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APTU Uniform Rules (Appendix F to COTIF 1999)

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

**FREIGHT WAGONS - (UTP WAG) - ANNEX ZZ**

**STRUCTURES AND MECHANICAL PARTS**

**PERMISSIBLE STRESS BASED ON ELONGATION CRITERIA**

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Explanatory note:

The texts of this UTP which appear without columns are identical with corresponding texts of the European Community regulations. Texts which appear in two columns differ; left-hand column contains the UTP regulations, right-hand column shows the text in the corresponding EC regulations. The text in the right hand column is for information only and not part of the OTIF regulations.

OTIF UTP

| Corresponding text in EC regulations <sup>1</sup>

EC ref. <sup>2</sup>

## ZZ.1 STRUCTURAL STEELS

For structural steels, the margin of safety represented by factor  $S_2$  in clause 3.4.3 of EN12663:2000 can be determined from the material elongation at failure. The table below gives a reduced value for  $S_2$  and acceptable criteria using this approach that have been proven in service.

	Material Property		Permissible stress
		Factor $S_2$	
Parent Metal	$R < 0,8 R_m$	$S_2 \geq 1,25$	$\sigma_c \leq R$
	$R > 0,8 R_m; A > 10 \%$	$S_2 < 1,25$	$\sigma_c \leq R$
	$R > 0,8 R_m; A < 10 \%$	$S_2 \geq 1,25$	$\sigma_c \leq \frac{R_m}{1,25}$
Weld Metal	$R < 0,8 R_m$	$S_2 \geq 1,25$	$\sigma_c \leq \frac{R}{1,1}$
	$R > 0,8 R_m; A > 10 \%$	$S_2 < 1,25$	$\sigma_c \leq \frac{R}{1,1}$
	$R > 0,8 R_m; A < 10 \%$	$S_2 \geq 1,25$	$\sigma_c \leq \frac{R_m}{1,375}$

## ZZ.2 OTHER STRUCTURAL MATERIALS

For other structural materials, the permissible stress shall be the lower value of the material yield (or proof stress) and the material ultimate stress divided by factor  $S_2$  as defined in clause 3.4.3 of EN12663.  $S_2$  shall be taken as 1,5 unless the criteria given in the Euronorm permit a lower value.

<sup>1</sup> 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.

<sup>2</sup> If no EC reference is indicated, it means that the chapter/section number is the same as in the OTIF text.