

GSI news



Status of European and international standardization in the fields of welder qualification tests and welding procedure tests

1. Introduction

In 1992, the first parts of EN 287 "Qualification test of welders - Fusion welding" and EN 288 "Specification and approval of welding procedures for metallic materials" were published as some of the first European welding standards.

Both series have been adopted as globally applicable ISO standards.

The EN 288 series has now become the new EN ISO 15607 15614 series of standards.

Please refer to the table for additional information about contents and structure of the new series.

2. DIN EN ISO 15614-1 replaces DIN EN 288-3 and defines the specification and qualification of welding procedures for metallic materials.

The major changes are as follows:

Test pieces

A difference is made between:

- Butt joint of plates with full penetration weld
- Butt joint of tubes with full penetration weld
- T-joint with full penetration weld
- Tube branch with full penetration weld
- Fillet weld on plates
- Fillet weld on tubes

Examination and testing of the test pieces

An application standard can define additional tests such as:

- Longitudinal weld tensile test
- All weld metal bend test
- Corrosion tests

- Chemical analysis
- Micro examination
- Delta ferrite examination
- Cruciform test

Hardness test

Permissible maximum hardness values have been defined (Hv10).



International participants in action

Basic material groups

For all welding standards, uniform material Groups based on CR ISO 15608 have been defined.

Range of approval for material thickness of butt joints and weld material thickness

The range of approval for the material thickness of butt joints and the weld material thickness as well as the range of approval for material thickness and weld thickness of fillet joints and the range of approval for the diameter of tubes and tube branches have been re-stated in the tables of DIN EN ISO 15614-1.

Joint and weld types

This section includes new rules on the inclusions of various types of joint and weld.

3. Summary and outlook

With the incorporation of EN 288 into the globally applicable EN ISO 15607 - 15614 series of standards, we will have worldwide uniform basic standards for the performance of procedure tests in future. Particularly noteworthy in this respect is the fact that the two key basic standards (welder qualification and welding procedure testing) will now be based on an identical material grouping system.

For the revision of the standards governing the welding procedure testing for steel, aluminum, titanium and zirconium, as well as the standards outlining other routes leading to the qualification of preliminary welding procedure specifications, the experience made so far with Parts 1 to 8 of EN 288 has been taken into account.

GSI offers a number of seminars on this subject. For more information, please visit www.gsi-mbh.de.

International Welding Engineer (IWE)
International Welding Technologist (IWT)
COURSE 2007
Part 1: Basics (Distance Learning)
Part 2 and 3:
Classroom Learning in Duisburg
January to March 2007

Table: New numbering system - Standard details on specifications and qualifications of welding procedures (excerpt from DIN EN ISO 15607/Table A.1)

Process	Arc welding	Gas welding	Electron beam welding
General rules		EN ISO 15607	
Guidelines for a grouping system		CR ISO/TR 15608	
WPS	EN ISO 15609-1	EN ISO 15609-2	EN ISO 15609-3
Tested consumables	EN ISO 15610		not applied
Previous welding experience	EN ISO 15611		
Standard procedure	prEN ISO 15612		
Pre-production test	EN ISO 15613		
Welding procedure test	<u>prEN ISO 15614</u> Part 1: Steel/nickel Part 2: Aluminum Part 3: Cast iron Part 4: Finishing welding of aluminum castings Part 5: Titanium/zirconium Part 6: Copper Part 7: Surfacing Part 8: Tube to tube plate Part 9: Wet hyperbaric Part 10: Dry hyperbaric	<u>prEN ISO 15614</u> Part 1: Steel/Nickel Part 3: Cast iron Part 6: Copper Part 7: Surfacing	<u>prEN ISO 15614</u> Part 7: Surfacing Part 11: Electron beam/laser beam

Accreditation of GSI mbH as "notified body" pursuant to the European Pressure Equipment Directive (PED)

With effect as from July 25, 2005, GSI mbH has been accredited as a notified body pursuant to Article 12 of the European Directive on Pressure Equipment 97/23/EU (PED).

The accreditation covers:

- testing and certifying of pressure equipment, assemblies and procedures for making pressure equipment;
- certifying of personnel for the execution of permanent material joints;
- certifying of quality systems for the manufacturing of pressure equipment and components.

All tests and certifications are centrally coordinated by the GSI branch SLV Duisburg as the seat of the certification body pursuant to the PED.

All GSI branches not only carry out the qualification tests and certifications for welders pursuant to DIN EN 287-1, for welding operators pursuant to DIN EN 1418 and for brazers pursuant to DIN EN 13133, but also the approval test and certification of working procedures, the welding procedure test pursuant to DIN EN ISO 15614 ff (previously DIN EN 288) and the brazing procedure test pursuant to DIN EN 13134.

Pressure equipment, components

and quality systems are centrally tested and certified by the GSI branch SLV Duisburg, with participation of the local GSI branch testing bodies.



Ultrasonic testing

For further information on your direct contacts at your GSI branch and the respective applications visit the website of your local GSI branch. There you can also file the applications for tests and certifications.

For all questions surrounding quality systems, EC type examination, EC design examination, or EC unit verification, the following contacts are available at the GSI branch SLV Duisburg:

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corrosion protection range from an assessment of the existing coating and the identification of required corrosion protection measures through to the support, testing and final acceptance of the execution of the work. Recently, for instance, corrosion protection concepts were worked out for the thorough restoration of the main tropical greenhouse in the Berlin Botanical Garden and for the restoration of the bronze soldier, in conjunction with expert opinions on materials, corrosion quick tests and welding tests.



Main tropical greenhouse in the Botanical Garden with a section of the old steel construction

Technical equipment

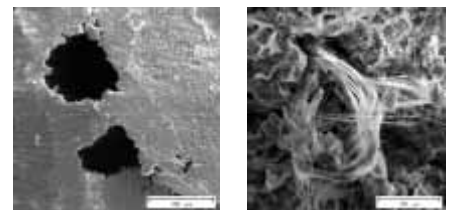
Our laboratory equipment allows the performance of

- Spray tests (salt spray chamber)
- Climate and environment simulations including introduction of hazardous gases and ultraviolet radiation
- Stress crack corrosion tests
- Water analyses
- Examinations with a digital scanning electron microscope with electron Beam microprobe (EDX)

Apart from performing standardized tests, we also design tests for component specific issues.

SEM/EDX examinations

In addition to fracture analysis (microfractography) for different types of damage, the scanning electron microscope and the microprobe are also used for microanalysis to determine the composition of corrosion products, dusts, residues and fibers (asbestos, man-made mineral fibers).



SEM photos

Left:
Pitting corrosion on Cr-Ni steel water pipes

Right: Asbestos fibers

Proof of excellence with the new GSI seal of quality



Certified
welding
company

As from now, a special seal of quality is available to all firms certified by GSI as part of the constructor's qualification. Member companies in possession of a GSI-issued certificate of classes B to E pursuant to DIN 18800 can now use this logo as a sign of the excellent quality of their production.

The seal of quality can be used as an additional logo on your stationary and as a sign at your premises to highlight your technical qualification in welding.

For more information, please contact the Quality Assurance department of your GSI-SLV.

SLV Berlin-Brandenburg extends its offer of analyses

With the integration of the Damage & Corrosion working party of the Materials Testing Office into its Materials Engineering department, SLV Berlin-Brandenburg, a branch of GSI, has extended its capacities in the field of corrosion analysis.

Damage analysis

One field of activity focuses on the analysis of corrosion-related damage in conjunction with the development of concepts for corrective action mainly in the following fields:

- Drinking water installations, heating and air conditioning systems
- Corrosion damage on components exposed to natural weathering
- Corrosion damage in plant manufacturing resulting from the impact of corrosive liquids or gases.

Corrosion protection

The consulting services available to customers in the field of corrosion and

GSI - partner for compulsory attestation in the Russian mandatory area

Following the opening of the markets in eastern and central Europe, also the German welding industry is exploring new opportunities for sales, cooperation and technology transfer.

Similarly to the European internal market, also the internal market of Russia is characterized by a legally regulated segment (the "mandatory area") and a segment not subject to statutory regulation (the "voluntary area"). For the market entry in Russia, a customs declaration and a certification on safety and quality is required which is documented with a GOST-R certificate and a GOST-R mark. For the application of welding materials, facilities and technologies in "industrial fields involving technical hazards" (which belongs to the legally regulated segment), however, additional attestation by the "Nationalnaja Assoziacija Kontrol i Svarka" (NAKS) is compulsory.



Handing over of the NAKS accreditation documents to the attestation center SLV M-V (left to right: Prof. Aleshin - NAKS President, Dr. Groß, Prof. von Hofe - General Manager of DVS e.V.)

The renowned accredited organization DVS ZERT e.V. has therefore concluded an agreement with NAKS which allows industrial enterprises with a particular focus on welding to obtain these compulsory attestations already in Germany.

On May 18, 2005, the accreditation document as a recognized NAKS attestation center for welding consumables, welding equipment and welding technologies was handed over to the SLV Mecklenburg-Vorpommern, a corporate institution of DVS ZERT e.V. and GSI mbH, at a ceremony attended by NAKS President Prof. N. P.

Mobile system for laser beam welding of short welds presented on the Schweissen & Schneiden trade fair in Essen

Novel concepts for fiber laser systems with output powers of some 10kW offer significant potential, especially in the manufacturing of large-volume components. The presented system comprised an Ytterbium fiber laser supplied by IPG with an output power of 4.8kW as the source of the laser beam and fiber-coupled handheld equipment for welding short butt and fillet welds.

The fields of application range from pure laser beam welding to hybrid gas-shielded metal-arc laser beam welding with higher performance in shipbuilding and steel construction as well as in railway ve-



Handing over of the ID cards to the NAKS experts (left to right: Dr. Scharff - Head of the attestation center, Dr. Lukjanov - NAKS auditor, Dr. Groß - Local deputy in Russia, the Ukraine, and the Baltic states)

Aleshin and DVS e.V. General Manager Prof. D. von Hofe. While there are 73 of such attestation centers in the Russian Federation, this is the first one abroad. Head of the new attestation center is Dr.-Ing. IWE Arite Scharff. Her deputy, Dr.-Ing. EWE Hans-Georg Groß, will provide her with local support from Russia, the Ukraine and the Baltic states.

At the SCHWEISSEN & SCHNEIDEN 2005 fair in Essen, representatives of the German and international welding industry were able to obtain first information about the rules and regulations to observe and the process of obtaining the attestation in Germany. They also had an opportunity to discuss with members of the board and the auditors of NAKS about previous experience with the market entry in Russia and the cooperation with Russian industrial and business enterprises.

The members of the attestation center took the opportunity of the trade fair to provide detailed support to German companies interested in these attestation processes.

For GSI, this new service is another step in responding to international challenges. For small and medium-sized businesses as well as large industrial corporations, GSI is available as mediator, contact and attestation organization for the economic area of the Russian Federation with its enormous potential for future growth.

hicle construction and automotive manufacturing.

With the cooperation of SLV Rostock and SLV Halle, applications in shipbuilding are currently being studied as part of the "Docklaser" project. Apart from the traditional applications with handheld and robotized welding equipment, this project also included the first tractor based solutions.

At the DVS and SLV fair stands, visitors were able to learn more about the mobile applications of this laser technology and the opportunities for its integration into their own manufacturing operations.

Certificate of qualification for small enterprises

With the publication of DIN 18800-7: 2002-09, also the previously designations of "Kleiner Eignungsnachweis" and "Großer Eignungsnachweis" (~ limited and comprehensive certificate of qualification) were renamed and are now referred to as Class B to E qualification of constructors.

A new addition is Class A. While for all other classes, certificates are issued in the form of a constructor's qualification, this is not the case for Class A.

Class A covers many construction products manufactured by small enterprises. Since these enterprises are not obliged to have the respective certificate, and no special requirements apply to the welding coordinators, it is often thought that these enterprises do not have to meet any other requirements at all.

Yet this impression is wrong because the components listed in DIN 18800-7, Table 9 and elsewhere are construction products subject to the regulations of the applicable Building Codes. A number of requirements can be derived from the Building Codes, e.g. from the acknowledged technical rules for works (*Liste der technischen Baubestimmungen*) and the technical rules for construction products and types of construction (*Bauregelliste*), which also small enterprises have to comply with.

Examples of such requirements are:

- An in-house production control must be in place.
- DIN EN 729-4 must be complied with.
- Compliance certificates must be available for the products used.
- The manufacturer of the welded construction product must itself issue a compliance certificate. It should be noted that a violation of this rule constitutes an administrative offense.

It is thus very helpful if such small enterprises can furnish their customer (principal) and the competent supervisory authorities with evidence that they are familiar with these very demanding requirements and address them in their manufacturing operations.

Such evidence can for example be provided by way of a certificate issued by a GSI-SLV pursuant to DIN EN 729-4.

For more information please contact the Quality Assurance department of your GSI-SLV.

Latest news on standards and the qualification of constructors

New standards and recommendations

DIN EN 10025-1 2005-02	Hot rolled products of structural steels - Part 1: General technical delivery conditions
DIN EN 10025-4 2005-04	- Part 4: Technical delivery conditions for thermomechanically rolled weldable fine grain structural steels
DIN EN 10025-5	- Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
DIN EN 10025-6 2005-02	- Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition
DIN EN ISO 15609-1 2005-01	Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding
DIN EN ISO 15612 2004-10	Specification and qualification of welding procedures for metallic materials - Qualification by adoption of a standard welding procedure
DIN EN ISO 15614-1 2004-11	Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and Nickel alloys

Some new publications of major welding standards and regulations for projects subject to construction supervision by the local authorities.

Welding in railway vehicle construction - the latest developments in application rules and regulations

Practical experience in applying DIN 6700, in particular DIN 6700, Part 2 since 2001, has prompted both the manufacturers of railway vehicles and the German Federal Railway Office to publish supplementary information on this series of standards.

In November 2004, the German Welding Society (DVS) published its Worksheet 1620 "Welding tests in railway vehicle construction". It includes recommendations on welding tests during design, planning, construction and repair of railway vehicles and components and also outlines the related responsibilities in the plant. The Worksheet describes the processes for performance of the welding tests and their implementation in the manufacturing plant as well as the scope of the welding-related planning documents to be reviewed. Annexes 1 and 2 describe examples of processes (flowcharts) for the tests during the design and engineering phase and for the tests before, during and after construction.

The new Worksheet 1621 covers the handling of work specimens in railway vehicle construction, pointing out when they are required and how they are to be documented. It serves to complement section 7 of DIN 6700, Part 4. The Worksheet 1622 contains corrigenda of misprints in all six parts of DIN 6700 and describes the application of new EN and/or EN ISO standards in railway vehicle construction (e.g. welder qualification tests for steel and aluminum pursuant to DIN EN 287-1 and/or EN ISO 9606-2, welding procedure tests pursuant to DIN EN ISO 15607 to 15614). Of particular importance is the application of DIN EN ISO 5817 (Quality levels for imperfections) a commented version of which is contained in an Annex to the Worksheet. With the

publication of the Worksheet 1622, this became a binding basis of work. The Worksheets had become necessary since the national German DIN 6700 can no longer be changed now that the process of European standardization has commenced. Finally, work was started on a European standard on welding railway vehicles and components. The first drafts of prEN 15085 Parts 1-5 have been published (German versions of February 2005) and Germany has already filed comprehensive objections to these drafts with the railway vehicle standards committee.

The adoption as a European standard is planned for 2007.

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