DANIELI CORUS

STANDARD

WELDING STANDARD

Rev.	Approve date	Description of modification	Created by	Checked by	Approved by
0	21-JAN-2022		R. DIMITRIU	A. HASELMAYER	J. GRIPPELING

Notes:
1. Only the Owner and/or the Approver are allowed to modify this document.
2. Comments and modification requests shall be forwarded to the Owner and/or the Approver.

Project No.	Danieli Corus Document No.	Rev.	Status
P999999	**100ZD11-000-ZD0001** Item ID: 08516518/G	**0**	**FINAL**

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1. Purpose

This Standard defines DC requirements for welding, heat treatment and inspection for the fabrication of equipment.

The present Standard shall be used in conjunction international standards and DC drawings as referred to in the enquiry or PO documents.

2. Abbreviations

ABS – American Bureau for Shipping

ASME – American Society of Mechanical Engineers

ASTM – American Society for Testing and Materials

AWS – American Welding Society

BM – Base Metal

BV – Bureau Veritas

CRA – Corrosion Resistant Alloys

DC – Danieli Corus

EN – European Norm

IIW – International Institute of Welding

ISO – International Standardization Organization

ITP – Inspection and Test Plan

MT – Magnetic Testing

NDT – Non-destructive Testing

NOBO – Notified Body

PO – Purchase Order

PT – Penetrant Testing

PWHT – Post Weld Heat Treatment

RT – Radiographic Testing

TMCP – Thermo-mechanically Controlled Processed

TUV – Technischer Überwachungsverein

UT – Ultrasonic Testing

VDL – Vendor Document List

VT – Visual Testing

WPQ – Welding Personnel Qualification

WPQR – Welding Procedure Qualification Record

WPS – Welding Procedure Specification

3. Application

This Standard is applicable to welded structures and equipment designed, manufactured and tested for DC under the PO.

This Standard in not applicable to welded structures and equipment designed, manufactured and tested according to EN 1090, EN 13445-2 or PD 5500. In this case the requirements of EN 1090, EN 13445-4, -5 respectively PD 5500 shall be applied in full.

4. Abbreviations

Terms with initial capital as used in this document shall have the meanings and interpretations assigned to them in the General Purchase Conditions Danieli Corus B.V.

Standard - a set of technical definitions and guidelines that functions as instructions for the supplier;

Shall - indicates the necessity of following the indicated action;

May - indicates the advice of following the indicated action;

Can - indicates the possibility of following the indicated action.

5. References

5.1 International Standards[1]

ASME Section V	Boiler and Pressure Vessel Code – Section V – Non-destructive Examination
ASME Section VIII	Boiler and Pressure Vessel Code – Section VIII – Rules for Construction of Pressure Vessels – Division 1
ASME Section IX	Boiler and Pressure Vessel Code - Section IX – Welding, Brazing and Fusing Qualifications
ASME B31.1	Power Piping
ASTM E1316	Standard Terminology for Nondestructive Examinations
AWS A5.1	Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding
AWS A5.18	Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding
AWS B1.10	Gide for Nondestructive Examination of Welds
AWS B2.1	Specification for Welding Procedure and Performance Qualification
AWS D1.1	Structural Welding Code – Steel
EN 1011-1	Welding – Recommendations for Welding of Metallic Materials – General Guidance for Arc Welding
EN 1090-1	Execution of Steel Structures and Aluminum Structures – Requirements for Conformity Assessment of Structural Components
EN 1090-2	Execution of Steel Structures and Aluminum Structures – Technical Requirements for Steel Structures
EN 10160	Ultrasonic Testing of Steel Flat Product of Thickness Equal or Greater than 6mm (Reflection Method)
EN 10204	Metallic Products – Types of Inspection Documents
EN 13445-3	Unfired Pressure Vessels – Design
EN 13445-4	Unfired Pressure Vessels – Fabrication
EN 13445-5	Unfired Pressure Vessels – Inspection and Testing
EN 13479	Welding Consumables – General Product Standard for Filler Metals and Fluxes for Fusion Welding of Metallic Materials

[1] Latest revision of the standard is applicable unless otherwise stated

ISO 2553	Welding and Allied Processes – Symbolic Representation on Drawings – Welded Joints
ISO 3452-1	Non-destructive Testing – Penetrant Testing – Part 1: General Principles
ISO 3452-2	Non-destructive Testing – Penetrant Testing – Part 2: Testing of Penetrant Materials
ISO 3452-3	Non-destructive Testing – Penetrant Testing – Part 3: Reference Test Blocks
ISO 3452-4	Non-destructive Testing – Penetrant Testing – Part 4: Equipment
ISO 3834-1	Quality Requirements for Fusion Welding of Metallic Materials – Part 1: Criteria for the Selection of the Appropriate Level of Quality Requirements
ISO 3834-2	Quality Requirements for Fusion Welding of Metallic Materials – Part 2: Comprehensive Quality Requirements
ISO 3834-3	Quality Requirements for Fusion Welding of Metallic Materials – Part 3: Standard Quality Requirements
ISO 3834-4	Quality Requirements for Fusion Welding of Metallic Materials – Part 4: Elementary Quality Requirements
ISO 4063	Welding and Allied Processes – Nomenclature of Processes and Reference Numbers
ISO 5576	Non-destructive Testing – Industrial X-Ray and Gamma Ray Radiology - Vocabulary
ISO 5577	Non-destructive Testing – Ultrasonic Testing – Vocabulary
ISO 5817	Welding – Fusion - Welded Joints in Steel, Nickel, Titanium and their Alloys (Beam Welding Excluded) – Quality Levels for Imperfections
ISO 6520-1	Welding and Allied Processes – Classification of Geometric Imperfections in Metallic Materials – Part 1: Fusion Welding
ISO 6947	Welding and Allied Processes – Welding Positions
ISO 9001	Quality Management Systems – Requirements
ISO 9013	Thermal Cutting – Classification of Thermal Cuts – Geometrical Product Specification and Quality Tolerances
ISO 9606-1	Qualification Test of Welders – Fusion Welding – Part 1: Steels
ISO 9606-3	Approval Testing of Welders – Fusion Welding – Part 3: Copper and Copper Alloys
ISO 9606-4	Approval Testing of Welders – Fusion Welding – Part 4: Nickel and Nickel Alloys
ISO 9606-5	Approval Testing of Welders – Fusion Welding – Part 5: Titanium and Titanium Alloys, Zirconium and Zirconium Alloys

ISO 9692-1	Welding and Allied Processes – Types of Joint Preparation – Part 1: Manual Metal Arc Welding, Gas Shield Metal Arc Welding, Gas Welding, TIG Welding and Beam Welding of Steels
ISO 9692-2	Welding and Allied Processes – Types of Joint Preparation – Part 2: Submerged Arc Welding of Steels
ISO 9712	Non-destructive Testing – Qualification and Certification of NDT Personnel
ISO 10675-1	Non-destructive Testing of Welds – Acceptance Levels for Radiographic Testing – Part 1: Steel, Nickel, Titanium and Their Alloys
ISO 10863	Non-destructive Testing of Welds – Ultrasonic Testing – Use of Time-of-Flight Diffraction Technique (TOFD)
ISO 11666	Non-destructive Testing of Welds – Ultrasonic Testing – Acceptance Levels
ISO 12706	Non-destructive Testing – Penetrant Testing – Vocabulary
ISO 12707	Non-destructive Testing – Magnetic Particle Testing – Vocabulary
ISO 13916	Welding – Measurement of Preheating Temperature, Interpass Temperature and Preheat maintenance Temperature
ISO 14731	Welding Coordination – Tasks and Responsibilities
ISO 14732	Welding Personnel – Qualification Testing of Welding Operators and Weld Setters for Mechanized and Automatic Welding Of Metallic Materials
ISO 15626	Non-destructive Testing of Welds – Time-of-Flight Diffraction Technique (TOFD) – Acceptance Levels
ISO 15607	Specification and Qualification of Welding Procedures for Metallic Materials – General Rules
ISO 15608	Welding – Guidelines for Metallic Materials Grouping System
ISO 15609-1	Specification and Qualification of Welding Procedures for Metallic Materials – Welding Procedure Specification – Part 1: Arc welding
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 15609-1	Specification and Qualification of Welding Procedures for Metallic Materials – Welding Procedure Specification – Part 1: Arc welding
ISO 15613	Specification and Qualification of Welding Procedures for Metallic Materials – Qualification based on Pre-production Welding Test
ISO 17020	Conformity Assessment – Requirements for the Operation of Various Types of Bodies Preforming Inspection

ISO 17635	Non-destructive Testing of Welds – General Rules for Metallic Materials
ISO 17636-1	Non-destructive Testing of Welds – Radiographic Testing – Part 1: X- and Gamma-ray Techniques with Film
ISO 17636-2	Non-destructive Testing of Welds – Radiographic Testing – Part 2: X- and Gamma-ray Techniques with Digital Detectors
ISO 17637	Non-destructive Testing of Welds – Visual Testing of Fusion-Welded Joints
ISO 17663	Welding – Quality Requirements for Heat Treatment in Connection with Welding and Allied Processes
ISO 17671-2	Welding – Recommendations for Welding of Metallic Materials – Part2: Arc Welding of Ferritic Steels
ISO 17638	Non-destructive Testing of Welds – Magnetic Particle Testing
ISO 17640	Non-destructive Testing of Welds – Ultrasonic Testing – Techniques, Testing Levels, and Assessment
ISO 23277	Non-destructive Testing of Welds – Penetrant Testing – Acceptance Levels
ISO 23278	Non-destructive Testing of Welds – Magnetic Particle Testing – Acceptance Levels

5.2 DC Standard

No DC standards are relevant to the present standard

5.3 Nomenclature

DC / SUPPLIER / MANUFACTURER: Party who is in charge with the supply of a welded structure.

FABRICATOR / VENDOR: Parties which are touching the material (forming, cutting, welding, heat treatment, etc.) such as workshop of the fabricator or sub-suppliers, including also supplier of material (plates, forgings, casting, welding additives, etc.) as well as groups or companies for pre-assembly-, erection- or maintenance, etc.

6. Responsibilities

Fabricator/Vendor of the welded structures and equipment is responsible that all relevant standards as well as this standard are applied and executed. Fabricator shall not subcontract any activities for a welded structure without prior written authorization from DC.

DC project specific requirements as detailed on project drawings take precedence over the general requirements in this Standard

DC shall be informed in writing;

- In cases the requirements of this document cannot meet by the Fabricator/Vendor.
- If conflicts between this Standard and referenced documents are found.

Any deviation and alteration from this document requires written authorization from DC to proceed.

7. Requirements

7.1 Code-Equipment

Equipment that is subjected to a design code such as pressure vessels and heat exchangers require welding in accordance to stringent standards and to local, national or international codes, rules and law requirements.

If design is conducted as per EN/ISO or ASME/AWS-standards conduct welding and inspection have to be in line with EN/ISO or ASME/AWS.

However, mixing of standards is not allowed.

7.2 Classification of Welds

DC has classified the welding, inspection and testing in three weld classes, this has been done to help Suppliers and clarify DC requirements.

The welds are divided in 3 quality classes, each with their own requirements:

- Class W-1 (highest quality class), see Appendix 1 or Appendix 2;
- Class W-2 (middle quality class), see Appendix 1 or Appendix 2;
- Class W-3 (workmanship quality class), see Appendix 1 or Appendix 2;

The required quality classes for the different group of welds are indicated in the relevant drawings and specifications.

7.3 Documentation

Prior to commencing any welding activity, submit for DC's review and approval the required welding documentation, as per applicable weld class and VDL.

After welding is completed the welding record (as-run) shall be submitted to DC.

Supplier shall use welding symbols in accordance to an International Organization e.g. ISO 2553, IIW or AWS standards.

7.4 Flame straightening

Flame straightening can be used after welding. Supplier shall submit for DC review and approval the flame straightening procedure, which shall include as a minimum the temperature application and control.

It is not allowed to use flame straightening on TMCP materials unless their manufacturing (material) certificates shows simulated PWHT has been conducted and they have been tested in this condition.

7.5 Fe contamination

Supplier shall have stainless steel and CRA material segregated (including use of separate labelled tools) from C-Mn steel in order to avoid Fe contamination. For stainless steel and CRA welding monitoring temperature (pre-heat and interpass) it is recommended to use contact thermocouples and not use surface temperature indicator crayons.

7.6 Backing Strips

- Supplier shall make use of the same type of material for permanent backing strips (ceramic backing strips are always allowed), -rings, -spacer blocks and run off tabs as the parent materials.
- Copper backing strips are only allowed after written confirmation from DC has been obtained

7.7 Welding Surface Preparation

- The welding surface shall be free from oxides, paint, oil, grease, fat, zinc, dust or other contamination.
- Weld bevels shall be inspected by VT and PT/MT (acceptance criteria as per Appendix 1 or 2) prior to the welding operation.
- The welding surface shall be free from pits, pores, cracks, flaws, laminations, burrs, etc. due to material imperfections or resulting from the manufacturing processes or caused by slitting, punching, nibbling, thermal cutting, etc.

Tack Welding

- Tack welds shall be positioned in the melting zone of the first weld bead layer (the root layer)
- Tack welds shall be cleaned, grinded or totally removed before the actual welding.

7.8 Welding Consumables

- Supplier shall use the noblest type of metal for welds joining dissimilar metals.
- Supplier shall determine the flushing requirements and the required amount of inert gas for the backing in relation to the type of weld seam, the position and the type of materials under concern. For stainless steel and CRA welding the purging method and extent shall be approved by DC prior to use.

7.9 Welding Conditions

All work (including welding) shall be executed as much as possible in a workshop which has heating facilities. In case that work has to be performed outside in the open air Supplier shall obtain approval from the DC with respect to the conditions.

Work outside shall not take place if climatic and ambient weather conditions are forecasted such as:

- Condensation, rain or snow are present on the base material;
- Dust and fallout is present on the base material;
- Wind speed at weld location is greater than 38km/h (10.7m/s);
- Temperature outside at weld location is below -5 °C (23 °F);
- Any other condition that would have a negative effect on the quality of the weld;

Whenever work is conducted outside weather-suitable protection shall be used to ensure that the welding work performed can meet the requirements. The weather-protection is subject to approval by the DC.

8. Non-Destructive Tests

NDT shall be carried out after final heat treatment (e.g. PWHT if required) and before any painting or coating application. The time for NDT after final heat treatment is depending on the material but shall not be less than 24 hours. It is recommended to apply NDT also before PWHT in order to avoid additional heat treatment in case of repair.

NDT testing shall be conducted as per Appendix 1 or Appendix 2. NDT testing shall be either MT or PT (not both techniques). NDT testing shall be either UT or RT (not both techniques).

NDT testing is detailed in Appendix 1 or Appendix 2 however requirements detailed in drawing will always take precedence and should be followed above this specification.

9. Non Conformity

Repairs of defects is allowed in conformance with the applicable welding codes according to which the main WPS is made (ISO, EN, AWS, ASME). If weld repairs are required DC shall be informed immediately. The welding record (as-run) shall be submitted also for repairs.

If PWHT is required by the WPS and a repair is conducted after PWHT, then a new PWHT shall be conducted. The WPQR shall be made simulating the intended number of re-repairs and PWHT allowed. Supplier shall completely finish all welding prior any PWHT

Appendix 1 – ISO/EN Matrix Welding Class Requirements

The welding requirements per Welding Class, W-1, W-2 and W-3 are indicated in the following Matrix in the four Sections;

1. Welding Quality Control
2. Welding Procedures
3. Weld Personnel
4. Weld Inspection and Testing

The international ISO/EN Standards are used as basis for the quality assessment of the different weld classes.

		General Standards	Weld Class W1	Weld Class W2	Weld Class W3
1	Quality Control				
1.1	Company Quality System including Subcontractors	ISO 9001	QA/QC System in accordance with ISO 9001		
1.2	Quality Requirements for Welding	ISO 3834 series	ISO 3834-2	ISO 3834-3	ISO 3834-4
1.3	Competence of NDT - External organization	ISO 17020	Certificate required		N/A
	Competence of NDT - Internal organization	ISO 3834	Only allowed if NDT Department is independent of Production Department		N/A
1.4	Welding Plan and Weld Map		Required		N/A
1.5	Welding Coordination	ISO 3834 series	ISO 3834-2	ISO 3834-3	N/A
1.6	Parent Materials - Certificate	EN 10204	3.1 Certificate		2.1 Declaration
	Parent Materials - Inspection for lamination and/or segregations	EN 10160	S3 body E4 for edge	S2 body E3 for edge	N/A
	Parent Materials - Weld edge requirements after bevelling	EN 10160	E4		E3
	Parent Materials - Storage, Identification, Traceability	ISO 3834 series	ISO 3834-2	ISO 3834-3	N/A
1.7	Welding Consumables	EN13479	Type and grade used required approval by NOBO e.g. TUV, ABS, BV, etc		
	Welding Consumables - Certificate	EN 10204	2.2 Test Report		
	Welding Consumables - Storage and handling	ISO 3834 series	ISO 3834-2 + As per manufacturer's instruction	ISO 3834-3 + As per manufacturer's instruction	As per manufacturer's instruction
1.8	ITP		Required to be approved by DC before welding starts		Only if required by VDL
2	Welding Procedures				
2.1	Indication of weld process & general standards	ISO 25901-3 ISO 4063 ISO 6947 EN 1011-1	Applicable – for vocabulary Applicable – for nomenclature and reference numbers Applicable – for welding positions Recommended – general guidance		
2.2	Specification and qualification of welding procedures – General rules	ISO 15607 ISO 15608	Applicable		N/A
2.3	WPS	ISO 15609-1	Required		
2.4	WPQR	ISO 15614-1 ISO 15613	Required		N/A
2.5	Joint design and preparation - General	ISO 9692-1 ISO 9692-2	Applicable		
	Joint design and preparation – Thermal cutting	ISO 9013	Applicable		

		General Standards	Weld Class W1	Weld Class W2	Weld Class W3
	Joint design and preparation – Surface roughness		Maximum 500 microns		
2.6	Pre-heating weld zones - General	ISO 17671-2	Applicable		
	Pre-heating weld zones – Measurement of pre-heat and interpass temperatures	ISO 13916	Applicable		
2.7	PWHT	ISO 3834 ISO 17663	ISO 3834-2 Applicable	ISO 3834-3 Applicable	ISO 3834-4 Applicable
3	**Weld Personnel**				
3.1	WPQ	ISO 9606	Required – Mechanical testing to be performed by NOBO		
3.2	Weld operator qualification	ISO 14732	Required – Mechanical testing to be performed by NOBO		
3.3	Weld coordination personnel	ISO 14731	Required		
4	**Welding Inspection and Testing**				
4.1	General Rules NDT – Selection of NDT methods	ISO 17635	Applicable		
	General Rules NDT – Terminology	ISO 5817 ISO 5577 ISO 5576 ISO 12706 ISO 12707	Applicable – for VT Applicable – for UT Applicable – for X-ray Applicable – for PT Applicable – for MT		
	General Rules NDT – Classification of imperfections	ISO 6520-1	Applicable		
	NDT Procedures		Required to be submitted for DC's review/approval		
4.2	Qualification of NDT personnel - General	ISO 9712	Required		
	Qualification of NDT personnel executing inspection and signing report	ISO 9712	Level 2		
	Qualification of NDT personnel approving procedures	ISO 9712	Level 3		
4.3	VT - General	ISO 17637	Required		
	VT – Acceptance criteria	ISO 5817	Quality Class B	Quality Class C	Quality Class D
	VT – Extent of examination		100% of all welds		
	VT – Test Report		Required		Only if required by VDL
4.4	PT - General	ISO 3452-1	Required		N/A
	PT – Acceptance criteria	ISO 23277	Level 2X		N/A
	PT – Extent of examination		100% of all finished welds	25%[2] of all finished welds	N/A

		General Standards	Weld Class W1	Weld Class W2	Weld Class W3
	PT – Test Report		Required		N/A
4.5	MT - General	ISO 17638	Required		N/A
	MT – Acceptance criteria	ISO 23278	Level 2X		N/A
	MT – Extent of examination		100% of all finished welds	25%[2] of all finished welds	N/A
	MT – Test Report		Required		N/A
4.6	UT - General	ISO 17640[2]	Testing Level C	Testing Level B	N/A
	UT – Acceptance criteria	ISO 11666	Level 1	Level 2	N/A
	UT – Extent of examination		100% of all finished welds	25%[2] of all finished welds	N/A
	UT – Test Report		Required		N/A
4.7	RT - General	ISO 17636	Test Class B		N/A
	RT – Acceptance criteria	ISO 10675-1	Level 1	Level 2	N/A
	RT – Extent of examination		100% of all finished welds	25%[3] of all finished welds	N/A
	RT – Test Report		Required		N/A

[2] If written agreement is obtained from DC, UT can also be done as per ISO 10863 test level C for weld class W1, test level B for weld class W2 with acceptance criteria as per ISO 15626 level 1 for weld class W1 and level 2 for weld class W2.

[3] NDT shall be increased by 25% (to 50%) if ≤20% of the examined welds are rejected.

NDT shall be increased to 100% if >20% of the examined welds are rejected.

DC has the right to indicate which welds shall be inspected comprising the 25%.

All welders and weld types shall be inspected with the 25%

Appendix 2 – AWS/ASME Matrix Welding Class Requirements

The welding requirements per Welding Class, W-1, W-2 and W-3 are indicated in the following Matrix in the four Sections;

1. Welding Quality Control
2. Welding Procedures
3. Weld Personnel
4. Weld Inspection and Testing

The AWS/ASME Standards are used as basis for the quality assessment of the different weld classes.

		General Standards	Weld Class W1	Weld Class W2	Weld Class W3
1	Quality Control				
1.1	Company Quality System including Subcontractors	ISO 9001	QA/QC System in accordance with ISO 9001		
1.2	Quality Requirements for Welding	ISO 3834 series	ISO 3834-2	ISO 3834-3	ISO 3834-4
1.3	Competence of NDT - External organization	ISO 17020	Certificate required		N/A
	Competence of NDT - Internal organization	ISO 3834	Only allowed if NDT Department is independent of Production Department		N/A
1.4	Welding Plan and Weld Map		Required		N/A
1.5	Welding Coordination	ISO 3834 series	ISO 3834-2	ISO 3834-3	N/A
1.6	Parent Materials – Mill Certificate	ASME II part A	Required		
	Parent Materials - Inspection for lamination and/or segregations	ASME II part A	Required - SA 20 section 9		
	Parent Materials - Weld edge requirements after bevelling		See sections 4.4 or 4.5 below		
	Parent Materials - Storage, Identification, Traceability	ISO 3834 series	ISO 3834-2	ISO 3834-3	N/A
1.7	Welding Consumables	AWS A5.1 AWS A5.18 ASME II part C	Type and grade used required approval by NOBO e.g. TUV, ABS, BV, etc		
	Welding Consumables - Certificate	EN 10204	2.2 Test Report		
	Welding Consumables - Storage and handling	ISO 3834 series	ISO 3834-2 + As per manufacturer's instruction	ISO 3834-3 + As per manufacturer's instruction	As per manufacturer's instruction
1.8	ITP		Required to be approved by DC before welding starts		Only if required by VDL
2	Welding Procedures				
2.1	Indication of weld process & general standards	ASME IX AWS D1.1	Applicable		
2.2	Specification and qualification of welding procedures – General rules	ASME IX AWS D1.1	Applicable		N/A
2.3	WPS	ASME IX AWS D1.1	Required		
2.4	WPQR	ASME IX AWS B2.1	Required		N/A
2.5	Joint design and preparation – Surface roughness		Maximum 500 microns		

		General Standards	Weld Class W1	Weld Class W2	Weld Class W3
2.6	Pre-heating weld zones – Measurement of pre-heat and interpass temperatures		Required		
2.7	PWHT	ISO 3834	ISO 3834-2	ISO 3834-3	ISO 3834-4
		ASME VIII	UW-40		
3	**Weld Personnel**				
3.1	WPQ	ASME IX AWS D1.1	Required – Mechanical testing to be performed by NOBO		
3.2	Weld operator qualification	ASME IX AWS D1.1	Required – Mechanical testing to be performed by NOBO		
3.3	Weld coordination personnel	ASME IX AWS D1.1	Required		
4	**Welding Inspection and Testing**				
	General Rules NDT – Selection of NDT methods	ASME V AWS B1.10	Applicable		
	General Rules NDT – Terminology	ASTM E 1316	Applicable		
	NDT Procedures		Required to be submitted for DC's review/approval		
4.2	Qualification of NDT personnel - General	SNT-TC-1A	Required		
	Qualification of NDT personnel executing inspection and signing report	SNT-TC-1A	Level 2		
	Qualification of NDT personnel approving procedures	SNT-TC-1A	Level 3		
4.3	VT - General	ASME V art 9 AWD D1.1 chapter 6	Required		
	VT – Acceptance criteria	AWS D1.1 chapter 6	Cyclically loaded nontubular connections (Table 6.1)	Statically loaded nontubular connections (Table 6.1)	
		ISO 5814	Quality Class B	Quality Class C	Quality Class D
	VT – Extent of examination		100% of all welds		
	VT – Test Report		Required		Only if required by VDL
4.4	PT - General	ASME V art 6	Required		N/A
	PT – Acceptance criteria	ASME VIII	Appendix 8		N/A
	PT – Extent of examination		100% of all finished welds	25%[3] of all finished welds	N/A
	PT – Test Report		Required		N/A
4.5	MT - General	ASME V art 7	Required		N/A

		General Standards	Weld Class W1	Weld Class W2	Weld Class W3
	MT – Acceptance criteria	ASME VIII	Appendix 6		N/A
	MT – Extent of examination		100% of all finished welds	25%[3] of all finished welds	N/A
	MT – Test Report		Required		N/A
4.6	UT - General	ASME V	Article 4		N/A
		AWS D1.1	Chapter 6		
	UT – Acceptance criteria	ASME VIII	Appendix 12		N/A
		AWS D1.1	Class B (Table 6.3)	Class B (Table 6.2)	
	UT – Extent of examination		100% of all finished welds	25%[3] of all finished welds	N/A
	UT – Test Report		Required		N/A
4.7	RT - General	ASME V	Article 2		N/A
	RT – Acceptance criteria	ASME VIII	UW 51	UW 52	N/A
	RT – Extent of examination		100% of all finished welds	25%[4] of all finished welds	N/A
	RT – Test Report		Required		N/A

[4] NDT shall be increased by 25% (to 50%) if 20% of the examined welds are rejected.

NDT shall be increased to 100% if more than 20% of the examined welds are rejected.

DC has the right to choose which welds shall be inspected to form the 25%.

All welders and weld types shall be inspected in the 25%

Appendix 3 – Danieli Corus Weld Plan – Example

Project: [Insert Project Name and Number] Doc NO / Rev: [Insert Weld Pland Doc No] Issue Date: [Insert Date] Part Name: [Insert Part Name]					**WELD PLAN** Manufact. Spec.: [Insert Doc. No.] Welding Spec.: [Insert Doc. No.] Drawing No: [Insert Doc. No.]							**DANIELI CORUS** Purchaser: Danieli Corus Ref. No: [Insert PO Number]						**SUPPLIER** Ref. No: [Insert Supplier ref. No]		
Weld ID No	Joint Type	Part ID1/ID2	Weld class	WPS Doc No	WPQR Doc No	WPQ ID	Fit-Up A/NA	Intended NDT [%]				VT [100 %]		PT/MT		UT/RT		Pre-HT [degC]	PWHT [degC]	Remarks
								PT	MT	UT	RT	Report No	A/NA	Report No	A/NA	Report No	A/NA			
1	FW	Ref	W1	Ref	Ref	Ref	A		100		100	Ref	A	Ref	A	Ref	A	150	-	
2	FW	Ref	W3	Ref	Ref	Ref	A		-		-	Ref	A	-	-	-	-	50	-	
3	FW	Ref	W2	Ref	Ref	Ref	A		25		25	Ref	A	Ref	A	Ref	A	100	-	
4	CJP	Ref	W1	Ref	Ref	Ref	A		100		100	Ref	A	Ref	A	Ref	A	100	450	
4-R	CJP	Ref	W1	Ref	Ref	Ref	A		100		100	Ref	A	Ref	A	Ref	A	100	450	
5	PJP	Ref	W1	Ref	Ref	Ref	A		100		100	Ref	A	Ref	A	Ref	A	100	450	

Suplemental Instructions:
1. Bring related drawing(s) in annex indicating unique Weld ID No and examination ares for partial NDT regarding weld class W2
2. Repeat Weld ID No extended with "-R" for loging repair weld
3. Indicate joint type (acc. AWS A3.) - R (Root), FW (Filet Weld), PJP (Partial Joint Penetration), CJP (Complete Joint Penatration)
4. Indicate Part ID No according to drawing / bill of material
5. Fit-up check includes sufcace quality and geometry of weld preparation including root openeing
6. Indicate acheived examinaion ststus through A (accepted) or NA (not accepted)
7. 100% VT is mandatory to all finished welds
8. Indicate intendedNDT initially through "extent %" in respective colums

	Created	Checked	Approved
Supplier			
Danieli Corus			
Clienmt			
Inspector			

Appendix 4 – Danieli Corus Weld Map – Example