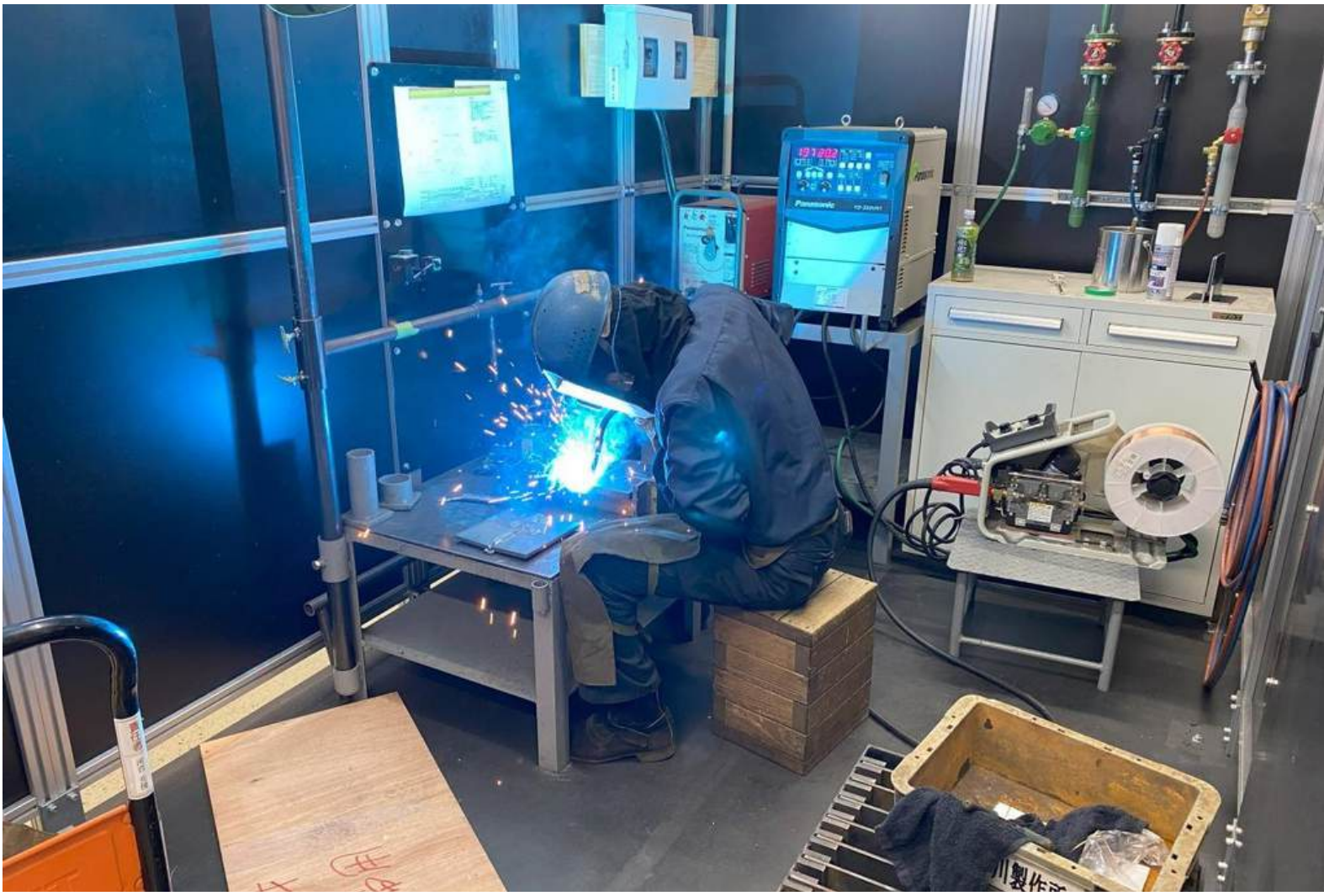
PRVÁ ZVÁRAČSKÁ, a. s.
FIRST WELDING Inc.

# EN ISO 9606-1 WELDER QUALIFICATION

## Qualification Testing of Welders – Fusion Welding of Steels

**Technical Handbook for Welder Qualification**

***EN ISO 9606-1 • Welder Testing • Qualification Range • Welding Processes • Materials • Positions • Examination • Acceptance Criteria • Retesting • Continuity • Prolongation • Certification***



For Welders, Welding Supervisors, Manufacturers, Fabricators & Welding Quality Professionals

**First Welding Certification Pvt Ltd (PRVÁ ZVÁRAČSKÁ, a. s. )**

**Edition 01 | 2026**

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# INTRODUCTION TO WELDER QUALIFICATION

## 1.1 General

Welder qualification is the process of demonstrating and recording a welder's ability to produce an acceptable welded joint under specified conditions.

For fusion welding of steels, EN ISO 9606-1:2012 establishes technical requirements for qualification testing of welders. The standard is intended to provide systematic qualification and uniform acceptance of qualified welders.

The principal objective is to demonstrate the welder's ability to manually manipulate the welding electrode, torch or blowpipe and produce a weld meeting the specified quality requirements.

## 1.2 Scope

EN ISO 9606-1 applies to qualification testing of welders performing manual or partly mechanized fusion welding of steels.

It does not cover fully mechanized or automated welding operations. Such applications are addressed by other qualification requirements, including ISO 14732 where applicable.

## 1.3 Importance of Welder Qualification

A qualified welder is required to demonstrate practical welding capability within a defined range.

Qualification considers variables such as:

- Welding process
- Product type
- Type of weld
- Filler material
- Mat
- Pipe
- Welding position
- Backing condition
- Welding technique
- Single-layer or multi-layer technique

The qualification certificate records the conditions under which the welder has demonstrated acceptable performance.

# PURPOSE OF WELDER QUALIFICATION

## 2.1 Objective

The objective of welder qualification is to verify that an individual welder can produce sound welds under controlled test conditions.

The qualification is concerned primarily with welder skill and manual welding ability, rather than qualification of the welding procedure.

## 2.2 Welder Skill

The qualification test evaluates the ability of the welder to:

1. Prepare the welding equipment correctly.
2. Use the specified welding process.
3. Maintain appropriate welding parameters.
4. Control electrode or torch movement.
5. Maintain suitable arc characteristics.
6. Control welding speed.
7. Maintain appropriate manipulation technique.
8. Produce acceptable weld appearance.
9. Avoid unacceptable welding imperfections.
10. Complete the test coupon according to the specified conditions.

## 2.3 Qualification Is Not a General Approval

A welder qualification certificate does not mean that the welder is automatically qualified for every welding application.

The qualification applies only within the range of qualification established by the applicable standard.

When an essential variable changes outside the permitted range, an additional qualification test may be required.

# APPLICABLE STANDARD: EN ISO 9606-1

## 3.1 Standard Identification

**EN ISO 9606-1:2012**
Qualification testing of welders – Fusion welding – Part 1: Steels
The standard specifies requirements for qualification testing of welders for fusion welding of steels. ISO currently lists the 2012 edition as the published edition; the standard is under revision and ISO/DIS 9606.2 is a draft under development, so the draft should not be presented as the current published replacement.

## 3.2 Main Technical Areas

**T**he standard establishes requirements concerning:

- Essential variables
- Range of qualification
- Test pieces
- Welding conditions
- Examination
- Testing
- Acceptance requirements
- Certification
- Validity and prolongation

## 3.3 Manual and Partly Mechanized Welding

The qualification system is focused on the welder's ability to manually manipulate the welding equipment.
Typical processes covered include applicable manual or partly mechanized fusion welding processes such as:

- 111 – Manual metal arc welding
- 114 – Self-shielded tubular-cored arc welding
- 121 – Submerged arc welding

- 131 – Metal inert gas welding
- 135 – Metal active gas welding
- 136 – Flux-cored arc welding with active gas
- 138 – Metal-cored arc welding with active gas
- 141 – Tungsten inert gas welding

The process designation must be correctly recorded on the qualification certificate.

## WELDER QUALIFICATION PROCESS

**General Qualification Sequence**

A typical welder qualification process consists of the following stages:

Step 1 – Welder Identification

The identity of the welder is verified.

Step 2 – Test Specification

The required welding process, material, joint type, dimensions and position are established.

Step 3 – Test Coupon Preparation

The test pieces are prepared according to the applicable requirements.

Step 4 – Test Welding

The welder performs the welding under specified conditions.

Step 5 – Examination

The completed test piece is examined using the required examination methods.

Step 6 – Testing

Required mechanical or other tests are performed.

Step 7 – Evaluation

Results are assessed against the applicable acceptance requirements.

- 131 – Metal inert gas welding
- 135 – Metal active gas welding
- 136 – Flux-cored arc welding with active gas
- 138 – Metal-cored arc welding with active gas
- 141 – Tungsten inert gas welding

The process designation must be correctly recorded on the qualification certificate.

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Step 6 – Testing

Required mechanical or other tests are performed.

Step 7 – Evaluation

Results are assessed against the applicable acceptance requirements.

Step 8 – Qualification
If all applicable requirements are satisfied, the welder is qualified within the specified range.
Step 9 – Certificate
A qualification certificate or record is issued containing the essential qualification information.

**Witnessing**
The welding of the qualification test piece is subject to witnessing by the examiner or examining body in accordance with the standard's requirements. ISO/TC 44 interpretations also address the role of the examiner/examining body in witnessing and verification.



# ESSENTIAL VARIABLES

## 1.General

Welder qualification is controlled by essential variables.
The principal variables include:

| Variable | Description |
|---|---|
| **Welding process** | Process used for welding |
| **Product type** | Plate or pipe |
| **Type of weld** | Butt weld or fillet weld |
| **Filler material group** | Classification of filler material |
| **Filler material type** | Specific filler classification/type |
| **Dimension** | Thickness and pipe diameter |
| **Welding position** | Position used during test |
| **Weld details** | Backing, sides, layers and related conditions |

These variables establish the range within which the welder is qualified.

## 2.Welding Process

A qualification performed using one welding process does not automatically qualify the welder for another process.
For example:

- 111 qualification does not automatically qualify 135.
- 135 qualification does not automatically qualify 141.
- 141 qualification does not automatically qualify 111.

Where multiple welding processes are used in a qualification test, the qualification range is determined according to the applicable provisions of EN ISO 9606-1.

## 3.Changes Outside the Range

If production welding requires conditions outside the qualified range, a new or additional qualification may be required.

# PRODUCT TYPE: PLATE AND PIPE

## 1.Plate

A welder may be qualified using a plate test piece.
The certificate should identify the applicable product type and test configuration.

## 2. Pipe

Pipe qualification is controlled by the applicable outside diameter range and test conditions.
Pipe welding introduces additional practical considerations, including:
Pipe diameter
Fixed or rotating pipe
Welding position
Access
Joint geometry
Welding direction

## 3.Plate-to-Pipe Application

Qualification ranges for plate and pipe are determined according to the relevant requirements of EN ISO 9606-1.

The product type should not be assumed to provide unlimited qualification for every plate and pipe application.

ISO/TC 44 has published interpretations specifically addressing product-type qualification and combinations of plate and pipe test pieces.

## 4. Test Piece Identification

Each test piece should be traceable to:

- Welder identification
- Test date
- Welding process
- Material
- Filler material
- Test position
- Test record
- Examination results

## TYPE OF WELD

### 1. Butt Weld

A butt weld joins two components approximately in the same plane.

Typical butt-weld qualification information includes:

- Joint preparation
- Root gap
- Root face
- Groove angle
- Backing
- Number of layers
- Welding process
- Position
- Thickness

## 2.Fillet Weld

A fillet weld joins two components generally at an angle.

Fillet weld qualification involves specific requirements for:

- Test piece geometry
- Throat or leg dimensions

Welding position

Material thickness

Examination

Macro examination where applicable

## 3. Separate Qualification Considerations

A butt weld qualification should not automatically be interpreted as unrestricted fillet weld qualification.

Similarly, a fillet weld qualification should not automatically be treated as unrestricted butt weld qualification.

The applicable qualification range must be established from the relevant provisions of the standard.

## 4.Combination Qualification

EN ISO 9606-1 contains provisions for certain combinations of test arrangements. ISO/TC 44 interpretations address questions concerning additional fillet-weld tests and combination tests.

# PARENT MATERIAL AND FILLER MATERIAL

## 1. Parent Material

The test piece material must be identified by appropriate material designation and documentation.

Typical information includes:

- Material grade & standard
- Material group where applicable
- Thickness & Product form
- Heat or batch identification

## 2. Material Grouping

Material grouping may be established using the applicable grouping system, such as ISO/TR 15608, where required by the qualification system.

The material group should be correctly recorded rather than relying only on a commercial material name.

## 3.Filler Material

Filler material is an important qualification variable.

The qualification record should identify:

- Filler material classification
- Filler material group
- Diameter
- Manufacturer/type where required
- Welding process
- Shielding gas where applicable

## 4. Filler Material Groups

EN ISO 9606-1 uses filler material groupings including, depending on application:

- FM1 – Non-alloy and fine grain steels
- FM2 – High-strength steels
- FM3/FM4 – Creep-resisting steels
- FM5 – Stainless and heat-resisting steels
- FM6 – Nickel and nickel alloys

The applicable filler material group and qualification range must be established from the standard's relevant tables.

# TEST PIECE DIMENSIONS

## 1. Thickness

Material thickness is an important qualification variable.
The qualified thickness range is determined from the thickness of the test piece and, for applicable cases, deposited weld metal thickness.

## 2. Deposited Thickness

For multi-process welding, deposited thickness associated with each process can be relevant when establishing the qualification range.
For example, if a test piece is welded using two different processes, the deposited thickness attributable to each process must be correctly recorded.
ISO/TC 44 has published interpretations addressing deposited thickness and multi-process qualifications.

## 3.Pipe Diameter

For pipe qualifications, the outside diameter of the test pipe is recorded.
The qualification range is determined according to the applicable diameter table.

## 4.Fillet Weld Dimensions

Fillet weld qualification has specific thickness/dimension provisions.
The test piece dimensions and resulting qualified range must be established using the relevant table rather than applying a general thickness rule.

## 5.Accurate Recording

The following should be recorded:

- Test piece thickness & Deposited thickness
- Pipe outside diameter & Fillet weld dimensions where applicable
- Number of processes & Thickness attributable to each process

# WELDING POSITIONS

## 1.Importance

Welding position is a major factor in welder qualification.
The standard identifies welding positions using standardized designations.
Typical positions include:

- Plate
- PA
- PB
- PC
- PD
- PE
- PF
- PG

### Pipe

Applicable pipe positions include fixed and rotating configurations, such as:

- PA
- PC
- PF
- PG
- PH
- PJ
- H-L045
- J-L045

## 2. Position Qualification

A welder qualified in one position is not necessarily qualified for every other welding position.
The qualified position range must be established from the applicable

### 3. Fixed Pipe

For fixed pipe qualifications, the orientation of the pipe and welding position must be correctly identified.

### 4. Position Recording

The qualification certificate should clearly state:

- Test position
- Product type
- Pipe condition where applicable
- Qualified positions

ISO/TC 44 has published interpretations concerning position qualification, including questions involving H-L045 and J-L045.

## WELD DETAILS

### 1.Backing

Backing is an important welder qualification variable.

Possible conditions include:

- Material backing
- Gas backing
- Flux backing
- Consumable insert
- No backing

The qualification range depends on the test condition and applicable requirements.

### 2.Single-Side and Both-Side Welding

The test may be performed:

From one side

From both sides

The applicable qualification range is determined from the standard.

## 3.Single-Layer and Multi-Layer

The welding technique may be:

- Single-layer
- Multi-layer

A change between these techniques may affect the qualification range.

## 4.Welding Direction

For applicable processes, welding direction may be identified as:

Leftward

Rightward

5.Abbreviations

Common abbreviations include:

| Abbreviation | Meaning |
|---|---|
| **mb** | Material backing |
| **gb** | Gas backing |
| **fb** | Flux backing |
| **ci** | Consumable insert |
| **nb** | No backing |
| **ss** | Single-side |
| **bs** | Both sides |
| **sl** | Single-layer |
| **ml** | Multi-layer |
| **lw** | Leftward |
| **rw** | Rightward |

# TEST PIECE PREPARATION AND WELDING

## 1.Test Piece Preparation

Before welding, the test piece should be checked for:

- Correct material
- Correct dimensions
- Correct joint preparation
- Correct root gap
- Correct groove angle
- Correct root face
- Correct backing condition
- Correct identification

## 2.Welding Equipment

The welding equipment should be suitable for the specified process.
Before starting the test, the following should be verified:

- Welding machine
- Welding leads
- Electrode holder/torch
- Shielding gas arrangement
- Consumable condition
- Polarity
- Gas flow where applicable
- Measuring instruments

## 3.Welding Conditions

The welder should weld the test piece under the specified test conditions.
The welding parameters should be recorded as applicable:

- Current
- Voltage
- Welding speed

- Wire feed speed
- Electrode diameter
- Heat input where required
- Shielding gas
- Gas flow rate
- Preheat temperature
- Interpass temperature

**4.Welder Identification**

The test piece must remain traceable to the welder who performed the welding.

The identity of the welder should be established before the test begins.

**EXAMINATION AND TESTING**

**1.General**

After welding, the test piece is examined and tested according to the applicable requirements.

EN ISO 9606-1 includes provisions for:

- Examination
- Test pieces
- Welding conditions
- Test methods
- Specimens

**2.Examination Sequence**

A typical sequence is:

- Visual examination
- Non-destructive testing where required
- Destructive testing where required
- Evaluation against acceptance requirements
- Recording of results

## 3 .Visual Examination

Visual examination evaluates the external condition of the weld.
Typical characteristics examined include:

- Weld profile
- Surface imperfections
- Undercut
- Cracks
- Surface porosity
- Overlap
- Arc strikes
- Incomplete weld profile
- Excessive reinforcement
- Root condition where accessible

## 4.Test Piece Condition

The test piece should be examined in its relevant condition before specimens are removed.
All examination results should remain traceable to the individual welder and qualification test.

## NON-DESTRUCTIVE TESTING

### 1.General

Depending on the qualification route and applicable requirements, non-destructive testing may be used to evaluate the completed test piece.
Possible methods include:

- Visual Testing (VT)
- Radiographic Testing (RT)
- Ultrasonic Testing (UT)
- Other applicable NDT methods

The required examination method is determined by the applicable standard and test configuration.

## 2.Visual Testing

VT is a fundamental examination of the completed weld.
It can identify visible imperfections such as:

- Cracks
- Surface porosity
- Undercut
- Overlap
- Excessive reinforcement
- Incorrect weld profile
- Surface damage

## 3.Radiographic Testing

RT can be used to detect internal discontinuities in applicable test pieces.
Potential indications include:

- Porosity
- Slag inclusions
- Lack of fusion
- Volumetric imperfections

## 4.Ultrasonic Testing

UT may be applicable for detecting internal imperfections in suitable welded joints.
The selection of RT or UT must follow the applicable qualification requirements.

## 5.NDT Personnel

Where NDT is performed, the examination should be carried out by appropriately qualified personnel in accordance with the applicable NDT qualification requirements.

# MECHANICAL TESTING

## 1.General

Mechanical testing provides evidence that the welded test piece meets the applicable qualification requirements.
Depending on the test configuration, testing may include:

- Bend testing
- Fracture testing
- Macro examination
- Other specified examinations

## 2.Bend Test

Bend testing evaluates the ductility and integrity of the welded joint. The test specimen is bent through the specified configuration and examined for unacceptable imperfections.

## 3.Fracture Test

A fracture test exposes the internal condition of the weld after fracture.
It may reveal:

- Lack of fusion
- Slag inclusions
- Porosity
- Cracks
- Other internal imperfections

## 4.Macro Examination

For applicable fillet-weld qualifications, macro examination can be used to evaluate the weld cross-section.
The examination may assess:

- Fusion
- Weld penetration
- Weld profile
- Internal imperfections
- Throat & Leg dimensions

### 5.Test Selection

It is incorrect to state that every welder qualification requires exactly the same combination of VT, bend, RT, UT or fracture testing.

The required tests depend on the applicable test configuration and provisions of EN ISO 9606-1.

## ACCEPTANCE, RETESTING & QUALIFICATION RANGE

### 1 Acceptance & Retesting

The qualification test must meet the applicable acceptance requirements for relevant welding imperfections.

Typical imperfections include:

Cracks • Lack of fusion • Lack of penetration • Porosity • Slag inclusions • Undercut • Overlap • Excessive convexity/concavity

Failed Test:

If the test does not meet the applicable requirements, the welder is not qualified on the basis of that test. Where retesting is permitted, it must follow the applicable requirements and remain traceable to the original test.

Retest records should identify:

Original test • Reason for retest • Retest date • Test conditions • Examination results • Final result

### 2.Range of Welder Qualification

A welder certificate defines a specific qualification range, not unlimited welding authorization.

The applicable range is determined using the relevant requirements and tables of EN ISO 9606-1.

**Key variables include:**

Welding process | Product type | Weld type | Filler material | Thickness | Pipe diameter | Welding position | Backing | Layer technique

A qualification for one welding process, position, thickness or backing condition does not automatically qualify the welder for all other conditions.

The qualification range must be correctly calculated and verified before the certificate is issued.

3.Welder Qualification vs WPQR

Important: A WPQR does not replace a welder qualification certificate, and a welder certificate does not qualify a welding procedure. Both may be required for production welding depending on the applicable requirements.

| Welder Qualification | WPQR |
|---|---|
| Qualifies welder skill | Qualifies welding procedure |
| EN ISO 9606-1 | EN ISO 15614 series |
| Individual welder | Welding procedure/test |
| Welder qualification certificate | WPQR |
| Defines welder qualification range | Provides basis for WPS |

# VALIDITY, CERTIFICATE & FINAL CHECKLIST

## Validity, Continuity and Prolongation

Welder qualification is subject to the validity, continuity and prolongation requirements of the applicable standard.

### Continuity Records

Where required, welding activity should be documented and traceable, including:

- Welder identification
- Welding process
- Welding activity/date
- Employer or production record
- Authorized verification

### Prolongation

EN ISO 9606-1 contains specific requirements for prolongation. The applicable route and conditions must be verified before prolongation.

A new qualification may be required when welding conditions fall outside the existing qualified range, such as changes in:

Process • Product/Weld Type • Thickness • Diameter • Position • Filler Material • Backing • Layer Technique

All continuity and prolongation records should be controlled and traceable.

## Welder Qualification Certificate

The certificate should clearly identify the qualification test and resulting qualification range.

### Essential Certificate Information

### Welder

- Name and identification
- Employer, where applicable

## Test

- Test date and test piece identification
- Product and weld type
- Welding process
- Material/material group
- Filler material/group
- Thickness and deposited thickness
- Pipe diameter, where applicable
- Welding position
- Backing and layer technique
- Examination & Testing
- Visual examination
- NDT, where applicable
- Mechanical/macro/fracture testing, where applicable
- Acceptance result
- Certification
- Qualification range
- Certificate number
- Examiner/examining body
- Qualification date
- Validity/prolongation information, where applicable
- Authorization/signature

## FINAL CERTIFICATE CHECKLIST

□ Welder identity verified
□ Test piece and material correctly recorded
□ Thickness/diameter correctly recorded
□ Joint, weld type and backing verified
□ Welding process and filler material recorded
□ Welding position verified
□ Required examination/testing completed
□ Results meet applicable acceptance requirements

□Qualification range correctly established
□ Process, product and weld type range verified
□ Filler material and dimensions verified
□ Certificate number and test date recorded
□ Examiner/examining body identified
□ Validity/prolongation information stated
□ Certificate approved and authorized

## TECHNICAL REFERENCE

EN ISO 9606-1:2012 — Qualification testing of welders — Fusion welding — Part 1: Steels
ISO identifies EN ISO 9606-1:2012 as the published edition for qualification testing of welders performing fusion welding of steels. The applicable standard, relevant tables, contractual requirements and product-specific requirements should always be verified when determining a qualification range.
The ISO/TC 44 interpretation database may also be consulted where a specific interpretation of EN ISO 9606-1 is required.

## Conclusion

EN ISO 9606-1 establishes documented evidence of a welder's ability to produce acceptable fusion welds in steels within a defined qualification range.
A correctly issued qualification certificate provides traceability between the welder, test, examination results and permitted qualification range.