OTIF/RID/CE/GTDD/2016-A

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TO THE GOVERNMENTS OF THE MEMBER STATES OF OTIF AND TO REGIONAL ORGANISATIONS WHICH HAVE ACCEDED TO COTIF

Report of the 5th session of the RID Committee of Experts' working group on derailment detection

(Berne, 19 and 20 April 2016)

1. At the invitation of the OTIF Secretariat, the 5th session of the RID Committee of Experts' working group on derailment detection was held on 19 and 20 April 2016 in Berne.

2. The following States took part in the discussions at this session: Finland, France, Germany, Italy, the Netherlands, Romania, Switzerland, Turkey and the United Kingdom. The European Commission and the European Railway Agency (ERA) were also represented. The European Chemical Industry Council (CEFIC), the Community of European Railways (CER), the International Union of Railways (UIC), the International Union of Wagon Keepers (UIP) and the International Union of Combined Road-Rail Transport Companies (UIRR) also took part in the session (see Annex III).

3. Since the subject of derailment detection concerns, inter alia, vehicle-related provisions, the participants of OTIF's Committee of Technical Experts (CTE) had also been invited to this working group.

Chairman of the working group meeting

4. At the 2nd session of the working group, Mr François Le Fort (Switzerland) was elected to chair the working group until further notice.

ITEM 1: Adoption of the agenda

5. The working group adopted the provisional agenda contained in calling notice A 81-02/503.2016 dated 8 February 2016. It was decided to delete agenda item 3 (Benefits of mechanical derailment detectors).

6. As it had been decided at the last session of the working group no longer to pursue the mandatory introduction of mechanical derailment detectors, various participants did not think it was necessary to continue the discussion on mechanical derailment detectors. Other delegates were of the view that the working group should instead formulate requirements for electronic detection systems.

7. It was agreed that this session should focus on agenda item 6 (Preparation of a final report).

ITEM 2: Approval of the report of the 4th session

8. The working group approved the draft report of the 4th session (Paris, 16 and 17 December 2015) prepared and distributed by the Secretariat in document [OTIF/RID/CE/GTDD/2015-C] with the amendments to paragraphs 22, 23 and 27 proposed by the European Commission and the deletion of a sentence in paragraph 11 proposed orally by France.

ITEM 6: Preparation of a final report for the 54th session of the RID Committee of Experts (Berne, 25 May 2016) and the meeting of the Committee of Technical Experts (Berne, 7 and 8 June 2016)

<u>Next steps</u>

Document: OTIF/RID/CE/GTDD/2016/1 (Switzerland)

9. Bearing in mind the specifications established at the 4th session of the working group, in his document 2016/1 the representative of Switzerland proposed to include requirements for mechanical derailment detectors to be used on a voluntary basis in the Technical Specifications for Interoperability and to set out an overall timetable for the step by step introduction of derailment detection in order to give the industry a clear signal that in future, wagons will have to be equipped with derailment detectors and that electronic solutions should be developed quickly.

10. Various participants welcomed the mandatory introduction of electronic derailment detectors into RID in principle. However, some participants thought this approach was premature, because in view of the fact that electronic systems were not yet available, any text adopted now could no longer be applicable in the future. In addition, before a new derailment detection system was introduced on a mandatory basis, further detailed analyses should be available, particularly as regards the cost/benefit ratio. Other participants rejected any mandatory obligation, so as to give market players the freedom to choose between the safety measures available for preventing derailments and mitigating the consequences of derailments.

11. The working group did not think it was in a position to comment on proposal 3 (mandatory fitting of all freight wagons).

12. Some participants rejected proposal 2 (carriage of dangerous goods for which tank-wagons with derailment detectors are prescribed only in trains in which all wagons are fitted with derailment detectors), as such a provision would make the carriage of dangerous goods by rail considerably more difficult.

13. The representative of Switzerland reserved the right to submit his proposal, perhaps in a revised form, to the 6th session of the RID Committee of Experts' standing working group (Berne, 23 to 25 May 2016).

<u>Preparation of a final report</u>

Documents: OTIF/RID/CE/GTDD/2016/2 (ERA)
OTIF/RID/CE/GTDD/2016/3 (Chairman)

14. Based on document 2016/2 submitted by the European Railway Agency (ERA), the working group had an in-depth discussion on the working group's final report to be submitted to the 54th session of the RID Committee of Experts (Berne, 25 May 2016) and to the Committee of Technical Experts' meeting (Berne, 7 and 8 June 2016).

15. The working group adopted a number of corrections and additions to the draft final report prepared by ERA. The comments set out in the Chairman's document 2016/3 were also taken into account. The final report adopted by the working group is attached to this report as Annex II. Those parts of the text that have been amended or added are highlighted in red.

Closure of the session

16. It was agreed that this report would be sent to all the working group participants for their information and that it would be submitted to the next session of the RID Committee of Experts' standing working group. The Chairman was asked to present the report at that session.

17. Following the decision no longer to pursue the mandatory introduction of mechanical derailment detectors, the questions the working group had formulated at its previous meetings relating to the mechanical derailment detector and possible alternatives that are already recognised were not concluded. Nevertheless, the working group thought it would be useful to submit this list, which is contained in Annex I, to the RID Committee of Experts' standing working group.

18. The Chairman summarised those questions that the working group had not been able to deal with in more depth:

– Derailments in tunnels,
– Automatic braking by the detector versus alarm in the driver's cab,
– Investigation of the false alarms that occur in Switzerland once or twice a year.

19. The Chairman thanked participants for their constructive cooperation. The working group thanked the Chairman for his commitment and very good conduct of the discussions.

Annex I

Questions relating to the mechanical derailment detector and possible alternatives that are already identifiable

A. Cost/benefit

Cost/benefit analysis of the installation, use and maintenance of mandatory derailment detectors

I Costs: Installation, use and maintenance of mechanical derailment detectors

Procurement costs:	€ 1 200 per wagon for small production volumes and € 1 000 for higher production volumes (information from Knorr-Bremse)
Installation costs:	maximum € 800 per wagon (information from Knorr-Bremse)
Maintenance costs:	€ 300 per derailment detector every 8 years (UIP document 2015/4)
Costs of suitability tests:	€ 10 000 per wagon design type (document 2015/3 from the United Kingdom); however, not every wagon design type has to be assessed separately (Knorr-Bremse)

II. Expected benefits

- fewer fatalities and injuries
- less track damage
- fewer wagons to be repaired or replaced
- less disruption to operations (or potential line closures)
- less environmental damage

III. Who pays vs who has the benefits – readiness to pay of the relevant actors

The working group agreed that in future discussions, no account should be taken of the fact that one actor bears the costs, but that it is other actors who mainly benefit (see paragraphs 11 and 12 of document 2015/5).

Related questions:

10. What are the costs of DDD (apparatus, installation, maintenance, overhaul)? Distinguish between the current price and the price expected in future.

B. Technical and railway operation aspects

to identify and analyse the progress made by DDD in terms of operation and safety since September 2009 (date of the previous agreement between EU RISC and TDG committees), including the impact on automatic braking of the train, the probability of a false alarm, its use in winter conditions

I. Automatic breaking vs decision by locomotive driver
II. Reaction to derailment in tunnels
III. Use in winter conditions
IV. False alarms: probability, consequences

Related questions:

1. What are the advantages/disadvantages of derailment detection?

2. When fitted to all dangerous goods wagons or to a particular type of dangerous goods wagon, to what extent is the derailment detector capable of preventing those effects of a derailment which may lead to the leakage of dangerous goods?

3. What is the benefit of fitting a DDD to some or all wagons in a train?

6. Are there any developments in rail transport (e.g. new brake blocks) which might raise new questions on operating safety?

   Note: Information by the safety authorities on the implementation of the technical measures recommended by DNV.

1. What are the advantages/disadvantages of automatic breaking (e.g. rapid reaction; (no) over-riding of emergency stop; (no) decision made by the driver)?

5. How reliable are the DDDs currently available on the market in terms of detection (false alarm, no alarm, low temperature conditions)?

6. How is the definition of false alarm to be understood in this context?

7. What are the problems caused by false alarms?

8. How many DDD manufacturers are there?

9. How could the number of system types available be increased?

11. How does automatic braking influence the behaviour of the train (e.g. uncoupling)?

12. What are the experiences with DDD already in use for transport?

C. Legal aspects, authorisation process

<u>to analyse the impact of imposing mandatory DDD within the authorisation process of railway rolling stock within EU/OTIF countries</u>

I. Impact of imposing mandatory DDD within the authorisation process of railway rolling stock within EU/OTIF countries

Related questions:

2. Is there a legal problem with automatic braking in view of the TSI on tunnel safety?

3. Is a standard available for the functionalities and performance of DDD?

4. How is it assessed whether a type of DDD is suitable to be fitted to wagons?

D. Alternative measures

to list the alternative measures to the mandatory use of the DDD and their effectiveness (including preventive measures)and evaluate their advantages/disadvantages in terms of cost and safety in comparison with the DDD

I. Alternative measures
II. Advantages/disadvantages

Related questions:

1. Which detection arrangements, apart from DDD, can be identified? (e.g. electronic detectors without/with cable along the train) (e.g. electronic detectors with/without cable along the train)

2. What are the advantages and disadvantages of these alternatives?

E. Miscellaneous

4. Are there any findings to demonstrate that safety measures relating to derailment detection are no longer necessary

   a) in general,

   b) in the context of dangerous goods only?

5. Must it be assumed that derailments will continue to happen in future and must therefore be taken into account in the transport of dangerous goods?

   Replies:

   Since 2009, the number of derailments has decreased due to various safety measures (figures needed). Derailments happen. Although the DDD will not prevent a primary derailment from occurring, it can mitigate the consequences of a derailment. The continued movement of derailed wagons along the track will lead to damage to the infrastructure and rolling stock and can lead to the overturning of wagons and leakage from tanks.

Annex II

<u>Draft final report of the RID Committee of Experts' working group on derailment detection</u>

Background

1. Since the RID Committee of Experts on the carriage of dangerous goods by rail proposed to include a provision concerning the detection of derailments, many discussions and contextual developments have brought new perspectives to this topic.

2. In particular, a lot of new information (referenced in footnotes) had to be considered in order to define a potential solution for the sustainable and efficient implementation of this new safety function – derailment detection – within the railway freight transport system.

3. Taking into account these developments, a few major decisions were taken, in particular:

   – in the 2013 edition of RID, it was clarified in section 7.1.1 that the voluntary use of derailment detectors was allowed on condition that the applicable legal framework on authorisation for placing into service of these vehicles was complied with, and

   – in May 2014 the EU Council indicated that[1] "*… the European Railway Agency, in cooperation with the relevant bodies, (should) continue to work on the identification of a sustainable solution to detect derailments and mitigate their effects, including the future implementation of this solution*".

4. As a milestone, this report suggests a possible sustainable way forward, taking into account the information collected since 2009 and the progress made in the recent discussions held within the RID working group on derailment detection.

Main conclusions from the discussions held within the RID Committee of Experts' working group on derailment detection

5. Following a proposal by the European Commission[2] the RID working group on derailment detection organised its discussion around the following items:

   – the progress made in the field of derailment detection in terms of operation and safety since September 2009 (date of the last agreement between the EU RISC and TDG committees on derailment detection), including the impact on automatic braking of the train, the probability of false alarms, use in winter conditions,

   – the cost and benefits of the installation, use and maintenance of mandatory derailment detectors,

   – the impact of imposing mandatory derailment detection within the authorisation process for railway rolling stock within EU/OTIF countries,

   – alternative measures to the mandatory use of derailment detectors and their effectiveness (including preventive measures) and evaluation of their advantages/disadvantages in terms of cost and safety in comparison with the derailment detectors.

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[1] EU Council, Decision 2014/327/EU of 6 May 2014.

[2] European Commission – *Next steps of the working group*, OTIF/RID/CE/GTDD/2015/1, 2015.

6. The most relevant conclusions of the discussions that might have a major influence on the preparation of a sustainable solution are summarised below. These findings should serve as a basis for the preparation of a decision on the way forward.

With regard to the safe operation and interoperability of vehicles equipped with detectors
(Braking effort within the train composition, authorisation for placing into service of equipped vehicles)

7. After the analysis of the most recent scientific results available on the longitudinal train dynamics under braking situations[3], and as already noted in the Det Norske Veritas Report[4], the working group noted that, **compared to braking initiated from the front of the train, automatic braking activated by mechanical detectors may lead to increased compressive forces. The extent of the compressive forces depends on the configuration of the train composition and operational parameters such as the brake mode. The risk related to increased compressive forces as a consequence of false alarms has not been quantified.**

8. It was noted that false alarms[5] of mechanical detectors occurred around 1 to 2 times per year for the fleet equipped in Switzerland – around 1000 wagons. The false alarms in Switzerland have not led to incidents during the twenty years of operation, which may be the result of the way trains are operated.

9. Studies suggest that false alarms have the potential to lead to increased compressive forces and associated operational risks. The group therefore concluded that it **was necessary to harmonise requirements** to **ensure the safe and interoperable operation of freight trains equipped with this technology.** This would help clarify the application of the first paragraph of the Note under RID 7.1.1.

10. The working group agreed that **such harmonised requirements should be developed by the European Railway Agency in the form of Technical Specifications for Interoperability** and should be transposed into the relevant COTIF Appendices (APTU/ATMF) in the form of Uniform Technical Prescriptions.

11. Meanwhile, the working group noted that **the voluntary use of the currently available technology continues to be allowed**, as already mentioned in RID 7.1.1, that **the railway undertakings were responsible for controlling any associated operating risks** and that the process for authorising vehicles to be placed into service[6,7], including the use of the Common Safety Method on Evaluation and Risk[8,9], is applicable within the European Union and that equivalent Uniform Technical Prescriptions[10,11], are also applicable within the COTIF region.

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[3] Dr Daniel Bing, Derailment detection in rail freight transport – Analysis of influences on longitudinal train dynamics, ISBN: 978-3-87154-520-7, October 2014.

[4] Det Norske Veritas Ltd, Assessment of freight train derailment risk reduction measures – Report B3 – Top ten ranking of safety measures, BA000777/08, 2011.

[5] The term "false alarm" is used to refer to the activation of the brake system by a derailment detection device which is not the result of a derailment.

[6] Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community.

[7] European Commission Recommendation of 5 December 2014 on matters related to the placing in service and use of structural subsystems and vehicles under Directives 2008/57/EC and 2004/49/EC of the European Parliament and of the Council.

[8] European Commission Implementing Regulation (EU) 2013/402 of 30 April 2013 on the common safety method for risk evaluation and assessment.

12. In addition it was clarified that **implementation of UIC leaflet 541-08** *"Brakes – Regulations concerning the manufacture of the different brake parts – Derailment detectors for wagons"* **is not sufficient to comply with the requirements of the applicable legal framework** concerning risk assessments and authorisation for placing into service.

With regard to the cost-effective and sustainable development of derailment detection
(Alternative measures, technical and scientific progress, implementation of innovations)

13. The review of the costs relating to the use of mechanical detectors available on the market today confirmed the assumptions set out in the relevant reports[12,13,14], although potential additional costs linked to the safe integration of this new device into the railway system were identified. **These extra potential costs may strengthen the conclusions of these reports, which already assessed that this technology** has a **lower cost-benefit ranking** compared to other more efficient measures to reduce the risks of freight train derailments.

14. In support of this view, both Dr Bing's dissertation and the EU's D-Rail research project[15,16,17] give clear indications that electronic solutions would be feasible and more efficient. It seems that this finding is sustainable, as the entire digitalisation of railway freight transport has started and should develop quickly, offering a favourable context for the use of new electronic safety devices. As a consequence, **it is likely that electronic derailment detection solutions, which were not practicable in the past, will become cost-effective solutions in the near future**.

    It was noted that equipping the entire fleet of freight wagons with electronic derailment detectors would have the greatest benefit in terms of safety.

15. UNIFE confirmed that **prototypes of electronic detectors have already been developed** and in view of the overall context and objectives of Shift2Rail[18], **indicated that if the Shift2Rail framework could facilitate further developments of electronic prototypes, new products may be available within 6 to 8 years**.

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[9] European Commission Implementing Regulation (EU) 2015/1136 of 13 July 2015 amending Implementing Regulation (EU) No 402/2013 on the common safety method for risk evaluation and assessment (Text with EEA relevance).

[10] COTIF Appendix F – APTU, UTP GEN-G – Common Safety Method (CSM) on Risk Evaluation and Assessment (RA), 12 June 2013.

[11] COTIF Appendix G – ATMF, Uniform Rules concerning the Technical Admission of Railway Material used in International Traffic.

[12] European Railway Agency, Impact Assessment on the use of Derailment Detection Devices in the EU Railway System, ERA/REP/03-2009/SAF, 2009.

[13] Det Norske Veritas Ltd, Assessment of freight train derailment risk reduction measures – Report B3 – Top ten ranking of safety measures, BA000777/08, 2011.

[14] European Railway Agency, Prevention and mitigation of freight train derailments at short and medium terms, ERA/REP/02-2012/SAF, 2012.

[15] D-Rail, Research project of the EU 7th framework programme - Grant Agreement n°285162 WP 5.2 – Outline system requirements specification for pan European freight monitoring, 2014.

[16] D-Rail, Research project of the EU 7th framework programme - Grant Agreement n°285162, WP 7.2 – RAMS analysis and recommendation (technical focus), 2014.

[17] D-Rail, Research project of the EU 7th framework programme - Grant Agreement n°285162, WP 7.3 - LCC analysis and recommendation (economic focus), 2014.

[18] Shift2Rail Joint Undertaking - Multi-Annual Action Plan - Brussels, November 2015.

16. It was noted that **electronic detection technology has already been integrated successfully into passenger train services**.

17. In line with the findings of D-Rail and Dr Bing's conclusions, the working group also considered that **the use of telematics in railway freight transport would offer a new environment for using many types of electronic sensors, which would also enable "prevention alarms",** thus providing more flexible and safer operation of freight trains and potentially improving the cost/benefit ratio.

18. In view of all these new aspects of the discussion, the working group considered that **in order to maintain a favourable economic context for the development of electronic technologies, mechanical detectors should not be mandatory**.

Proposed way forward

19. In line with the findings of the RID working group on derailment detection and in view of the overall objectives of the European Union's White Paper on Transport of 2011 and of the Joint Undertaking initiative Shift2Rail, the following recommendations are submitted to the RID Committee of Experts on the carriage of dangerous goods by rail:

    – the use of mechanical detection technologies should remain voluntary, so there would be no need to amend RID, and in particular the existing note in 7.1.1,

    – railway undertakings and Railway Safety Authorities should take particular care in using mechanical detectors safely, in line with the legislation in force, and it is advisable to check the operating rules in place, notably in the light of admissible compression forces, when using this type of detector,

    – while the safe use of derailment detectors will remain under the responsibility of railway undertakings, harmonised Technical Specifications should be developed to ensure the interoperable use of these systems and to prevent the associated safety risks,

    – such Technical Specifications should cover both types of detectors: 1) those that actuate the brakes within the train composition (after a derailment), 2) those that report an alarm in the driver's cab (either before or after a derailment),

    – these Technical Specifications should be developed by the European Railway Agency. It is important that the European Railway Agency considers the following:

        – technical provisions of UIC leaflet 541-08,

        – requirements for the safe operation of wagons equipped with mechanical derailment detectors,

        – requirements concerning the railway personnel involved,

        – requirements for clear communication concerning the presence of a derailment detector on a train,

        – other provisions, such as those in the General Contract of Use (GCU),

    – the OTIF Secretariat will be involved in the development of these specifications by the European Railway Agency in accordance with the Administrative Arrangements between ERA, DG MOVE and OTIF of October 2013.

    – The European Railway Agency is also requested to invite experts in the field of the transport of dangerous goods from the RID Contracting States to its working groups.

- As the development, adoption and entry into force of such technical specifications will take some time, the European Railway Agency is requested to issue, as soon as possible, guidelines or best practices that may help the sector deal with derailment detection devices until the new technical specifications become available.

- The European Railway Agency is also invited to draft a timetable for the implementation of the derailment detection system.

- The development of electronic technologies based on the genuine reporting of alarms needs to be encouraged, as all aspects of them are clearly promising. As these technologies are considered very positively by all the parties that have taken part in the discussions, prototype electronic detectors should be developed further, including demonstrators.

- To maximise the cost-effectiveness of electronic detectors, a train condition monitoring function should also be integrated, which should be able to report different levels of alarms before a derailment occurs, thus allowing derailments to be prevented in addition to detecting them.

- Opportunities to develop such demonstrators in the framework of Shift2Rail should be checked by the European Commission services.

20. These strategic orientations should give all interested parties a clear indication of the anticipated further development of derailment detection and alarm reporting functions in freight trains.

21. **If the RID Committee of Experts were to adopt the above recommendations**, the anticipated sequence of actions for the European Commission, the European Railway Agency and the Committee of Technical Experts would be as follows:

- the Committee of Technical Experts and the European Commission are invited to support these lines of action;

- the European Commission should be invited to adopt a delegated act in 2016/2017 asking the European Railway Agency to prepare the relevant Technical Specifications related to both types of derailment detection;

- the European Railway Agency should develop these specifications in 2017/2018 and issue its recommendation to the European Commission in July 2018;

- the European Railway Agency should report regularly on the progress of its work to the RID Committee of Experts and the Committee of Technical Experts;

- the European Commission should adopt revised Technical Specifications in the form of an executive act in 2019 and the OTIF Committee of Technical Experts should adopt equivalent provisions in the form of Uniform Technical Prescriptions.

Annex III

Liste des participants
Teilnehmerliste
List of participants

I. Gouvernements/Regierungen/Governments

Allemagne/Deutschland/Germany

Mr H. **Rein**
Mr A. **Hoffmann**

Belgique/Belgien/Belgium

Ms C. **Bailleux**

Finlande/Finnland/Finland

Mr J. **Karhunen**

France/Frankreich/France

Mr C. **Pfauvadel**
Mr M. **Korhel**
Mr C. **Gassa**

Italie/Italien/Italy

Mr B. **Legittimo**
Mr R. **Cammarata**

Pays-Bas/Niederlande/Netherlands

Mr H. **Langenberg**
Ms C. **Puts**

Roumanie/Rumänien/Romania

Mr A.G. **Badea**
Mr P. **Bogdan**

Royaume-Uni/Vereinigtes Königreich/United Kingdom

Mr A. **Bale**

Suisse/Schweiz/Switzerland

Mr C. **Bonnet**
Mr B. **Gutzwiller**
Mr F. **Le Fort**

Turquie/Türkei/Turkey

Mr T. **Iyiiş**

II. Organisations internationales gouvernementales/ Internationale Regierungsorganisationen/ International governmental organisations

Commission européenne/Europäische Kommission/European Commission

Mr P. **Grillo**

Agence ferroviaire européenne/Europäische Eisenbahn-Agentur/European Railway Agency (ERA)

Mr E. **Ruffin**

III. Organisations internationales non gouvernementales Internationale Nichtregierungsorganisationen International non-governmental organisations

CEFIC

Mr T. **Klein**

CER

Mr J. B. **Simmonet**

UIC

Mr J.-G. **Heintz**

UIP

Mr Stefan **Franke**

UIRR

Mr O. **Zanini**

IV. Secrétariat/Sekretariat/Secretariat

Mr J. **Conrad**
Mr B. **Leermakers**

V. Interprètes/Dolmetscher/Interpreters

Mr W. **Küpper**
Mr D. **Ashman**