



SLOVENSKI STANDARD
oSIST prEN 12732:2020
01-april-2020

Infrastruktura za plin - Varjenje jeklenih cevovodov - Funkcionalne zahteve

Gas infrastructure - Welding steel pipework - Functional requirements

Gasinfrastruktur - Schweißen an Rohrleitungen aus Stahl - Funktionale Anforderungen

Infrastructures gazières - Soudage des tuyauteries en acier - Prescriptions fonctionnelles

Ta slovenski standard je istoveten z: prEN 12732

[oSIST prEN 12732:2020](https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020)

<https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020>

ICS:

25.160.40	Varjeni spoji in vari	Welded joints and welds
91.140.40	Sistemi za oskrbo s plinom	Gas supply systems

oSIST prEN 12732:2020

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 12732:2020](https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020)

<https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 12732

April 2020

ICS 25.160.40

Will supersede EN 12732:2013+A1:2014

English Version

Gas infrastructure - Welding steel pipework - Functional requirements

Infrastructures gazières - Soudage des tuyauteries en acier - Prescriptions fonctionnelles

Gasinfrastruktur - Schweißen an Rohrleitungen aus Stahl - Funktionale Anforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 234.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

[https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-](https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1eb706b2/osist-pr-en-12732-2020)

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	6
1 Scope.....	7
2 Normative references.....	9
3 Terms and definitions.....	11
4 Quality system.....	13
4.1 General.....	13
4.2 Welding contractors.....	14
4.3 Welding procedure requirements.....	14
4.4 Welders.....	15
4.5 Welding supervisory and coordination personnel.....	15
4.6 Testing companies and personnel.....	15
4.6.1 General.....	15
4.6.2 Non-destructive testing (NDT).....	15
4.6.3 Destructive testing (DT).....	15
5 Welding consumables.....	16
6 Production welding.....	16
6.1 General requirements.....	16
6.1.1 General.....	16
6.1.2 Working area.....	16
6.1.3 Layout of weld joints.....	17
6.1.4 Types of weld joints.....	17
6.1.5 Weld fit-up.....	17
6.1.6 Different wall thickness.....	17
6.1.7 Laminations.....	17
6.1.8 Interaction of longitudinal or spiral seams at a girth weld.....	17
6.2 Joint preparation.....	18
6.2.1 Joint end preparation.....	18
6.2.2 Alignment of the joints.....	18
6.3 Preheating.....	19
6.4 Tacking.....	19
6.5 Welding.....	19
6.6 Actions after welding.....	20
6.7 Repair of weld defects.....	20
6.8 Destructive testing of production welds for DP over 16 bar.....	20
7 Attachment-, and in-service welding.....	21
7.1 General.....	21
7.2 Attachment of structural parts.....	21
7.3 Attachment of cathodic protection connections.....	21
7.4 Hot-tapping and other welding work on in-service pipelines.....	21
8 Inspection of the weld joint.....	22
8.1 General.....	22
8.2 Scope of inspection.....	22
8.3 Non-destructive testing, assessment levels and acceptance criteria.....	23
8.4 Time of inspection.....	25
8.5 Tie in welds for DP over 16 bar.....	25

8.6	Recording of test results	25
8.7	Requirements for records and documentation	25
9	Metering, regulating and compressor stations.....	26
Annex A (normative) Qualification of pipeline welders and operators of mechanized welding equipment for steel pipelines		27
A.1	General	27
A.2	Additional requirements to EN ISO 9606-1:2017 and EN ISO 14732:2013	27
A.2.1	Welded length	27
A.2.2	Welding conditions	27
A.2.3	Confirmation of the validity	27
A.2.4	Revalidation of the welder	27
A.2.5	Revocation of Qualification	28
A.2.6	Welders Qualification Test certificate	28
A.2.7	Designation	28
A.3	Additional requirements for operators of mechanized welding equipment.....	28
Annex B (informative) Testing of lamination defects.....		29
Annex C (informative) Time-of-flight diffraction technique (TOFD).....		30
C.1	General	30
C.2	Additional and substitutional requirements to EN ISO 10863:2011	30
C.2.1	Addition to the whole document EN ISO 10863:2011	30
C.2.2	Addition to EN ISO 10863:2011, Clause 3 “Terms and definitions”	30
C.2.3	Addition to EN ISO 10863:2011, Clause 5, “Examination Levels”	32
C.2.4	Addition to EN ISO 10863:2011, 7.2.2, “Ultrasonic probes”	32
C.2.5	Substitution of EN ISO 10863:2011, Clause 11, 3 rd paragraph “Weld testing”	32
C.2.6	Substitution of EN ISO 10863:2011, 12.5.2 “Sizing”	32
Annex D (normative) Critical aspects for hot-tap welding or welding on in-service pipelines		38
D.1	General	38
D.2	procedural requirements	38
D.3	Supervision	39
D.4	Safety precautions.....	39
D.5	Welding consumables	40
D.6	Welding procedure specification (WPS)	40
D.7	Welding Procedure Qualification for in-service welding.....	40
D.8	Qualification of the welder.....	40
D.9	Weld preparation long seam	40
D.10	Weld preparation circular seam	41
D.11	Repairs.....	41

prEN 12732:2020 (E)

D.12	Non-destructive testing.....	41
D.13	Pressure test.....	41
D.14	Documentation.....	41
Annex E (normative) AUT examination of joints		42
E.1	Scope.....	42
E.2	General Requirements	42
E.3	AUT Quality assurance	42
E.3.1	Content of the procedure.....	43
E.3.2	Ultrasonic system equipment and components.....	45
E.3.3	Reference blocks	45
E.3.4	Recorder set-up	46
E.3.5	Circumferential scanning velocity	46
E.3.6	Software.....	46
E.3.7	Reference line, band position and coating cut-back.....	46
E.3.8	Operators	47
E.3.9	Calibration (Sensitivity Setting).....	47
E.3.9.1	Initial static calibration	47
E.3.9.2	Gate settings.....	48
E.3.9.3	Recording threshold	48
E.3.9.4	Dynamic calibration.....	49
E.3.9.5	Recording of set-up data.....	49
E.4	Field Inspection	49
E.5	Adjustments of the AUT system	51
E.6	Acceptance criteria tier 1	51
E.7	Acceptance criteria tier 2	53
Annex F (informative) Manual ultrasonic testing of weld joints for wall thickness between approximately 6 mm and 8 mm		57
F.1	General.....	57
F.2	Setting of range	57
F.3	Sensitivity adjustment when using the Distance Gain Size method	57
Annex G (normative) EPRG acceptance criteria.....		61
G.1	EPRG defect acceptance levels and defect limits	61
G.1.1	Requirements	62
Annex H (normative) Visual acceptance criteria according EN ISO 5817:2014		69
Annex I (normative) RT acceptance criteria according to EN ISO 10675 and EN ISO 5817:2014.....		71
Annex J (normative) Alternative method and acceptance criteria for UT inspection.....		73

Iteh STANDARD PREVIEW
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020>

<https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020>

J.1	Distance Gain Size method	73
J.2	Comparative Element method	73
J.3	General	73
Annex K (informative) Brazing and stud welding of leads for cathodic protection systems		75
K.1	Joining techniques.....	75
K.2	Procedure qualification.....	75
K.3	Operation qualification	76
K.4	Production joints	76
Annex L (informative) Significant technical changes between this European Standard and the previous edition.....		77
Bibliography		78

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN 12732:2020](https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020)

<https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020>

prEN 12732:2020 (E)**European foreword**

This document (prEN 12732:2020) has been prepared by Technical Committee CEN/TC 234 “Gas infrastructure”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12732:2013+A1:2014.

This document has been prepared under the standardization request M/17 given to CEN by the European Commission and the European Free Trade Association.

Annex L provides details of significant technical changes between this document and the previous edition.

There is a complete suite of functional standards prepared by CEN/TC 234 “Gas infrastructure” to cover all parts from the input of gas to the transmission system up to the inlet connection of the gas appliances, whether for domestic, commercial or industrial purposes.

In preparing this document, a basic understanding of gas infrastructure by the user has been assumed.

Gas infrastructure is complex and the importance on safety of its construction and use has led to the development of very detailed codes of practice and operating manuals in the member countries. These detailed statements embrace recognized standards of gas engineering and the specific requirements imposed by the legal structures of the member countries.

CEN/TC 234 will continue its work updating this standard to the latest developments at regular intervals.

oSIST prEN 12732:2020
<https://standards.cen.eu/catalog/standards/sist/75e14844-8115-441c-8a16-997e1ab706b2/osist-pren-12732-2020>

1 Scope

This document contains requirements for the production and testing of weld joints for the installation and modification, including in-service welding, of onshore steel pipelines and pipework used in gas infrastructure. This includes all pressure ranges and processed, non-toxic and non-corrosive natural gas according to EN ISO 13686 and non-conventional gases such as (injected) biomethane and hydrogen, where:

- the pipeline elements are made of unalloyed or low-alloyed carbon steel;
- the pipeline is not located within commercial or industrial premises as integral part of the industrial process on those premises except for any pipelines and facilities delivering gas to such premises;
- the pipework is not located within household installations according to EN 1775;
- the design temperature of the system is between $-40\text{ }^{\circ}\text{C}$ up to and including $120\text{ }^{\circ}\text{C}$.

For injected biomethane or hydrogen a detailed technical evaluation of the functional requirements is required, ensuring there are no other constituents or properties of the gases that can affect the integrity of the pipeline.

This document is not applicable to welds produced prior to the publication of this document.

Table 1 assigns the application areas to quality requirement categories as a function of the working pressure and pipe materials used.

When using this standard the following is defined by the pipeline operator, the applicable paragraph is given in brackets;

- a) Applicable quality requirement category. (scope)
- b) Applicable quality requirements as defined in Table 2. (4.1)
- c) Are there specific requirements on VT testing, personnel, and/or qualification. (4.1)
- d) Applicable welding qualification standards. (4.3)
- e) Are all weld metal tensile tests required. (4.3)
- f) When process 311 is used, applicable requirements for welder qualification. (4.4)
- g) For category B and C, are batch certificates required for welding consumables, when required the pipeline operator has to define the contents of the certificate. (Clause 5)
- h) For filler materials not in accordance with listed European standards, is batch qualification with WPQR allowed. (Clause 5)
- i) If overmatching weld material is required. (Clause 5)
- j) If hot deformation for misalignment compensation is allowed for materials of $R_t 0,5 \leq 360\text{ MPa}$. (6.2.2)
- k) Is the weld always to be covered after completion of welding. (6.6)
- l) For category D, requirements for repair welding procedures. (6.7)

prEN 12732:2020 (E)

- m) Extent of NDT techniques. (8.2)
- n) Alternative acceptance criteria when applicable. (8.3)
- o) When alternative criteria in accordance with Annex G are used, if alternative weld overmatching criteria are applicable.

Table 1 — Allocation to quality requirement categories

Quality requirement category	Area of activity applies to
B	≤ 5 bar Group 1.1, 1.2 and 1.4 according to CEN ISO/TR 15608 $R_{t0,5} \leq 360$ N/mm ² Examples of use: Mains and service pipes in gas distribution systems, pipework in stations
C	> 5 bar ≤ 16 bar Group 1.1, 1.2 and 1.4 according to CEN ISO/TR 15608 $R_{t0,5} \leq 360$ N/mm ² Examples of use: Pipelines including pipework in stations and gas distribution systems
D	> 16 bar ^a Group 1, 2 and 3 according to CEN ISO/TR 15608 Examples of use: Pipelines including pipework in stations and gas transmission systems
Key	
R _{t0,5} is the specified minimum yield strength according to EN ISO 3183	
NOTE 1 “Category A” for pipework up to and including 100 mbar, as mentioned in the previous version EN 12732:2000, has been incorporated in the pressure range of “Category B” and has been deleted from this table.	
NOTE 2 Gas infrastructure with a MOP up to and including 16 bar is generally dedicated to gas distribution.	
^a Pipelines having hoop stresses at design pressure up to 30 % of specified minimum yield strength ($R_{t0,5}$) and operated at a pressure up to 24 bar may be allocated to quality requirement Category C by the pipeline operator.	

Additional requirements may be specified when, for example:

- the strain on pipelines and systems,
- the materials,
- the line routing,
- the design or the welding technique

are considered critical.

This document specifies common basic principles for gas infrastructure. Users of this document should be aware that there can exist more detailed national standards and/or codes of practice in the CEN member countries.

This document is intended to be applied in association with these national standards and/or codes of practice setting out the above-mentioned basic principles.

In the event of conflicts in terms of more restrictive requirements in national legislation/regulation with the requirements of this document, the national legislation/regulation takes precedence as illustrated in CEN/TR 13737 (all parts).

NOTE CEN/TR 13737 (all parts) contains:

- clarification of relevant legislation/regulations applicable in a country;
- if appropriate, more restrictive national requirements;
- national contact point for the latest information.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

<std>EN 1708-1, *Welding - Basic welded joint details in steel - Part 1: Pressurized components*</std>

<std>EN 10204, *Metallic products - Types of inspection documents*</std>

<std>EN ISO 636, *Welding consumables - Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels - Classification (ISO 636)*</std>

<std>EN ISO 2560, *Welding consumables - Covered electrodes for manual metal arc welding of non-alloy and fine grain steels - Classification (ISO 2560)*</std>

<std>EN ISO 5817, *Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817)*</std>

<std>EN ISO 6520-1, *Welding and allied processes - Classification of geometric imperfections in metallic materials - Part 1: Fusion welding (ISO 6520-1)*</std>

<std>EN ISO 9606-1, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1)*</std>

<std>EN ISO 9692-1, *Welding and allied processes - Types of joint preparation - Part 1: Manual metal arc welding, gas-shielded metal arc welding, gas welding, TIG welding and beam welding of steels (ISO 9692-1)*</std>

<std>EN ISO 9712, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712)*</std>

<std>EN ISO 13588, *Non-destructive testing of welds - Ultrasonic testing - Use of automated phased array technology (ISO 13588)*</std>

<std>EN ISO 14171, *Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels - Classification (ISO 14171)*</std>

prEN 12732:2020 (E)

<std>EN ISO 14174, *Welding consumables - Fluxes for submerged arc welding and electroslag welding - Classification (ISO 14174)*</std>

<std>EN ISO 14175, *Welding consumables - Gases and gas mixtures for fusion welding and allied processes (ISO 14175)*</std>

<std>EN ISO 14341, *Welding consumables - Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels - Classification (ISO 14341)*</std>

<std>EN ISO 14732, *Welding personnel - Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials (ISO 14732)*</std>

<std>EN ISO 15609-1, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding (ISO 15609-1)*</std>

<std>EN ISO 15609-2, *Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 2: Gas welding (ISO 15609-2)*</std>

<std>EN ISO 15614-1, *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 (ISO 15614-1)*</std>

<std>EN ISO/IEC 17020, *Conformity assessment — Requirements for the operation of various types of bodies performing inspection (ISO/IEC 17020)*</std>

<std>EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025)*</std>

<std>EN ISO 17636-1, *Non-destructive testing of welds - Radiographic testing - Part 1: X- and gamma-ray techniques with film (ISO 17636-1)*</std>

<std>EN ISO 17636-2, *Non-destructive testing of welds - Radiographic testing - Part 2: X- and gamma-ray techniques with digital detectors (ISO 17636-2)*</std>

<std>EN ISO 17637, *Non-destructive testing of welds - Visual testing of fusion-welded joints (ISO 17637)*</std>

<std>EN ISO 17638, *Non-destructive testing of welds - Magnetic particle testing (ISO 17638)*</std>

<std>EN ISO 17640, *Non-destructive testing of welds - Ultrasonic testing - Techniques, testing levels, and assessment (ISO 17640)*</std>

<std>EN ISO 18275, *Welding consumables - Covered electrodes for manual metal arc welding of high-strength steels - Classification (ISO 18275)*</std>

<std>EN ISO 19285, *Non-destructive testing of welds - Phased array ultrasonic testing (PAUT) - Acceptance levels (ISO 19285)*</std>

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

design pressure

DP

pressure on which design calculations are based

3.2

design temperature

DT

temperature on which the design calculations are based

3.3

gas

gaseous fuel which is in a gaseous state at a temperature of 15 °C under atmospheric pressure (1,01325 bar absolute)

iTeh STANDARD PREVIEW

(standards.iteh.ai)

3.4

gas infrastructure

all pipelines, stations and installations from the input of gas to the transmission system up to the inlet connection of the gas appliances, whether for domestic, commercial or industrial purposes

<https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441c-8af6-997e1ab706b2/osist-pren-12732-2020>

3.5

gas distribution system

pipeline system including piping above and below ground and all other equipment necessary to deliver the gas to the consumer

3.6

gas transmission

activity intended to convey gas from one place to another through pipelines in order to deliver gas to distribution systems or to industrial consumers

3.7

installation

equipment and facilities for the extraction, production, chemical treatment, measurement, control, storage or off-take of the transported gas

3.8

national requirements

requirements following from applicable national legislation or national standards

3.9

onshore pipeline

buried and/or above ground pipeline including those sections laid in or across inland lakes or water courses

prEN 12732:2020 (E)**3.10****pipeline**

system of pipework with all associated equipment and stations up to the point of delivery

Note 1 to entry: This pipework is mainly below ground but also includes above ground parts

3.11**pipeline components**

elements from which a pipeline is constructed. The following are distinct pipeline elements: pipe including cold-formed bends, fittings

Note 1 to entry: Reducers, tees, factory-made elbows and bends, flanges, caps, welding stubs, mechanical joints, fabrications, manufactured from elements referred above;

Note 2 to entry: Manifolds, slug catchers, pig launching/receiving stations, metering and control runs, equipment

Note 3 to entry: Valves, expansion joints, insulating joints, pressure regulators, pumps, compressors, dedicated pressure vessels

3.12**pipeline operator**

private or public organisation authorised to design, construct, and/or operate and maintain the gas infrastructure, i.e. gas transmission operators (TSO) and gas distribution operators (DSO)

3.13**pipework**

assembly of pipes and fittings

3.14**pressure**

gauge pressure of the fluid inside the system, measured in static conditions

3.15**station**

plant or facility for the operation and/or processing of gas infrastructure

3.16**test pressure****TP**

pressure to which a part of the gas infrastructure is subjected to, to ensure safe operation

Note 1 to entry: The test pressure can be different for the different parts of the infrastructure to be tested.

3.17**weld repair**

process of repairing a defect that is discovered after the weld has been completed, by additional welding

Note 1 to entry: The repair can involve complete removal of a cylinder of pipe or removal of a localized area by grinding or other means followed by additional welding.

3.18**welder**

person who holds and manipulates the electrode holder, welding torch or blow pipe by hand

3.19**weld operator**

person who operates a mechanized welding system

3.20**welding procedure specification****WPS**

document that has been qualified and provides the required variables of the welding procedure to ensure repeatability during production welding

3.21**temper bead method**

a weld sequence where the heat-affected zone of the base material is softened as much as possible

3.22**hydrogen dissolved in metal, HDM**

the amount of diffusible hydrogen in 100 mg of weld metal

4 Quality system**4.1 General**

If required by the pipeline operator, a quality system can be applied to pipeline welding. A set of recommended quality requirements according to EN ISO 3834 (all parts) is provided in Table 2, which specifies the requirements of EN ISO 3834 (all parts) for the different categories as defined in Table 1.

Table 2 — Recommended quality requirements

Requirement relating to:	Quality requirement category in accordance with Table 1		
	B	C	D
<p>oSIST prEN 12732:2020 https://standards.iteh.ai/catalog/standards/sist/75e14844-8ff5-441e-8a16-411111111111/iso-12732-2020</p> <p>Quality system according to:</p> <ul style="list-style-type: none"> — EN ISO 3834-1 and EN ISO 3834-2 (complete) — EN ISO 3834-1 and EN ISO 3834-3 (standard) — EN ISO 3834-1 and EN ISO 3834-4 (elementary) 	+	•	•
<p>Welding coordination personnel:</p> <ul style="list-style-type: none"> — Personnel according to EN ISO 14731:2006 <ul style="list-style-type: none"> — welding engineer — welding technologist — welding specialist — — welding practitioner as defined in IIW-IAB-252-07 	+	+	•
<p>NDT</p> <ul style="list-style-type: none"> — Independent NDT company according to ISO/IEC 17020 or 17025. — personnel performing NDT to EN ISO 9712 — personnel performing Visual Testing; VT level 2, or qualification as welding practitioner or over. ^a 	•	•	•
<p>Welding procedure specification (WPS):</p>	+	+	•