

# Welding of railway vehicles and vehicle parts

## Part 1: Basic terms, Basic rules

DIN  
6700-1

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Welding of railway vehicles and vehicle parts - Part1: Basic terms, Basic rules

Soudage des vehicules ferroviaires et des pieces - Partie 1: Terminologie generale, regles fondamentales

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### Foreword

This standard has been prepared by the Standards Committee Railway Vehicles (FSF).

Welding is an essential process in the manufacture of railway vehicles and their parts.

Railway vehicles in the sense of this standard are defined in DIN 25 003.

In the standards of the DIN 6700 series, the required provisions for the special process "welding" are being stipulated. The basis of these provisions is the basic technical welding standards in respect of the special requirements for the construction of railway vehicles.

Part 2 deals with the requirements for the qualification of welding plants.

Part 3 deals with the design criteria,

Part 4 deals with the rules for executing the work,

Part 5 deals with quality requirements for weld joints,

Part 6 deals with the criteria for materials, welding consumables, welding procedures, and the welding planning documents.

### 1 Scope

This standard applies to the welding of metallic materials during the manufacture and repair of railway vehicles and vehicle parts. It specifies the general terms and basic rules for welding work.

This standard does not apply to the following parts or components of railway vehicles.

- Pressure vessels.  
Here the Pressure Vessel Regulations (DruckbehV), Technical Rules for Pressure Vessels (TRB) as well as the standards of the DIN EN 286 ff series apply.
- Cargo containers for the transport of dangerous materials.  
Here the Dangerous Goods Regulations - Railway (GGVE) apply together with the Regulations governing the international carriage of dangerous goods by rail (RID) and the Technical Guidelines - Tanks (TRT).

- Cargo containers for the transport of non-dangerous goods loaded or unloaded under pressure. For these, the Pressure Vessel Regulations (DruckbehV), Technical Rules for Pressure Vessels (TRB) as well as AD Leaflets apply.

### 2 Normative references

This norm incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments or revisions of any of these publications apply to this standard only when incorporated by amendment or revision. For undated references, the latest edition of the publication referred to applies.

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Standards Committee Railway Vehicles (FSF) in the German Institute for Standardisation (DIN)  
Standards Committee Welding Technology (NAS)

DIN EN 287-1

Approval testing of welders - Fusion welding -  
Part 1: Steels

DIN EN 287-2

Approval testing of welders - Fusion welding -  
Part 2: Aluminium and aluminium alloys

DIN EN 288-1

Specification and approval of welding procedures for  
metallic materials  
Part 1: General rules for fusion welding

DIN EN 719

Welding coordination – Tasks and responsibilities

DIN EN 729-2

Quality requirements for welding, Fusion welding of  
metallic materials  
Part 2: Comprehensive quality requirements

DIN EN 1418

Welding personnel: Approval testing of welding operators  
for fusion welding and resistance weld setters for fully  
mechanized and automatic welding of metallic materials

DIN 6700-2

Welding of railway vehicles and vehicle parts  
Part 2: Classes of parts, Recognition of welding plants,  
Conformity assessment

DIN 6700-3

Welding of railway vehicles and vehicle parts  
Part 3: Design rules

DIN 6700-4

Welding of railway vehicles and vehicle parts  
Part 4: Rules of execution

DIN 6700-5

Welding of railway vehicles and vehicle parts  
Part 5: Quality requirements

DIN 6700-6

Welding of railway vehicles and vehicle parts  
Part 6: Materials, Welding fillers, Welding processes and  
welding technological planning documents

DIN 8582-1

Weldability, Metallic materials, Terms

DIN EN 24063

Welding, brazing, soldering and braze welding of metals  
– List of processes names and reference numbers for  
use in technical documentation

DIN EN 25817

Arc-welded joints in steel – guidance on quality levels for  
imperfections

DIN EN 26520

Imperfections in metallic fusion welds, classification and  
terminology

DIN EN 30042

Arc-welded joints in aluminium and its weldable alloys -  
guidance on quality levels for imperfections

DIN ISO 857

Welding and allied processes, Welding, brazing and  
soldering processes – Vocabulary

DIN EN ISO 8402

Quality management and quality assurance - Vocabulary

DIN EN ISO 9001

Quality systems - Model for quality assurance in  
design/development, production, installation and  
servicing

DIN EN ISO 9002

Quality systems - Model for quality assurance in  
production and installation

DIN EN 10204

Metallic products; Types of inspection documents

DIN 25003

Classification of rail vehicles, survey, nomenclature,  
terminology

DIN EN 45014

General criteria for suppliers' declaration of conformity

### 3 Basic terms

**3.1 Welding supervision personnel:** see DIN EN 719.

#### 3.2 Welding personnel

**3.2.1 Welder:** see DIN EN 287 ff.

**3.2.2 Operator:** see DIN EN 1418.

**3.2.3 Set-up man:** see DIN EN 1418.

**3.3 Welding equipment:** see DIN EN 1418.

**3.4 Welding procedure specification (WPS),  
Provisional welding procedure specification (pWPS):**  
see DIN EN 288-1.

**3.5 Test piece:** see DIN EN 287-1 or DIN EN 288-1.

**3.6 Specimen:** see DIN EN 287-1 or DIN EN 288-1.

**3.7 Welding procedure, welding process:** see DIN EN  
288-1.

**3.8 Job instruction:** see DIN EN 288-1.

**3.9 Welding procedure approval record (WPAR):** see  
DIN EN 288-1.

**3.10 Welding consumables:** see DIN EN 288-1.

**3.11 Parent metal:** see DIN EN 288-1.

**3.12 Irregularity:** Faults in welding or deviation from the  
stated geometry. Imperfections are for instance cracks,  
insufficient penetration, porosity, slag inclusions and  
undercuts.

NOTE: DIN EN 26520 contains a list of irregularities.

**3.13 Manufacturer:** A person or organisation responsible  
for the welding fabrication (new fabrication or repair) of  
railway vehicles and vehicle parts.

**3.14 Welding plant:** A plant that operates welding fabrication for the manufacture or repair of railway vehicles and vehicle parts.

A plant that does not operate any welding fabrication of its own can also be deemed a welding plant in the sense of this standard if it:

- designs welded components and parts or
  - purchases and assembles welded components and parts
- and fulfils the requirements of DIN 6700-2, part-class C5.

**3.15 Fabrication welding:** Weldings which are undertaken by the cast manufacturer in the process of fabrication. Their aim is to ensure the casting condition necessary for the guaranteed properties and intended use.

**3.16 Fabrication conditions:** Conditions under which the welded joint is produced in the welding plant. They refer to locations, position, design, technical and personnel equipment and statements of the WPS.

NOTE: A change in any of these points means a change in the fabrication conditions.

**3.17 Start of fabrication:** Start of the welding fabrication of a series or of a single part.

NOTE: This also applies to welding work for repairs.

**3.18 Fabrication reliability:** The reliability with which the welding joint has to be produced. It is influenced for example by the design, the weldability of the materials, the accessibility, the welding procedures including their process monitoring, and the testability of the weld joint.

**3.19 Area of fabrication:** Area of fabrication means an organisationally self-contained unit which carries out welding fabrication within a welding plant (e.g. fabrication of components, - bogies, - underframes, - bodysheils, - assembly, steel fabrication, aluminium fabrication).

**3.20 Conformity:** Fulfilment of the requirements stated in this series of standards and/or the contract.

**3.20.1 Conformity certificate:** Certificate of an agreed body as to conformity according to this series of standards. See also DIN EN 10 204.

**3.20.2 Conformity declaration:** Declaration by the manufacturer about conformity according to this series of standards and/or the contract. See also DIN EN 45014.

**3.21 Recognised body:** The body which has been recognised on the basis of a EU Directive, a law or a regulation (so-called regulated area) by the competent supervisory authority.

The inspectors of the recognised body must be able to prove a qualification acc. to DIN EN 719 with extensive technical knowledge (grade 1 acc. to DIN 6700-2, Table 3) and also have relevant experience.

**3.22 Agreed body:** The agreed body is the body which has been agreed upon by way of contract between client and contractor (so-called voluntary area) for proof of conformity with the approved and ordered type of construction.

**3.23 Quality management system (QMS):** see DIN EN ISO 8402.

**3.23.1 Certified QMS:** A QMS certified by an accredited body acc. to DIN EN ISO 9001 or DIN EN ISO 9002.

**3.23.2 Externally supervised QMS:** A QMS supervised by an accredited body acc. to DIN EN ISO 9001 or DIN EN ISO 9002.

**3.24 Quality assurance:** see DIN EN ISO 8402.

**3.25 Weld seam quality class:** The quality requirements for the welding joint and the extent of testing are stipulated in the weld seam quality class.

**3.26 Quality requirements:** Requirements for the execution of welding joints.

**3.27 Evaluation groups:** Classification of permissible irregularities.

**3.28 Local excess:** If, according to DIN 6700-5, local excess of the permissible irregularities is allowed, this may not concern more than 10% of the single seam length.

**3.29 Safety relevance:** Safety relevance is the relevance of a railway vehicle component or part for the safety of the railway vehicle for the protection of persons, facilities and the environment. The following grades of safety relevance are differentiated:

**3.29.1 High safety relevance:** Failure of the component or part leads to danger in operations with personal injuries and to the breakdown of the overall function.

**3.29.2 Medium safety relevance:** Failure of the component or part leads to impairment of the overall function and can lead to danger in operations with personal injuries.

**3.29.3 Low safety relevance:** Failure of the component or part does not lead to any direct impairment of the overall function. Danger in operations with personal injuries is unlikely.

**3.30 Safety requirement:** Safety requirement is the demand for the safety of the single welding joint for the protection of persons, facilities and the environment. The following grades of safety requirements are differentiated:

**3.30.1 High safety requirement:** Failure of the welding joint leads to danger in operations with personal injuries and breakdown of the overall function.

**3.30.2 Medium safety requirement:** Failure of the welding joint leads to an impairment of the overall function and can lead to danger in operations with personal injuries.

**3.30.3 Low safety requirement:** Failure of the welding joint does not lead to any direct impairment of the overall function. Danger in operations with personal injuries is unlikely.

**3.31 Stressing:** Stressing of the part results from external loading. The following are differentiated:

**3.31.1 Static stressing:** This results from predominantly static loading.

**3.31.2 Dynamic stressing:** This results from not predominantly static (pulsating, alternating) loading.

**3.32 Classes of parts:** Classification of the components and parts of railway vehicles as a function of safety relevance.

**3.33 Work specimen:** Work specimens are samples – welding joints for proof of the manual skill of the welder or

the execution of welding joints according to regulations. DIN 6700-4 is to be observed.

**3.33.1 Normal work specimen:** The extent of testing is stipulated in the respective section of the welding processes acc. to DIN 6700-5.

**3.33.2 Simplified work specimen:** The extent of testing is stipulated in the respective section of the welding processes acc. to DIN 6700-5.

**3.34 Documentation:** Preparation and retention of test reports (e.g. reports on non-destructive testing, work specimens and records of process monitoring) within a period (warranty period) agreed upon between client and contractor but at least five years (see DIN EN 729-2).

**3.35 Welding plan:** The welding plan is a list of all welding fabrication details which are necessary for the specification of a welded construction and which specifies the sequence for the assembly of the parts.

**3.36 Welding sequence plan:** The welding sequence plan supplements the welding plan; it comprises a compilation of the welding sequence on one part. It must contain at least details of the welding seam sequence, of the welding seam composition and of the welding direction.

**3.37 Tacking plan:** The tacking plan comprises the position and shape of tacks and their sequence and is usually included in the welding plan.

**3.38 Test plan:** The test plan determines the extent of testing, the test procedures and their sequence taking the welding fabrication process into consideration.

**3.39 Weldability:** Achieving the material connection by welding by means of a given welding procedure while adhering to a suitable fabrication process. The welds must fulfil the requirements made with regard to their local characteristics and their influence on the construction (see also DIN 8528-1).

**3.40 Welding suitability:** The term welding suitability implies that the material permits the production of welded joints on the basis of its chemical, metallurgical and physical characteristics corresponding to the particular requirements. This also includes materials which have a limited welding suitability, i.e. additional measures are necessary when welding these materials (e.g. pre-heating, use of special welding consumables) (see also DIN 8528-1).

**3.41 Welding reliability:** Welding reliability of a construction exists if the part remains functionable within its expected life span, with the materials used, as a result of its design and under the intended operating conditions (see also DIN 8528-1).

**3.42 Welding possibility:** Welding possibility in a welding fabrication exists if the intended weldings on the construction can be produced according to the requirements under the given fabrication conditions (see also DIN 8528-1).

## 4 Basic rules, measures

To determine the welding execution on railway vehicles and vehicle parts and to guarantee their quality the following measures are necessary:

1. Proof of qualification of the welding plants acc. to part 2 of this series of standards,

2. Fulfilment of the design criteria acc. to part 3 of this series of standards,
3. Compliance with the rules for executing work in fabrication acc. to part 4 of this series of standards,
4. Fulfilment and/or proof of quality requirements acc. to part 5 of this series of standards and
5. Compliance with requirements and/or proof with regard to the selection of the materials, welding consumables, welding procedures and welding planning documents acc. to part 6 of this series of standards.