

BLUE_TS_WLD_01

Technical Specification

STEEL AND ALUMINIUM ROLLING STOCK STRUCTURE WELDING

02	04/09/2017	Revision	M.Rapello	M.Borlo	M.Gorlani
01	27/10/2011	Base Release	M.Rapello	M.Borlo	M.Gorlani
REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED




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1 SCOPE AND APPLICABILITY

The scope of this document is to supply guidelines about design and construction of steel and aluminium welded structures for rolling stock.

Present Technical Specification is of general application for manufacturing steel and aluminium welded structures and assemblies.

It is not intended to cover specific requirements that could be requested by a particular product or purchasing order.

The specific product requirements shall be managed with dedicated documents: drawings, technical specification, manufacturing specification, etc.

This is valid also if the requirements from the Customer are the same but more stringent than those mentioned here.

In any case, at the project start phase, a technical review for requirements verification shall be performed.

In the case of welded structures (complete assembly or partial sub-assemblies) produced by an external supplier, this supplier shall meet the requirements of the present Specification:

2 APPLICABLE STANDARDS

Welding process shall be performed according to following listed standards.

EN 15085 - 1	Railway applications. Welding of railway vehicles and components. General
EN 15085 - 2	Railway applications. Welding of railway vehicles and components. Quality requirements and certification of welding manufacturer
EN 15085 - 3	Railway applications. Welding of railway vehicles and components. Design requirements
EN 15085 - 4	Railway applications. Welding of railway vehicles and components. Production requirements
EN 15085 - 5	Railway applications. Welding of railway vehicles and components. Inspection, testing and documentation
ISO 14731:2006	Welding coordination -- Tasks and responsibilities

Table 1 – Applicable standards



3 DESIGN

Welding joints design shall be performed in accordance to the norm EN 15085-3. In particular the following process shall be followed by the design and verification team.

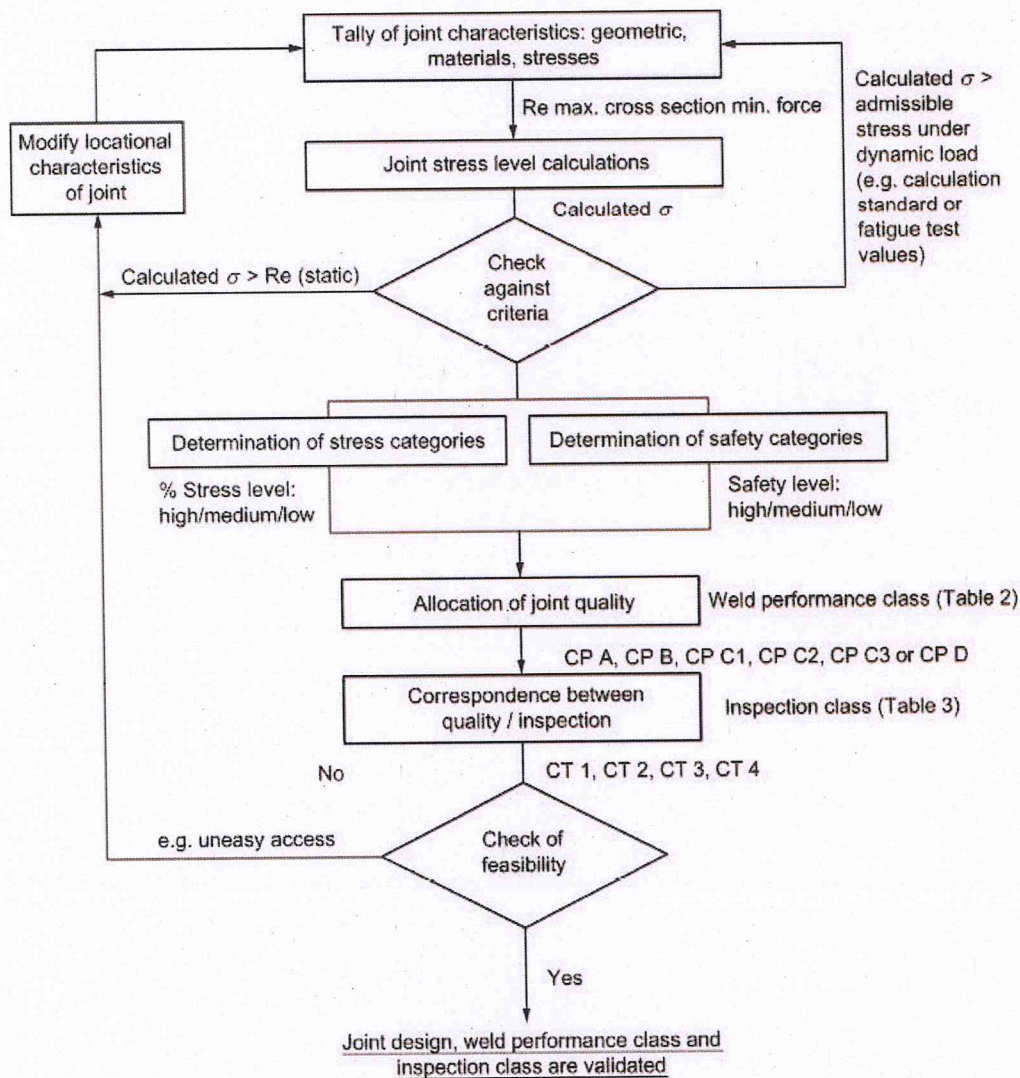


Table 2 – Welded joint validation chart (Extract from EN 15085-3)

The admissible stress (static and dynamic) shall be defined at project level.

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4 PRODUCTION, INSPECTION, TESTING

The manufacturer of welded structures shall be certified in accordance to the norm EN 15085-2.

Welded structures (complete assembly or partial sub-assemblies) production, inspection, testing and documentation shall be performed in accordance to the norms EN 15085-4 and EN 15085-5.

5 SPECIFIC REQUIREMENTS CARBON STEEL STRUCTURE

5.1 POST WELD HEAT TREATMENT

If the drawing requires the execution of the stress-relieving treatment after the welding process, the structures shall be subjected to the following heat treatment in an oven:

- initial temperature: 200 °C max
- heating to 590 ± 15 °C, with heat increment gradient of between 60 and 150 °C/h
- stay at a temperature of 590 ± 15 °C for a period of at least 1 h and not longer than 3 h
- cooling to 200 °C, with a heat gradient not to exceed 120 °C/h
- continuation of the cooling process in still air

Any different stress-relieving cycles shall be expressly indicated in the construction drawings of the structures.

The necessary venting holes shall be represented in the drawings.

5.2 CALIBRATION

Plastic deformation interventions on the welded structures should be avoided as far as possible, but could be admitted if they were indispensable (e.g. size and shape corrections, ...).

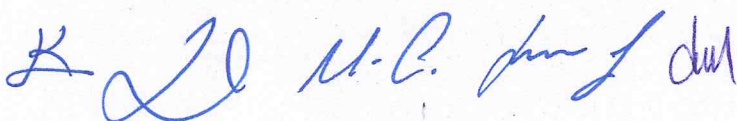
However, such interventions must be performed with the following precautions:


- for cold deformation processes: the strictly necessary load-effect shall be applied in a gradual manner, so as to prevent the occurrence of a permanent elongation of over 4% in any zone of the structure.
- for heat deformation processes: it is necessary to resort solely to heat expansion and shrinkage processes; the max tolerated heat temperature depends on the parent material.

For example: S355J2, normalized steel:

- heat point, heat line: $T \leq 800$ °C
- all other heat figures: $T \leq 700$ °C

It is forbidden to operate with hammer blows or sudden load-effects.



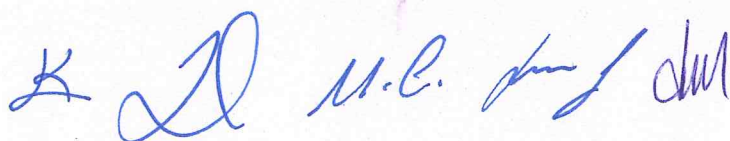
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6 WELDING COORDINATOR

Welding coordinator shall be in accordance to EN ISO 14731 and EN 15085-2 chapter 5.1.2

Tasks and areas of competence of the welding coordinator		Welding coordinator		
Related clause from EN ISO14731 Annex B	Tasks and areas of competence for rail vehicle building	Level A	Level B	Level C
B.1 Review of requirements	-product standard to be used, together with any supplementary requirements.	X	(X)	(X)
B.2 Technical Review	- parent material(s) specification and welded joints properties.	X	(X)	(X)
	- joints location with relation to the design requirements	X	X	(X)
	-requirements for weld performance class	X	(X)	(X)
	-location accessibility and sequence of welds, including accessibility for inspection and non-destructive testing.	X	X	(X)
	-dimension and detail of joint preparation and completed weld.	X	X	(X)
B.11 Materials	- any supplementary requirements in the material purchasing specifications, including the types of inspection document for the material	X	(X)	(X)
B.16 Non-conformance and corrective action	- with regard to non-conformance and corrective actions, the necessary measures and action (e.g weld repairs, reassessment of repaired welds, corrective actions) shall be determined	X	(X)	(X)
B.19 Quality records	Preparation and release of the necessary welding records and documents shall be carried out.	X	(X)	(X)
<p>Explanations:</p> <p>X Fully authorised</p> <p>(X) Fully authorised only if the responsible welding coordinator (Level A) is missing.</p>				

Table 3 – Tasks and areas of competence of the welding coordinator
(Extract from EN 15085-2 Annex B)



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7 RESPONSIBILITY

7.1 DIRECT RESPONSIBILITY

Blue Engineering s.r.l. Project Manager is responsible of the adoption of the present specification to the project.

Blue Engineering s.r.l. Design Team Leader is responsible for the application of the chapter 3 of the present specification.

7.2 CORRELATED RESPONSIBILITY

Blue Engineering s.r.l. Welding Coordinator shall guarantee the correct application of the chapter 3 of the present specification.

7.3 EXCLUDED RESPONSIBILITY

Blue Engineering s.r.l. is not responsible of the application of chapters 4 and 5 of the present specification.

END of DOCUMENT

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