

1 Scope

This requirement for suppliers is only applicable for welding-related orders for the manufacturing of converters as well as for welded components.

This requirement for suppliers is applicable for orders worldwide, with the exception for manufacturers in the USA.

2 Purpose

This requirement for suppliers is to ensure the required quality of welding seams, as well as for the correct execution of all welding work and procedures.

3 Scope of application

- Converters and welded components
- For construction of rail-bound vehicles and ships, there are complementary regulations.

4 Terms

IWE International Welding Engineer

rWS responsible Welding Supervisor

ISTR Initial Sample Test Report

FAT Factory Acceptance Test

5 General guidelines

- Prior to welding, oil, slag, rust and scale must be removed.
- After the welding, spatters must be generally removed.
- After the welding, the converters must be generally cleaned from welding- and grinding-dusts.

6 Normative guidelines

6.1 Basic normative guidelines

- **EN ISO 3834-2** Quality requirements for the fusion welding procedure of metallic materials - part 2 Material examination- 2: Comprehensive requirements to quality.

The rWS in the area of **EN ISO 3834-2** must hold at least the certificate "International welding specialist engineer" (IWE) or "European welding specialist engineer" (EWE).

The provider must specify the rWS (external or internal), as responsible person for welding quality, when providing the quotation to HUG Representation must be quoted complementary (one of the two must be internal).

The qualification of the rWS must be proved by the rWS certificate.

- Complementary, the use of the standards **EN ISO 3824-1** and **EN ISO 3834-5** is mandatory.
- The company must be holding a related rWS **EN ISO 14731**. The responsibilities of the rWS must be regulated and organised according to standard **EN ISO 14731**.
- Considering the related basic materials, the related welding procedure test must be proved according to standard:
EN ISO 15614-1 Requirement and qualification of welding methods for metallic materials – welding procedure test part 1: Arc- and gas-welding of steels and arc-welding of nickel and nickel-alloys.
- Considering the related basic materials, the related welding procedure test must be proved according to standard:
EN ISO 15609-1 Requirement and qualification of welding methods for metallic materials - welding procedure test - Part 1: Arc-welding.
- Under consideration of the basic- and welding auxiliary materials as well as the welding position, related valid certificates must be proved by the executing welder according to the following standard:
EN ISO 9606-1 Tests for welders - Melt-welding - Part 1: Steels.
- Consider the recommendations for welding of metallic materials according to the following standards:
EN 1011-1 Welding - Recommendations for welding metallic materials – Part 1: General instructions for arc welding.
EN 1011-2 Welding - Recommendations for welding metallic materials – Part 2: Arc welding of ferritic steels
EN 1011-3 Welding - Recommendations for welding metallic materials – Part 3: Arc welding of stainless steels
- For construction of rail-bound vehicles and ships, there are complementary regulations:
 - Rail vehicle construction: Conditions out of rail-regulations and standards **EN 15085-1 bis -5**.

6.2 Normative guidelines for the execution of welding work

- The welding seam preparation must be made under the consideration of the technical documentation and the drawing related specifications according to the standard:

EN ISO 9692-1 Welding and related processes - Variations of welding seam preparation - Part 1: Arc welding, protective gas welding, gas welding, WIG welding, and beam welding of steels.

- Minimal requirements for irregularities in welding seams, **evaluation group C**, according to standard:
EN ISO 5817 Welding-melt welding connections in steel, nickel, titan and its alloys (without beam welding) - Valuation groups of irregularities.

In particular cases there may be drawing related conditions or higher requirements in the technical documentation.

- Minimal requirements for general tolerances for the execution of welded constructions, **tolerance class BF** according to standard:
EN ISO 13920 Welding - general tolerances for welded constructions - dimensions and angles; form and position.

6.3 Normative guidelines for the materials to be processed

- The processed base materials must be evidenced by an **inspection certificate 3.1**.
The processed welding consumables must be evidenced by an **inspection certificate 2.2**.
The verification is carried out in accordance with the standard:

EN 10204 Metallic products: Types of inspection documents

6.4 Normative conditions for the execution of welding work

- For the visual test, qualified staff is necessary according to
EN ISO 9712 Qualification and certification of personnel of non-destructive examination
- During visual testing, the following standard must be considered:
EN ISO 17637 Visual testing of melt welding connections

7 Documents to be archived and/or submitted

The required documents according to separate order text and the specifications from point 6 following, must be archived for at least 10 years (project based with the Hug order number) and need to be submitted to Hug on request.

In case of a first-time order, according to « 6 normative specification» the certificate EN ISO 3834 as well as technical documentations according to EN ISO 15614 and EN ISO 15609 must be handed together with the quotation.

8 Contract review

Prior to a confirmation of order by the supplier, it must be guaranteed in form of a contract review, that all requirements to the welding performance/requirement can be properly met. This also includes:

- The examination under a construction/design perspective related to arrangement, design and execution of the welding connections according to the presented building documentations (drawings). Related deficiencies that are detected must be reported to Hug Engineering prior to the confirmation of order.
- Examination related to the completeness of the documentation.

9 Specification from rWS of Hug Engineering AG

The rWS of Hug Engineering AG decides on a project-based necessity of work samples, special tests and photo documentations.

10 Materials

Materials must be used according to their specifications. Basic materials must be marked (short determination e.g. Standard materials eventually colour marked). The marking must be made in a manner that it remains legible at all times during transport and storage. The supplier must guarantee the separated handling and machining of INOX-steels and black-steels.

For the marking and storage of welding auxiliary materials it is to be observed:

- Welding sticks must be marked individually by flags or stamping.
- Welding wire must be marked at the roll/coil.
- Stick electrodes must be marked by stamping at the coating. Appropriate storage conditions (special storage room for special materials, drying, oven) must be kept.

11 Subcontracting

The subcontracting of the manufacturing of welded parts/components to third parties is only allowed after prior written permission of rWS and the procurement department. Subcontractors must comply with all quality standards and requirements of the present norm.

12 Initial Sample Test Report inspection for series projects

The sampling (ISTR) and quality assurance of series production is agreed on with the contractor prior to the award.

13 Tests/Documentation/FAT

Performed tests must be assigned to an individual tester i.e. by a signature. The test characteristics to be documented are detailed in the test-drawing. In case this is not available, they are to be mutually agreed with Hug Engineering AG.

On the test document, a signature of the Welding Supervisor is mandatory.

An eventual FAT is going to be announced by a separate order text.

14 Documents to be handed over to Hug Engineering AG after the finishing of a product

The documents required according to the separate order text must be provided to the procurement department and the rWS.

15 Monitoring

The monitoring of the required approvals and verifications according to point 6 and 9 are in the supplier's responsibility.

It is expected that the supplier proactively clarifies any questions and ambiguity with the rWS of Hug Engineering AG.