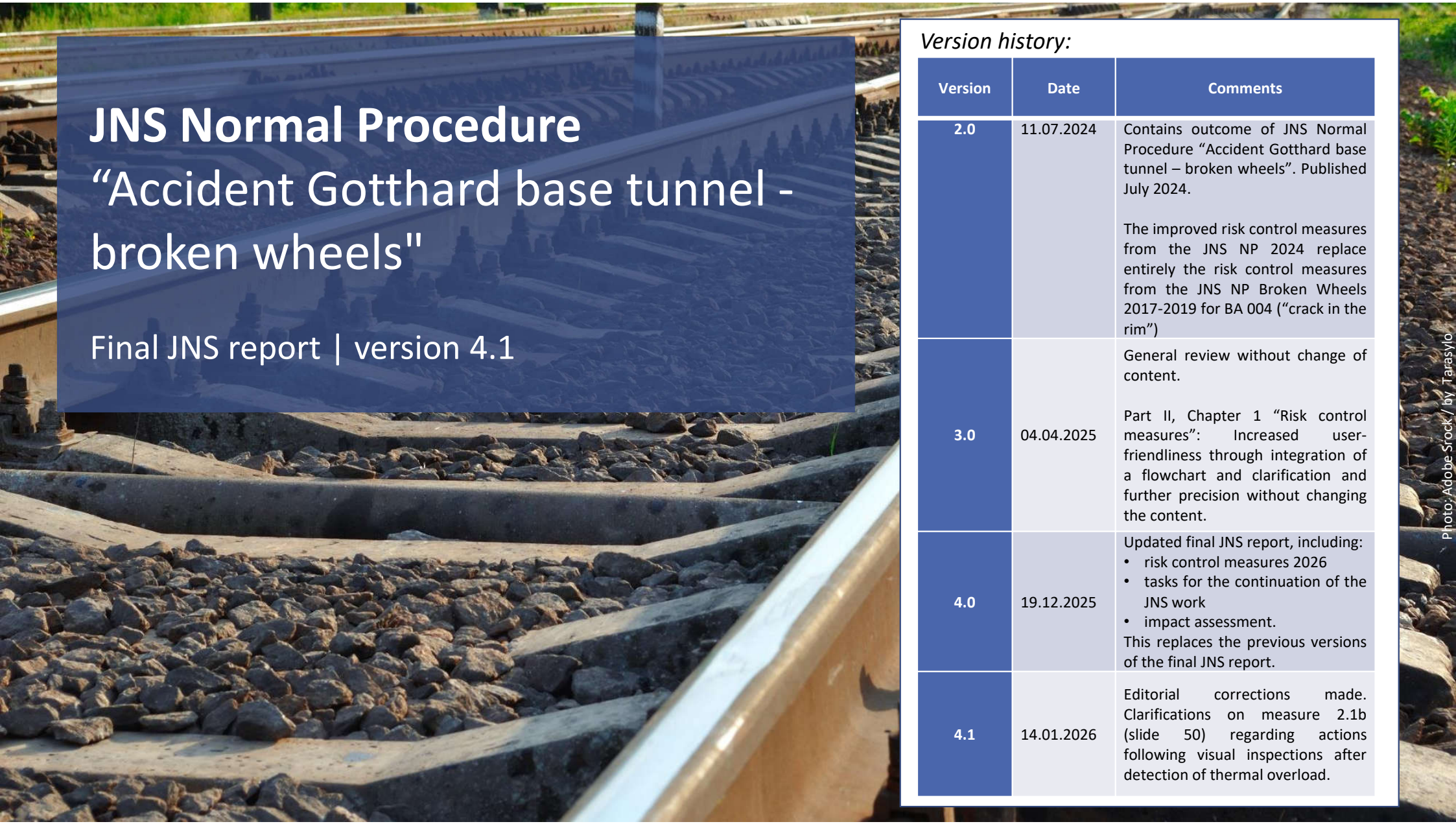


JNS Normal Procedure

“Accident Gotthard base tunnel - broken wheels"

Final JNS report | version 4.1

Version history:

Version	Date	Comments
2.0	11.07.2024	Contains outcome of JNS Normal Procedure “Accident Gotthard base tunnel – broken wheels”. Published July 2024. The improved risk control measures from the JNS NP 2024 replace entirely the risk control measures from the JNS NP Broken Wheels 2017-2019 for BA 004 (“crack in the rim”)
3.0	04.04.2025	General review without change of content. Part II, Chapter 1 “Risk control measures”: Increased user-friendliness through integration of a flowchart and clarification and further precision without changing the content.
4.0	19.12.2025	Updated final JNS report, including: • risk control measures 2026 • tasks for the continuation of the JNS work • impact assessment. This replaces the previous versions of the final JNS report.
4.1	14.01.2026	Editorial corrections made. Clarifications on measure 2.1b (slide 50) regarding actions following visual inspections after detection of thermal overload.

Table of Contents

Part I - Introduction

Chapter 1: explanation JNS

Content

Joint Network Secretariat (JNS)

- Triggered by accident Viareggio 2009 ➔ Joint Sector Group at ERA
- National Safety Authorities (NSA network) + Representative Bodies (NRB network)
- Creation of Task Forces of experts to solve technical issues
  (usually after accidents and dangerous events)
- Urgent (2 months) - and Normal Procedures (max. 2 years)
- Every actor can notifiy a JNS procedure
  Form can be found at https://www.era.europa.eu/activities/joint-network-secretariat_en to be sent to jns@era.europa.eu
- Neutral moderation and chairing by ERA
- From 2026[1)]: Legal basis in CSM ASLP (Assessment of Safety level and Safety Performance)

1) Depends on the adoption of the Regulation on these Common Safety Methods

Part I, Chapter 1. : Explanation JNS

Role of RU and IM in the EU safety framework

- **Railway Undertaking (RU)** and **Infrastructure Manager (IM)** are together responsible for safe operation.
- In case of incidents and accidents, **RUs** and **IMs** shall evaluate, where appropriate with **entities in charge of maintenance (ECM)** and **all other actors having a potential impact on the safe operation of the Union rail system**, including manufacturers, maintenance suppliers, keepers, service providers, contracting entities, carriers, consignors, consignees, loaders, unloaders, fillers and unfillers if the risk requires measures immediately preventing any related danger and if yes, define and implement them.
- **RUs, IMs and any other actor involved** have to share relevant information (currently in Safety Alert IT (SAIT)) to allow other actors to react appropriately to ensure safety.

In accordance with Article 4 of DIRECTIVE (EU) 2016/798 (Railway Safety Directive)

Part I, Chapter 1. : Explanation JNS

Role of NSAs in the EU safety framework

- After incidents and accidents the **National Safety Authority (NSA) supervises** stakeholder´s immediate actions aiming at assessing whether the measures taken by the companies involved sufficiently prevent any related danger at European level. If not, the **NSA may intervene** respecting the responsibility of all actors. These immediate measures might increase costs for the sector and may harm interoperability.[1)]

- **NSAs** have to share relevant information within the NSA network and within the SIS system to enable other NSAs to react appropriately in order to ensure safety. This is usually done in the form of a notification.

1) In accordance with Article 17 of DIRECTIVE (EU) 2016/798 (Railway Safety Directive)

Part I, Chapter 1. : Explanation JNS

Role of NIBs and the JNS in the EU safety framework

- In parallel the **National Investigation Body (NIB) may run an independent investigation** of the incident or accident with the objective to learn lessons for the future improvement of safety of the railway system and to question the functioning of the existing framework for railway safety. The NIB investigation shall publish the final report of their investigation within one year which shall contain, where appropriate, safety recommendations[1)].

- In case of an incident or accident any entity (preferably the competent NSA) might notify a **Joint Network Secretariat (JNS) urgent (fast track) or normal procedure** by submitting a filled notification form (https://www.era.europa.eu/activities/joint-network-secretariat_en) to ERA (jns@era.europa.eu).

1) In accordance with Chapter V of DIRECTIVE (EU) 2016/798 (Railway Safety Directive)

Part I, Chapter 1. : Explanation JNS
General requirements for the RUs and IMs

Railway Undertakings (RUs) and Infrastructure Managers (IMs) are required to have a Safety Management System (SMS) that meets the requirements of Commission Delegated Regulation (EU) 2018/762 of 8 March 2018 (establishing common safety methods on safety management system requirements)

This regulation stipulates in Annex I Clause 1.1 (RUs) and Annex II Clause 1.1 (IMs):

“The organisation shall:
….
(c) identify interested parties (e.g. regulatory bodies, authorities, railway undertakings, infrastructure managers, contractors, suppliers, partners), including those parties external to the railway system, that are relevant to the safety management system;
(d) identify and maintain legal and other requirements related to safety from the interested parties referred to in point (c);
(e) ensure that the requirements referred to in point (d) are taken into account in developing, implementing and maintaining the safety management system;”

Part I, Chapter 1. : Explanation JNS
General requirements for the ECMs (1/2)

The Entities in Charge of Maintenance (ECMs) are required by the Commission Implementing Regulation (EU) 2019/779 of 16 May 2019 to share information

Article 5.3 of this regulation stipulates:

"All parties involved in the maintenance process such as railway undertakings, infrastructure managers, keepers, entities in charge of maintenance, as well as manufacturers of vehicles, subsystems or components, shall exchange relevant information about maintenance in accordance with the criteria listed in Sections I.7 and I.8 of Annex II."

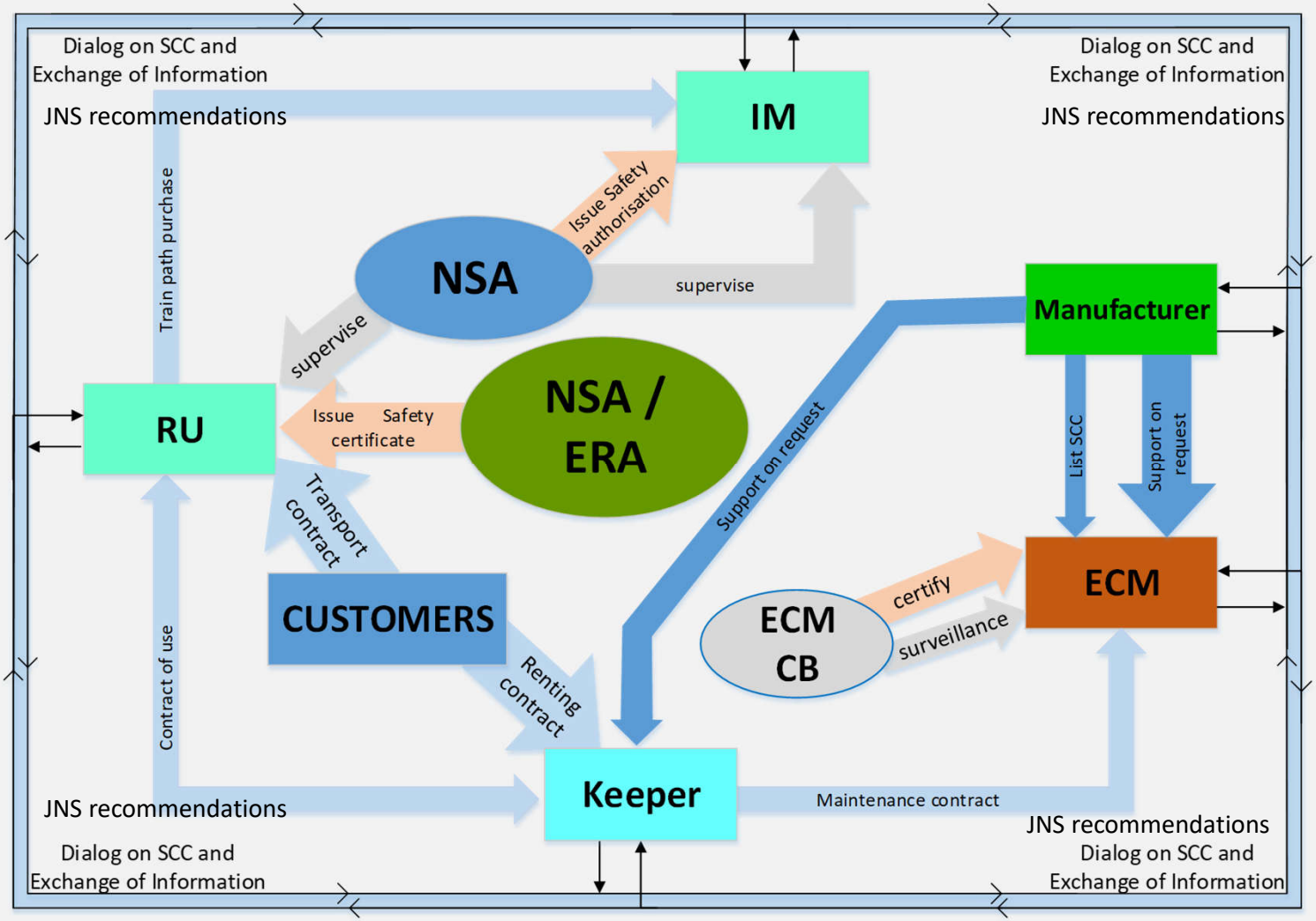
ECMs should apply any new limits and conditions of use provided by manufacturers.

Furthermore, the Guidance on ECM certification process (see Agency website: https://www.era.europa.eu/domains/trains/certification-entities-charge-maintenance_en) explains further the sharing of information, including the JNS outcomes. See also the figure from this Guidance document (2026 version) on the next slide.

EUROPEAN UNION AGENCY FOR RAILWAYS

Part I, Chapter 1. : Explanation JNS

General requirements for the ECMs (2/2)



Source: Guidance on ECM certification process 2026

Part I, Chapter 1. : Explanation JNS
General requirements for the manufacturers

- For all wheel types, manufacturers should verify that restrictions on use for wheels certified in accordance with standard EN 13979-1:2023 (including previous standards), not tested with composite brake blocks are indicated in the EC certificates of conformity. These types of wheels should not be considered as thermostable when they are installed on freight wagons equipped with composite brake blocks.

- If manufacturers become aware of discrepancies between the certification process and the limits and conditions of use, they shall inform the relevant parties involved[1)]. This can be done by creating a notification in the SAIT[2)], indicating in the notification form that this should be brought to the attention of the JNS.
  Furthermore, they shall inform the JNS Task Force “Accident Gotthard Base tunnel/Broken Wheels” by sending an email to JNS@era.europa.eu.

1) In accordance article 4 of DIRECTIVE (EU) 2016/798 (Railway Safety Directive)
2) Please consult https://www.era.europa.eu/content/what-safety-alerts-it-tool-sait for instructions.

Part I, Chapter 1. : Explanation JNS
Urgent (fast track) Procedure

- **Objective:** recommendation of appropriate European-wide harmonised short-term risk control measures in order to :
  - ensure safety,
  - maintain or restore interoperability, and
  - reduce costs for the sector (as far as possible at this stage).

- **Result:**
  - replacement of the often costly and restrictive immediate measures of the actors and/or NSAs

- **Timeline:** maximum 2 months

- **Objective:** development of mid- and long term measures, to sustainably
  - restore / increase the safety level,
  - ensure interoperability, and
  - return to the previous cost base or lower.

- **Result:**
  - update of the measures from the Urgent Procedure,
  - improvements of regulation and standards,
  - identification of research needs.

- **Timeline:** maximum 2 years

Part I, Chapter 1. : Explanation JNS

JNS Panel and JNS Task Force

- After submission of **the notification form** to ERA, the JNS Panel needs to endorse the proposed JNS procedure.
- The **JNS panel** consists of two NSA and two RB representatives
  - Michael SCHMITZ (NSA DE)
  - Benjamin STEINBACHER-PUSNJAK (NSA SI)
  - Marcel DE LA HAYE (CER)
  - Gilles PETERHANS (UIP)
- The networks of National Safety Authorities and Representative Bodies and the cooperation of ECM CBs nominate **competent experts** for the respective **JNS Task Force**
- The **Agency is moderator/facilitator and secretariat**
- ERA strives for **consensus**.

Part I, Chapter 1. : Explanation JNS
Sharing of information in the JNS

- Only nominated **Task Force members** should participate in the meetings.
- **Information shared** within the task force **remain within its members**
- **Documents are shared** on dedicated space on the Agency's Extranet. (only accessible to nominated experts)
- The **results** will be published on the ERA website and disseminated by the networks of the Representative Bodies, the National Safety Authorities and the ECM Certification Bodies in an appropriate way (e.g. final report) agreed among the task force members and have the character of a recommendation.
  The network members are requested to assure that all concerned parties are informed.

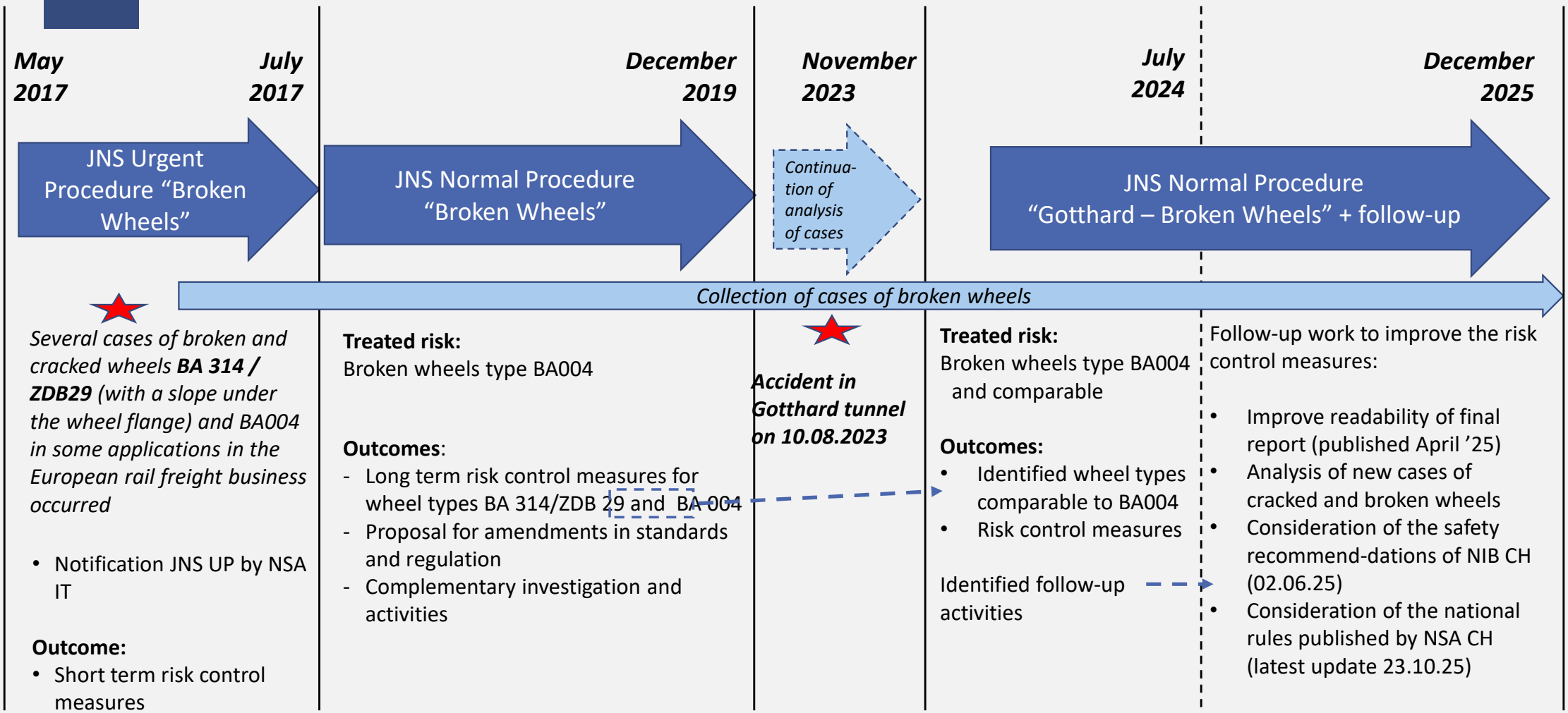
Part I - Introduction

Chapter 2: background

Content

Part I, Chapter 2. : Background

Timeline JNS procedures on broken wheels



Part I, Chapter 2. : Background

History of JNS activities regarding broken wheels

- In the past years, events of broken tread braked wheels have occurred all over Europe. As a response, the experts of the JNS Urgent (2017) and Normal Procedure (2017 - 2019) on Broken Wheels identified risk control measures for the wheel type BA 004 (crack in the rim) and BA 314 old/ZDB29 (crack in the web);
  (see https://www.era.europa.eu/domains/accident-incident/joint-network-secretariat-jns_en)
- After the conclusion of the Normal Procedure in 2019, the Task Force experts continued to analyse cases of cracked and broken wheels which occurred after 2019 and followed-up the implementation of the identified risk control measures and recommended changes to legislation, standardization and company rules;
- On 10 August 2023, a freight train derailed in the Gotthard base tunnel, caused by a broken wheel of type BA 390. The accident led to a damage of infrastructure and rolling stock amounting to around 150 Mio. CHF (ca. 160 Mio. €). For the repair works, one tube of the Gotthard base tunnel had to be closed for more than one year and subsequently the cross alpine traffic was tremendously disturbed;
- On 15 August 2023, the Swiss National Investigation Body (NIB CH)[1)] announced to launch an investigation. In its intermediate report of 28 September 2023, the NIB CH provided details of the accident and made two safety recommendations to the Swiss National Safety Authority:

  183. Extension of risk control measures identified in the JNS procedure on broken wheels of 2019 to the wheel type used in wheelsets BA 390.

  184. Notification of a new JNS procedure.

1) the Transport Safety Investigation Board (STSB)

Part I, Chapter 2. : Background

Start of the JNS NP ‘Accident Gotthard base tunnel/broken wheels’

- Accordingly, NSA CH submitted a notification for a JNS Normal Procedure on 17 October 2023, which was subsequently approved by the JNS Panel on 24 October 2023;
- The NSA CH described the expected outcomes in its notification :
  “Analyse whether the long-term mitigation measures identified by the JNS NP on broken wheels for wheelsets of type BA 004 would be effective for the wheel type of wheelset type BA 390 and if they could be extended to other similar wheel types.

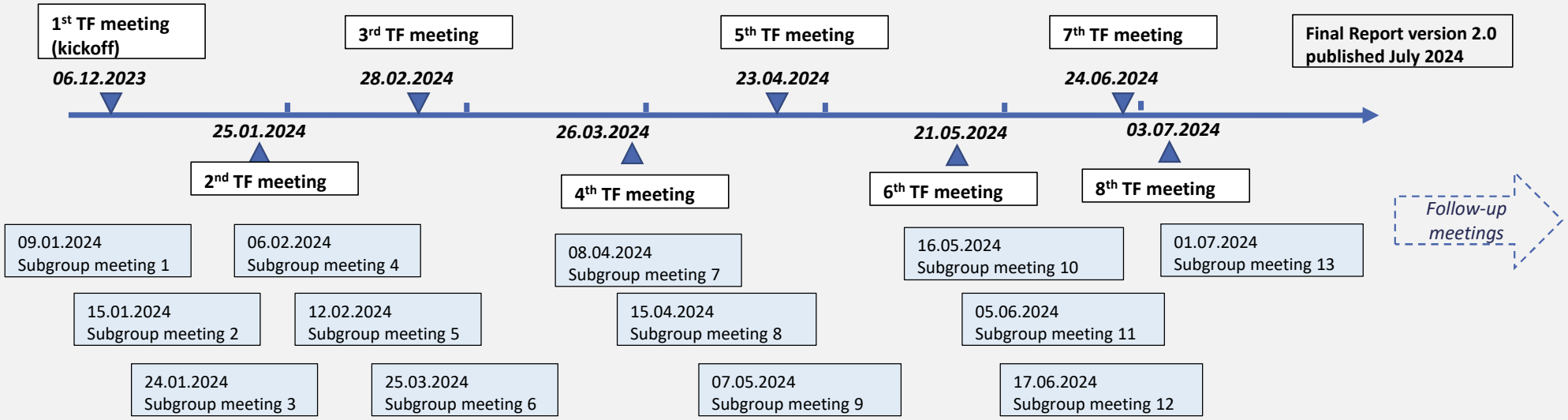
  In case these measures would not be sufficient, improvements of these measures will need to be identified.“
- A JNS Task Force of experts nominated by the NSAs and the European Representative Bodies was assembled;
- In its kickoff meeting on 6 December 2023, the experts of the JNS Task Force discussed the scope and objective of the new Normal Procedure and decided to regard it as a continuation of the previous JNS Normal Procedure on Broken Wheels which concluded its works in 2019 and which was focused among others on wheels of type BA 004 with cracks initiated in the rim;

Part I, Chapter 2. : Background

Activities up to the publication of first report

- The Task Force members decided to create a Subgroup of JNS experts from the railway actors. This “Joint Sector Group” (JSG) worked on the different tasks and reported in the Task Force meetings on their progress and proposals for risk control measures;

- Eight Task Force meetings and thirteen subgroup meetings took place.



- In July 2024, the Task Force published a final report containing JNS risk control measures 2024 on the website of the Agency (“final report v2.0”). The Task Force continued working (see next slides).

Part I, Chapter 2. : Background
Start of JNS Gotthard follow-up

- After the publication of the final report version 2.0, the JNS Task Force identified the following follow-up tasks:
  - Revision of JNS report of July 2024, in order to improve the structure and clarity of the JNS risk control measures 2024 (the content was not changed) ➔ **version 3.0 published 04.04.2025 on ERA website**
  - Investigation of the need to further improve the JNS risk control measures 2024, based on:
    - The analysis of new cases of cracked and broken wheels;
    - The safety recommendation in SUST (NIB CH) report
- On 02.06.2025, the Swiss National Investigation Body (SUST) published its final report on the investigation of the accident in the Gotthard base tunnel. Its report contained four safety recommendations, of which three were addressed to the European Union Agency for Railways;
- However, ERA, responded to these recommendations, stating that the right recipients are the railway actors and that these recommendations therefore need to be dealt with in the JNS Task Force within the follow-up activities;
- On 26.06.2025 and 07.08.2025 NSA CH organized two so called ‘round table meetings’ with representatives of rail freight actors which operate in Switzerland. As a result of this meetings, NSA CH unilaterally published on 11.09.2025 Swiss national rules ‘measures relating to the safety of freight wagons’. On 23.10.2025 NSA CH published an update of these rules.

Part I, Chapter 2. : Background

Swiss national rules of 11.09.2025 and consideration in JNS

- The Swiss national rules contain four measures related to freight wagon wheels used on the Swiss railway network:
  - Measure #1 related to the thermostability;
  - Measure #2 related to the minimum wheel diameter and the addition of wheels of type;
  - Measure #3 related to the tightened wheel inspections;
  - Measure #4 related to the hammer (sound) test.

- NSA CH initially imposed the entry into force of these national rules from 01.01.2026 onwards. After further discussions with railway actors, NSA CH postponed on 23.10.2025 the deadline for Measure #3 by one year to 01.01.2027. Several companies filed a lawsuit against the national rules at the end of 2025. This lawsuit is ongoing at the time of publication of this JNS final report.

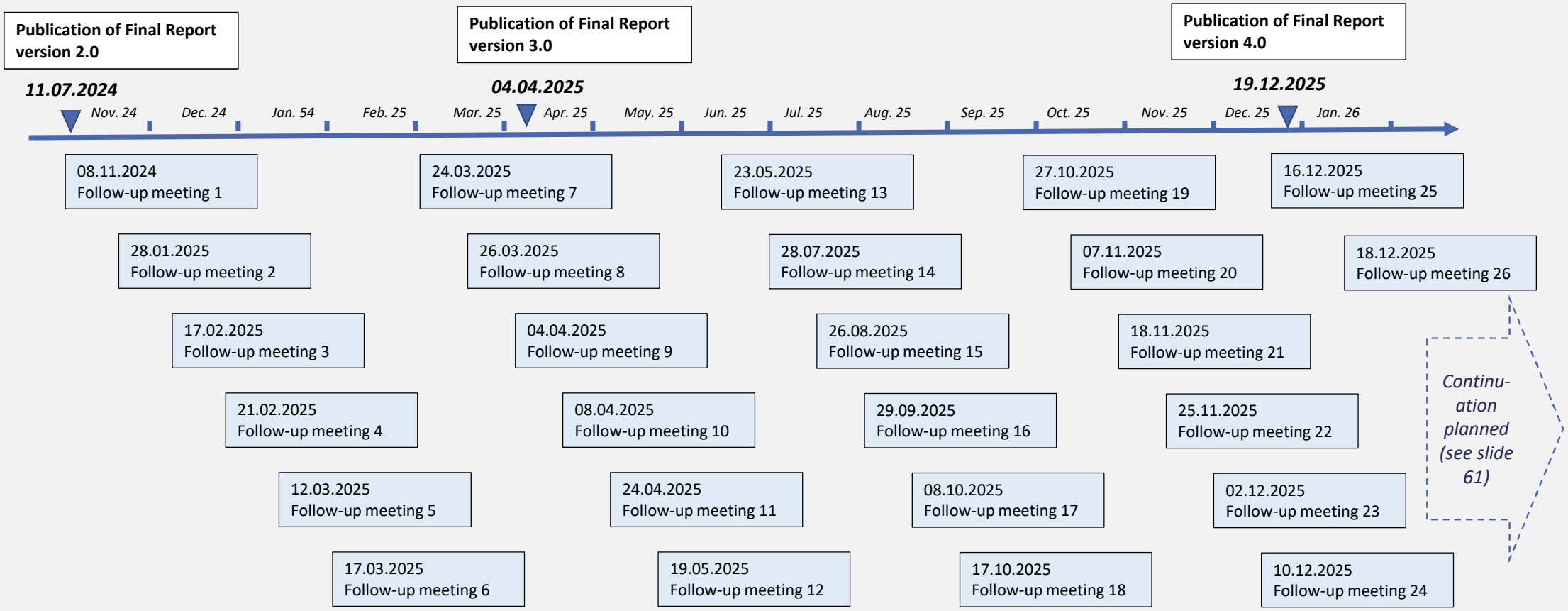
- NSA CH however stated in the accompanying letter to ERA that "*.. The FOT [therefore] is committed to continue working actively towards a European solution and is willing to withdraw the implemented measures at national level as soon as a joint approach with the appropriate effectiveness is found.*"

- ERA sent a letter on 22.09.25 to the Networks of National Safety Authorities and the Representative Bodies and to the Cooperation of ECM Certification Bodies asking for the best level of participation and contribution to come to proportionate European-wide risk control measures within the framework of the JNS by the end of 2025;

- The JNS Task Force organized 26 further meetings in 2025 (see next slide).

Part I, Chapter 2. : Background

Overview follow-up meetings



Accompanied by: numerous meetings of the Joint Sector Group and the NSA Subgroup, bilaterals with Task Force members, a meeting with the so called “Gotthardteam” and ERA presentations to the NSA and NRB networks.

Part I - Introduction

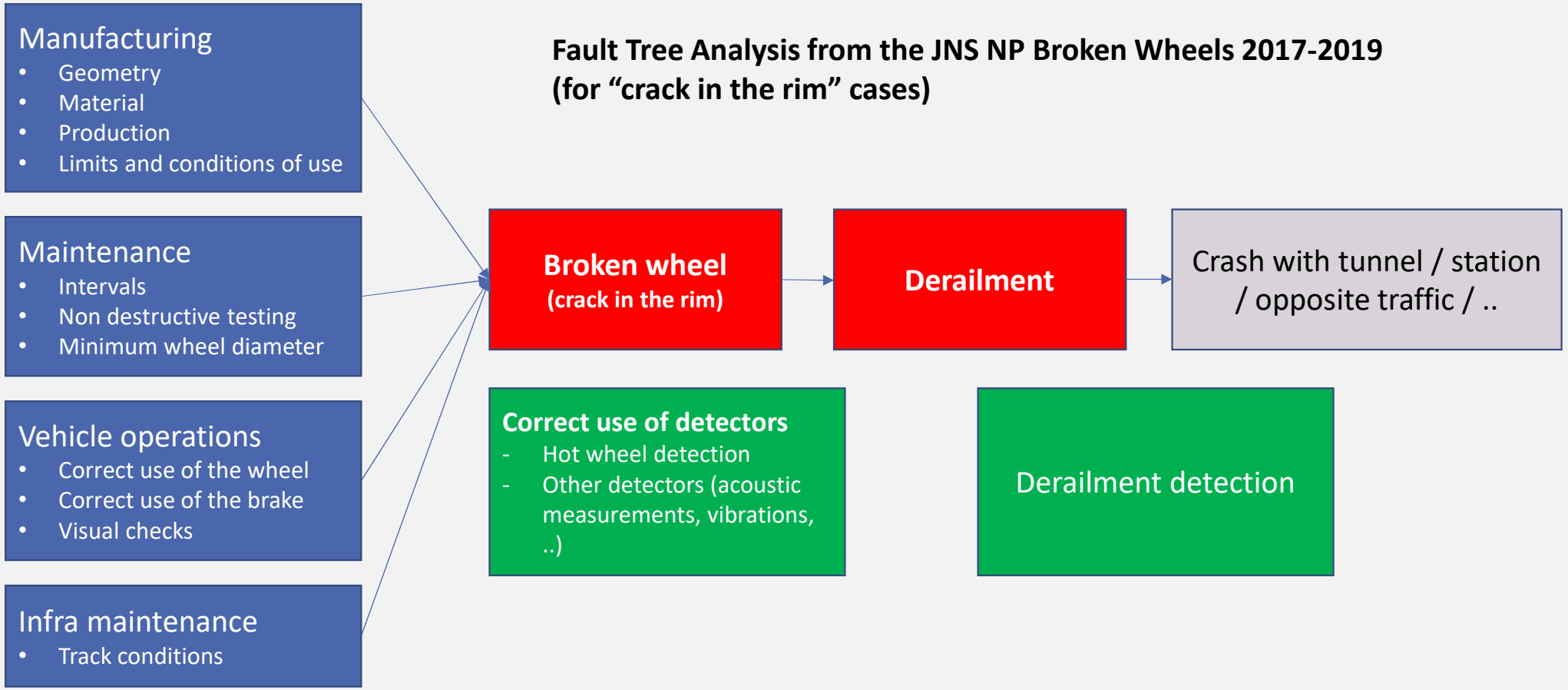
Chapter 3: risk to be tackled

Content

Part I, Chapter 3. : Risk to be tackled

Fault Tree analysis

Fault Tree Analysis from the JNS NP Broken Wheels 2017-2019 (for "crack in the rim" cases)



Part II - Outcome

Chapter 0: Summary and orientation

Chapter 0: summary and orientation

Chapter 1: risk control measures

- **1a: identification of wheel types comparable to BA 004**
- **1b: risk control measures 2026**
- **1c: continuation of JNS work**

Chapter 2: changes to legislation, standards and company rules

Chapter 3: related non-JNS analyses

Chapter 4: impact assessment

Part II, chapter 0. : Summary and orientation (1/4)

- The JNS Task Force analysed..
  - Any information linked to the accident in the Gotthard base tunnel, e.g.
    - The intermediate report of the NIB CH of 28 September 2023;
    - The recurrent updates of the NIB CH's representative in the Task Force;
    - The metallurgical investigation by QualiTech, initiated by NIB CH;
    - The final report published by NIB CH on 02 June 2025;
  - The information reported on new cases of cracked and broken wheels
  - The Swiss national rules published on 11 September 2025 and the explanations by NSA CH;
  - The information exchanged in the meeting with the "Gotthardteam" on 11 November 2025.

- The JNS Task Force concluded that the risk to be treated remains the one described by the fault tree analysis of broken wheels with crack initiation in the rim (see **slide 25**).

- The Gotthard base tunnel accident, and the subsequently analysed reported cases of cracked and broken wheels showed that wheel types other than BA 004 experienced crack initiation in the rim. Therefore questions arose if the risk control measures of 2019
  - shall be, next to the BA 390 (accident Gotthard), also extended to further wheel types comparable to BA 004, and
  - if these measures of 2019 control the risk sufficiently or need to be improved;

Part II, chapter 0. : Summary and orientation (2/4)

- The Task Force developed an assessment scheme to identify wheel types comparable to BA 004 (see **slides 37**);

- In December 2025, the following six wheel types have been identified as comparable to BA 004[1)]:
  - BA 390 (involved in the accident in the Gotthard tunnel);
  - Db-004sa;
  - RI 025;
  - R 32;
  - BA 304;
  - BA 005

- Wheels of wheel type BA 004 and comparable shall be treated as non-thermostable wheels and their white stripe markings shall be removed and JNS risk control measures 1.2, 1.3, 1.4a and 1.4b (see **slides 44 to 48**) shall apply to them;

- For all wheel types not covered by the assessment by the JNS Task Force, ECMs shall use the assessment scheme to clarify if these wheel types are also comparable to BA 004. ECMs shall inform the JNS Task Force of the outcomes of their assessment. The list of the assessed wheel types is available on the ERA website.

1) Note: The wheel type BA 004 could also be used in some versions of wheelset type VRY.

Part II, chapter 0. : Summary and orientation (3/4)

- Furthermore, the Task Force recognized the fact that
  - the removal of white stripe markings from wheels of wheel type BA 004 and comparable wheel types was not yet completed. Therefore, these wheels cannot reliably be recognized in operation and risk to be wrongly treated as thermostable wheels in case of thermal overload.
  - the in-service monitoring of wheels through visual and/or hammer (sound) checks does not provide sufficient reliability to detect all possible damages.
- Therefore, the Task Force developed further risk control measures 1.1 (see **slide 43**) and 2.1a & 2.1b (see slides **49 & 50**) to mitigate these risks which apply to all tread-braked wheels.
- **All actors involved shall either implement fully the improved JNS risk control measures or, implement measures justified by a risk assessment[1)] that guarantees at least the same level of safety.**
  The general requirements for the maintenance of wheels remain applicable, as described in EN 15313.
- The JNS risk control measures 2026 replace entirely the JNS risk control measures of the final report version 3.0 of the JNS NP "Accident Gotthard Base tunnel/Broken Wheels" of 04.04.2025, (which already replaced the measures from the final report version 2.0 of 11.07.2024) and they replace the agreed long term risk control measures from the JNS NP Broken Wheels 2017-2019 for BA 004 ("crack in the rim").
  Note: the measures for "crack in the web" (wheel types BA 314 old/ZDB29) from this report remain valid;

1) This risk assessment shall be done according to the process described in the Appendix of Commission Implementing Regulation (EU) no. 402/2013, and shall include the demonstration of compliance with the safety requirements;

Part II, chapter 0. : Summary and orientation (4/4)

- The Task Force members agreed to summarize in the final report the outcome of a discussion on responsibilities in accordance with Article 4 of the Railway Safety Directive and the related liabilities after accidents and incidents (see **slide 63**). The Task Force members concerned are encouraged to follow up the outcome;
- The crack in the wheel involved in the accident in the Gotthard base tunnel was probably initiated by a thermal overload that occurred a long time before the accident. Therefore, the Task Force members …
  - remind all actors concerned to consider the risk control measures aiming at reducing the number of fixed brakes and subsequently cases of thermal overload, as identified in the JNS Normal Procedure "Consequences of unintended brake applications with LL blocks" of March 2024 (see **slide 65**) (https://www.era.europa.eu/system/files/202403/JNS%20NP%20LL%20brake%20blocks_Final%20report_v2.0.pdf)
  - recommend to follow-up development in Project "Brake Blocks/Wheel Interaction" and the "UIC Project 'NETWORK MONITOR' that aims at harmonizing requirements for trackside detection systems (see **slide 65**);
- All actors are reminded to report new cases of cracked and broken wheels detected when applying the risk control measures, independently of the wheel type involved, using the template available on the website of the European Union Agency for Railways (https://www.era.europa.eu/domains/accident-incident/joint-network-secretariat-jns_en).
- Finally, ERA, together with the Task Force members, developed a Full Impact Assessment. This qualitative and quantitative assessment showed the preferred option is to implement the JNS 2026 measures (see **slides 67 & 68** and the full document on the ERA website www.era.europa.eu/jns).

Part II

Chapter 1: Risk control measures

Part II

Chapter 1: Risk control measures

Chapter 0: summary and orientation

Chapter 1: risk control measures

- 1a: identification of wheel types comparable to BA 004
- 1b: risk control measures 2026
- 1c: continuation of JNS work

Chapter 2: changes to legislation and standards

Chapter 3: related non-JNS analyses

Chapter 4: impact assessment

Part II, chapter 1a. : identification wheel types comparable to BA 004

Reflections and justifications

A scientific justification why crack initiation and propagation of wheels of certain wheel types are more frequent than wheels of other wheel types is currently not possible with the available knowledge and methods.

Up to 2019, cracked and broken wheels with cracks originating in the wheel rim concerned only wheels of wheel type BA 004. The accident in the Gotthard tunnel and the subsequently reported cases of cracked and broken wheels showed, however, that also other wheel types might be affected. For this reason, the assessment scheme to identify other concerned wheel types than BA 004 has been developed in a phenomenological way based on the analysis in the JNS, that includes the analysis of reported cases of cracked and broken wheels;

The criteria selected to identify other concerned wheel types are listed in the following slides. These criteria are based on similarities with the wheel geometry of wheel type BA 004. Detailed weighting of the different criteria is not feasible;

The identification of other concerned wheel types, so called “wheel types comparable to BA 004” takes also into account the results obtained during the JNS Broken Wheels Normal Procedure 2017 - 2019.

In case other wheel materials than R7 (UIC 812-3) respectively ER7 (EN13262) are used, a risk assessment* has to be carried out for the impacted wheels to identify whether or not additional risk control measures are needed;

* In accordance to Art. 4 of the ECM Regulation 2019/779, the ECM and manufacturers involved shall carry out a risk assessment. This risk assessment shall be done according to the process described in the Appendix of Commission Implementing Regulation (EU) no. 402/2013, and shall include the demonstration of compliance with the safety requirements.

Part II, chapter 1a. : identification wheel types comparable to BA 004

General criteria

The assessment scheme (see **slide 37**) shall be applied to wheel types used in freight transport which comply with all of the following general criteria:

1. **100 % tread braked with cast iron or composite brake blocks:**

   Reason:
   - Cracked rim was thermally initiated and happened with all types of brake blocks.

2. **Nominal wheel diameter 920 mm:**

   Reasons:
   - In wheel types with a smaller nominal wheel diameter, the reduced distance between hub and rim results in less critical radii of the web contour;
   - In wheel types with a smaller nominal wheel diameter, there is no negative service experience.
   - BA 004 has only this nominal wheel diameter;
   - The vast majority of the other wheel types used in tread braked freight application also have this nominal wheel diameter;

3. **Axle load ≥ 22,5t:**

   Reasons:
   - The calculation of the brake power in accordance with EN 13979-1 shows a direct correlation between an increased braking power and an increased axle load. This is further detailed in the original UIC 510-5:2003.
   - The input of brake power occurs not only during long drag braking, but also during in service brake application.

Part II, chapter 1a. : identification wheel types comparable to BA 004

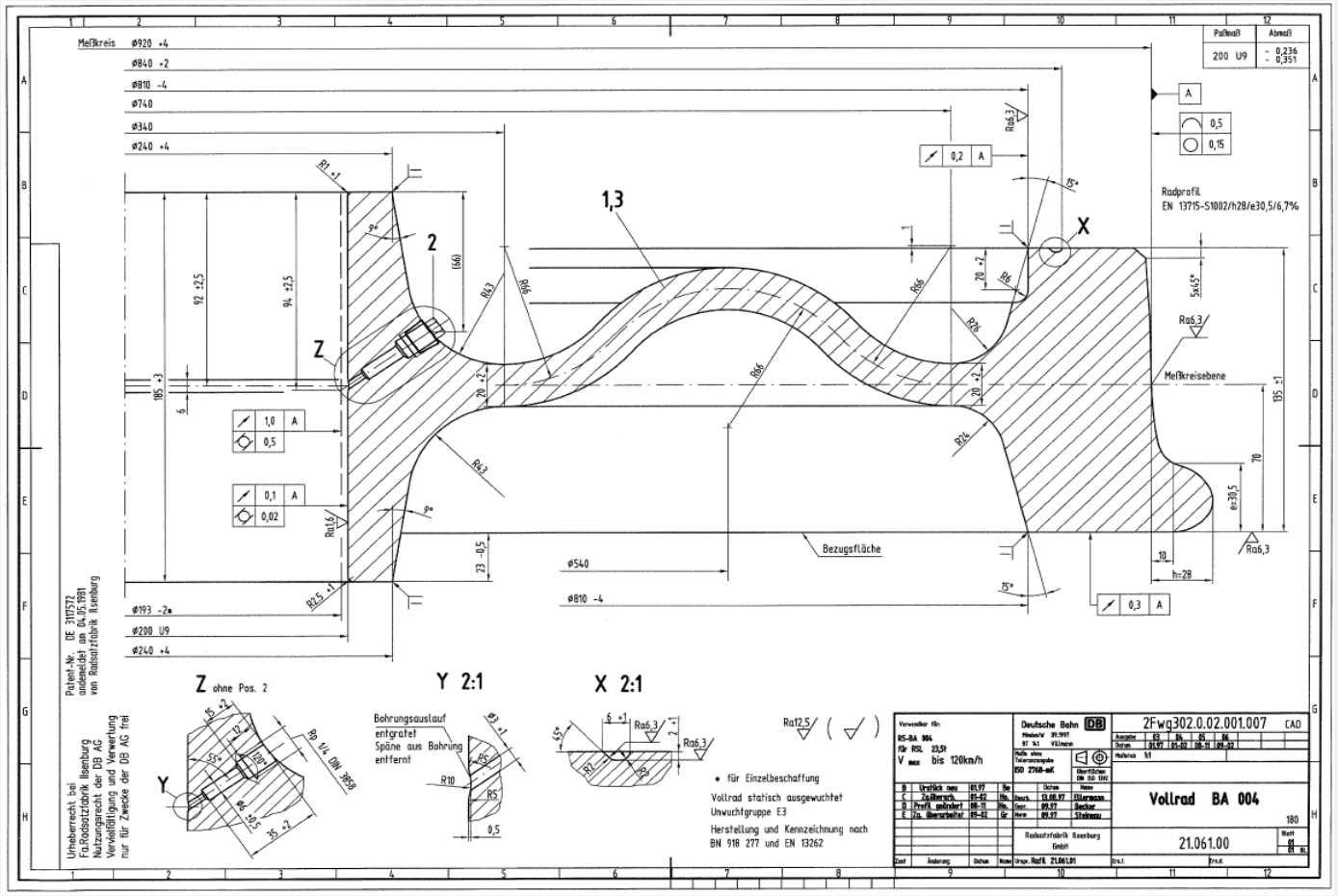
Reference : wheel type BA 004

Main features:

- nominal wheel diameter: 920 mm
- minimum wheel diameter: 840 mm
- inner diameter of the rim: 810 mm
- thickness of the web near the rim: 20 + 2 mm
- axle load up to 23,5t
- tread braked application in freight / cast iron and composite brake blocks
- residual stresses in new and worn conditions fulfill EN 13979-1
- wheel material: R7 (UIC 812-3) / ER7 (EN13262)

Design and delivery:

- introduction of this wheel: 1994
- original design from RAFIL (Radsatzfabrik Ilsenburg, today Bochumer Verein Verkehrstechnik)
- delivered by a great number of suppliers around the world, design possibly adapted



Part II, chapter 1a. : identification wheel types comparable to BA 004

Specific criteria

The criteria concern the combination of three special design features of wheel type BA 004 of the contour in the transition from rim to web and the minimum allowed residual cross section area of the rim, identified within the analysis of the reported cases of cracked and broken wheels.

Criteria
1. Radii in the transition between rim and web comparable to wheel type BA 004 (see figure)
2. Position of the web nearly in the middle of rim (see figure)
3. Allowed thickness of the web near the rim equal to or greater than 20 mm and equal to or smaller than 22 mm (see figure)
4. Minimum residual rim cross section area (in fully worn state) in accordance with chapter 4.3.1 of EN 13979-1 is lower than 0,23 dm^2.

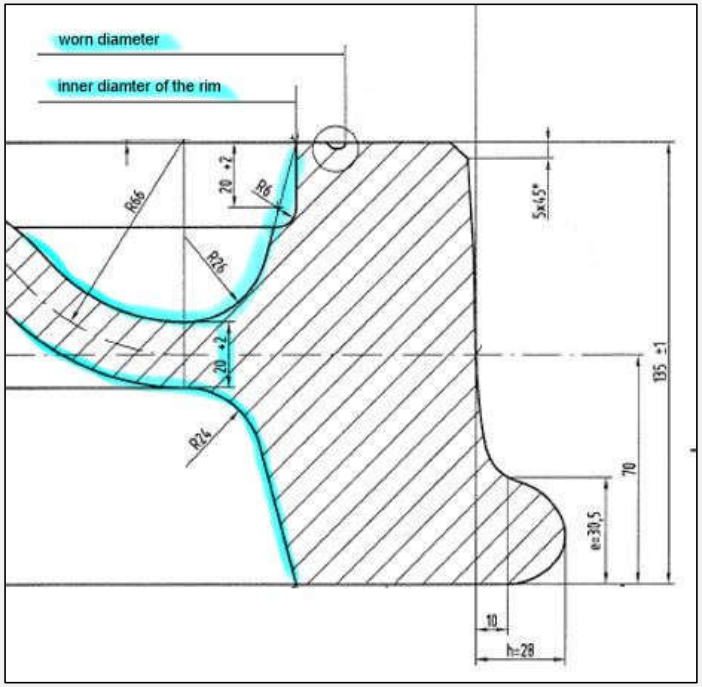


Figure: drawing of BA 004 showing design features referred to in the criteria

Part II, chapter 1a. : identification wheel types comparable to BA 004

Assessment scheme

Interpretation of the assessment results:

Only if **all** the results are “applicable”, the wheel type is considered comparable to BA 004 and the JNS risk control measures 1.2, 1.3 and 1.4a & 1.4b apply (see **slides 43 to 48**).

Example 1:

Criteria and value		Value/ evaluation	result
design of the contour of the wheel web in the transition rim – web like wheel type BA 004	Radii in the transition between rim and web comparable to wheel type BA 004	Yes	applicable
	Position of the web nearly in the middle of rim	yes	applicable
	Allowed thickness of the web near the rim equal to or greater than 20 mm and equal to or smaller than 22 mm	20 mm	applicable
Minimum residual rim cross section area (in fully worn state) in accordance with chapter 4.3.1 of EN 13979-1 is lower than 0,23 dm^2.		0,2025 dm^2	applicable

➔ Wheel type assessed as **comparable** to BA 004

➔ The additional JNS risk control measures in chapter 1b or alternative measures **apply**

Example 2:

Criteria and value		Value/ evaluation	result
design of the contour of the wheel web in the transition rim – web like wheel type BA 004	Radii in the transition between rim and web comparable to wheel type BA 004	no	not applicable
	Position of the web nearly in the middle of rim	yes	applicable
	Allowed thickness of the web near the rim equal to or greater than 20 mm and equal to or smaller than 22 mm	20 mm	applicable
Minimum residual rim cross section area (in fully worn state) in accordance with chapter 4.3.1 of EN 13979-1 is lower than 0,23 dm^2.		0,2025 dm^2	applicable

➔ Wheel type assessed as **not comparable** to BA 004

➔ The additional JNS risk control measures **do not apply**

*) Or alternative measures that guarantee at least the same level of safety, justified by a risk assessment.This risk assessment shall be done according to the process described in the Appendix of Commission Implementing Regulation (EU) no. 402/2013, and shall include the demonstration of compliance with the safety requirements;

Part II, chapter 1a. : identification wheel types comparable to BA 004

Sources for wheel types assessed by the JNS Task Force

- In the European freight sector, many wheel types are used. The European maintenance guideline (EMG) from the Verband der Güterwagenhalter in Deutschland e. V. (VPI) provides a good overview (VPI EMG 04 – 04.02). The JNS experts used this list and added further known wheel types, as a basis for the JNS assessment;
- The list on the next slide includes the results of this JNS assessment. It will be made available on the ERA website. (https://www.era.europa.eu/domains/accident-incident/joint-network-secretariat-jns_en)

The assessment in accordance with the assessment scheme (see slides 37) of wheel types not included in this table shall be done by all ECMs who use these not yet assessed wheels with support by the respective wheel manufacturers.
The ECMs shall inform ERA and the JNS Task Force experts of the results of their assessment (via jns@era.europa.eu). ERA will update the list accordingly.

In case of doubt when assessing any of the criteria, the experts of the JNS Task Force “Accident Gotthard base tunnel - broken wheels“ can be contacted for advice via jns@era.europa.eu.

Part II, chapter 1a. : identification wheel types comparable to BA 004

List of wheel types assessed by the JNS Task Force

Nr. from ...	additional wheel type	wheel	Drawing Nr	nominal wheel ...	outer diameter of ...	inner diameter of the rim - outer ...	inner diameter of the rim - inner ...	axle load in the ...	web thickness ...	residual rim area (like definition in prEN13979-[dm²]	residual rim area (like definition in prEN13979-1:2022, but considering ... clamping ... diameter only)	shape of web geometric comparable to BA (yes/partially/not)	Minimum residual rim area ...	Radii in the transition between rim and ...	Position of the web near middle	Allowed thickness of the web near the ... 20 ... inc	criteria ...	Decision JNS - relevant (yes/no)	Detailed analysis in JNS ...	Remark
1		002	1Fuq665.0.02.001.007	920	854	820	N/A	22.5	20	N/A	0.23	na	-	-	-	-	na	na	-	
2		004	2Fuq302.0.02.001.007	920	840	810	810	22.5	20	0.20	0.20	yes	applicable	applicable	applicable	applicable	yes	yes	-	Reference
3		005	2Fuq663.0.02.001.007	920	840	810	810	20 (JNS)	20	0.20	0.20	yes	applicable			applicable	na	yes	yes	geometrical comperable, included in JNS 12/25
9		102	Fu 0600.02.001.05.87	920	840	810	N/A	22.5	19	N/A	0.20	na	-	-	-	-	na	na	-	
14		302	1Fuq665.0.02.003.302	920	880	820	N/A	22.5	22	N/A	0.41	na	-	-	-	-	na	na	-	
15		303	2Fuq302.0.02.003.303	920	840	796	800	25.0	20	0.28	0.30	yes	not applicable	applicable	applicable	applicable	na	na	yes	
16		304	2Fuq302.0.02.003.304	920	854	810	810	25.0	20	0.30	0.30	yes	not applicable	applicable	applicable	applicable	na	yes	yes	taken in account because similar to BA 390
17		306	2Fuq000.0.02.003.013	920	840	775	775	22.5	22	0.44	0.44	na	-	-	-	-	na	na	-	
18		307	2Fuq000.0.02.003.014	920	840	775	775	25.0	22	0.44	0.44	na	-	-	-	-	na	na	-	
	x	309	21.724.01	920	840	780	775	25.0	25	0.42	0.41	yes	not applicable	applicable	applicable	not applicable	na	na	yes	
	x	310	21.724.00	920	840	780	775	25.0	25	0.42	0.41	yes	not applicable	applicable	applicable	not applicable	na	na	yes	
	x	313		920	840	800	800	25.0	17	0.27	0.27	yes	not applicable	applicable	not applicable	not applicable	na	na	yes	DB Number, manufacturer CAF
19		313	455.0.215.000.36	920	840	800	800	25.0	20	0.27	0.27	partially	not applicable	applicable	not applicable	applicable	na	na	yes	VPI Number, manufacturer Bonatrans, Bana 313
20		314	2Fuq000.0.02.003.002	920	840	805	810.5	25.0	20	0.22	0.24	na	-	-	-	-	na	na	-	Crack in the web care - JNS Broken wheels 2019
21		315	2Fuq000.0.02.003.001	920	840	800	N/A	25.0	22	N/A	0.27	na	-	-	-	-	na	na	-	
22		318	455.0.215.000.07	920	840	800	800	22.5	22	0.27	0.27	na	-	-	-	-	na	na	-	
	x	319		920	840	800	800	25.0	22	0.27	0.27	na	-	-	-	-	na	na	-	
23		324	2Fuq000.0.02.003.003	920	840	805	810.5	22.5	20	0.22	0.24	na	-	-	-	-	na	na	-	Crack in the web care - JNS Broken wheels 2019
24		325	2Fuq000.0.02.003.004	920	854	820	820	22.5	17	0.23	0.23	na	-	-	-	-	na	na	-	
29		428	455.0.217.000.07	920	854	820	N/A	22.5	22	N/A	0.23	na	-	-	-	-	na	na	-	
30		706	X.03.00706	920	840	800	800	25.0	17	0.27	0.27	partially	not applicable	not applicable	not applicable	not applicable	na	na	yes	
32		ESFA	455.0.215.000.41	920	840	800	800	25.0	20	0.27	0.27	partially	not applicable	applicable	applicable	applicable	na	na	yes	same like ZDB 34
34		RI027	21.738.00	920	840	780	775	25.0	25	0.42	0.41	partially	not applicable	applicable	applicable	not applicable	na	na	yes	
35		VRY	038-0122/00020445-02.11	920	854	820	N/A	22.5	22	N/A	0.23	na	-	-	-	-	na	na	-	
36		VRY	-0123/000022325-02.11	920	840	810	N/A	22.5	20	N/A	0.20	yes	applicable	applicable	applicable	applicable	yes	yes	yes BA 004	The wheel type BA 004 could also be used in some versions of wheelset type VRY
39		RI025	21.061.56	920	840	810	N/A	25.0	20	N/A	0.20	yes	applicable	applicable	applicable	applicable	yes	yes	yes	
41		803	X094400-1-01	920	854	820	N/A	22.5	22	N/A	0.23	na	-	-	-	-	na	na	-	ORE Standard wheel
46		9054	10.4005 784 Rep. 1	920	850	N/A	N/A	22.5	N/A	N/A	N/A	N/A	N/A	-	-	-	N/A	special	yes	overview drawing - 4 wheel designs, no further information, individual assessment necessary
47		9054B	10.4018.602	920	850	820	820	22.5	17	0.20	0.20	na	-	not applicable	not applicable	-	na	na	yes	overview drawing - 4 wheel designs based on BA 318, 306/307, Valdunes Drawing 10-4018 602/ 70 751-30 and CAF
	x	9054B CAF		920	850	820	820	22.5	17	0.20	0.20	partially	applicable	-	-	not applicable	na	na	yes	
50		9071	70,761	920	830	800	800	25.0	17	0.20	0.20	N/A	applicable	-	-	-	N/A	special	yes	overview drawing - 3 wheel designs, no further information, individual assessment necessary
	x	9071 CAF		920	830	800	800	25.0	17	0.20	0.20	na	-	-	-	-	na	na	yes	Wheel from CAF
51		9074B	10.4017.647	920	830	800	800	22.5	17	0.20	0.20	na	-	-	-	-	na	na	yes	
	x	9074B CAF		920	830	800	800	22.5	17	0.20	0.20	na	-	-	-	-	na	na	yes	
59		B46UR/m	103123	920	854	820	820	22.5	22	0.23	0.23	na	-	-	-	-	na	na	-	
61		SURA25	110000001179	920	840	775	775	25.0	22	0.44	0.44	na	-	-	-	-	na	na	-	
62		LF26	110000001210	920	840	785	785	25.0	19	0.37	0.37	na	-	-	-	-	na	na	-	
63		ZDB29	455.0.212.000.03	920	840	810	845	25.0	20	0.08	0.20	na	-	-	-	-	na	na	-	
64		ZB34	455.0.215.000.41	920	840	800	800	25.0	20	0.27	0.27	partially	not applicable	-	-	applicable	na	na	yes	
	x	390	21.061.28	920	840	810	N/A	22.5	20	N/A	0.20	yes	applicable	applicable	applicable	applicable	yes	yes	yes	
	x	YALD25+	YDI0277	920	830	782	784	25.0	16	0.32	0.32	na	-	-	-	-	na	na	-	
	x	ULT25	KP-0050-16 /CV	920	840	790	790	25.0	31.6	0.34	0.34	partially	not applicable	not applicable	applicable	not applicable	na	na	yes	
	x	ULT23	KP-0050-16 /CV	920	840	790	790	22.5	31.6	0.34	0.34	partially	not applicable	not applicable	applicable	not applicable	na	na	yes	
	x	LiTheS CAF		920	840	783	783	25.0	16	0.38	0.38	na	-	-	-	-	na	na	yes	
	x	RI028	21.740.00	920	840	796	808	25.0	21	0.26	0.30	partially	not applicable	applicable	applicable	applicable	na	na	yes	
	x	Db-004a	21.061.43	920	840	810	810	22.5	20	0.20	0.20	yes	applicable	applicable	applicable	applicable	yes	yes	yes	
	x	Db-10a		920	854	N/A	N/A	22.5	N/A	N/A	N/A	N/A	N/A	-	-	-	N/A	special	yes	
	x	Db-10a	RM 411.00.551.2	920	854	800	800	22.5	25	0.36	0.36	partially	not applicable	applicable	applicable	not applicable	na	na	yes	
	x	Db-10a		920	852	820	825	22.5	22	0.20	0.22	na	-	-	-	-	na	na	yes	
	x	Db-10	ZFW 411.00.525.2	920	854	820	820	22.5	22	0.23	0.23	na	-	-	-	-	na	na	-	
	x	RI101		920	840	796	800	22.5	20	0.28	0.30	yes	not applicable	applicable	applicable	applicable	na	na	yes	
	x	R32	A68.0AZ0.07.1026	920	840	810	810	22.5	20	0.2025	0.2025	yes	applicable	applicable	applicable	applicable	yes	yes	yes	
	x	HLF306	110000003260 version 1b2	920	840	785	785	23.5	19	0.37	0.37	na	-	-	-	-	na	na	-	
	x	HLF307	110000003260 version 3	920	840	785	785	25	19	0.37	0.37	na	-	-	-	-	na	na	-	

Part II, chapter 1a. : identification wheel types comparable to BA 004

Wheel types assessed by the JNS Task Force as comparable to BA 004

The following wheel types were identified by the JNS Task Force as comparable to BA 004*) [status January 2026]:

- Db-004sa
- BA 390
- RI 025
- R32
- BA 304
- BA 005**

*) The wheel type BA 004 could also be used in some versions of wheelset type VRY which shall therefore be treated like wheels of type BA 004.

**) Because of identical geometry to BA004, despite lower axle load of 20t.

Part II

Chapter 1: Risk control measures

Chapter 1b. : Risk Control Measures 2026

overview of risk control measures

	Risk Control Measures				
	Visual inspections	**Removal of white stripe markings**	**Off vehicle maintenance**	**Increased minimum wheel diameter**	**Supervision / Surveillance**
Freight ECMs	Measure 1.1, **Slides 43**	Measure 1.2 **Slide 44**	Measure 1.3 **Slide 45**	Measure 1.4a & 1.4b **Slides 46-48**	
All RUs /IMs that operate freight wagons	Measures 2.1a & 2.1b **Slides 49-50**				
ECM CBs					Measure 3.1 **Slide 52**
NSAs					Measure 4.1 **Slide 53**

➔ RUs and IMs who operate freight wagons shall declare in their Safety Management System (SMS) that they apply the relevant JNS risk control measures. This declaration shall be made available upon request.

➔ ECMs assigned to freight wagons shall declare in their Maintenance Management System (MMS) that they apply the relevant JNS risk control measures. This declaration shall be made available upon request.

Part II, Chapter 1b. : Risk Control Measures 2026
Visual inspections by freight ECMs

No.	Risk Control Measure	When/where to apply
1.1	Visual wheel inspection of the visible part of the wheel to detect • single cracks on the wheel tread (see **slides 54-56**) • cracks in rim and/or web (see **slides 57-58**) • any indication of thermal overload of the wheel (see **slide 51**) Additional hammer (sound) test in case of limited visibility of the wheel rim/ web (see **slide 59**). In case of any detections: • dispatch wagon to workshop (if not already there) • carry out additional measures during off-vehicle maintenance (measure 1.3, see **slide 45**) In case of detection of a cracks in rim and/or web: • report the detection using the template available on the website of the European Union Agency for Railways (https://www.era.europa.eu/domains/accident-incident/joint-network-secretariat-jns_en).	From **01.02.2026**, for all tread-braked wheels. Every time a wagon is treated by an ECM in- or outside of a workshop (e.g.): • During change of brake blocks in- or outside of workshops • During axle inspections done in accordance with the European Visual Inspection Catalogue (EVIC) (see EN 15313, chapter 6.5.13.2) • During off-vehicle maintenance • During wagon technical inspection by ECM (if environmental conditions allow)

Part II, Chapter 1b. : Risk Control Measures 2026

Removal of white stripe markings by freight ECMs

No.	Risk Control Measure	When/where to apply
1.2	Removal of white stripe markings on axle box cover (see Chapter 6.2.7.2 in EN 15313:2024) if environmental conditions allow. ECMs shall have developed traceable programmes for the removal of the white stripe markings.	For wheels of wheel type BA004 and comparable (see **slide 40**) The deadline for removal of white stripe markings is **01.07.2027**. The deadline for the finalization of traceable programme is **01.02.2026** : The removal shall be one according to the traceable programmes, during e.g. • Visual inspections • Off-vehicle maintenance • EVIC • Other occasions defined by ECM

Part II, Chapter 1b. : Risk Control Measures 2026
Additional measures during off-vehicle maintenance by freight ECMs

No.	Risk Control Measure	When/where to apply
1.3	Intensified measures and stronger criteria : • Residual stress measurement with reduced limit of 300 MPa instead of 400 MPa*, and • Non Destructive Testing (NDT) of the tread*, and • Measurement back to back distance between the wheels *alternative : systematic reprofiling of large reduction in diameter and visual inspection of the tread according to service experience (see EN 15313:2024, 6.2.4.3) Follow-up actions in case of non-conformities: standard procedures	For for wheels of wheel type BA004 and comparable • During the first visit to workshop of a wheel after its wheel type has been identified as comparable to BA004 • After the first visit: in case of detections (following measures 1.1, 2.1a or 2.1b, see **slides 43 and 49 & 50**) and as part of scheduled maintenance activities

Part II, Chapter 1b. : Risk Control Measures 2026

Increased minimum wheel diameter by freight ECMs

No.	Risk Control Measure	When/where to apply
1.4a	In case of use in wagons with nominal axle load >20t: • Increased minimum in service wheel diameter of 864 mm; • Minimum wheel diameter after the last reprofiling of 880 mm**; • It is not allowed to re-install wheelsets with a wheel diameter of 864mm or less. The deadline to fully comply with the diameter requirement is **01.01.29 (reduced deadline of 31.12.2026***). During the transition period, all wheels documented on 01.02.2026 as not fulfilling the diameter criteria of 864mm can be used, under the following conditions: • A visual inspection (see JNS risk control measure 1.1) is applied every 50.000 km; • A risk assessment shall be carried out in accordance with the process described in Annex I of (EU) 402/2013 CSM REA (Risk Evaluation and Assessment). * In the following conditions: • where dragged braking over longer distances takes place (i.e. mainly in mountainous region), or; • on infrastructure with shorter brake distances and/or more severe winter conditions (such as is the case in Norway and Sweden). Only wheels, for which previously a risk assessment had been carried out that demonstrated that they could be used in 'affected application' (see **slide 47**), can be used only up to the reduced deadline.	From **01.02.2026**, for wheels of wheel type BA004 and comparable (see **slide 40**) Deadlines: see description of measure on the left.

** In case a lower minimum wheel diameter than 880mm after the last reprofiling is decided, the (EU) 402/2013 CSM REA shall be applied, considering this a significant change.

Part II, chapter 1b. : Risk control measures 2026

Definition of affected application from previous JNS final report v3.0

In the previous JNS final report version 3.0 (published on the website of ERA on 04.04.2025 – and replaced by the JNS final report version 4.0), a wheel was considered to be used in “affected application” if **one or more** of the below mentioned conditions applied:

- Wheel used in combined traffic
- Wheel used in the middle bogie of an articulated waggon
- Wheel braked under regime “ss”
- Wheel used in wheelset with a calculated brake weight per axle > 15,25t
  (according to UIC 544-1 6th Edition)
- Wheel used in transport taking place fully or partially within the mountainous region where dragged braking over longer distances takes place
- Wheel used in transport taking place in infrastructure with shorter brake distances and/or more severe winter conditions (such as is the case in Norway and Sweden)

Part II, Chapter 1b. : Risk Control Measures 2026
Increased minimum wheel diameter by freight ECMs

No.	Risk Control Measure	When/where to apply
1.4b	In case of use in freight wagons with nominal axle load ≤ 20t: Wheels can still be used until they reach the documented latest valid service limit value for the wheel diameter, with the following boundary condition: not used in ss – brake application The deadline to fully comply with the requirement to not use these wheels in ss-brake application is **01.01.27**. During the transition period, these wheels can still be used in ss-brake application if these wheels are visually inspected (see JNS risk control measure 1.1) every 50.000 km. In case this transition period is used, a risk assessment shall be carried out in accordance with the process described in Annex I of (EU) 402/2013 CSM REA (Risk Evaluation and Assessment) Reminder: these wheels are also in this use case no longer to be considered thermostable (see measure 1.2 (see **slide 44**) and measure 2.1b (see **slide 50**)).	From **01.02.2026**, for wheels of wheel type BA004 and comparable (see **slide 40**) Deadline: see description of measure on the left.

Part II, Chapter 1b. : Risk Control Measures 2026
Visual inspections by all RUs/IMs that operate freight wagons

No.	Risk Control Measure	When/where to apply
2.1.a	Visual inspection of the visible part of the wheels to detect one or more of the following: • single cracks on the wheel tread (see **slides 54-56**) • cracks in rim and/or web (see **slides 57-58**) • any indication of thermal overload of the wheel (see **slide 51**) A hammer test/sound test may be of help in detecting cracked rims/ web of wheels and can be carried out as an extra measure when the operational conditions are favourable (see **slide 59)** ➔ In case of cracks on the wheel tread or cracks in rim and web : dispatch wagon to ECM maintenance (for off-vehicle wheelset maintenance (measure 1.3, see **slide 45**)) ➔ In case of any indication of thermal overload of the wheel, apply JNS risk control measure 2.1.b (see **slide 50**)	From **01.02.2026**, for all tread-braked wheels. • Before train departure (pre-departure checks) • During change of brake blocks in- or outside of workshops carried out by an actor that also operates these freight wagons. • As soon as possible after a detection by a trackside detection device (e.g. hot wheel detectors, ..)

Part II, Chapter 1b. : Risk Control Measures 2026

Visual inspections by all RUs/IMs that operate freight wagons

No.	Risk Control Measure	When/where to apply

2.1.b	<u>For wheelsets without white stripe marking</u> :
	• Visually inspect the wheel in accordance with measure 2.1.a (see **slide 49**)
	  • In case of cracks*: ➔ detach wagon
	  • Without cracks*: ➔ measure the widening of the inner faces (E value)
	  • E-value inside tolerance range: ➔ switch off the brake, the wagon can complete the journey
	  ➔ no reloading and dispatch wagon to ECM maintenance (for off-vehicle wheelset maintenance (measure 1.3, see **slide 45**))
	  • E-value outside tolerance range: ➔ detach wagon
	• Inform the Keeper/ECM, ensure traceability of detections and actions taken
	(e.g by filling standard international forms such as GCU appendix 4 and appendix 9, annex 12)
	
	<u>For wheelsets with white stripe marking - **Until 30.06.27**</u> (Deadline for the removal of the white stripe markings on wheels of wheel type BA004 and comparable)
	• Visually inspect the wheel in accordance with measure 2.1.a (see **slide 49**)
	  • In case of cracks*: ➔ detach wagon
	  • Without cracks*: ➔ switch off the brake and the wagon can run to the end of the journey
	  ➔ no reloading and dispatch wagon to ECM maintenance (dispatch wagon to ECM maintenance (for off-vehicle wheelset maintenance (measure 1.3, see **slide 45**))
	• Inform the Keeper/ECM, ensure traceability of detections and actions taken
	(e.g by filling standard international forms such as GCU appendix 4)
	
	<u>For wheelsets with white stripe marking - **From 01.07.27**</u>:
	• Visually inspect the wheel in accordance with measure 2.1.a (see **slide 49**)
	  • In case of cracks*: ➔ detach wagon
	  • Without cracks*: ➔ the wagon can run without restrictions
	• Inform the Keeper/ECM, ensure traceability of detections and actions taken
	(e.g by filling standard international forms such as GCU appendix 4)
		Like measure 2.1.a, in case of detection of any indication of thermal overload of the wheel

* cracks = single cracks on the wheel tread or cracks in rim and/or web (see measure 2.1.a)

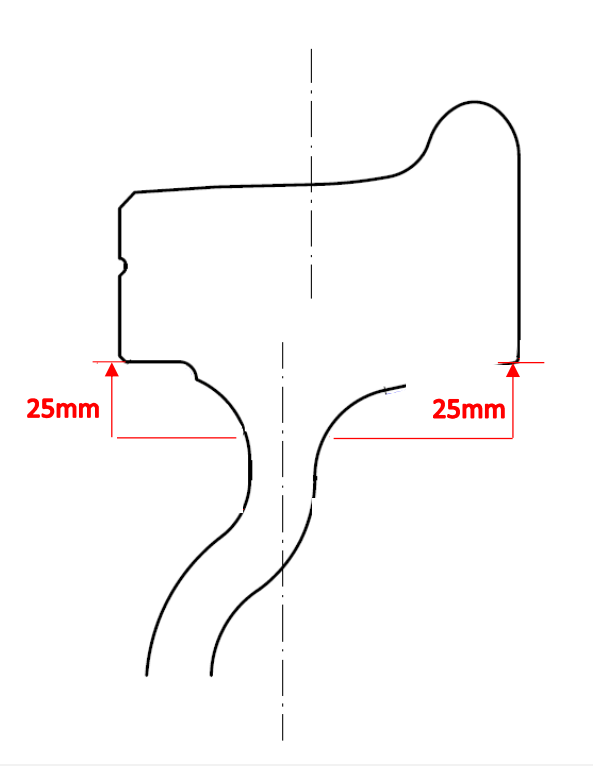
Part II, Chapter 1b. : Risk Control Measures 2026

Indications of thermal overload

ECMs and all RUs and IMs that operate freight wagons shall visually inspect all tread braked wheels for all the following indications of thermal overload:

- Obvious burnt paint (cracks or shelling on paint) or no paint or corrosion (traces of rust) >25 mm between rim and wheel plate(see red marking of figure to the right and Annex C.3.2.2 of EN15313:2024)
- Fusion of brake blocks
- Deterioration of wheel tread with build-up of metal (see Annex C.2.2 of EN15313:2024)
- Uneven bluish coloured rim from overheating

ECMs and all RUs and IMs that operate freight wagons shall also consider any available data from detection devices (e.g. hot wheel detectors, ..) that might indicate thermal overload.



Part II, Chapter 1b. : Risk Control Measures 2024
Surveillance by ECM certification bodies (ECM CB)

No.	Risk Control Measure	When/where to apply
3.1	Surveillance of the freight ECMs. Special attention shall be drawn to whether the ECM is using wheels of wheel type BA004 and comparable or not. The ECM CB shall check: • Correct implementation of the JNS NP risk control measures 2026 (**slides 43 to 48**) also for outsourced maintenance function activities; • Correct implementation of alternative risk control measures that the ECM has identified in risk assessments in accordance with the process described in Annex I of (EU) 402/2013 CSM REA (Risk Evaluation and Assessment), if required; • Correct application of the CSM REA in case a wheel diameter of less than 880mm is chosen after reprofiling in case a wheel of wheel type BA 004 or comparable is used with an axle load >20t (measure 1.4b, see **slide 46**); • The monitoring of the risk control measures in accordance with (EU) 1078/2012 CSM MON (Monitoring) to verify the effectiveness of the JNS risk control measures 2026. If during the surveillance the ECM CB becomes aware of a case of cracked/broken wheels : check if the ECM has reported the case to the JNS Task Force, in accordance with the ECM's Maintenance Management System (MMS).	From **01.02.2026**, during surveillance activities

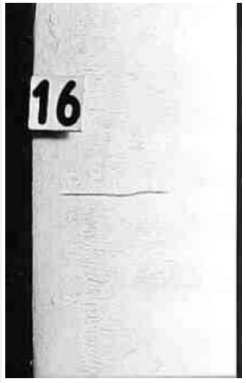
Part II, Chapter 1b. : Risk Control Measures 2026
Supervision by national safety authorities (NSAs)

No.	Risk Control Measure	When/where to apply
4.1	Supervision of the freight RUs and IMs that operate wagons. Special attention shall be drawn to: • Correct implementation of the JNS NP risk control measures 2026 (measures 2.1a & 2.1b, see **slides 49 & 50**), • Correct implementation of alternative risk control measures that the RU has identified in risk assessments in accordance with the process described in Annex I of (EU) 402/2013 CSM REA (Risk Evaluation and Assessment), if required, • The monitoring of the risk control measures in accordance with (EU) 1078/2012 CSM MON (Monitoring) to verify the effectiveness of the JNS risk control measures 2026. If during the supervision the NSA becomes aware of case of cracked / broken wheels : check if the RU or the IM that operates freight wagons has reported the case to the ECM, in accordance with the processes of the RU's/IM's Safety Management System (SMS). Also the NSA shall check that the information was delivered by the ECM to the JNS Task Force. The NSA can use the email address jns@era.europa.eu to contact the JNS Task Force.	From **01.02.2026**, during supervision activities

Part II, chapter 1b. : Risk control measures 2026

Reference “single cracks on the wheel tread” (1/3)

Description: The tread exhibits cracks at an angle of approximately 90° to the circumference of the wheel and have a typical length of 30mm or more. Transverse cracks generally develop at the surface in either straight or slightly crooked lines and can penetrate radially (usually of thermal origin in these cases) or branch out in a circumferential direction (usually of mechanical origin in this case). They occur individually and can be distributed at several points around the circumference. [EN 15313, §C.2.6]



Transverse crack revealed by magnetic particle testing [EN 15313, §C.2.6]

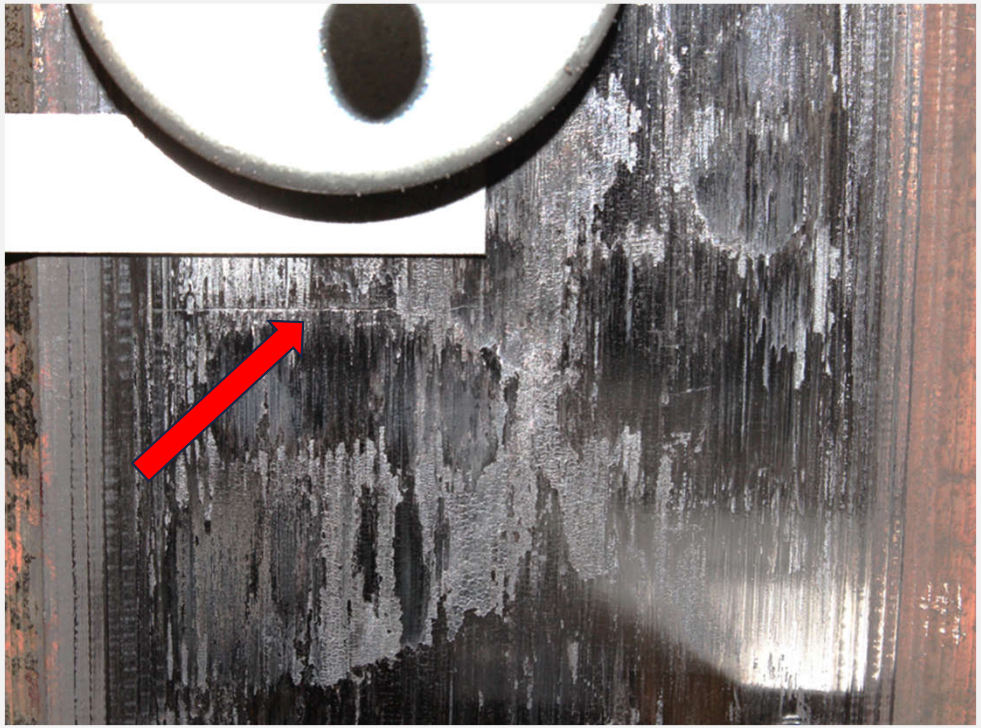
Example for single cracks on the wheel tread by visual inspection

Part II, chapter 1b. : Risk control measures 2026

Reference “single cracks on the wheel tread” (2/3)

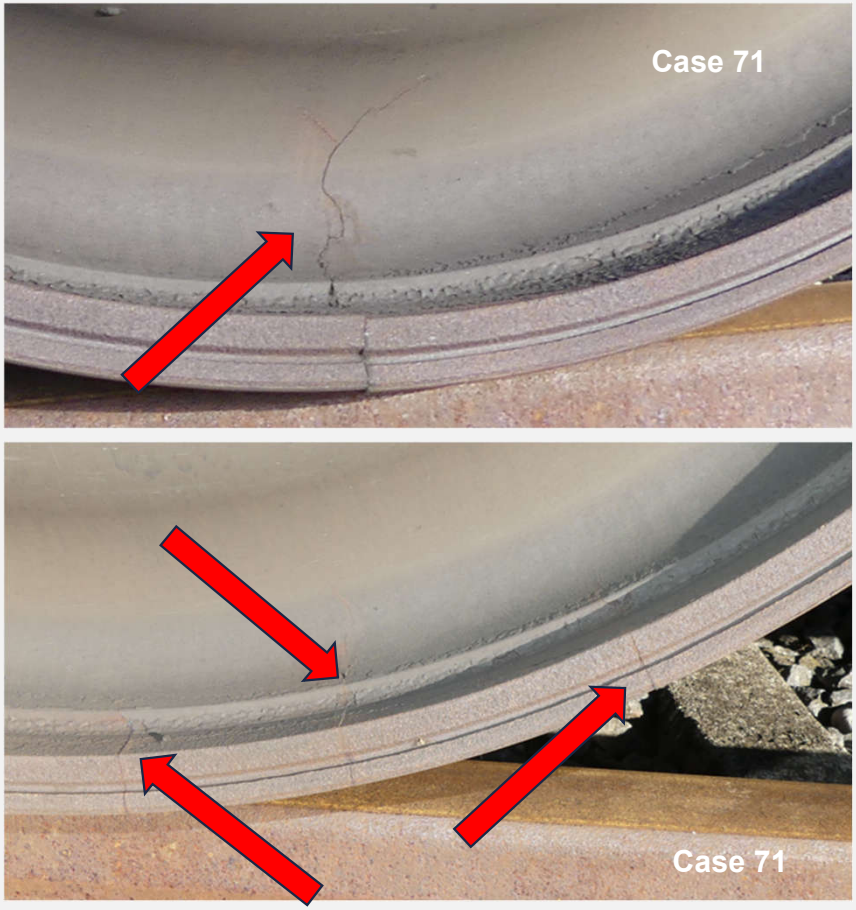
Part II, chapter 1b. : Risk control measures 2026

Reference “single cracks on the wheel tread” (3/3)



Part II, chapter 1b. : Risk control measures 2026

Reference “cracked rim/web” (1/2)



Part II, chapter 1b. : Risk control measures 2026

Reference “cracked rim/web” (2/2)

Part II, chapter 1b. : Risk control measures 2026

Hammer (sound) test of the wheels

Instructions:

- The hammer (sound) test shall be done by qualified staff;
- The hammer (sound) test shall be done with a metal hammer;
- The hammer (sound) test shall be done with fully released brakes;
- The hammer (sound) test shall be done at the outer side of the rim's circumfere in the following areas (see photo) expressed in terms of clock time:
  - between 1 and 5;
  - Between 7 and 11;

Interpretation of results:

- Wheel responds with a thud-like/damped sound: crack from the rim to the web (independently from the position of the cracks over the circumference);
  Important: defects on the tread (without cracks propagated to the web) cannot be detected;
- Wheel responds with a ringing sound: no cracks from rim to web (independently from the wheel type (web shape) and wheel diameter).

Part II

Chapter 1: Risk control measures

Part II, chapter 1c. : continuation of JNS work

Tasks

- Analyse if the measures are applicable to wheels of only 920mm
- Analyse criteria for the identification of wheel types comparable to BA 004, e.g.
  - Axle load,
  - Residual rim cross-section area in accordance with EN13979-1:2023,
  - Analysis of the case of BA 303 (case 75)
- Develop an EU-wide harmonized JNS risk control measure based on the Swiss measure #3 for wheel inspections
- Develop an updated wheel maintenance concept
- Identify changes in regulation and standards (e.g. EN 13979-1, EN 15313, ..)
- Define of research needs (e.g. more reliable in-service monitoring)
- Update the impact assessment
- Explore standardisation of the identification of wheel types during inspections
- Explore possible requirements for exchange of wheel information
- Explore harmonized levels of risk acceptability
- Analyse effectiveness and possible improvements of the hammer (sound) test
- Analyse the application of the concept of safety critical component (e.g. by analysing the outcome of application of Directive (EU) 2016/798 (the Railway Safety Directive) article 29, paragraph 3)
- Definition of thermal overload (colorisation)

Part II

Chapter 2: Changes to legislation and standards

Part II, chapter 2. : Changes to legislation and standards

Responsibilities and related liability of the actors

Outcome of a discussion in the JNS Task Force

Current situation:
The accident in the Gotthard tunnel in August 2023 resulted in an enormous damage to infrastructure and rolling stock and has caused severe operating restrictions on the important transit line between North and South Europe over a period of more than one year.
The accident was caused by a broken wheel which was probably triggered by a thermal overload several months before the accident.

In the current claims settlement, the responsibility lies probably with the Railway Undertaking of the accident journey, despite the fact that the defined JNS risk control measures are supposed to be applied by many other actors:

- Other Railway Undertakings;
- ECMs;
- NSAs and ECM Certification Bodies;
- Infrastructure Managers.

Recommendations:

- Representative Bodies or EU member states resp. EFTA member states should initiate a discussion to clarify responsibilities and liability of the different actors, in particular the Entity in Charge of Maintenance, with the European commission;
- Representative Bodies should consider to notify a JNS procedure to give guidance to railway undertakings regarding the correct involvement of third parties, in particular Entities in Charge of Maintenance, in their operational activities. Subsequently, the need for modifications to the legal framework shall be analysed and proposals for improvement shall be formulated, if any.

Part II

Chapter 3: Related non-JNS analyses

Content

Part II, chapter 3. : Related non-JNS analyses

JNS Normal Procedure “Consequences of unintended brake …”, Sector projects

The crack(s) in the wheel involved in the accident in the Gotthard base tunnel was probably initiated by a thermal overload that occurred a long time before the accident. Therefore, the Task Force members recommend..

- The concerned actors to implement the risk control measures aiming at reducing the number of fixed brakes and subsequently cases of thermal overload, as identified in the already concluded **JNS Normal Procedure “Consequences of unintended brake applications with LL blocks”** of March 2024 (https://www.era.europa.eu/system/files/2024-03/JNS%20NP%20LL%20brake%20blocks_Final%20report_v2.0.pdf);

- That the Task Force members closely follow the **Sector Project “Brake Blocks/Wheel Interaction”** and in case the outcome has an impact on the risk control measures, a new JNS procedure shall be notified;

- That the Task Force members closely follow the **UIC Project ‘NETWORK MONITOR’** that addresses track side Hot Axle Box Detection Systems and Hot Wheel Detection Systems and in case the outcome has an impact on the risk control measures, a new JNS procedure shall be notified.

Part II

Chapter 4: Impact assessment

Content

Part II, chapter 4. : Impact Assessment

Full Impact Assessment - options

- For this JNS procedure, a Full Impact Assessment (FIA) was carried out (building on the LIA accompanying the JNS 2024 report)
- The following options were considered:

  - **Option 0**: apply outcome of the JNS NP 2024 “Accident in the Gotthard base tunnel with focus on broken wheels” (“JNS 2025”);
  - **Option 1**: the situation where the Swiss measures put forward on 11 September and updated in October is implemented on a European level;
  - **Option 2**: the situation where the JNS 2024 measures are updated along with replacing the Swiss National rules (“JNS 2026”).
  - **It should be noted that for both Options 1 and 2 there would be variation over time (especially distinguishing between 2026 and 2027+)**

Part II, chapter 4. : Impact Assessment

Full Impact Assessment – main findings

- Impacts considered in analysis: costs of measures, external costs and safety gains associated with the different options;
- Option 2 is preferred to Option 1 on the basis of qualitative and quantitative assessment (quantitative assessment considers costs or cost-effectiveness);
- Questionnaire with 15 answers from TF members complemented with bilateral meetings provided insights about the extent to which risks are sufficiently controlled + lowest possible costs;
- Follow-up monitoring (similar to the consideration of 2024 in the JNS NP “Consequences of unintended brake applications with LL blocks”) could be relevant to analyse the implementation and JNS risk control measures and their effectiveness.
- Preliminary findings from survey on the effectiveness of RCMs associated with the JNS NP “Consequences of unintended brake applications with LL blocks” indicate the possibility for reduced risks for broken wheels (to be further considered) in the next steps in 2026

For more information, see the document “Full Impact Assessment JNS Normal Procedure “Accident in the Gotthard base tunnel with focus on broken wheels” – Follow-up from 2024 reporting” on the ERA website (https://www.era.europa.eu/domains/accident-incident/joint-network-secretariat-jns_en)

END OF REPORT