

SPRS Retreatment Plant: General Manufacturing Specification – Mechanical Equipment

Project title: **SPRS Retreatment Plant (SRP)**

Project number: **35/09592**

Bldg name/number: **B2014**

Document ref: **SP/SRP/MECH/00096/K**

Configuration Cat: **Support**

Functional Hierarchy: **N/A**

System Number: **Various**

Date of issue: **11-Jan-2022**


Author: **Chris Edwards**

Department: **Mechanical**

Group: **Engineering**

Checked by: **P G Tidbury**

Level of checking: **Level 3**

Checker's signature: 

Date: **11th January 2022**

Approved by: **Mike Williams**

Approver's position: **SRP Glove Box Mechanical RE**

Approver's company: **Purchaser**

Approver's signature:



Date: **11/01/2022**

Approved for issue: **Issued for Manufacture**

OFFICIAL

Copyright NDA 2019. This document contains proprietary information for use in association with the Sellafield M&O contract. It may be copied and distributed as required for this purpose. It may additionally be distributed to other Site Licence Companies and used to support Management and Operations work in the Authority Field of Use (as defined in the 2004 Energy Act). Permission to copy or use the information for any other purpose should be sought from the Intellectual Property Manager, Sellafield Ltd

Circulation list

Purpose of issue: 1 For comment
2 For action
3 For information

Name	Location	No of copies	Remarks	Log-on ID	Purpose of issue
John Lord	Hinton House	1		n/a	3
John Mooney	Hinton House	1		n/a	3
Chris Edwards	Hinton House	1		CE39	3
Ian Gravener	Hinton House	1		IG34	3
Neil Bell	Hinton House	1		NB92	3
Paul Quinn	Hinton House	1		PCQ001	3
Phil Tidbury	Hinton House	1		PGT001	3
Tom Christie	Hinton House	1		TAC11	3
Tom Dillon	Hinton House	1		TD58	3
Derek Bromley	Hinton House	1		n/a	3
Scheisy Ferrer	Hinton House	1		n/a	3
Emily Goldie	Hinton House	1		n/a	3
Mike Williams	Hinton House	1		n/a	3
Grace Frost	Hinton House	1		n/a	3
John McMahon	Hinton House	1		n/a	3
Joanna Heaton	Hinton House	1		n/a	3
Paul Anderson	Hinton House	1		n/a	3
Paul Joyce	Hinton House	1		n/a	3
Andy Postlethwaite	Hinton House	1		n/a	3
Fran Pickup	Hinton House	1		n/a	3
Stephen Martland	Hinton House	1		n/a	3
Sam Creed	Hinton House	1		n/a	3
Mike Bradley	Hinton House	1		n/a	3
Kevin Orme	Hinton House	1		n/a	3
Andrew Pollitt	Hinton House	1		n/a	3

History sheet

Issue	Date	Reason for issue	Issued by
A	13-Feb-2019	Issued for Comment	M Anders
B	22-May-2019	Issued for Manufacture	M Anders
C	17-Jan-2020	Fully Revised for Manufacturability	C Edwards
D	24-Feb-2020	Section 25.2 – “CS / NS / NSS Clarification of Requirements” reworded to simplify the CS documentation requirements	C Edwards
E	16-Jun-2020	Section 4.1.1 ISO 9001 Accreditation revised to include internationally accepted equivalent	C Edwards
F	17-Aug-2020	Section 4 Proprietary equipment certification added. Section 4.13 Elastomeric Seals – Viton Type A Items section added for Containment Seals Section 10.2 Salt Contamination Testing reworded. Section 10.1 Ferroxy Testing reworded.	C Edwards
G	4-Dec-2020	Contractor, Sub-Contractor definitions replaced with Purchaser and Supplier throughout document. Defect definition amended. Cavendish Nuclear Limited / CNL documentation replaced with purchaser documentation and references. Cleaning guidance document removed. References section amended. Section 25.2 example 2, two additional examples added for NS component to CS assembly and NS component to NSS assembly. Requirement to issue Specialist procedures and processes to Client SME added.	C Edwards
H	15-June-2021	Section 4 “that form part of the Containment” added to section. Section 4.1.1 statement “All material shall be of British or Western European origin” removed. Section 4.9 BS standard changed to BS3909/2. Section 4.9 Quality Category now states NS / NSS (was just NSS).	C Edwards

History sheet

Issue	Date	Reason for issue	Issued by
		Section 4.10 Beechwood and Lead Layer density added.	
		Section 4.10 Painting requirements now specify Detail Design Drawings.	
J	01 Sept 2021	Wording in section 3.1.2 revised to clarify project requirements.	C Edwards
		NS added to quality category in section 10.3 (Passivity Test) in line with SDRL quality category requirements.	
		Acceptance statement added to section 4.5.5 (Bars) reference Sulphur content.	
K	11 Jan 2022	Wording in section 16.1 revised to clarify requirements for Bolt torquing record requirements.	C Edwards
		Wording in section 3.1.2 revised to further clarify requirements.	
		Pipe bending procedure review by client SME removed from section 5.6 (CS Quality Category).	
		Heat treatment procedure review by client SME removed from section 7.1 (CS Quality Category).	
		Note added to Section 4.5.4 stating acceptable sheet thickness.	
		HB and Brinell Hardness added to Definitions / Abbreviations.	
		Brinell Hardness testing requirements - BS EN ISO 6506-1, BS EN ISO 6506-2, BS EN ISO 6506-3, and BS EN ISO 6506-4 added to Appendix A.	
		Conversion of Hardness Values - BS EN ISO 18265 added to Appendix A.	
		Hardness testing in Appendix B now states option to use BS EN ISO 6506-1 or BS EN ISO 6507-1 and also states Alternative hardness testing methodologies are acceptable.	
		Acceptance shall be equivalent to the HV or HB value specified in BS EN ISO 18265.	
		Section 8.8 Weld Procedures – Wording from “Bespoke” to “Client SME” removed (CS Quality Category).	
		Wording in section 10 revised to clarify requirements for Cleaning of Completed Fabrications.	

History sheet

Issue	Date	Reason for issue	Issued by
		CNL Document Number SN-00878_SPEC_0039_K removed.	

Contents

Circulation list	2
History sheet	3
Definitions/Abbreviations	10
1 Purpose / Scope	11
2 Introduction	11
2.1 Technical Order of Precedence	11
3 Scope of Supply	11
3.1 Quality and Programme	11
3.1.1 Overall Quality Requirements	11
3.1.2 Quality Management System	12
3.1.3 Quality Documentation	13
3.1.4 Quality Plan(s) and Inspection and Test Plan(s)	13
3.2 Production Permits, Concessions and Technical Queries	13
3.2.1 Production Permit (Specification Deviation)	14
3.2.2 Concession	14
3.2.3 Technical Query	14
3.2.4 Non-Conformance	14
4 Materials and Proprietary Equipment	14
4.1 Materials	14
4.1.1 Material Origin	14
4.1.2 Acceptance of Materials	15
4.1.3 Storage and Handling	15
4.1.4 Contact Materials for Stainless Steel Fabrications	15
4.1.5 Transfer of Material Identification	16
4.2 Proprietary Equipment	16
4.3 Self-lubricating Bearing and Materials	16
4.4 Materials – General	16
4.5 Stainless Steel	17
4.5.1 Mechanical Tube	17
4.5.2 Pipes	17
4.5.3 Pipe fittings	17
4.5.4 Plate, Sheet and Strip	17
4.5.5 Bars	18
4.5.6 Sections	18
4.6 High Tensile Stainless Steel	18
4.7 Carbon Steel	19
4.8 Aluminium	19
4.9 Lead for Shielding	19
4.10 Laminated Beechwood Panels (Neutron Shielding)	19
4.11 Thermal Insulation	19
4.12 Viewing Panels	20
4.13 Containment Seals - Elastomeric Seals - Viton® Type A Items	20
5 Fabrication	20
5.1 Pipework	20
5.2 Shells (Containments and Enclosures)	20
5.3 Cutting of Materials	21
5.4 Manipulation of Material	21
5.5 Plate Bending of Stainless Steel	21
5.6 Pipe Bending	21
5.7 Hot Bending	22
6 Welding	22

6.1	Welding – General.....	22
6.2	Welding Schedule	23
6.3	Welding – Stainless Steel.....	23
6.4	Welding – Carbon Steel	23
7	Heat Treatment Requirements.....	23
7.1	General	23
7.1.1	Heat Treatment Temperatures	24
7.1.2	Hot Working.....	24
7.1.3	Rectification of Distortion	24
7.1.4	Vibratory Stress Relief	24
7.1.5	Descaling – Chemical Process	25
7.1.6	Descaling – Mechanical Process	25
7.2	Surface Texture.....	25
7.3	Tolerances.....	25
8	Management of Welding Activities.....	25
8.1	Welding Responsibility / Supervision	25
8.2	Weld Procedure Qualification by Others.....	26
8.3	Welder Qualifications	26
8.4	Consumables / Filler Material.....	26
8.5	Issue of Filler Materials	26
8.6	Welding Equipment	27
8.7	Weld Processes	27
8.8	Weld Procedures.....	27
8.8.1	Laser Beam Welding.....	27
8.8.2	Arc Stud Welding	27
8.8.3	Spot Welding	28
8.8.4	Seam Welding	28
8.9	Cleanliness of the Welded Surface.....	28
8.10	Joint Preparation	28
8.11	Proximity of Welds.....	29
8.12	Setting up Prior to Welding.....	29
8.13	Tack Welds	29
8.14	Welding Technique	30
8.15	Welding Environment	30
8.16	Purging	30
8.17	Fillet Welds.....	30
8.18	Weld Attachments to Thin Material.....	31
8.19	Butt Welds	31
8.20	Dissimilar Metals.....	31
8.21	Interpass Temperature	31
8.22	Grinding.....	31
8.23	Root profile.....	31
8.24	Weld Finish Reinforcement.....	32
8.25	Removal of Temporary Fittings	32
8.26	Weld Repair and Rectification.....	32
8.27	Post-weld Finish and Cleaning of Stainless Steel Welds.....	32
8.28	Heat Tint	33
9	Non Destructive Testing	33
9.1	NDT Schedule	33
9.2	NDT/Weld Inspection Operative Qualifications.....	33
9.3	Fabricated Lifting Features and Accessories	33
9.4	NDT Procedures.....	34
9.5	NDT Methods and Standards	34
9.5.1	Inspection Sequence	34

9.5.2	Visual Inspection.....	34
9.5.3	Liquid Penetrant Inspection.....	34
9.5.4	Magnetic Particle Inspection	35
9.5.5	Ultrasonic Testing	35
9.5.6	Radiographic Examination	35
9.5.7	Ferrite Checks (if applicable)	35
9.5.8	Stud Weld Testing	36
10	Cleaning of Completed Fabrications	36
10.1	Ferroxyl Testing.....	36
10.2	Salt Contamination Testing.....	37
10.3	Passivity Test (Stainless Steel Only).....	37
10.4	Rectification	37
11	Screw Threads and Fasteners	37
11.1	General.....	37
12	Lubricants (excluding thread lubrication)	38
13	Surface Preparation and Painting	38
13.1	Painting – Stainless Steel.....	38
13.2	Painting – Carbon Steel.....	38
13.3	Marking / Painting / Labelling.....	38
13.4	Renovation / Rectification of Damaged Areas	38
14	Identification and Marking	38
15	Inspection and Testing.....	38
15.1	In-Process Inspection and Notification	38
15.2	Testing.....	39
15.3	Purchaser Surveillance	39
15.4	Final Inspection of Completed Fabrications	39
16	Assembly.....	39
16.1	General Fasteners Torques.....	39
17	Lifting Points – Load Testing.....	39
17.1	Fabricated Lifting points	39
17.2	Lifting Points.....	39
17.3	Proof Load Testing	40
18	Health and Safety.....	40
18.1	Lifting and Lifting Plans	40
18.2	Method Statements.....	40
18.3	Risk Assessments	40
19	Factory Acceptance Testing.....	40
19.1	Factory Acceptance Test Procedure	40
19.2	Factory Acceptance Test Report	41
19.3	Pipework Testing	41
19.4	Glove Box Alignment Check	41
19.5	Static Mechanical Checks	41
19.6	Totally Enclosed (Box) Section Leak Test	41
19.7	Containment Leak Testing	42
19.8	Safety Precautions.....	42
19.9	Temporary Windows.....	42
19.10	The Sharps Audit	42
20	Red Line Drawings	42
21	Cleaning	43
22	Packaging.....	43
22.1	Lubricants and Hydraulic Fluids.....	44
23	Final Sign Off and Release.....	44
24	Despatch and Delivery	44

25 Documentation / Lifetime Records.....	44
25.1 Lifetime Records.....	45
25.2 CS / NS / NSS Clarification of Requirements	45
26 References	47
Appendix A – Applicable Standards.....	49
American Standards (ASTM and AWS)	49
British, European and International Standards	49
Appendix B – ES Standards Guidance Tables	52
ES_0_5502_2 Issue 3 – Pipe, Cold-finished, Seamless Stainless Steel	52
ES_0_5512_2 Issue 2 – Butt Weld Pipe Fittings, Cold Formed, Stainless Steel	53
ES_0_5522_2 Issue 4 – Stainless Steel Plate, Sheet and Strip	54
ES_0_5562_2 Issue 2 – Stainless Steel Bar	55
ES_0_5572_2 Issue 3 – Hot and Cold Formed Sections, Stainless Steel	56

Definitions/Abbreviations

Abbreviations	Meaning
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BS	British Standard
Client	Sellafield Limited
CoC	Certificate of Conformity
CON	Concession
Containments	Containment is considered to be either a Glove Box or an Enclosure.
Purchaser	Purchaser (as defined in the Contract)
CSWIP	Certification Scheme for Weld Inspection Personnel
Defect	As defined in clause 11. 2. (3) of the Contract
DoC	Declaration of Conformity
Enclosure	An Enclosure is a type of containment which once in use has typically lower expected contamination levels than a Glove Box. For the purposes of this specification Enclosures and Glove Boxes are to be manufactured and tested to the same requirements.
ES	SL Engineering Standard
FME	Foreign Material Exclusion
Glove Box	A total enclosure with viewing windows and facilities for gloved hand entry, in which material may be manipulated in isolation from the operators' environment.
HB	Brinell Hardness
HV	Vickers Hardness
Inspector	Purchaser's Nominated Inspector
IRN	Inspection Release Note
ISO	International Standard Organisation
LEEA	Lifting Equipment Engineers Association
LPI	Liquid Penetrant Inspection
LTR	Lifetime Records
MMA	Manual Metal Arc
MPI	Magnetic Particle Inspection
NDT	Non Destructive Testing
NoI	Notification of Inspection
NPoC	Nominated Point of Contact
O&M	Operation & Maintenance
PARJO	The name given to a method for the leak rate assessment of containments operating at pressures close to atmospheric values
PCN	Personnel Certification in Non-Destructive Testing
PP	Production Permit
PPE	Personal Protective Equipment
QMS	Quality Management System
SDR	Supplier Document Requirements
SDRL	Supplier Document Requirements List
Shielded Glove Box	A Glove Box which incorporates sufficient thickness of shielding material to allow radioactive materials to be handled safely making the dose to hands the controlling factor rather than the whole body dose.
SLF	Sellafield Limited Form
SME	Subject Matter Expert
SPRS	Sellafield Product & Residue Store
SRP	SPRS Retreatment Plant
Supplier	Supplier (as defined in the Contract) Organisation responsible for undertaking The Works
TIG	Tungsten Inert Gas

Abbreviations	Meaning
TQ	Technical Query
UKAS	United Kingdom Accreditation Service
UT	Ultrasonic Testing
WPS	Weld Procedure Specification

1 Purpose / Scope

This specification details the requirements for the manufacture, inspection, factory testing of Containments, Enclosures and associated equipment to be supplied to support the SPRS Repackaging Plant (SRP). This includes the following;

1. A series of new shielded Glove Boxes.
2. A series of new unshielded Glove Boxes.
3. A series of ventilated Enclosures.
4. Associated Glove Box / Enclosure internal and external equipment.
5. Packaging and despatch of the equipment for delivery.

This General Manufacturing Specification shall be read in conjunction with the manufacturing documentation which comprises of Contract Quality Requirements Document, Detail Design Drawings, General Manufacturing Notes Drawing (Ref 9), Contractual Documentation, Specific Specifications and the various References. If any information within this specification contradicts with any information on the Detail Design Drawings or contained within other Contractual Documentation it shall be drawn to the attention of the Purchaser at the earliest opportunity via Technical Query.

2 Introduction

This General Manufacturing Specification covers the requirements for the Mechanical Plant and Equipment associated with the SPRS Repackaging Plant.

As appropriate, each package of work issued by the Purchaser will be accompanied by this General Manufacturing Specification and equipment specific documentation.

It shall be noted that this Specification is of a general nature, being compiled to cover all those elements that are common to this type of work. In this respect certain clauses may not be applicable to the work in hand, as dictated by its content. Equipment specific Specifications shall therefore take precedence where applicable.

2.1 Technical Order of Precedence

The technical order of precedence shall be as shown below, unless any sub-contract terms and conditions dictate otherwise:-

1. Design Drawings
2. Equipment specific specifications
3. General Manufacturing Specification (this document)
4. SDRL/SDR
5. ES Standards
6. BS/EN Standards

3 Scope of Supply

The Supplier shall procure all materials, manufacture, inspect, test and package all equipment as specified within the equipment specific Specifications in accordance with the accompanying Contract documentation and this Specification, ready for delivery to a location specified within the Contract.

The Supplier shall be responsible for the design, manufacture, factory testing and supply of all tooling, jigs, fixtures and temporary lifting points that are required for the manufacture of all equipment as specified within the equipment specific Specifications.

3.1 Quality and Programme

3.1.1 Overall Quality Requirements

The equipment associated with the SRP project will be assessed by the Purchaser in consultation with the Client and a decision made on which specific equipment shall be designed and manufactured to Commercial, Nuclear Standard or Nuclear Standard Significant. This designation will dictate the level of Assurance and Oversight that

shall apply to the specific equipment and allow the Supplier to supply the appropriate level of documentation and inspection to support the manufacture / supply of equipment to meet the Quality Requirements.

All equipment will be allocated a Quality Requirements category; this will be clearly identified on the Detail Design Drawings / Parts lists.

The Quality Requirements defined on the Drawings / Part Lists are as follows:

- CS Commercial Standard** – An assembly that is delivered, manufactured, assembled, tested, assured to the Suppliers own processes, methods, procedures and international standards. The normal functionality meets SRP requirements. This may also be applied to standard and bespoke items that are designed and / or manufactured to commercial standards. Receipt inspection only, no requirement for inspection visits; equipment comes with the manufacturer's documentation only i.e. Declaration or Certificate of Conformity (DoC (manufactured item) or CoC (purchased item)).
- Each sub-section relating to material, fabrications, welding, weld testing and cleaning etc. identifies the **CS** quality requirements.
- NS Nuclear Standard** – As specified in the Commercial Standard above.
- Any additional assurance and oversight required by the Purchaser will be specified in the Supplier Document Requirements List (SDRL). Inspection visits may be requested by the Purchaser, equipment comes with the Suppliers documentation and additionally, those documents identified in the SDRL.
- NSS Nuclear Standard Significant** - An assembly/part (SRP design or supplier design) supplied specifically for the project that will be manufactured tested and inspected in accordance with this document.

Due to the range of fabrications which may be manufactured to this standard the Supplier shall ensure that welding quality requirements conform and are compliant with the following:-

Quality Category	Standard	Description
CS	BS EN ISO 3834-3	Fusion Welding - Standard Quality Requirements
NS	BS EN ISO 3834-3	Fusion Welding - Standard Quality Requirements – Plus Additional Quality Requirements
NSS	BS EN ISO 3834-2	Fusion Welding - Comprehensive Quality Requirements

3.1.2 Quality Management System

The Supplier shall, for all work covered by the contract, establish and implement quality management system arrangements relevant to the scope of the contract in accordance with SLM 4.06.02 (Ref 25).

The relevant requirements within this specification and other contract documentation will be flowed down to all appropriate tiers of the supply chain.

It is the intention that all suppliers shall be able to meet the requirements of SLM 4.06.02 section 2 (Ref 25). All sub-suppliers shall be assessed by the supplier using a risk based approach, based on the scope of supply.

The Client will approve sub-suppliers using Intention to use Sub-Suppliers (ITSS) form(s).

The supplier shall submit Intention to use Sub-Suppliers (ITSS) form(s) which detail any controls or mitigations.

In the event a sub-supplier is unable to meet any of the requirements of SLM 4.06.02 section 2 (Ref 25), the ITSS form should detail the reasons for using the sub-supplier, along with the controls and mitigations to be deployed to address any potential risk or shortfall.

Example mitigations / Controls –

- A preferred supplier noted on drawing
- Previous history of supply
- Low risk scope of supply
- Additional controls, surveillance or inspection to be put in place
- Supplier audits completed (supported by reports)
- Supplier accreditations
- Approved stockist
- No alternative supplier available
- etc.

All sub-suppliers will be reviewed on a case by case basis by all parties, based on the information in the ITSS form(s) and supporting evidence provided.

All sub-suppliers shall be approved by the Supplier and the Client prior to their use.

3.1.3 Quality Documentation

Documentation for approval shall, where practicable be provided as a 'package' in accordance with the Contract requirements and not issued as individual documents on an ad-hoc basis. If this is not achievable due to the size of the package of work, a planned approach can be used subject to the Purchasers Project Manager and nominated Quality Engineer(s) agreement.

The Supplier should check and approve all documentation prior to submission to the Purchaser to avoid any unnecessary amendments / changes. Any amendments must be recorded within the document on an amendment page.

It will be agreed at the kick off meeting any resource support that may be required from the Purchaser to expedite these requirements as efficiently as possible.

All quality documents shall be marked with the Purchasers Contract number and project number.

3.1.4 Quality Plan(s) and Inspection and Test Plan(s)

Prior to commencing manufacture, the Supplier shall gain acceptance of manufacturing activity based Quality Plan(s) and / or Inspection & Test Plan (as required). These plans shall detail inspection and testing requirements, as well as identify Supplier and Purchaser witness or review points. All Quality Plan(s) and Inspection & Test Plans shall conform to Purchaser Quality Procedure Ref. SLP 2.15.01 (Ref 8) and SLF 2.15.01.01 (Ref 11) (SLM 4.06.02).

The content shall be to an agreed build sequence format and shall identify all resources, tests, intermediate and final inspections necessary to demonstrate the work meets contract requirements.

Dependent upon the size and complexity of the work scope it may be beneficial to generate more than one Quality Plan or sub-assembly Inspection & Test Plan (ITP). In these instances, a top level Quality Plan should be prepared for the scope and make reference to each individual sub-Quality Plan or ITP (where applicable). Benefits of this approach gives improved controls for specific activities to be completed concurrent with each phase of work i.e. build / delivery over a period of time. The Supplier is to perform regular checks to ensure Quality Plan or ITP activities are being signed off by all parties in a progressive / timely manner, the Client and Purchaser shall support this with best endeavours.

The Supplier shall document in Quality Plan(s), controls to be applied to its own Suppliers. Any change to an accepted Quality Plan or Inspection and Test Plan shall be resubmitted to the Purchaser for review. Special Process procedures denoted within Quality Oversight Arrangements form and/or Purchaser Supplier Documents Requirements Listing (SDRL), shall be identified within the Quality Plan and Inspection & Test Plans. These procedures, where specified will require approval by the Purchaser. Typical special processes include, but not limited to welding, heat treatment, non-destructive testing and material finishes.

The Purchaser reserves the right to identify surveillance inspection, witness, hold points in the Quality Plan and / or Inspection & Test Plans. The representative of the Purchaser may identify hold points which work must not proceed without verification and / or permission. If work commences prior to acceptance of the Quality Plan, or work progresses past a hold point without the required sign off on the Quality Plan, the Supplier shall notify the Purchaser at the earliest opportunity using a Non-Conformance Report (NCR) requiring corrective and preventive action, refer to Purchaser Non Conformance procedure SLP 2.15.01 (Ref 8) and SLF 1.03.124 (Ref 20) (SLM 4.06.02).

The Supplier shall provide the Purchaser with a minimum of five working days' notice of a Quality Plan or ITP hold point requiring Purchasers attendance within the UK. The Supplier shall provide the Purchaser with a minimum of ten working days' notice of a Quality Plan hold point requiring the Purchaser attendance outside the UK.

3.2 Production Permits, Concessions and Technical Queries

When the Supplier identifies a requirement for a Production Permit or Concession or Technical Query, they should formally submit a request to the Purchaser. In such cases the Production Permit or Concession or Technical Query will be generated by the Supplier using form SLP 1.02.18 (Ref 4) and SLF 1.02.18.01 (Ref 7) (SLM 4.06.02).

Points to note with respect to Supplier document submission:

- The Purchaser should work with the Supplier in the production of the TQ / PP / CON paperwork, this will expedite the Purchaser turnaround time.
- All field entries must be completed.
- References shall be made to all associated document and drawing numbers and Plant Item Numbers.
- Detailed explanation of the issue/fault, demonstrating a clear understanding of the issue in hand. Particularly important during manufacturing where the Supplier may have made an error, it is incumbent on the Supplier to provide the solution for which the Purchaser may accept.
- Should, when appropriate, include a proposed resolution.

- Shall be raised expediently, as soon as the issue is recognised.

3.2.1 Production Permit (Specification Deviation)

This is used prior to the event, if the Supplier knows they cannot meet the Specification prior to manufacture, but it is believed that the design intent will still be met with the proposed deviation. Once accepted by the Purchaser the Production Permit is a change to the Suppliers scope. Refer to form SLP 1.02.18 (Ref 4) and SLF 1.02.18.01 (Ref 7) (SLM 4.06.02).

3.2.2 Concession

This is used post the event, if the Supplier discovers during or post manufacture they have not met Specification. However, it is believed that the design intent will still be met. Refer to form SLP 1.02.18 (Ref 4) and SLF 1.02.18.01 (Ref 7) (SLM 4.06.02).

All Defects must be recorded on a Concession. Weld and inspection Defects/indications that are within allowable limits by the relevant standards do not require a concession.

If the Supplier makes a defect during manufacture, the commentary on the Concession by the Supplier shall include a review as to either why the fault is acceptable or what recovery options are available.

If a Concession is accepted (i.e. does not impact on functionality or design intent) then the Purchaser needs to see a copy at the point of inspection to allow them to sign off (provide a Release Note) the completed component or assembly.

3.2.3 Technical Query

During the Contract it may become apparent that technical information provided by the Purchaser to the Supplier is incomplete, ambiguous or conflicting which may impact on the technical services being undertaken and as such confirmation and / or clarification is required. Refer to form SLP 1.02.18 (Ref 4) and SLF 1.02.18.01 (Ref 7) (SLM 4.06.02).

TQ's shall be used by the Supplier for clarification only. TQ are not used to instruct any work or deviate from specification.

3.2.4 Non-Conformance

If the Purchaser finds a product that does not meet Specification and has not been covered with either a Production Permit or a Concession then a Non-Conformance Report (NCR) will be raised using the Purchaser Non Conformance procedure SLP 2.15.01 (Ref 8) and SLF 1.03.124 (Ref 20) (SLM 4.06.02).

At any point during the Contract where equipment is identified as being non-conforming, it shall be immediately sanctioned as 'non-conforming product' in accordance with the Supplier's own QMS.

No part of the work shall be repaired or, spoilt work corrected, without the prior written approval of the Purchaser. Any deviation from the Specification shall be dealt with as a Concession / Production Permit Request, which shall be submitted to the Purchaser for approval.

For the avoidance of doubt all Production Permits and Concession requests shall be submitted to the Purchaser, for acceptance. No work shall commence until formal instruction from the Purchaser is received in line with the conditions of the Contract.

4 Materials and Proprietary Equipment

Proprietary items that are to be welded to NSS parts or assemblies that form part of the Containment require material certification, for the material to be welded, in accordance with BS EN 10204 type 3.1.

4.1 Materials

4.1.1 Material Origin

The stockists shall be on the Supplier's own preferred suppliers list with the provision that the stockists:

- Have a management system certified to ISO 9001 by an accredited third party.
- The Supplier has assessed them and is satisfied that they shall supply the correct material in line with this specification.

The original mill supplier shall have a management system certified to ISO 9001 by an UKAS accredited certification body or internationally accepted equivalent, as defined by the international accreditation forum (IAF), as a minimum for NSS Quality Grade materials. Evidence of accreditation to be retained by the Supplier and shall be included in the LTRs (not required to be attached to each material certificate).

All materials shall be new and shall comply with this specification and all relevant European and / or British Standards.

4.1.2 Acceptance of Materials

Quality Category	Description
CS	<p><u>Manufactured Items</u></p> <p>Metallic material certificates shall comply with BS EN 10204 type 3.1.</p> <p>The Supplier shall maintain a system where material is traceable to the material certificate (original or true copy). The Supplier must be able to provide evidence of the correct material used, if requested by the Purchaser.</p> <p><u>Proprietary Items and Manufactured Non-Metallic Items</u></p> <p>Certificate of Conformity or Delivery Note CoC, unless stated otherwise (minimum requirement to be retained by Supplier).</p>
NS	<p><u>Manufactured Items</u></p> <p>Metallic material certificates shall comply with BS EN 10204 type 3.1.</p> <p>The Supplier shall maintain a system where material is traceable to the material certificate (original or true copy). The Supplier must be able to provide evidence of the correct material used, if requested by the Purchaser.</p> <p><u>Proprietary Items and Manufactured Non-Metallic Items</u></p> <p>Certificate of Conformity that complies with EN10204 Type 2.1 (minimum requirement to be retained by Supplier).</p>
NSS	The Material certification shall be in accordance with ES_0_5394_2 (Ref 3) and / or SLM 4.06.02 Sections 5.15 to 5.17 (Ref 25).

4.1.3 Storage and Handling

Quality Category	Description
CS	All material and equipment shall be stored under cover in a dry ventilated area segregated from all other materials and protected from contamination.
NSS	<p>The Supplier shall operate a system of storage and issue of material in accordance with ES_0_5360_2 (Ref 16).</p> <p>Containment viewing panels (Lexan and Premac) should be stored horizontally not vertically. This will help to ensure flatness prior to assembly.</p> <p>Containment surface finishes (both internal and external) must be protected from damage / marks.</p> <p>Containment viewing panels must be protected from scratches or damage.</p>

4.1.4 Contact Materials for Stainless Steel Fabrications

Quality Category	Description
CS	<p>All equipment is to be kept clean, dry and free from contaminants throughout the manufacturing process, which includes storage. Contact with or contamination by Lead, Zinc, Copper or Copper alloys and non-austenitic steels is not permitted.</p> <p>Welding fixtures such as clamps or manipulators and earthing clamps shall either be manufactured from contact material of compatible composition or shall be isolated from contact with stainless steel by the use of a buffer layer of compatible composition.</p> <p>Where materials, i.e. paints, dye, inks, glues, tapes etc. are being used in contact with the fabrication, all residues must be removed.</p> <p>Hand tools which come into contact with stainless steel e.g. files etc. must be segregated from other tools to remove risk of contamination from ferrous materials.</p>

Quality Category	Description
	Press machine tooling shall be stainless steel or shall be coated to protect against contamination and damage.
NSS	Contact materials for Stainless Steel fabrications shall be in accordance with ES_0_5363_1 (Ref 2).

4.1.5 Transfer of Material Identification

The Supplier shall have a documented process for identification and traceability of materials and products during storage, manufacturing and delivery in accordance with relevant specified requirements.

Quality Category	Description	Transfer of Material Identification
CS	The Supplier shall maintain a system of identification for all parent materials (type and cast number) used in fabrications in order that all material in the completed work can be traced to its origin. Permanent transfer of material identification is not permitted for items within the containment.	SUPPLIERS INTERNAL PROCESS
NSS	The Supplier shall maintain a documented system of identification for all parent materials (type and cast number) used in fabrications in order that all material in the completed work can be traced to its origin. Permanent transfer of material identification is not permitted for items within the containment. Where identified on the Detail Design Drawings, all site piping connections external to the glove box to be identified, by etching the cast / heat number and material grade e.g. 1.4307, on outside of pipe adjacent to the connection end.	DOCUMENTED

4.2 Proprietary Equipment

Proprietary equipment shall be inspected and tested by the Supplier's receipt inspection, in accordance with their QMS.

Proprietary items such as fasteners, gearboxes, actuators and electric motors shall in general be inspected and tested against manufacturer's specifications. Proprietary equipment shall be supplied with appropriate documentation e.g. CoC, DoC, Load Test Certificates, Vendor Literature and Operation and Maintenance (O&M) Manuals as relevant.

Prior to acceptance, equipment shall be inspected for leaks of lubricant, which shall be rectified at source.

Any documentation supplied with equipment in addition to the main CoC and DoC, O&M's, Spares Lists, etc. shall be retained in a separate package from the main Lifetime Record (LTR) package and provided to the Contactor for inclusion within the O&M's.

4.3 Self-lubricating Bearing and Materials

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings. Self-lubricating bearing and materials for use within containments shall be in accordance with ES_0_1501_1 – Section 5.5 (Ref 12).

4.4 Materials – General

Materials shall be in accordance with British and International standards and as specified on the Detail Design Drawings. Materials and proprietary items shall be in accordance with the details contained in this specification, equipment-specific Functional Specification and Detail Design Drawings.

All materials shall be new and shall comply with this Standard and all relevant European / British standards.

4.5 Stainless Steel

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings and this specification. Stainless Steel shall be in accordance with ES_0_1501_1 – Section 5.2 (Ref 12).

4.5.1 Mechanical Tube

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings. Mechanical Tube (thick walled, structural) - hot finished seamless shall be in accordance with ASTM A511/ A511M grade MT304L.

4.5.2 Pipes

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings. Pipe to be supplied as cold finished, seamless Stainless Steel grade 1.4307 (304L) unless otherwise stated on Detail Design Drawings, in accordance with ASTM A312/A312M and ES_0_5502_2 (Ref 14). Carbon content of the pipe shall not exceed 0.030% Refer to Appendix B - ES Standards Guidance Table for ES_0_5502_2 – Pipe, Cold-finished, Seamless Steel, reference section 25.2

4.5.3 Pipe fittings

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings. Pipe Fittings to be supplied in Stainless Steel grade 1.4307 (304L) unless otherwise stated on Detail Design Drawings, in accordance with ASTM A403/A403M and ES_0_5512_2 (Ref 15). Pipe Fittings shall be traceable to its material certificate and the original batch number shall be marked on the fitting and shown on the certificate. All fittings shall be manufactured from material that is compliant with ES_0_5502_2 (Ref 14 - pipe) or ES_0_5522_2 (Ref 17 - plate, end caps only). The fittings shall be manufactured using a cold forming process in accordance with ASTM A403/A403M Class WP and ASME B16.9. Carbon content of the fitting shall not exceed 0.030% Refer to Appendix B - ES Standards Guidance Table for ES_0_5512_2 – Butt Weld Pipe Fittings, Cold-Formed, Stainless Steel, reference section 25.2

4.5.4 Plate, Sheet and Strip

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings.

Quality Category	Description
	<p>Sheet and Strip to be supplied as cold rolled finish Stainless Steel grade 1.4307 (304L) unless otherwise stated on Detail Design Drawings, in accordance with BS EN 10088-2 and ES_0_5522_2 (Ref 17). Both Sides of finished plate to have a surface finish of 2B.</p> <p>Note: There is no defined thickness for sheet on this project, it is dependent on the steel manufacturer i.e. 6mm cold rolled sheet is acceptable for Glove Box containments.</p> <p>Plate to be supplied as hot rolled finish Stainless Steel grade 1.4307 (304L) unless otherwise stated on Detail Design Drawings, in accordance with BS EN 10028-7 and ES_0_5522_2 (Ref 17). Both Sides of finished plate to have a surface finish of 1D or 1E.</p> <p>Refer to Appendix B - ES Standards Guidance Table for ES_0_5522_2 – Stainless Steel Plate, Sheet and Strip, reference section 25.2</p>

4.5.5 Bars

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	<p>As specified on the Detail Design Drawings.</p> <p>Bar to be supplied in Stainless Steel grade 1.4307 (304L) unless otherwise stated on drawings, in accordance with BS EN 10272 and ES_0_5562_2 (Ref 18).</p> <p>Refer to Appendix B - ES Standards Guidance Table for ES_0_5562_2 – Stainless Steel Bar, reference section 25.2</p> <p><u>Acceptance Statement – NS / NSS Quality Bar Material</u></p> <p>The purchaser will accept, where there may be difficulty in providing bar material to specification, then a higher sulphur spec to BS EN 10272, in excess of 0.015% and up to 0.03%, may be supplied. This only applies to bar material that does not form part of the containment. This acceptance does not remove the supplier's responsibility to meet the fabrication requirements of ES_0_5394_2'.</p>

4.5.6 Sections

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	<p>As specified on the Detail Design Drawings.</p> <p>Sections to be supplied as hot formed sections, in Stainless Steel grade 1.4307 (304L), unless otherwise stated on detail drawings, in accordance with BS EN 10088-3 (or in accordance with ASTM A276) and ES_0_5572_2 (Ref 19). For cold formed sections refer to Plate, Sheet and Strip section above and ES_0_5522_2 (Ref 17).</p> <p>Refer to Appendix B - ES Standards Guidance Table for ES_0_5572_2 – Hot and Cold Formed Sections, Stainless Steel, reference section 25.2</p>

4.6 High Tensile Stainless Steel

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	<p>As specified on the Detail Design Drawings.</p> <p>High tensile Stainless Steel shall be in accordance with ES_0_1501_1 – Section 5.3 (Ref 12).</p>

4.7 Carbon Steel

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings. Carbon Steel shall be in accordance with ES_0_1501_1 – Section 5.4 (Ref 12).

4.8 Aluminium

Quality Category	Description
CS	As specified on the Detail Design Drawings. If there is a requirement to weld Aluminium the Supplier shall carry out all welding operations in accordance with an approved WPS. WPS approval shall be by a qualified welding engineer.
NSS	As specified on the Detail Design Drawings. Aluminium shall be in accordance with ES_0_1501_1 – Section 5.6 (Ref 12).

4.9 Lead for Shielding

Quality Category	Description
CS	Lead shall be in accordance with BS 3909/2 with a density equal to 11.04 g/cm ³ or greater, as specified on the Detail Design Drawings.
NS / NSS	Lead shall be in accordance with BS 3909/2 with a density equal to 11.04 g/cm ³ or greater, as specified on the Detail Design Drawings.

4.10 Laminated Beechwood Panels (Neutron Shielding)

Quality Category	Description
CS	N/A.
NS / NSS	As specified on the Detail Design Drawings. Laminated Beechwood panels shall be in accordance with ES_0_1501_1 – Section 5.8 and Appendix B (Ref 12). Densified laminate Beechwood shall have a density of 1.3g/cc or greater, Any integral lead layer shall be supplied with a density equal to 11.04 g/cm or greater. Approved suppliers are listed in ES_0_1501_1 – Appendix A (Ref 12). Painting requirements specified on the Detail Design Drawings. Certificates of Conformity (that complies with EN 10204 type 2.1) shall be provided and included with the LTR's.

4.11 Thermal Insulation

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings. Thermal insulation shall be in accordance with ES_0_1963_1 (Ref 21).

4.12 Viewing Panels

Quality Category	Description
CS	As specified on the Detail Design Drawings. Containment viewing panels (Lexan) must be protected from scratches or damage. The viewing panels are part of an NSS assembly and as such the Supplier shall take due regard of ES_0_1501_1 Appendix D during material ordering, supply and control.
NSS	As specified on the Detail Design Drawings. Viewing panels (Premac & Lexan) shall be in accordance with ES_0_1501_1 – Section 11.0 (Ref 12). Viewing panels (Premac & Lexan) shall be free of surface defects on installation. Reference should be made to ES_0_1501_1 - Appendix D for acceptable surface marking (Ref 12).

4.13 Containment Seals - Elastomeric Seals - Viton® Type A Items

Quality Category	Description
CS	N/A. Most applications, where commercial grade rubber is considered acceptable, the specific material grade and supplier shall be as stated on the Detail Design Drawings e.g. for O-rings.
NS / NSS	As specified on the Detail Design Drawings. Glove Box Window and Flange Seals (Containment Seals) that are not easily maintainable / replaceable, require a long (>25 years) design life and where design conditions are relatively onerous, e.g. continuous operation at high temperature (100 - 200°C) shall be manufactured using Elastomeric Seals - Viton® Type A Items, material grade 50 in accordance with Spec.Goods.X.0349_1 (Ref 26).

5 Fabrication

Quality Category	Description
CS	The Supplier shall be responsible for achieving the final dimensions and tolerances as specified on the Detail Design Drawings and General Manufacturing Notes Drawing.
NSS	As specified on the Detail Design Drawings, General Manufacturing Notes Drawing and this specification. Fabrication shall be in accordance with ES_0_5394_2 (Ref 3) and ES_0_1501_1 – Section 7.1 (Ref 12) and this specification.

5.1 Pipework

Quality Category	Description
CS	As specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings (inclusive of build level). All pipe work shall be prepared in accordance with ES_0_5391_1 section 6.2.2 (Ref 1).

5.2 Shells (Containments and Enclosures)

Quality Category	Description
CS	N/A

NSS	As specified on the Detail Design Drawings. Shells shall, as far as is practicable, be formed by bending or flanging. The minimum number of plates practicable shall be used in the fabrication. Plate hardness checks are not required to be carried out, refer to section 5.5.
------------	---

5.3 Cutting of Materials

Quality Category	Description
CS	Materials can be cut to size and shape by sawing, machining, grinding, shearing, plasma, laser or water jet cutting. Cutting processes shall take due regard of cross contamination from machine elements to manufactured part. Plate edges $\geq 10\text{mm}$ cut by shearing and not forming part of the weld joint shall have a minimum allowance of 3mm left on the edges which shall be removed by machining or grinding. All thicknesses of material cut by air plasma cutting shall have the edges dressed. Material cut by the inert gas shielded plasma, laser or water jet process does not require further dressing other than deburring / removal of dross and to meet any surface finish requirements (specified on Detail Design Drawings and General Manufacturing Notes Drawing). All lubricants, burrs and debris shall be removed.
NSS	Cutting of materials shall be in accordance with ES_0_5394_2 – Section 6.1 (Ref 3).

5.4 Manipulation of Material

Quality Category	Description
CS	Formed sections shall be manipulated to the required shape by a process which does not impair the quality of the material. Forming shall be carried out by gradually applied pressure using suitable tools such that the surface is not damaged. This may require the use of suitable contact materials between the work piece and the tool. Jacking is preferred to hammering for minor misalignment. If hammering has been carried out then a non-metallic contact material e.g. high-density polyethylene, shall be used. Tooling shall be maintained in a good condition.
NSS	Manipulation of materials shall be in accordance with ES_0_5394_2 – Section 6.2 (Ref 3).

5.5 Plate Bending of Stainless Steel

Quality Category	Description
CS	Plate bending shall be in accordance with the Suppliers own quality assurance procedures and as specified on the Detail Design Drawings.
NSS	As specified on the Detail Design Drawings. Plate bending shall be in accordance with ES_0_5394_2 - Section 6.3 (Ref 3). Hardness testing of plate is not required (unless plate is in contact with fluid) on plate with a bend radius greater than the thickness of plate ($r > t$). A bend procedure will be required for $r \leq 10t$.

5.6 Pipe Bending

Quality Category	Description
CS	As specified on the Detail Design Drawings.

	<p>Wherever possible, pipes shall be bent cold by gradually applying pressure. If hot bending is necessary, then heat treatment shall be carried out between 900°C - 1150°C.</p> <p>Hardness tests are not required on pipe bent to a minimum bend radius of 6 x OD (outside diameter).</p> <p>All pipe bending shall be in accordance with a written procedure and using suitable temperature measurement equipment.</p>
NSS	<p>As specified on the Detail Design Drawings.</p> <p>Pipe bending shall be in accordance with ES_0_5391_2 – Section 6.5.4 (Ref 1).</p>

5.7 Hot Bending

Quality Category	Description
CS	<p>All heating and heat treatments shall be performed in a uniform and controlled manner, such as fan-enclosed furnace, electrical resistance or electrical induction. The use of hand held gas torches is not permitted.</p> <ul style="list-style-type: none"> Hot bending shall be performed above 900°C. <p>Hot bending of stainless steel shall be followed by solution heat treatment in the temperature range 900° to 1150°C.</p>
NSS	Hot bending shall be in accordance with ES_0_5394_2 – Section 6.3.1 (Ref 3).

6 Welding

6.1 Welding – General

Quality Category	Description
CS	Shall be carried out in accordance with BS EN ISO 3834-3, Detailed Design Drawings and this specification.
NSS	<p>As specified on the Detailed Design Drawings and this specification.</p> <ol style="list-style-type: none"> Welding shall be in accordance with ES_0_5394_2 (Ref 3) and the following: All main shell butt welds shall be full penetration welds unless otherwise stated on Detail Design Drawings. All welds are to be positioned so as to avoid glove and posting port positions. Studs shall be welded on the outside faces only of the Glove Box unless otherwise stated and shall be straight and perpendicular to the gasket sealing face. The proposed method of attaching welded studs to the external face of Glove Boxes shall be in accordance with ES_0_5394 (Ref 3). Alternative methods of attaching welded studs submitted to the Purchaser for approval. Lifting lugs incorporated into the design to aid installation / erection shall be subjected to Non-destructive Testing (NDT). All welds within the Glove Box containment shall be ground back and polished to give the required surface finish. All welds shall be taken as continuous and should have a minimum number of 'stop/starts'. Weld spatter should be limited and any adhering to surfaces shall be removed by smooth grinding to give an even polished surface. The proposed use of weld spatter release agents shall be submitted for approval by the Purchaser. Unless otherwise stated on drawings or agreed via the Purchaser, Glove Box fabrications forming the primary containment shall be subject to inspection, test and acceptance standard in accordance with ES_0_5394_2 (Ref 3) with the following modifications: <ol style="list-style-type: none"> All butt welds shall have a uniform profile either convex or flush to the plates as indicated.

Quality Category	Description
	<p>b) All fillet welds inside the Glove Box shall have a concave profile which is smoothly blended to adjacent surfaces to form a radius of at least 10mm (where practical).</p> <p>c) All plate corners and edges shall be smoothly rounded to a radius between 1 to 2mm.</p>

6.2 Welding Schedule

Quality Category	Description
CS	<p>The Supplier shall carry out adequate production planning in accordance with BS EN ISO 3834-3, section 10.</p> <p>Note: Sequence, in which the welds are to be made, is dependent on the complexity of the fabrication.</p>
NSS	Welding schedule shall be in accordance with ES_0_5394_2 – Section 4.1 (Ref 3).

6.3 Welding – Stainless Steel

Quality Category	Description
CS	All general welding of stainless steel shall be in accordance with BS EN ISO 3834-3, this specification and Detail Design Drawings.
NSS	<p>All general welding of stainless steel shall be in accordance with ES_0_5394_2 section 8 (Ref 3) and this specification, unless otherwise shown on Detail Design Drawings or stated in the equipment-specific Functional Specification.</p> <p>In addition, the manufacture and fabrication of stainless steel cabinets and internals shall be carried out in accordance with the requirements of ES_0_5394_2 section 8 (Ref 3) and this specification.</p> <p>Where indicated on Detail Design Drawings, fabrication of stainless steel piping and vessels inside the cabinets shall be manufactured in accordance with the requirements of ES_0_5391_2 sections 8 & 9 (Ref 1) and this specification.</p>

6.4 Welding – Carbon Steel

Welding of Carbon Steel shall be in accordance with the Detail Design Drawings, weld procedures and this specification.

7 Heat Treatment Requirements

7.1 General

Quality Category	Description
CS	<p>Unless specified on the Detail Design Drawings, heat treatment will only be carried out when deemed appropriate by the Supplier to achieve the stated dimensional requirements.</p> <p>Final heat treatment of a fabrication shall be carried out only after all welded connections and fittings have been attached to it.</p> <p>Welds that have been subjected to Non-Destructive Testing (NDT) prior to heat treatment shall be retested by the same method and to the same acceptance standard after heat treatment has been completed.</p> <p>Stress relief heat treatment shall only be carried out where residual stresses are not acceptable (e.g. dimensional stability after machining) and it is not feasible to solution anneal. It shall only be carried out in accordance with instructions given in the contract documents or on the relevant drawings.</p>

Quality Category	Description
	Heat treatment and hot working shall be in accordance with a written procedure using suitable temperature measurement equipment.
NSS	Heat treatment shall be in accordance with ES_0_5394_2 - Section 6.4 (Ref 3).

7.1.1 Heat Treatment Temperatures

Quality Category	Description
CS	<p>Heat treatment shall be carried out in a furnace heated by oil, gas or electricity, but the work shall be protected from all possibility of flame impingement.</p> <p>Heating of the furnace by coke, coal or carburising gas flame is not permitted. Main pipeline supplied natural gas in the UK and EU is acceptable without analysis. Gas supplied outside of this requirement shall not contain Sulphur in excess of 700 mg/m³. For oil fired furnaces the Sulphur content of the fuel shall not exceed 0.5% by weight.</p> <p>A slightly oxidising or inert furnace atmosphere shall be employed.</p> <p>The material shall be cleaned and degreased then heated uniformly in a temperature-controlled furnace in a manner that ensures that the fabrication receives full heat treatment throughout. Partial insertion of the fabrication into a furnace is not permitted.</p> <p>Heat treatment shall be carried out at temperatures as defined by the relevant British Standards.</p> <p>Thermocouples shall be placed to ensure that the material is wholly within the above temperature limits. Time/temperature charts are to be recorded by a calibrated automatic instrument.</p> <p>The work shall be maintained at full temperature for a time proportional to its maximum thickness. This soaking period shall be determined on the basis of 1 hour soak per 25mm thickness. The minimum soak period, regardless of material thickness shall be 30 minutes.</p>
NSS	Heat treatment temperature shall be in accordance with ES_0_5394_2 - Section 6.4.1 (Ref 3).

7.1.2 Hot Working

Quality Category	Description
CS	<p>Hot working shall be supervised by competent personnel using suitable temperature measuring equipment.</p> <p>Forming shall only be carried out in an inert atmosphere, the temperature range shall be in accordance with relevant British Standards. Where it is not possible to create an inert atmosphere for forming, the operation shall be followed by a descaling operation. When it is not possible to carry out forming in a single operation owing to the risk of cracking, inter stage annealing shall be carried out between each forming cycle.</p>
NSS	Hot working shall be in accordance with ES_0_5394_2 - Section 6.4.1.1 (Ref 3).

7.1.3 Rectification of Distortion

Quality Category	Description
CS	It is not permissible to re-melt weld metal or re-weld pipe or plate for the purpose of rectifying distortion.
NSS	Rectification of distortion shall be in accordance with ES_0_5394_2 - Section 6.5 (Ref 3).

7.1.4 Vibratory Stress Relief

Quality Category	Description
------------------	-------------

CS	Vibratory stress relief is permitted; however, it is only suitable for reducing peak stress and has no effect on reducing hardness. Vibratory stress relief shall only be carried out by recognised companies with demonstrated competence in that activity.
NSS	Vibratory stress relief shall be in accordance with ES_0_5394_2 - Section 6.6 (Ref 3).

7.1.5 Descaling – Chemical Process

Quality Category	Description
CS	The Supplier shall operate in alignment with their processes. Following hot working and/or heat treatment, descaling can be carried out using Nitric-Hydrofluoric acid descaling process. The Supplier may use an alternative chemical descaling process.
NSS	Descaling shall be in accordance with ES_0_5391_2 – Section 6.4.3 (Ref 1)

7.1.6 Descaling – Mechanical Process

Quality Category	Description
CS	Mechanical descaling shall use clean iron-free glass, ceramic beads, sand, alumina or zirconia type abrasives. Recycling of abrasive during descaling is prohibited.
NSS	Descaling shall be in accordance with ES_0_5391_2 – Section 6.4.4 (Ref 1).

7.2 Surface Texture

Quality Category	Description
CS	Surface finish requirements for the internal and external surfaces of the containments, enclosures and all associated internal equipment etc. are stated on the Detail Design Drawings or the General Manufacturing Notes Drawing. The machining symbols shown on Detail Design Drawings indicate surface finish in micrometres. Identification marks, engraved or indented, are not permitted on surfaces located within containments, unless specifically called for on Detail Design Drawings.
NSS	Surface texture shall be in accordance with ES_0_1501_1 – Section 10.0 (Ref 12), Detail Design Drawings and General Manufacturing Notes Drawing (Ref 9).

7.3 Tolerances

Quality Category	Description
CS / NSS	Dimensions, tolerances and geometric tolerances shall be in accordance with the Detail Design Drawings and General Manufacturing Notes Drawing. Unless otherwise specified on Detail Design Drawings a suitable allowance shall be made on each surface to be machined to ensure that the entire surface is cleaned up by the machining process.

8 Management of Welding Activities

The use of any automated welding processes e.g. Plasma welding by the Supplier shall be agreed with the Client SME by the raising of a Production permit prior to the use of the automated process.

8.1 Welding Responsibility / Supervision

Quality Category	Description
------------------	-------------

CS	The Supplier shall appoint an individual to be responsible for co-ordinating all welding activities. This individual maybe supported by other responsible welding personnel dependent upon the complexity of the fabrication. The welding co-ordinator shall have knowledge and experience on welding co-ordination activities e.g. CSWIP 3.1 welding inspector for welding supervision and EFW / IIW welding specialist for welding co-ordination
NSS	Welding responsibility and supervision shall be in accordance with ES_0_5394_2 – Section 7.1 and 7.2 (Ref 3).

8.2 Weld Procedure Qualification by Others

Quality Category	Description
CS	Weld procedures to be used by the Supplier shall be their own. The Suppliers weld procedures shall not be qualified by other fabrication companies.
NSS	Weld procedure qualification by others shall be in accordance with ES_0_5394_2 – Section 7.6 (Ref 3).

8.3 Welder Qualifications

Quality Category	Description
CS	All welders who are engaged on the contract will be required to undergo or maintain a welding qualification test in accordance with BS EN ISO 9606-1 or BS EN ISO 9606-2 as applicable. .
NSS	Welder qualification / approval shall be in accordance with ES_0_5394_2 – Section 7.7 (Ref 3).

8.4 Consumables / Filler Material

Quality Category	Description
CS	The Supplier shall operate a system for the verification and traceability of welding consumables in accordance with BS EN ISO 3834-3. The Supplier must be able to provide evidence of the correct material used, if requested by the Purchaser. Weld consumables shall be stored in accordance with the manufacturer's recommendations.
NSS	Weld consumables (filler material) shall be in accordance with ES_0_5394_2 – Section 5.4 and Appendix C (Ref 3).

Note: It is the Purchasers expectation that the Supplier carrying out TIG or Plasma welding shall use non Thoriated Tungsten electrodes. Where Thoriated Tungsten electrodes are employed for TIG or plasma welding, the Supplier shall ensure that appropriate measures exist with respect to storage, handling and disposal of any grinding residues (see HSE document 564/6 for requirements).

8.5 Issue of Filler Materials

Quality Category	Description
CS	The Supplier must operate a documented system which identifies materials correctly and includes relevant issue details in accordance with BS EN ISO 3834-3. Only one batch of electrodes/filler material per size shall be issued to a welder.

	Unused filler materials shall be returned to store at the end of the day or shift where they can be checked and re-identified. Filler materials, which cannot be identified, shall be discarded.
NSS	The issue of filler material shall be in accordance with ES_0_5394_2 – Section 5.4.2 (Ref 3).

8.6 Welding Equipment

Quality Category	Description
CS	Welding plant and equipment (manual or automatic) shall be regularly serviced, maintained and calibrated / validated. Records of maintenance or calibration to be made available on request to the Purchaser.
NSS	Welding equipment shall be in accordance with ES_0_5394_2 – Section 7.3 (Ref 3).

8.7 Weld Processes

Quality Category	Description
CS	The Supplier shall operate in alignment with their processes and procedures. The use of all conventional welding processes, Power Beam Welding, Drawn Arc Stud Welding, Spot Welding and Resistance Welding are acceptable. Capacitor Discharge Stud welding is not suitable for thicker sections and only permitted for use on materials up to 3mm thick.
NSS	Welding processes shall be in accordance with ES_0_5394_2 – Section 7.4 (Ref 3).

8.8 Weld Procedures

Quality Category	Description
CS	All welding operations shall be carried out to written procedures, this includes repair welds. These procedures shall include all the basic information from the initial joint preparation to final weld inspection. Weld procedures shall be in accordance with BS EN ISO 15607, BS EN ISO 15609-1, BS EN ISO 15614-1 and BS EN ISO 3834-5, all WPS's shall be approved by a qualified welding engineer. Propriety items e.g. Standard items designed and manufactured to a defined set of standards which have been proven to delivery against the design intent and the defined quality requirements should not normally require review of special processes unless the items has been identified as high risk and additional assurance has been identified
NSS	Welder procedures shall be in accordance with ES_0_5394_2 – Section 7.5 (Ref 3).

8.8.1 Laser Beam Welding

Quality Category	Description
CS	As specified on the Detail Design Drawings. Laser beam weld procedures shall be in accordance with BS EN ISO 15609-4, BS EN ISO 15614-11 and BS EN 1011-6 and in accordance with BS EN ISO 3834-5.
NSS	As specified on the Detail Design Drawings. Laser beam weld procedures shall be in accordance with ES_0_5394_2 – Section 7.5 (Ref 3).

8.8.2 Arc Stud Welding

Quality Category	Description
CS	As specified on the Detail Design Drawings.

	<p>Arc stud welding procedures shall be in accordance with BS EN ISO 14555.</p> <p>Arc stud welding studs and ceramic ferrules to be in accordance with BS EN ISO 13918.</p> <p>Studs to be tested in accordance with BS EN ISO 14555.</p> <p>Welding shall also be in accordance with BS EN ISO 3834-5.</p> <p>Refer also to Section 9.5.8.</p>
NSS	<p>As specified on the Detail Design Drawings.</p> <p>Arc stud welding shall be in accordance with ES_0_5394_2 – Section 7.5 and 10.1.1 (Ref 3).</p> <p>Arc stud welding studs and ceramic ferrules to be in accordance with BS EN ISO 13918.</p> <p>Refer also to Section 9.5.8.</p>

8.8.3 Spot Welding

Quality Category	Description
CS	<p>As specified on the Detail Design Drawings.</p> <p>The general principles of BS EN ISO 14373 shall be used for the Spot welding of Stainless Steel unless stated otherwise on the Detail Design Drawings.</p>
NSS	<p>As specified on the Detail Design Drawings.</p> <p>Spot welding shall be in accordance with ES_0_5394_2 – Section 7.5 (Ref 3).</p> <p>Weld inspection shall be in accordance with ES_0_5394_2 – Section 10.1.2 (Ref 3).</p>

8.8.4 Seam Welding

Quality Category	Description
CS	<p>As specified on the Detail Design Drawings.</p> <p>Seam welding shall be in accordance with the general principles of BS EN ISO 16433 unless stated otherwise on the Detail Design Drawings.</p>
NSS	<p>As specified on the Detail Design Drawings.</p> <p>Seam welding shall be in accordance with ES_0_5394_2 – Section 7.5 (Ref 3).</p> <p>Weld inspection shall be in accordance with ES_0_5394_2 – Section 10.1.3 (Ref 3).</p>

8.9 Cleanliness of the Welded Surface

Quality Category	Description
CS	<p>All surfaces to be welded and adjacent surfaces on both sides of each plate or pipe shall be thoroughly cleaned and free from scale, paint, grease, or other foreign material.</p>
NSS	<p>The cleanliness of the welded surface shall be in accordance with ES_0_5394_2 – Section 8.1 (Ref 3).</p>

8.10 Joint Preparation

Quality Category	Description
CS	<p>Joints shall be prepared in accordance with BS EN 1011-1 unless otherwise stated within the Detail Design Drawings.</p> <p>Joint preparation and cutting, shall be carried out by machining, grinding, filing, plasma, laser and water jet cutting.</p> <p>All materials cut by plasma shall be dressed back to smooth bright finish with all evidence of oxidation and discoloration removed. Inert shielded cutting processes that leave the surface in a bright condition do not need any further dressing.</p>

	Prepared edges shall be in accordance with the welding procedure. All swarf and debris shall be removed prior to welding. With the exception of weld tacks to facilitate fit-up, the use of deposited weld metal inside or outside the joint to permit alignment shall not be permitted.
NSS	Joint preparation shall be in accordance with ES_0_5394_2 – Section 8.2 (Ref 3).

8.11 Proximity of Welds

Quality Category	Description
CS	The toes of adjacent butt welds shall whenever possible be no closer than four times the nominal thickness of the parent material unless shown on the Detail Design Drawings. Wherever practicable, weld seams shall be staggered from adjoining seams.
NSS	Proximity of welds shall be in accordance with ES_0_5394_2 – Section 8.3 (Ref 3).

8.12 Setting up Prior to Welding

Quality Category	Description
CS	Joints shall be assembled and retained in position for welding. The use of manipulators or other devices to permit welding in the horizontal position (down-hand) should be employed where practicable. Before welding, all joint preparations shall be checked by a qualified welding inspector. (CSWIP 3.1 / PCN Weld Inspection).
NSS	Setting up prior to welding shall be in accordance with ES_0_5394_2 – Section 8.4 (Ref 3).

8.13 Tack Welds

Quality Category	Description
CS	Tack welds, where used on open gap preparations shall be equally spaced in such a manner as to maintain a regular joint gap and correct alignment during welding. In instances where bullets are chosen as the preferred method for tacking and maintaining the root gap, the bullets shall be to the same material specification with the parent material. On closed butt type preparations, tacking shall be carried out in such a manner that only partial penetration of the root face is achieved. Gas purging normally using argon, shall be applied in all instances where tack welding is to be used to align joint faces prior to welding (except where using Bridge Tacks). Tack welds shall be cut back to sound metal before laying down the main weld or completely fused out during welding. Electrodes and/or filler materials used in tacking shall be of the same type and grade as those intended for completing the weld. Tacking strips and cleats temporarily welded to the fabrication shall be to the same material specification as the parent metal. Such attachments shall be kept to a minimum and, where possible, confined to the outer surface of the fabrication. Precautions shall be taken to avoid stray arcing on the work-piece caused by the welding process or by poor earth clamping. Before welding, tacking shall be checked.
NSS	Tack welds shall be in accordance with ES_0_5394_2 – Section 8.5 (Ref 3).

8.14 Welding Technique

Quality Category	Description
CS	<p>All welding techniques shall be carried out in the horizontal position (down-hand) wherever practicable. There shall be a minimum of puddling and weaving. For all processes weave width shall be consistent with the filler metal/electrode manufacturer's recommendations. In the case of MMA this shall not exceed 4 times the core wire diameter.</p> <p>Care shall be taken to protect the welding area on the work piece from draughts during this operation.</p> <p>On stainless steels where wire brushing is employed, only clean stainless steel wire brushes which have not been used on other materials are permissible. Wire brushing is permitted on root passes and subsequent filling runs, but is only permitted on capping runs when subsequent post-weld finish and cleaning is carried out, see section 8.27.</p> <p>After welding has been stopped for any reason, care shall be taken on re-starting to ensure proper fusion and penetration between the parent material, the weld metal and previously deposited weld metal which shall be thoroughly cleaned and free from slag, crater defects, cracks, etc.</p> <p>Distortion is to be reviewed prior to welding and controlled throughout the welding process.</p>
NSS	Welding technique shall be in accordance with ES_0_5394_2 – Section 8.6 (Ref 3).

8.15 Welding Environment

Quality Category	Description
CS	<p>Welding shall not be carried out when the workshop or ambient temperature is below 5°C. Adequate heating and sheltering shall be utilised to assure temperatures are kept higher than 5°C.</p> <p>No welding shall take place if there is impingement on the weld area of rain, sleet, snow or excessive wind, or if the weld area is frosted or wet.</p>
NSS	Welding environments shall be in accordance with ES_0_5394_2 – Section 8.7 (Ref 3).

8.16 Purging

Quality Category	Description
CS	Purging shall be carried out using inert gases; the preferred gas is Argon with a purity of not less than 99.998%. The back purge is designed to keep oxidation and therefore heat tint to a minimum.
NSS	Purging shall be in accordance with ES_0_5394_2 – Section 8.8 (Ref 3).

8.17 Fillet Welds

Quality Category	Description
CS	<p>Supplier to manufacture in accordance with their weld procedure specification (WPS).</p> <p>Fillet welds shall be made so as to ensure, good root and sidewall fusion. They shall conform to the details and dimensions shown on the Detail Design Drawings and shall not be below the size or length stated.</p> <p>Where the Detail Design Drawings require stitch fillet welds to be deployed, there is no requirement for LPI, and only visual inspection is required.</p>
NSS	<p>As specified on the Detail Design Drawings.</p> <p>Fillet welds shall be in accordance with ES_0_5394_2 – Section 8.9 (Ref 3).</p>

8.18 Weld Attachments to Thin Material

Quality Category	Description
CS	Supplier to manufacture in accordance with their weld procedure specification (WPS).
NSS	Weld Attachments shall be in accordance with ES_0_5394_2 – Section 8.10 (Ref 3).

8.19 Butt Welds

Quality Category	Description
CS	Supplier to manufacture in accordance with their weld procedure specification (WPS). Butt welds shall be made so as to ensure, good root and sidewall fusion. They shall conform to the details and dimensions shown on the Detail Design Drawings and shall not be below the size or length stated.
NSS	As specified on the Detail Design Drawings. Butt welds shall be in accordance with ES_0_5394_2 – Section 8.11 (Ref 3).

8.20 Dissimilar Metals

Quality Category	Description
CS	As specified on the Detail Design Drawings. Supplier to manufacture in accordance with their weld procedure specification (WPS).
NSS	As specified on the Detail Design Drawings. Welding of dissimilar metals shall be in accordance with ES_0_1501_1 – Section 7.8 (Ref 12).

8.21 Interpass Temperature

Quality Category	Description
CS	Supplier to manufacture in accordance with their weld procedure specification (WPS), taking due regard of the interpass temperatures.
NSS	Interpass temperature shall be in accordance with ES_0_5394_2 – Section 8.12 (Ref 3).

8.22 Grinding

Quality Category	Description
CS	In all cases where grinding is allowed e.g. preparation of welding edges, finish of welds etc. care shall be taken to avoid excessive local heating. Sparks from grinders shall be considered from a contamination of materials point of view. On stainless steel, grinding wheels shall not have been used previously on other materials.
NSS	Grinding shall be in accordance with ES_0_5394_2 – Section 8.13 (Ref 3).

8.23 Root profile

Quality Category	Description
CS	Supplier to manufacture in accordance with their weld procedure specification (WPS), A weld is required with a smooth penetration bead, fully fused and free from oxidation and marked irregularities.

NSS	Root profile shall be in accordance with ES_0_5394_2 – Section 8.14 (Ref 3).
------------	--

8.24 Weld Finish Reinforcement

Quality Category	Description
CS	The surface finish of undressed welded joints shall be regular and even and shall be free from undercutting. All burrs, sharp edges and weld spatter shall be removed. Hammering of the completed weld is not permitted. The intentional removal of undercut which results in under flushing of the parent material shall be kept to a minimum.
NSS	Weld finish reinforcement shall be in accordance with ES_0_5394_2 - Section 8.15 (Ref 3).

8.25 Removal of Temporary Fittings

Quality Category	Description
CS	Temporary welded fittings such as shop handling lugs, tacking strips and cleats shall all be carefully removed to prevent damage to the parent material.
NSS	Removal of temporary fittings shall be in accordance with ES_0_5394_2 - Section 8.16 (Ref 3).

8.26 Weld Repair and Rectification

Quality Category	Description
CS	The Supplier shall carry out weld repairs and rectification in accordance with their weld procedures and internal quality systems. Dressing or buffing of or re-melting of the oxidation is not permitted. The maximum number of repairs to the same area of welded joint shall be three. Repairs and rectification are to be recorded in accordance with BS EN ISO 3834-3. Where a weld is cut out for any reason the heat affected zone shall be removed prior to the making of a new weld. The amount of material that shall be removed is 5mm from the toe of the weld.
NSS	Weld repair and rectification shall be in accordance with ES_0_5394_2 – Section 8.17 (Ref 3).

8.27 Post-weld Finish and Cleaning of Stainless Steel Welds

Quality Category	Description
CS	On completion of welding all welds shall be thoroughly cleaned, comprising of a minimum of complete de-slagging and cleaned in such a manner that the heat affected zones and weld areas are left in a passive condition. Wire brushing is not permitted on final weld pass(es) as a stand-alone process. Methods for the removal of heat tint from stainless steel fabrications are; acid pickling & passivation or mechanical cleaning processes (Scotchbrite™ silicon carbide abrasive pads). All methods of cleaning shall have internal operating procedures in place prior to deployment.
NSS	Post-weld finish and cleaning of Stainless Steel shall be in accordance with ES_0_5394_2 – Section 8.18 (Ref 3) and ES_0_5361_2 – Section 4.3 (Ref 13). Recommended Mechanical Cleaning Process (ES_0_5361_2):- <ul style="list-style-type: none"> Degrease in accordance with Procedure 1 prior to mechanical cleaning (total immersion statement can be disregarded). Polish glove boxes and internal equipment using only “Scotchbrite™” Silicone Carbide

	<p>Abrasive Pads / Consumables.</p> <ul style="list-style-type: none"> Passivation treatment is not a mandatory requirement following the use of Scotchbrite™ Abrasives (ES_0_5361_2 – Section 4.4.2). Surface finish to be checked in accordance with surface texture section 7.2 <p>Other processes can be used as specified in ES_0_5394_2, but may require mandatory passivation treatment and passivity testing.</p>
--	---

8.28 Heat Tint

Quality Category	Description
CS	<p>The heat tint that Austenitic Stainless Steel exhibits when welded is directly related to the level of Oxygen present at the time of welding. The darker the colour appears after welding the thicker the Oxide layer.</p> <p>It is the expectation that there shall be a sufficient quality of purge media to achieve zero discolouration while welding. However, it is noted that where joint configuration, distance to purge access is large and the line complexity is high, then zero discolouration may be more difficult to achieve. Therefore in these instances the maximum level of heat tint which is allowable shall depend on the service of line. However, straw to first order blue would be considered the maximum level allowed. This level is depicted by sample No.4, see AWS D18.2.</p>
NSS	Heat tint shall be in accordance with ES_0_5394_2 – Section 8.19 (Ref 3).

9 Non Destructive Testing

9.1 NDT Schedule

Quality Category	Description
CS	N/A.
NSS	NDT Schedule shall be in accordance with ES_0_5394_2 – Section 4.2 (Ref 3).

9.2 NDT/Weld Inspection Operative Qualifications

Quality Category	Description
CS	NDT Operators shall be qualified to either Personnel Certification in Non-Destructive Testing (PCN) Level 2 or CSWIP Level 2 for the discipline they are undertaking.
NSS	<p>NDT/Weld inspection operative qualifications shall be in accordance with ES_0_5394_2 – Section 9.2 (Ref 3).</p> <p>MPI, Ultrasonic and Radiographic operative qualifications shall be in accordance with EN ISO 9712 (PCN) Level 2, ES_0_5393_2 (Ref 23) section 8.2 (MPI), ES_0_5260_2 (Ref 24) section 5 (Radiography) and ES_0_5391_2 (Ref 1) section 10.7 (Ultrasonic).</p>

9.3 Fabricated Lifting Features and Accessories

Quality Category	Description
CS	N/A.
NS	<p>Where identified on Detail Design Drawings all fabricated lifting features (i.e. bespoke lifting accessories, or fixed lifting lugs) shall be subject to visual, LPI, before and after proof load testing. Acceptance criteria shall be as per Sections 9.5.1 and 9.5.2 as applicable, with the exception of the acceptance criteria for visual weld indications shall be in accordance with BS EN ISO 5817 Quality Level 'B'.</p>

	Any indications found during manufacture tests that are outside the welding and inspection standards shall be reported by size and location and be brought to the attention of the Suppliers inspector. Certificate of load testing shall be supplied with equipment.
NSS	As specified on the Detail Design Drawings. Fabricated lifting features shall be in accordance with ES_0_5394_2 – Section 9.3 (Ref 3).

9.4 NDT Procedures

Quality Category	Description
CS	All NDT shall be written procedures in accordance with ISO 9712.
NSS	NDT procedures shall be in accordance with ES_0_5394_2 – Section 10.2 (Ref 3).

9.5 NDT Methods and Standards

9.5.1 Inspection Sequence

Testing should be generally carried out in the order as shown below:

1. Visual Inspection before and during welding.
2. Visual Inspection after welding.
3. Visual Inspection after grinding / polishing.
4. Liquid Penetrant Inspection.
5. Surface finish check.
6. Load, Leak and Pressure testing (as applicable).
7. If the fabrication is load tested, then the LPI shall be repeated after satisfactory load test.
8. Completed Fabrication Inspection.

Sequence of inspection after repair, during fabrication: (1) to (5).

The Supplier shall ensure the fabrication sequence is planned in such a manner to ensure all the mandatory inspections (as specified in the contract documents) can be completed. This includes giving access to fabrications as indicated above, before access is precluded by the next manufacturing step.

9.5.2 Visual Inspection

Quality Category	Description
CS	All welds shall be subject to visual weld inspection in accordance with BS EN ISO 17637. Weld defect acceptance to BS EN ISO 5817 quality level 'C'. Internal viewing aids, e.g. introsopes, fibrosopes, TV cameras, shall be supplied and used where necessary by the Supplier.
NSS	Visual weld inspection shall be in accordance with ES_0_5394_2 – Sections 9.3 and 10.1 (Ref 3).

9.5.3 Liquid Penetrant Inspection

Quality Category	Description
CS	All stainless steel welds (and where applicable carbon steel) shall be LPI examined in accordance with BS EN ISO 3452-1. Acceptance criteria for LPI weld defects shall be in accordance with BS EN ISO 23277 Acceptance Level 2X.
NSS	LPI shall be in accordance with ES_0_5394_2 – Sections 9.3 and 10.2 (Ref 3).

9.5.4 Magnetic Particle Inspection

Quality Category	Description
CS	Welds shall be MPI examined in accordance with BS EN ISO 9934-1. Acceptance criteria for MPI weld defects shall be in accordance with BS EN ISO 23278 Quality Level 2X.
NSS	N/A.

9.5.5 Ultrasonic Testing

Quality Category	Description
CS	N/A.
NS / NSS	As specified on the Detail Design Drawings. UT examination shall be in accordance with BS EN ISO 17640. Acceptance criteria for Ultrasonic Testing to be in accordance with BS EN ISO 11666; Acceptance Level 3. Glove Box Containments do not require Ultrasonic Testing.

9.5.6 Radiographic Examination

Quality Category	Description
CS	N/A.
NS	As specified on the Detail Design Drawings. Radiographic examination procedures shall be in accordance with BS EN ISO 17636. Acceptance criteria for weld Radiographic Testing to be in accordance with BS EN ISO 10675-1 Acceptance Level 2. Radiographic films shall be submitted to the client's recipient (stated in the contract documents) on completion of lifetime records (LTRs).
NSS	As specified on the Detail Design Drawings (inclusive of build level). Radiographic examination shall be in accordance with ES_0_5391_2 – Section 10.6 (Ref 1). Glove Box Containments do not require Radiographic examination. Radiographic films shall be submitted to the client's recipient (stated in the contract documents) on completion of lifetime records (LTRs).

9.5.7 Ferrite Checks (if applicable)

Ferrite checks are not required unless there is the likelihood of a ferritic weld consumable having been employed instead of the correct austenitic weld consumable.

Quality Category	Description
CS	If Ferrite checks are to be undertaken, then checks to be carried out in accordance with BS EN ISO 8249.
NSS	If Ferrite checks are to be undertaken, then checks to be carried out in accordance with ES_0_5394_2 – Section 9.4 (Ref 3).

9.5.8 Stud Weld Testing

Quality Category	Description
CS	Before studs are welded, a procedure test in accordance with BS EN ISO 14555 shall be undertaken. Number of studs to be tested (BS EN ISO 14555 - Table 1) and acceptance criteria to be in accordance with ISO 3834-3. Production tests shall be performed by the Supplier before the beginning of welding operations.
NSS	Stud weld testing shall be in accordance with ES_0_5394_2 – Section 10.1.1 (Ref 3) and ES_0_1501_1 – Section 21.12.2 (Ref 12).

10 Cleaning of Completed Fabrications

Quality Category	Description
CS	All completed fabrications shall be cleaned of all contaminants and corrosive products. General cleaning (degrease, wash and dry) requirements, use non-etching soak cleaner or spirit based solvent cleaner (Xylene, Toluene or Isopropyl Alcohol). If the Supplier is unable to conform to this general cleaning requirement, then the Supplier shall provide details of all chemicals that will be used to clean the stainless steel fabrications, which shall be approved by the Client SME prior to use. Methylene Chloride and 1.1.1 Trichlorethane shall not be used on stainless steel.
NSS	Cleaning of completed fabrications shall be in accordance with ES_0_5394_2 – Section 11.0 (Ref 3) and ES_0_5361_2 (Ref 13). All chemicals to contact stainless steel shall be approved by the Client SME prior to use. Cleanliness of the fabrication to be proven by Ferroxy Testing, refer to section 10.1.

10.1 Ferroxy Testing

Quality Category	Description
CS	N/A. The Supplier shall take due regard that some CS items are included under NS / NSS assemblies and as such shall be subject to Ferroxy testing. <u>Glove Box Support Frames</u> Support Frames for Glove Boxes will require Ferroxy testing as stated below, in accordance with ASTM A380 (a test for free iron). The Ferroxy test can be deployed one of two ways (Suppliers decision):- Option 1 The test shall be carried out on strategically placed target plates within the fabrication facility. Target plates to be tested weekly. In the event of a failure manufactured Support Frames are to be tested until such a time that the workshop environment is proven to be demonstrated as clean. Option 2 The Test shall be deployed at random positions directly to the Support Frames prior to assembly or packaging. The test shall be deployed in locations as specified by the Suppliers Inspector.
NS / NSS	Ferroxy test shall be in accordance with ES_0_5394_2 – Section 11.0 and Appendix A Table 2 for acceptance criteria (Ref 3). Written Ferroxy procedure to be approved by client. The Ferroxy test can be deployed one of two ways (Suppliers decision):- Option 1 The test shall be carried out on strategically placed target plates within the fabrication facility, the location of the plates shall be detailed in the procedure. Target plates to be tested weekly. In the event of a failure manufactured assemblies are to be tested until such a time that the workshop environment is proven to be demonstrated as clean.

Quality Category	Description
	Option 2 The Test shall be deployed at random positions directly to an assembly prior to packaging and dispatched to the client. The test shall be deployed in locations as specified by the Purchaser.

10.2 Salt Contamination Testing

Quality Category	Description
CS	N/A. The Supplier shall take due regard that CS items may be included under NS / NSS assemblies and as such shall be subject to salt contamination testing.
NS / NSS	Salt contamination testing shall be in accordance with ES_0_5394_2 – Section 11.0 (Ref 3). Salt contamination testing shall be carried out using calibrated equipment e.g. Salt Contamination Test Kit, Salt Contamination Meter, Solution Salt Meter, Bresle Test Kits etc. After final cleaning the limit for acceptance shall be $<0.1\mu\text{g}/\text{cm}^2$ ($<0.1\text{mg}/\text{m}^2$).

10.3 Passivity Test (Stainless Steel Only)

Quality Category	Description
CS	N/A.
NS / NSS	Passivity testing shall be in accordance with ES_0_5394_2 – Section 11.0 (Ref 3). The test shall be carried out on parent material, weld beads and heat affected zones using calibrated passivity testing equipment, locations to be determined by the Purchasers or Clients inspector. Follow the manufacturer's guidelines for advice on an acceptable result to indicate passivity of the material (ES_0_5361_2 – Section 4.14.1). Passivity testing is not a mandatory requirement when mechanically cleaning has been carried out in accordance with ES_0_5361_2 – Section 4.3 (Ref 13) – Refer to section 8.27 of this specification.

10.4 Rectification

The Supplier shall bear the cost of all rectification work at any stage of the contract of any item(s) or equipment not complying with the requirements of this specification, contract documents or Detail Design Drawings. All rectification work shall be subject to the prior approval of the Purchaser and any subsequent tests shall be carried out to their satisfaction and be fully documented.

11 Screw Threads and Fasteners

11.1 General

Quality Category	Description
CS	As specified on the Detail Design Drawings and General Manufacturing Notes Drawing.
NSS	As specified on the Detail Design Drawings and General Manufacturing Notes Drawing. Screw threads and fasteners shall be in accordance with ES_0_1501_1 – Section 13.1 & 13.2 (Ref 12).

12 Lubricants (excluding thread lubrication)

If lubrication is required this will be stated on the Detail Design Drawings and within section 4.3.

13 Surface Preparation and Painting

13.1 Painting – Stainless Steel

Quality Category	Description
CS	Stainless Steel components shall not be painted or coated with preservatives except where stated on the Detail Design drawings.
NSS	Stainless Steel components shall not be painted or coated with preservatives except where stated on the Detail Design Drawings, reference ES_0_1501_1 – Section 15.1 (Ref 12).

13.2 Painting – Carbon Steel

Quality Category	Description
CS	The Supplier shall carry out painting in accordance with the Detail Design Drawings and the paint manufacturer's data sheets. <u>Proprietary items</u> Paint as per supplier's standard finish.
NSS	As specified on the Detail Design Drawings. Painting of Carbon Steel shall be in accordance with ES_1_5142_3 (Ref 22).

13.3 Marking / Painting / Labelling

Quality Category	Description
CS	The Supplier shall carry out marking, painting, labelling in accordance with the Detail Design Drawings, General Manufacturing Notes Drawing and paint manufacturers data sheets. Attention to be drawn to the section 4.1.4 contact materials for stainless steel.
NSS	As specified on the Detail Design Drawings, General Manufacturing Notes Drawing and paint manufacturers data sheets. Marking Painting and labelling shall be in accordance with ES_0_5394_2 – Section 12 and Section 17 (Ref 3).

13.4 Renovation / Rectification of Damaged Areas

Areas of primer and protective finishes that are damaged during handling, assembly and testing shall be made good by the paint manufacturers recommended procedure, to the satisfaction of the Supplier's or Purchaser (where applicable).

14 Identification and Marking

All general information relating to Identification and Marking of plant and equipment is stated on the Detail Design Drawings or General Manufacturing Notes drawing.

15 Inspection and Testing

The applicability of the sub-sections below will depend on specific Quality Category of the equipment. For NS / NSS designated equipment the following sub-sections will apply, for CS designated equipment reference should be made to the SDRL.

15.1 In-Process Inspection and Notification

The Supplier shall be responsible for carrying out all inspection and testing activities necessary to demonstrate compliance with the drawings, specification and statutory / regulatory requirements and shall provide all plant,

equipment, materials and suitably qualified personnel to carry out inspection and testing activities. This includes the involvement of third parties (independent of those having direct responsibility for the work being performed) necessary to comply with Statutory Regulations.

The Supplier and / or their nominated representative shall carry out inspection activities at the Supplier's or their Sub-Supplier's works in accordance with the approved Quality Plan(s) where required.

The Supplier shall notify the Purchaser in writing with a Notice of Inspection (NoI), five working days (UK based Suppliers) and ten days (outside the UK Suppliers) in advance to arrange for the attendance of the Purchaser Authority, although the Purchaser and / or their representative reserve the right to carry out surveillance visits at any time. In such cases the Purchaser shall give 24 hours' notice to the Supplier.

All tests shall be recorded and any faults identified during manufacture or inspection or testing shall be notified to the Purchaser. Any remedial work to be carried out shall be documented and agreed prior to the rectification work being carried out.

All test equipment, weights, materials and services necessary to satisfactorily perform testing shall be supplied by the Supplier, and have current calibration certificates for the testing campaign.

15.2 Testing

All tests as specified in the contract, this specification or Detail Design Drawings shall be carried out to the satisfaction of the Purchaser (NS or NSS), whether at the Supplier's works or elsewhere. The Supplier shall bear the full costs of all tests and retests, irrespective of where the inspections are carried out.

15.3 Purchaser Surveillance

In addition to the surveillance activities to be established on the approved Quality Plan the Purchaser reserves the right to carry out a surveillance visit at any time. In such cases a 24 hour notice period shall be given.

15.4 Final Inspection of Completed Fabrications

An external and (where possible) internal examination shall be carried out by the Supplier's Inspector in the presence of the Purchaser (NS or NSS) unless otherwise agreed in the approved Quality Plan.

The finished surfaces, dimensions and cleanliness of the fabrication shall comply with the relevant Detail Design Drawings and this specification. Any deviation i.e. scratches etc. shall be brought to the attention of the Purchaser.

16 Assembly

Great care shall be taken when assembling the Containments such that components are not scratched or damaged.

16.1 General Fasteners Torques

All general fastener details are stated on the Detail Design Drawings or General Manufacturing Notes Drawing (Ref 9), this includes the viewing panel fastener torques. The Supplier shall maintain a bolt torquing schedule that shall include torque wrench/equipment calibration records and bolt torquing records. Bolt torquing records are required to demonstrate that certain specified fasteners have been torqued correctly in accordance with Detail Design Drawings and/or Specifications. Recording of fastener torque values is Only required when stated on Detail Design Drawings or Specifications.

17 Lifting Points – Load Testing

17.1 Fabricated Lifting points

Fabricated lifting points shall be subject to load testing in accordance with Detail Design Drawings.

Load testing shall be performed by a competent person (LEEA member) and shall be witnessed by the Suppliers or Purchaser (where applicable). Load test certificate to be supplied with goods.

17.2 Lifting Points

Metallic Non-Fabricated Lifting points [threaded holes] to be identified and stamped 'LIFT POINT' together with thread size and pitch e.g. M24 x 3. Where the application is painted the 'LIFT POINT' and identification shall be marked using a black ink marker in accordance with ES_0_5363_1 – Section 5.8 and Detail Design Drawings.

Thread size must be checked with a calibrated 'go / no go' gauge, core diameter verified and the minimum depth of full thread confirmed. A certificate shall be included with the equipment and included in the LTR's (if applicable). Threaded holes shall not be load tested (these features are proven by calculation).

17.3 Proof Load Testing

When specified, equipment shall be proof load tested at the Suppliers Works or at an approved Test House.

Proof load testing shall be performed by a competent person (LEEA member) using a test load as specified on the Detail Design Drawings or equipment specific Specification. The full test load shall be applied for a duration of not less than 2 minutes.

For NS / NSS Quality Category equipment, where specified, a procedure shall be submitted for approval by the Purchaser prior to any testing taking place. The procedure shall cover Health and Safety requirements, pre-requisites, detail of operations and any datum points to be used as a minimum. This shall be reviewed and accepted by the Supplier prior to submission to the Purchaser.

A Risk Assessment shall be carried out prior to any load testing and this shall be made available to the Purchaser prior to the testing.

Proof load testing shall be carried out prior to painting.

18 Health and Safety

The Supplier is reminded of their legal responsibility to comply with health and safety legislation. There may be a requirement for the Purchaser's Health and Safety representatives to attend the Suppliers site and conduct a Health and Safety review. The Purchaser will provide a notice of 24 hours as a minimum.

Following any audit, an action plan shall be agreed (if necessary) and the Supplier / Purchaser shall agree to the relevant actions and close out dates accordingly.

If there is a requirement for the Purchaser or Clients personnel to visit the Supplier's works during the course of the contract, the Supplier shall take measures to ensure safety of such visiting personnel by an appropriate induction and provide appropriate personal protective equipment (PPE) as a minimum.

18.1 Lifting and Lifting Plans

The Supplier shall be responsible for all lifts on their site and for the completion of all associated activities and documentation including any Lifting Plans / procedures (NSS Quality Category equipment).

If equipment does not possess the inherent strength to be handled by overhead crane or forklift, then strong backs or other bracing devices shall be provided. Loads to be handled by cranes shall be furnished with registered lifting eyes. A copy of all lifting eye certificates shall be supplied.

Lifting procedure / instructions shall be clearly indicated on equipment, equipment packaging or packing cases.

Quality Category	Description
CS	Items shall be safety lifted in accordance with the Suppliers own procedures.
NSS	Lifting of the Glove Boxes shall be in accordance with ES_0_1501_1 – Section 24.2 (Ref 12) and as specified on Detail Design Drawings.

18.2 Method Statements

The Supplier shall be responsible for producing the required Method Statements to conduct work safely on their site. The Method Statements must clearly identify all activities to be undertaken and assessed for risks in order to produce a safe system of work in accordance with guidelines laid down by the Health and Safety Executive.

18.3 Risk Assessments

The Supplier shall be responsible for producing all necessary Risk Assessments to ensure work is conducted safely on their site.

19 Factory Acceptance Testing

19.1 Factory Acceptance Test Procedure

The Purchaser shall detail the tests required to be undertaken by the Supplier in the Test documents supplied with the contract documentation.

19.2 Factory Acceptance Test Report

The supplied Test documents shall be used to record each test undertaken and the successful completion or otherwise of the test. The completed test document will form the Test Report when complete.

19.3 Pipework Testing

Quality Category	Description
CS	N/A.
NS	<p>As specified on the Detail Design Drawings.</p> <p>Blanking pieces shall be designed, manufactured and fitted to branches for the purpose of testing. The assembly shall be filled with penetrating liquor or 0.1% Synperonic N in demineralised water by volume and allowed to stand for a period of not less than 1 hour under the stated pressure.</p> <p>All welds and connections shall be coated with an approved white dye penetrant developer and allowed to dry.</p> <p>On completion of the tests all areas shall be inspected for signs of leakage. Any leakage which occurs shall be repaired and the assembly re-tested to the complete satisfaction of the Suppliers inspector.</p> <p>On satisfactory completion of test the pipework shall be emptied of the liquor used for testing, flushed out with demineralised water and completely dried.</p> <p>Caps of suitable material shall then be fitted to any open pipework such as to guarantee internal cleanliness and foreign material exclusion (FME), until final connections are made.</p>
NSS	<p>As specified on the Detail Design Drawings and this specification.</p> <p>Pipework shall be tested in accordance with ES_0_5391_2 section 10.8 (Ref 1) and the additional requirements of ES_0_1501_1 – Section 21.11 (Ref 12).</p>

19.4 Glove Box Alignment Check

Quality Category	Description
CS	N/A
NSS	<p>As specified on the Detail Design Drawings.</p> <p>The Glove Box end flanges shall be machined square and parallel in accordance with the tolerances stated on the Detail Design Drawings, however due to the expected build-up in tolerances, individual Glove Box end flanges may require additional machining to meet the expected overall alignment tolerance for Glove Box system / line. This alignment check shall be carried out prior to leak testing of the Containments. Refer to system level general arrangement drawing for alignment tolerance (where applicable). Record of Glove Box Alignment checks shall be provided.</p>

19.5 Static Mechanical Checks

It is important that specific checks are undertaken to confirm adherence to key requirements, this may take the form of but not limited to:

- Dimensional surveys of key equipment interfaces.
- Equipment functionality.
- Alignment of assemblies.

The requirement and detail of these requirements will be specified on the specific design documentation (FAT documents etc.).

19.6 Totally Enclosed (Box) Section Leak Test

Applies only to totally enclosed (box) sections internally within the Glove Box containment

Quality Category	Description
------------------	-------------

CS / NS / NSS	All totally enclosed box sections and cavities shall be subject to a leak test. The test shall consist of applying air at low pressure to box sections covered externally with a 2% solution of "Synperonic N" in water. The surface shall be examined for leaks that if detected shall be corrected at source. After satisfactory completion of the test the section shall be dried out and a seal weld applied to the air inlet.
----------------------	--

19.7 Containment Leak Testing

Quality Category	Description
CS	N/A.
NSS	Containment Leak Testing shall be carried out using Glove Box Leak Procedure Exemplar in accordance with PRO_SRP_MECH_00007 (Ref 27).

19.8 Safety Precautions

Quality Category	Description
CS	All work shall be carried out in accordance with the Suppliers own procedures.
NSS	Safety precautions relating to Glove Box leak testing refer to ES_0_1501_1 – Section 21.15 (Ref 12).

19.9 Temporary Windows

Quality Category	Description
CS / NS / NSS	If the Supplier wishes to use temporary containment viewing panels for leak testing these shall replicate the actual window sizes and tolerances stated on the Detail Design Drawings. Temporary windows shall not form part of the scope of supply (delivered to Sellafield Site).

19.10 The Sharps Audit

Caution - Great care is to be taken during this exercise.

Quality Category	Description
CS	All sharp edges and burrs shall be removed to provide smooth radii. The Supplier shall take due regard of CS items within a NS / NSS assembly in respect of sharps audit.
NSS	Sharps audit shall be in accordance with ES_0_1501_1 – Appendix E (Ref 12).

20 Red Line Drawings

Should there be a requirement for a Red Line Drawing to be generated, for example as a result of an identified error, modification or fettling (FAT) that has been identified / requested i.e. Technical Query, Production Permit or Concession then a Red Line mark-up shall be produced by the Supplier using the Detail Design Drawings, General Arrangement or Parts List (as applicable). These drawings shall be submitted with a transmittal note to the Purchaser.

No part shall be changed / modified / fettled without approval from the Purchaser.

Copies of any Red Line marks up, if applicable, shall be supplied to the Purchaser for CS / NS / NSS Quality Category equipment.

Red line drawings shall be of sufficient quality to allow a qualified draftsman to amend the drawings without explicit detail or prior knowledge of the change.

The Purchaser will define on any response to a Technical Query, Production Permit or Concession if a red line mark-up **IS NOT** required for that particular unique document.

21 Cleaning

Quality Category	Description
CS	Prior to final packaging and despatch, equipment shall be cleaned in accordance with the Suppliers QMS and section 10 of this specification.
NSS	Cleaning shall be in accordance with ES_0_5361_2 (Ref 13).

22 Packaging

Quality Category	Description
CS	<p>Proprietary items supplied to the Supplier shall be packed as per standard packing from the supplier.</p> <p>All items shall be suitably packed and protected so as to obviate damage during handling and transit for delivery to Sellafield Site.</p> <p>Guidance Notes for packing of Glove Boxes and Glove Box Equipment: -</p> <ul style="list-style-type: none"> Glove Box internal equipment shall be removed for transportation in line with the outline installation method statement (OIMS) supplied by the Purchaser. Remaining equipment shall be suitable braced with timber (where applicable) and bubble wrapped (taped). Items removed from containments for packaging shall be transported individually i.e. not within the containment. Glove Boxes to be wrapped in polythene, if coloured polythene is used then there must be a clear section of polythene for viewing inside the Glove Box. Premac Shielded Window Frames are considered fragile and shall be packed horizontally in a timber case, several Window Frames can be stacked on top of one another, however each layer must be adequately supported and wrapped to protect from damage during transportation. Lexan viewing panels are to be protected from scratching / damage and shall be packed horizontally in a timber case. Panels can be stacked on top of one another, however each layer must be adequately wrapped to protect from damage during transportation. Containment apertures are to be suitably blanked to avoid environmental damage, ingress of contaminants and FME during transport. During transportation all Beechwood shielding shall be removed. The top member of the Glove Box Support Stand shall be strapped to the vehicle flat bed. The Glove Box must not be strapped over or around the windows. Equipment that are potentially fragile e.g. Swabbing Robot, Turntable Magazine are to be removed and packed separately either in the supplied timber case or cardboard box. Loose equipment shall be either packed in cardboard boxes with adequate protection internally (bubble wrap etc.) or adequately packed on timber pallets (strapped and polythene wrapped), dependant on size of equipment. Several cardboard boxes can be packed onto timber pallets if required and viewed as safe. Each individual package shall be labelled internally and externally; equipment assembled within the Glove Box will not require labelling. Packaging shall clearly identify lifting positions and gross weight markings. Lifting point certification and lifting accessories certification, if applicable, shall be supplied within the packaging. All equipment shall be fully protected from environmental damage during transport. Risk of salt corrosion during transportation to site.
NSS	Packing shall generally be in accordance with ES_0_1501_1 – Section 24.1 (Ref 12) and guidance notes specified for CS quality category above. Reference to the provision of DPD shall be disregarded.

The packed equipment shall be weighed prior to despatch and clearly marked / identified.

Loose items, bags and / or bundles shall be clearly identified and firmly attached to the main Plant Item to prevent loose items becoming separated from the main Plant Item following delivery.

All packing shall be supported with a detailed packing list showing what is in boxes, on pallets etc. All packing shall be identified with the following:

- Purchasers Purchase Order Number.
- Purchasers Project Number.
- Supplier s Name.
- Equipment Title.
- Unique Equipment Identifier.
- Weight.

The packing list shall be waterproof.

22.1 Lubricants and Hydraulic Fluids

Large Gearboxes, reservoirs and systems filled with lubricants or hydraulic fluids shall be drained prior to delivery. Sufficient quantity of fresh lubricant or hydraulic fluid for flushing and first fill purposes shall be despatched with the equipment to site. Where drained equipment is to be subject to storage, then measures shall be taken to prevent corrosion. This is particularly relevant to equipment that has operated on Shell WG Fluid C. Any item drained for transport shall be clearly identified (to insure refilling at commissioning), new replacement fluid shall be supplied by the Supplier and identified to the equipment.

23 Final Sign Off and Release

Quality Category	Description
CS	The Supplier shall operate in alignment with their processes, procedures and in accordance with the supplied SDRL (if applicable). A detailed release / delivery note shall be provided with all delivered goods.
NSS	Release of equipment by the Purchaser will be on completion of an Inspection Release Note (SLM 4.06.02). Items covered by this specification shall not be despatched until written authorisation has been given by the Client's Inspector using Intermediate Certificate of Inspection Form (5199) SLF 2.15.02.04 (Ref 5) for interim release and Final Certificate of Inspection Form (5059) SLF 2.15.02.05 (Ref 6) for final release. Prior to equipment being released, the LTR package is to be complete to the satisfaction of the Client's Inspector.

24 Despatch and Delivery

For NSS Quality Category equipment, no equipment shall be released for despatch unless authorised by the Purchaser.

Approval by the Purchaser shall not relieve the Supplier of his obligation to ensure that packing is adequate.

Where equipment is to be shipped direct to the Clients site the Supplier will be notified along with the appropriate delivery address.

Failure to provide the necessary delivery documentation will result in the delivery being rejected by the Purchaser.

25 Documentation / Lifetime Records

The documentation required as part of this Contract is clearly identified within the SDRL supplied by the Purchaser.

All documentation supplied for this scope of supply shall clearly reference the following information:

- Purchaser Purchase Order
- Purchaser Project Number
- Sellafield limited Contract Number

All documents shall be legible.

25.1 Lifetime Records

Quality Category	Description
CS	Certificate of Conformity or Declaration of Conformity must be supplied with the equipment. Redline drawings (if required). Proprietary lifting equipment shall be supplied with statutory lifting certification. Non-fabricated lifting point certificates shall be provided.
NS	The records (if required) for completion of the LTR will be specified in the SDRL issued by the Purchaser. All records including those generated by the Supplier or their suppliers shall be compiled, indexed and uniquely identified to the Contract and specific work activity. The LTR's shall be supplied in accordance with Purchaser document SLSP 2.15.05 (Ref 10) and SLF 2.15.01.01 (Ref 11) (SLM 4.06.02).
NSS	LTR pack shall be in accordance with ES_0_5394_2 – Section 16.0 (Ref 3) and for guidance Purchaser document SLSP 2.15.05 (Ref 10) and SLF 2.15.01.01 (Ref 11) (SLM 4.06.02). LTR pack to comprise of the following: - Master completed LTR. Electronic copy of LTR to be supplied on CD-ROM or DVD-ROM. LTRs to be delivered to customer on completion of System Package components.

25.2 CS / NS / NSS Clarification of Requirements

Clarification examples shown for CS / NS / NSS requirements.

Supplier Documentation Requirements Listing (SDRL) to be used to identify additional requirements and documentation for CS, NS and NSS category assemblies.

Key (for examples only):-

CoC or DoC = Supplier produced document – Certificate of Conformity / Declaration of Conformance

SCoC = Supplier produced document - Certificate of Conformity e.g. Fastener Supplier

Note: When material certificates are requested, all materials certificates and SCoC's to be supplied.

Example 1 – Standard Fasteners			
Component Quality Category	Assembly Quality Category	Documentation Supplied	Notes
CS	CS	CoC or DoC for CS Assembly	Fastener SCoC retained by Supplier
CS	NS (does <i>not</i> state material certificates required)	CoC or DoC for NS Assembly NS Assembly LTR	Fastener SCoC retained by Supplier
CS	NS (states material certificates required)	CoC or DoC for NS Assembly NS Assembly LTR	Fastener SCoC retained by Supplier
CS	NSS	CoC or DoC for NSS Assembly NSS Assembly LTR	Fastener SCoC retained by Supplier
NS (states material certificates required)	NS	CoC or DoC for NS Assembly NS Assembly LTR	Fastener SCoC included in LTR
NS	NSS	CoC or DoC for NSS Assembly	Fastener SCoC retained by Supplier

Example 1 – Standard Fasteners			
Component Quality Category	Assembly Quality Category	Documentation Supplied	Notes
(does not state material certificates required)		NSS Assembly LTR	
NSS	NSS	CoC or DoC for NSS Assembly NSS Assembly LTR	NSS Assembly LTR

Example 2 – Fabricated Bracket (Build to Print)			
Component Quality Category	Assembly Quality Category	Documentation Supplied	Notes
CS	CS	CoC or DoC for CS Assembly	Manufacturing Documentation retained by Supplier
CS	NS	CoC or DoC for NS Assembly NS Assembly LTR	Manufacturing Documentation retained by Supplier
CS	NSS	CoC or DoC for NSS Assembly NSS Assembly LTR	Manufacturing Documentation retained by Supplier
NS (states dimensional reports)	CS	CoC or DoC for CS Assembly NS Component LTR	Manufacturing Documentation retained by Supplier Dimensional Reports included in LTR
NS (states material certificates, thread certificates and dimensional reports required)	NS	CoC or DoC for NS Assembly NS Assembly LTR	Material Certificates, Thread Certificates and Dimensional Reports included in LTR
NS (states dimensional reports)	NSS	CoC or DoC for NSS Assembly NSS Assembly LTR NS Component LTR	NSS Assembly LTR Dimensional Reports included in LTR
NSS	NSS	CoC or DoC for NSS Assembly NSS Assembly LTR	NSS Assembly LTR

Example 3 – Pneumatic Cylinder (Proprietary Item)			
Component Quality Category	Assembly Quality Category	Documentation Supplied	Notes
CS	CS	CoC or DoC for CS Assembly	Pneumatic Cylinder SCoC retained by Supplier
CS	NS	CoC or DoC for NS Assembly NS Assembly LTR	Pneumatic Cylinder SCoC retained by Supplier
CS	NSS	CoC or DoC for NSS Assembly NSS Assembly LTR	Pneumatic Cylinder SCoC retained by Supplier
NS (states material certificates required)	NS	CoC or DoC for NS Assembly NS Assembly LTR	Pneumatic Cylinder SCoC included in LTR
NSS	NSS	CoC or DoC for NSS	NSS Assembly LTR

Example 3 – Pneumatic Cylinder (Proprietary Item)			
Component Quality Category	Assembly Quality Category	Documentation Supplied	Notes
		Assembly NSS Assembly LTR	

26 References

No.	Document Reference	Issue	Title
1.	ES_0_5391_2	Contract Docs	Fabrication of Plant and Equipment (Stainless Steel).
2.	ES_0_5363_1	Contract Docs	The Evaluation of Materials for Contact with Stainless Steels.
3.	ES_0_5394_2	Contract Docs	Fabrication of Stainless Steel P&E, General Duty – For Use Where Corrosion Performance and Extended Life is Expected.
4.	SLP 1.02.18	Contract Docs	Resolution of Technical Queries / Concessions / Production Permits.
5.	SLF 2.15.02.04	Contract Docs	Intermediate Certificate of Inspection Form 5199.
6.	SLF 2.15.02.05	Contract Docs	Final Certificate of Inspection Form 5059.
7.	SLF 1.02.18.01	Contract Docs	Technical Query / Concession / Production Permit.
8.	SLP 2.15.01	Contract Docs	Quality of products and Services.
9.	OBE 3021764	Contract Docs	General Manufacturing Notes Drawing.
10.	SLSP 2.15.05	Contract Docs	Guidelines for the compilation, review and submission of lifetime records.
11.	SLF 2.15.01.01	Contract Docs	Quality Plan.
12.	ES_0_1501_1	Contract Docs	Alpha Plant & Equipment - Manufacture, Mechanical Works Testing, Storage & Installation.
13.	ES_0_5361_2	Contract Docs	Guide to cleaning Austenitic Stainless Steels.
14.	ES_0_5502_2	Contract Docs	Pipe, Cold-finished, Seamless Stainless Steel.
15.	ES_0_5512_2	Contract Docs	Butt Weld Fitting, Cold Formed, Seamless Stainless Steel.
16.	ES_0_5360_2	Contract Docs	The storage and handling of Stainless Steel materials, components and fabrications.
17.	ES_0_5522_2	Contract Docs	Stainless Steel Plate, Sheet and Strip.
18.	ES_0_5562_2	Contract Docs	Stainless Steel Bar – Commercial Grades.
19.	ES_0_5572_2	Contract Docs	Hot and cold Formed Sections, Stainless Steel.

No.	Document Reference	Issue	Title
20.	SLF 1.03.124	Contract Docs	Defect / Non Conformance Report.
21.	ES_0_1963_1	Contract Docs	Thermal Insulation – Plant, pipework and ducting.
22.	ES_1_5142_3	Contract Docs	Sellafield maintenance Painting Specification, Industrial and Decorative Finishes.
23.	ES_0_5393_2	Contract Docs	Fabrication and Installation of Metallic Pipework Carbon & Stainless Steel Builds 3 to 6.
24.	ES_0_5260_2	Contract Docs	General Procedure & guidance specification for radiographic examination.
25.	SLM 4.06.02	Contract Docs	Contract Quality Requirements Manual.
26.	Spec.Goods.X. 0349_1	Contract Docs	Elastomeric Seals – Viton Type A Items.
27.	PRO_SRP_ME CH_00007	Contract Docs	Glove Box Leak Test Procedure Exemplar.

Appendix A – Applicable Standards

The listings of Standards and Technical Data Sheets given below are not exhaustive but merely record those of prime relevance to general Alpha Plant work.

The issue status of any References, Engineering Standards, British Standards / Code of Practice or International Standard / Code of Practices referenced within this document shall be latest at the date of tender and contract award. Where changes in such information or statutory regulations necessitate modifications to the work, they shall be agreed with the Purchaser before implementation. Where both Metric International System (SI) and Imperial unit issues are current, the SI issue shall apply.

The complete requirements of the Statutory Acts and Regulations, as applicable, are to be adhered to.

Where the Supplier is required to perform work not covered by the listed specifications and standards, they shall bring this to the attention of the Purchaser Nominated Point of Contact (NPoC) for agreement / addition of the relevant Standards prior to the formal placement of contract.

American Standards (ASTM and AWS)

Document	Title
ASTM A380	Ferroxyl test for free Iron.
ASTM A967	Standard specification for chemical passivation treatments for Stainless Steel parts.
ASTM B117	Salt test for excessive Salt on Stainless Steel.
ASTM A511/ A511M	Standard Specification for Seamless Stainless Steel Mechanical Tubing and Hollow Bar.
ASTM A312/ A312M	Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
ASTM A403/ A403M	Standard Specification for Wrought Austenitic Stainless Steel Pipe Fittings
ASTM A276/ A276M	Standard Specification for Stainless Steel Bars and Shapes

British, European and International Standards

Document	Title
BS 1134:2010	Assessment of surface texture – Guidance and general information.
BS EN 1011-1:2009	Welding – Recommendations for welding of metallic materials – Part 1: General guidance for arc welding.
BS EN 1011-6:2018	Welding – Recommendations for welding of metallic materials – Part 6: Laser beam welding.
BS EN ISO 13918:2018	Welding - Studs and ceramic ferrules for arc stud welding.
BS EN ISO 14327:2004	Resistance Welding – Procedures for determining the weldability lobe for resistance spot, projection and seam welding.
BS EN ISO 14555:2017	Welding - Arc stud welding of metallic materials.
BS EN ISO 15607:2019	Specification and qualification of welding procedures for metallic materials - General Rules.
BS EN ISO 15609-4:2009	Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 4: Laser Beam Welding.
BS EN ISO 15614-1:2017	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.
BS EN ISO 3452-1:2013	Non-destructive testing - Penetrant testing - Part 1: General Principles.
BS EN ISO 3834-2:2005	Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements.

Document	Title
BS EN ISO 3834-3:2005	Quality requirements for fusion welding of metallic materials - Part 3: Standard quality requirements.
BS EN ISO 3834-5:2015	Quality requirements for fusion welding of metallic materials - Part 5: Documents with which it is necessary to conform to claim conformity to the quality requirement of ISO 3834-2, ISO 3834-3 or ISO 3834-4.
BS EN ISO 9001:2015	Quality management systems – Requirements.
BS EN ISO 5817:2014	Welding — Fusion-welded joints in Steel, Nickel, Titanium and their alloys (beam welding excluded) — Quality levels for imperfections.
BS EN ISO 669:2016	Resistance welding – Resistance welding equipment – Mechanical and electrical requirements.
BS 3909:1965	Ingot lead for radiation shielding.
BS EN ISO 11666:2018	Non-destructive testing of welds — Ultrasonic testing — Acceptance levels.
BS EN ISO 6507-1:2018	Metallic materials - Vickers hardness test - Part 1: Test method.
BS EN ISO 6507-2:2018	Metallic materials - Vickers hardness test - Part 2: Verification and calibration of testing machines.
BS EN ISO 6507-3:2018	Metallic materials - Vickers hardness test - Part 3: Calibration of reference blocks.
BS EN ISO 6507-4:2018	Metallic materials — Vickers hardness test Part 4: Tables of hardness values.
BS EN ISO 6506-1:2014	Metallic materials - Brinell hardness test - Part 1: Test method.
BS EN ISO 6506-2:2018	Metallic materials - Brinell hardness test - Part 2: Verification and calibration of testing machines.
BS EN ISO 6506-3:2014	Metallic materials - Brinell hardness test - Part 3: Calibration of reference blocks.
BS EN ISO 6506-4:2014	Metallic materials — Brinell hardness test Part 4: Tables of hardness values.
BS EN ISO 18265:2013	Metallic materials – Conversion of hardness values.
BS EN ISO 15614-11:2002	Specification and qualification of welding procedures for metallic materials - Welding procedure test - part 11 Electron and laser beam welding.
BS EN 3658:2008	Aerospace series - Tube bend radii, for engine application - Design standard.
BS EN ISO 14373:2015	Resistance welding - Procedure for spot welding of uncoated and coated low carbon steels.
BS 2633:1987	Specification for Class I Arc Welding of Ferritic Steel Pipework for Carrying Fluids.
BS EN ISO 13916:2017	Welding - Measurement of preheating temperature, interpass temperature and preheat maintenance temperature.
BS EN ISO 9934-1:2016	Non-destructive testing — Magnetic particle testing Part 1: General principles.
BS EN ISO 17637:2016	Non-destructive testing of welds - Visual testing of fusion-welded joints.
BS EN ISO 23277:2015	Non-destructive testing of welds - Penetrant testing - Acceptance levels.

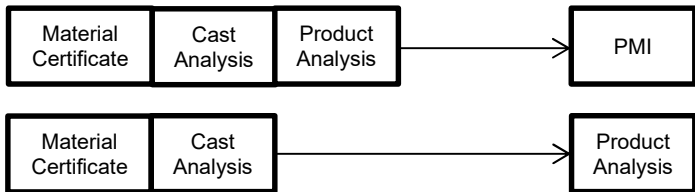
Document	Title
BS EN ISO 17640:2018	Non-destructive testing of welds - Ultrasonic testing - Techniques, testing levels, and assessment.
BS EN ISO 17636-1:2013	Non-destructive testing of welds - Radiographic testing Part 1: X- and gamma-ray techniques with film - CORR: February 28, 2013.
BS EN ISO 10675-1:2016	Non-destructive testing of welds — Acceptance levels for radiographic testing Part 1: Steel, nickel, titanium and their alloys.
BS EN ISO 8249:2018	Welding - Determination of Ferrite Number (FN) in austenitic and duplex ferritic-austenitic Cr-Ni stainless steel weld metals.
BS EN ISO 16433:2007	Resistance Welding – Procedure for Seal Welding of Uncoated and Coated Low Carbon Steels.

Table 1 – British, European and International Standards

Appendix B – ES Standards Guidance Tables

These notes are for guidance when purchasing stock material. When material is manufactured then the full ES specification will apply. These guidance notes do not remove responsibility from the Supplier in meeting the requirements of the SL Engineering Standard. Where clauses are not listed, the Purchaser shall comply fully with the requirements specified in the referenced SL Engineering Standard.

ES_0_5502_2 Issue 3 – Pipe, Cold-finished, Seamless Stainless Steel

ES_0_5502_2 Issue 3 – Pipe, Cold-finished, Seamless Stainless Steel		
Clause	Requirement	Engineering Comment
4.1	Quality plan requirement	Quality Plan is not a contract requirement
5.3.1	Batching	Material identification to be specified during the procurement process. Material identification shall be maintained and checked against the material certificate at goods receipt
5.5.3	Sizes / dimensions	As specified on Detail Design Drawings
6.1.1	Ultrasonic testing	There may be a requirement in specific areas to use UT depending on structural or containment dose or critical component reasons, which will be identified on the Detail Design Drawing and or machine/ item specific specification
6.2.1 – 6.2.3	Visual examination	Required if sampling inspection at mill
6.2.4 – 6.2.6	Visual examination	Mandatory requirement regardless of whether its mill or stockist (this should be 100% receipt inspection from stockist)
6.3	Hydrostatic testing	Hydrostatic testing will be proposed in specific areas, which will be identified on the Detail Design Drawing and or machine/ item specific specification
6.5	Tensile testing	There may be a requirement in specific areas to use Tensile Testing depending on structural or containment dose or critical component reasons, which will be identified on the Detail Design Drawing and or machine/ item specific specification
6.6	Hardness test	If not present on mill certificate would be additional testing. Testing shall be to BS EN ISO 6506-1 or BS EN ISO 6507-1, if this is a UKAS accredited lab then no need for procedure submission but in-house testing requires procedure. Alternative hardness testing methodologies are acceptable. Acceptance shall be equivalent to 190HV specified in BS EN ISO 18265
6.7	Product analysis	When procuring from stockist product analysis (additional test, different to cast analysis!) should be on the certification, if not, additional product analysis is required to be carried out
6.8	Surface carburisation	This is additional testing in excess of that stated in the ASTM specification
6.9	Material type test PMI	<p>If additional product analysis is carried out in section 6.7 (not on certification), then further PMI testing is not required. If product analysis is stated on certification, then PMI testing of the material must be carried out in accordance section 6.9.</p>  <pre> graph LR MC1[Material Certificate] --> CA1[Cast Analysis] CA1 --> PA1[Product Analysis] PA1 --> PMI1[PMI] MC2[Material Certificate] --> CA2[Cast Analysis] CA2 --> PA2[Product Analysis] </pre>

ES_0_5502_2 Issue 3 – Pipe, Cold-finished, Seamless Stainless Steel		
Clause	Requirement	Engineering Comment
8	Marking of pipe	Where supplied via stockists the references to SL standards don't apply but the content of the clauses does

Ref Clause 1.3 - Where the original mill certification already demonstrates compliance with Sellafield Ltd's additional testing requirements, replication of testing is not required.

ES_0_5512_2 Issue 2 – Butt Weld Pipe Fittings, Cold Formed, Stainless Steel

ES_0_5512_2 Issue 2 – Butt Weld Pipe Fittings, Cold-Formed, Stainless Steel		
Clause	Requirement	Engineering Comment
4.1	Quality plan requirement	Quality Plan is not a contract requirement
5.3	Batching	Material identification to be specified during the procurement process. Material identification shall be maintained and checked against the material certificate at goods receipt
5.5.3	Finish of ends	As specified on Detail Design Drawings (where applicable)
5.5.4	Fitting bores	As specified on Detail Design Drawings (where applicable)
5.6.1	Sizes / dimensions	As specified on Detail Design Drawings
5.6.2	Component dimensions and code references	Where supplied via stockists the references to SL standards don't apply
5.6.3	Machined weld preparations	As specified on Detail Design Drawings (where applicable)
5.6.4	Tangent, parallel bores and square ends	As specified on Detail Design Drawings (where applicable)
6.3	Hydrostatic testing	Hydrostatic testing will be proposed in specific areas, which will be identified on the Detail Design Drawing and or machine/ item specific specification
6.5	Product analysis	When procuring from stockist product analysis (additional test, different to cast analysis!) should be on the certification, if not, additional product analysis is required to be carried out. The Carbon content of the plate shall not exceed 0.030%
6.6	Hardness test	If not present on mill certificate would be additional testing. Testing shall be to BS EN ISO 6506-1 or BS EN ISO 6507-1, if this is a UKAS accredited lab then no need for procedure submission but in-house testing requires procedure. Alternative hardness testing methodologies are acceptable. Acceptance shall be equivalent to 190HV specified in BS EN ISO 18265
6.7	Surface carburisation	This is additional testing in excess of that stated in the ASTM specification
6.8	Dye penetrant testing	If not present on mill certification would be additional testing. Procedure submission is required

6.9	Material type test PMI	<p>If additional product analysis is carried out in section 6.5 (not on certification), then further PMI testing is not required. If product analysis is stated on certification, then PMI testing of the material must be carried out in accordance section 6.9.</p> <pre> graph LR MC1[Material Certificate] --> CA1[Cast Analysis] CA1 --> PA1[Product Analysis] PA1 --> PMI[PMI] MC2[Material Certificate] --> CA2[Cast Analysis] CA2 --> PA2[Product Analysis] </pre>
8	Marking of fitting	Where supplied via stockists the references to SL standards don't apply but the content of the clauses does

Ref Clause 1.3 - Where the original mill certification already demonstrates compliance with Sellafield Ltd's additional testing requirements, replication of testing is not required.

ES_0_5522_2 Issue 4 – Stainless Steel Plate, Sheet and Strip

ES_0_5522_2 Issue 4 – Stainless Steel Plate, Sheet and Strip		
Clause	Requirement	Engineering Comment
4.1	Quality plan requirement	Quality Plan is not a contract requirement
5.1.3	Material identity during manufacture	Material identification to be specified during the procurement process. Material identification shall be maintained and checked against the material certificate at goods receipt
5.1.4	Process contact materials	Stock material shall be supplied in a pickled and passivated condition. The material may require additional cleaning on receipt of material from stockist. Procurement process to specify importance of contact materials, e.g. cutting of profiles will require cleaning. The Evaluation of Materials for contact with Stainless Steel to be in accordance with ES_0_5363_1
5.2.1	Sizes and dimensions	As specified on Detail Design Drawings
5.2.2	Tolerances to table 1	Dimensions and tolerances stated in Table 1 shall be included in the procurement process
5.3.3	Surface condition to BS EN 10163-2 class B, sub-class 3	Surface finish included in BS 10088-2 & BS EN 10028-7, both reference to BS EN 10028-1, which specifies BS EN 10163
6.3	Product analysis	When procuring from stockist product analysis (additional test, different to cast analysis!) should be on the certification, if not, additional product analysis is required to be carried out. The Carbon content of the plate shall not exceed 0.030%
6.4	Hardness test	The hardness test for austenitic shall not exceed 190HV. If not present on mill certificate would be additional testing. Testing shall be to BS EN ISO 6506-1 or BS EN ISO 6507-1, if this is a UKAS accredited lab then no need for procedure submission but in-house testing requires procedure. Alternative hardness testing methodologies are acceptable. Acceptance shall be equivalent to 190HV specified in BS EN ISO 18265

6.5	Material type test PMI	<p>If additional product analysis is carried out in section 6.3 (not on certification), then further PMI testing is not required. If product analysis is stated on certification, then PMI testing of the material must be carried out in accordance section 6.5.</p> <pre> graph LR subgraph TopPath MC1[Material Certificate] --> CA1[Cast Analysis] CA1 --> PA1[Product Analysis] PA1 --> PMI[PMI] end subgraph BottomPath MC2[Material Certificate] --> CA2[Cast Analysis] CA2 --> PA2[Product Analysis] end </pre>
8	Marking of plate	Where supplied via stockists the references to SL standards don't apply but the content of the clauses does

Ref Clause 1.3 - Where the original mill certification already demonstrates compliance with Sellafeld Ltd's additional testing requirements, replication of testing is not required.

ES_0_5562_2 Issue 2 – Stainless Steel Bar

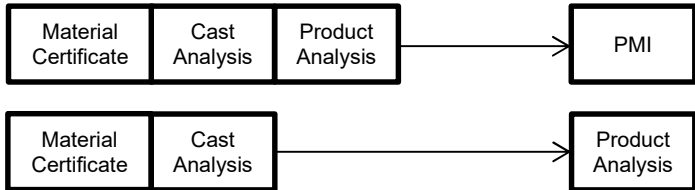
ES_0_5562_2 Issue 2 – Stainless Steel Bar		
Clause	Requirement	Engineering Comment
4.1	Quality plan requirement	Quality Plan is not a contract requirement
5.2.1 – 5.2.3	Batching	Where stockist material is used batch sizes shall be as per BS standard
5.3.1	Material identity during manufacture	Material identification to be specified during the procurement process. Material identification shall be maintained and checked against the material certificate at goods receipt
5.4.1	Process contact materials	Stock material shall be supplied in a pickled and passivated condition. The material may require additional cleaning on receipt of material from stockist. Procurement process to specify importance of contact materials, e.g. cutting of bar or clamping etc. will require cleaning. The Evaluation of Materials for contact with Stainless Steel to be in accordance with ES_0_5363_1
6.2.1	Ultrasonic examination	An invoked option from within BS 10272. If not present on mill certification would require additional testing
6.2.2	Batch testing	Frequency applies when being carried out as additional testing
6.5	Hardness test	If not present on mill certificate would be additional testing. Testing shall be to BS EN ISO 6506-1 or BS EN ISO 6507-1, if this is a UKAS accredited lab then no need for procedure submission but in-house testing requires procedure. Alternative hardness testing methodologies are acceptable. Acceptance shall be equivalent to 190HB specified in BS EN ISO 18265
6.6	Product analysis	When procuring from stockist product analysis (additional test, different to cast analysis!) should be on the certification, if not, additional product analysis is required to be carried out

ES_0_5562_2 Issue 2 – Stainless Steel Bar		
Clause	Requirement	Engineering Comment
6.7	Material type test PMI	<p>If additional product analysis is carried out in section 6.6 (not on certification), then further PMI testing is not required. If product analysis is stated on certification, then PMI testing of the material must be carried out in accordance section 6.7.</p> <pre> graph LR MC1[Material Certificate] --> CA1[Cast Analysis] CA1 --> PA1[Product Analysis] PA1 --> PMI[PMI] MC2[Material Certificate] --> CA2[Cast Analysis] CA2 --> PA2[Product Analysis] </pre>
8	Marking of plate	Where supplied via stockists the references to SL standards don't apply but the content of the clauses does.

Ref Clause 1.3 - Where the original mill certification already demonstrates compliance with Sellafield Ltd's additional testing requirements, replication of testing is not required.

ES_0_5572_2 Issue 3 – Hot and Cold Formed Sections, Stainless Steel

ES_0_5572_2 Issue 3 – Hot and Cold Formed Sections, Stainless Steel		
Clause	Requirement	Engineering Comment
4.1	Quality plan requirement	Quality Plan is not a contract requirement
5.3.1 – 5.3.2	Batching	Batch is as specified in British Standard
5.3.3	Material identity during manufacture	Material identification to be specified during the procurement process. Material identification shall be maintained and checked against the material certificate at goods receipt
5.4.1 – 5.4.5	Heat treatment	Heat treatment requirements are only required if additional tests fail
6.4	Dye Penetrant	Dye penetrant test shall only apply to cold formed sections. If not present on mill certificate for hot formed sections, would be additional testing. Procedure submission is required
6.5	Tensile test	Only required when not evident on the 3.1 test certificate, tensile test must be relevant to the product form and not the parent billet or plate etc.
6.6	Hardness test	If not present on mill certificate would be additional testing. Testing shall be to BS EN ISO 6506-1 or BS EN ISO 6507-1, if this is a UKAS accredited lab then no need for procedure submission but in-house testing requires procedure. Alternative hardness testing methodologies are acceptable. Acceptance shall be equivalent to 190HV (hot formed) or 250HV (cold formed) specified in BS EN ISO 18265
6.7	Product analysis	When procuring from stockist product analysis (additional test, different to cast analysis!) should be on the certification, if not, additional product analysis is required to be carried out

ES_0_5572_2 Issue 3 – Hot and Cold Formed Sections, Stainless Steel		
Clause	Requirement	Engineering Comment
6.10	Material type test PMI	<p>If additional product analysis is carried out in section 6.7 (not on certification), then further PMI testing is not required. If product analysis is stated on certification, then PMI testing of the material must be carried out in accordance section 6.10.</p>  <pre> graph LR subgraph TopPath [] direction LR MC1[Material Certificate] --- CA1[Cast Analysis] --- PA1[Product Analysis] end PA1 --> PMI[PMI] subgraph BottomPath [] direction LR MC2[Material Certificate] --- CA2[Cast Analysis] end CA2 --> PA2[Product Analysis] </pre>
8	Marking of sections	Where supplied via stockists the references to SL standards don't apply but the content of the clauses does.

Ref Clause 1.3 - Where the original mill certification already demonstrates compliance with Sellafield Ltd's additional testing requirements, replication of testing is not required.