APTU Uniform Rules (Appendix F to COTIF 1999)

Uniform Technical Prescriptions (UTP) applicable to Rolling Stock, subsystem

FREIGHT WAGONS - (UTP WAG) - ANNEX CC

STRUCTURE AND MECHANICAL PARTS

SOURCES OF FATIGUE LOADING

Explanatory note:

The texts of this UTP which appear across two columns are identical to corresponding texts of the European Union regulations. Texts which appear in two columns differ; the left-hand column contains the UTP regulations, the right-hand column shows the text in the corresponding EU regulations. The text in the right-hand column is for information only and is not part of the OTIF regulations.

OTIF UTP	*Corresponding text in EU regulations* [1]	*EU ref.* [2]

CC.1 PAYLOAD SPECTRUM

CC.1.1 GENERAL

Changes in payload are likely to cause significant fatigue load cycles. Where the payload changes significantly, the time spent at each load level shall be determined. Load/unload cycles should also be determined from the operator's specified duty and represented in a suitable manner for analysis purposes. Where applicable, account shall be taken of changes to the distribution of the payload and to the local pressure loads due to wheeled vehicles moving over the floor of the wagon.

CC.1.2 TRACK INDUCED LOADING

Induced load cycles resulting from vertical, lateral and twist irregularities of the track shall be taken into account. These load cycles may be determined from:

a) dynamic modelling;

b) measured data;

c) empirical data.

It is permissible to base fatigue design on load case data and assessment methods proven in the application where this exist.

Tables 15 and 16 of EN12663 give empirical data, in the form of wagon body accelerations consistent with normal European operations suitable for an endurance limit approach to fatigue design when normal established data is available.

CC.1.3 TRACTION AND BRAKING

Load cycles due to traction and braking shall reflect the number of start-stops (including

[1] TSI Freight Wagons – The Annex to the Commission Decision 2006/861/EC published in the EU Official Journal L344 on 08.12.2006 as amended by Commission Decision 2009/107/EC published in EU Official Journal L45 on 14.02.2009.

[2] If no EU reference is indicated, it means that the chapter/section number is the same as in the OTIF text.

unscheduled ones) associated with the intended mode of operation.

CC.1.4 AERODYNAMIC LOADING

Significant aerodynamic load input may arise due to:

a) trains passing at speed;

b) tunnel operation;

c) cross winds.

If such loading generates significant cyclic stresses in the structure it shall be included in the fatigue assessment.

CC.1.5 FATIGUE LOADS AT INTERFACES

The dynamic load used in design shall be in a range of +/- 30 % of the vertical static load.

If this assumption is not chosen, then the following method shall be followed:

The main fatigue loads at the body-bogie connection are due to:

a) load/unload cycles;

b) track input;

c) traction and braking.

The interface shall be designed to carry the cyclic loads due these inputs.

Equipment attachments shall withstand the cyclic loads due to the motion of the wagon and any loads induced by the operation of the equipment. The accelerations may be determined as described above. For normal European operations, empirically derived accelerations for items of equipment that follow the motion of the wagon structure are given in tables 17, 18 and 19 of EN12663 and can be used where no more appropriate data is available.

Cyclic loads in coupling components shall be taken into account if the experience of the operator or designer indicates they are significant.