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## RECOMMENDATION FOR USE

### NB-RAIL COORDINATION GROUP

Administrative Decision according to Interoperability Directive  
(EU) 2016/797 art. 30.6



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**RFU-RST-306**

Issue 01

Date 23/06/2020

#### TITLE

REQUIRED FATIGUE LIFE WITH CUMULATIVE DAMAGE APPROACH

#### ORIGINATOR

TÜV SÜD NEDERLAND B.V.

#### SUBJECT RELATED TO

- Directives (EU) 2016/797 and 2008/57/EC
- TSI LOC&PAS (Commission Regulation (EU) No 1302/2014, amended by Reg. (EU) 2019/776), section 4.2.2.2.2 and 4.2.2.4

AMENDMENT RECORD:

18-03-2020 Creation

#### DESCRIPTION AND BACKGROUND EXPLANATION

The aim of this question is:

- A) To clarify if TSI LOC&PAS and its mandatory standards require for structural components (except those subject to wear and/or ageing), e.g. the inner coupling of articulated units, any minimum fatigue life, and if yes,
- B) To clarify if TSI LOC&PAS and its mandatory standards require for structural components (except those subject to wear), e.g. the inner coupling of articulated units, a minimum fatigue life longer or equal to the vehicle service life;
- C) To clarify if TSI LOC&PAS and its mandatory standards allow that structural components other than those which are subject to wear and/or ageing, e.g. the inner coupling of articulated units, are designed to be renewed (replaced) during vehicle service life.

#### **Background:**

TSI LOC&PAS and its mandatory standards offer the possibility to either prove fatigue strength by infinite life approach or by cumulative damage approach. In case the cumulative damage approach is taken, the required fatigue life is a required input.

For components subject to wear and/or ageing (like wheels, bearings, rubber parts, ...) it is common practice that they have a shorter lifetime than the vehicle and are monitored and replaced at regular intervals during maintenance. For other components, it is not common to replace them during maintenance.

Neither the TSI nor the mandatory standard EN 12663-1:2010 + A1:2014 define a fixed design life (like "30 years").

- For the strength of vehicle structure, TSI LOC&PAS 4.2.2.4, the "relevant clause(s)" of EN 12663-1:2010 + A1:2014 are mandatory points, plus section 5.2



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(rolling stock categories), 9.2 (method of verification), 6.1-6.5 (alternative requirements for OTMs);

- For the inner coupling for articulated units, TSI LOC&PAS 4.2.2.2, the mandatory points of EN 12663-1:2010 + A1:2014 are 6.5.3 (static loads) and 6.7.5 (fatigue loads). Point 6.7.5 of EN12663-1 further refers to points 6.6 and 6.8 that relate to fatigue calculation.

Please note the following:

Generally, if the TSI refers to specific sections of an EN standard, those are the mandatory sections; what happens several times is the fact that specific sections in an EN standard refers to others and so on. In other words, if in a specific point conditions related to another point are mentioned, it means that those conditions are part of the referred specific point; e.g.: a certain TSI requirement is limited to the section 3 of the EN A; however in section 3 of the EN A it is requested to apply the section 2 of that EN A, then sections 2 and 3 of the EN A are mandatory; even if in the TSI is only referred section 3.

In EN 12663-1:2010 + A1:2014 section 5.6.2.2 the cumulative damage approach is described:

*"[...] the cumulative damage at such details, as determined from stress cycles measured during tests (as defined in 8.3 c)) shall remain below unity when the duration is extrapolated to represent the full vehicle life."*

For some load cases, EN 12663-1:2010 + A1:2014 specifies  $10^7$  load cycles for the load assumptions given in the tables of the standard to be used with cumulative damage approach.

#### RFU PROPOSAL

TSI LOC&PAS and its mandatory standards do not require for structural components (except those subject to wear and/or ageing), e.g. the inner coupling of articulated units, any minimum fatigue life.

Especially, TSI LOC&PAS and its mandatory standards do not require for the aforementioned components, a minimum fatigue life longer or equal to the vehicle service life.

TSI LOC&PAS and its mandatory standards allow that structural components (including those which are subject to wear and/or ageing), e.g. the inner coupling of articulated units, are designed to be renewed (replaced) during vehicle service life. (NB: In these cases, the NoBo will have to verify that the defined lifetime is listed in the technical documentation / maintenance documentation)

#### THIS RFU WAS AGREED ON

PLENARY MEETING 059

#### THIS RFU ENTERS INTO FORCE ON

23/06/2020 (DATE OF PUBLICATION)



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FROM THIS DATE ON THIS RFU CAN BE APPLIED INSTEAD OF THE PREVIOUS MANDATORY VERSION.

#### RFU APPLICATION IS MANDATORY STARTING FROM

01/08/2020

AT THIS DATE ANY PREVIOUS VERSIONS OF THIS RFU WILL BE WITHDRAWN.

RFUS SHALL BE APPLIED BY ALL NOBOS. PLEASE REFER TO RFU-STR-702, CHAPTER 3 OF THE SECTION "DESCRIPTION AND BACKGROUND EXPLANATION", FOR THE LEGAL BASIS SUPPORTING THIS OBLIGATION.

#### ERA COMMENTS

PLE 059 – 17/06/2020: NO COMMENTS