

Technical Specifications (In-Cash Procurement)

Technical Specification of Contract #2 for Procurement of Flanges, Gaskets and fasteners for PBS26 CWS

This document is a technical specification of the Contract #2 for the procurement of flanges, related gaskets, related fasteners (nuts, bolts & washers and pins), blind plates, paddle spacers, and flow restrictors for the CWS project of the ITER plant

Table of Contents

1	PREAMBLE	4
2	PURPOSE	4
3	ACRONYMS & DEFINITIONS.....	4
3.1	Acronyms	4
3.2	Definitions.....	5
4	APPLICABLE DOCUMENTS & CODES AND STANDARDS.....	7
4.1	Applicable Reference for Regulations Requirements	7
4.2	Applicable Reference for Codes and Standards.....	8
4.3	Applicable References for Safety Requirements	9
4.4	Applicable References for General Requirements.....	9
4.5	Applicable Reference for IO Technical Requirements	10
5	SCOPE OF SUPPLY	11
5.1	Background	11
5.2	Description	11
5.3	Flanges and forgings	12
5.3.1	Material and Dimensions	12
5.3.2	Chemical and Mechanical Properties.....	12
5.3.3	Dimensions and Tolerances	13
-	Forgings.....	13
-	Flanges.....	13
-	Line Blank (Spectacle blank, Paddle blank, Paddle spacer).....	13
5.3.4	Supply conditions.....	14
-	Forgings.....	14
-	Flanges.....	14
-	Line Blank (Spectacle blank, Paddle blank, Paddle spacer)	14
5.3.5	Marking.....	14
-	Forgings.....	14
-	Flanges.....	15
-	Line Blank (Spectacle blank, Paddle blank, Paddle spacer).....	15
5.3.6	Testing.....	15
5.3.7	Inspection	16
5.3.8	Reports/Documents	17
5.4	Gaskets	18

5.4.1	Material and Dimensions	18
5.4.2	Chemical and Mechanical Properties.....	18
5.4.3	Dimensions and Tolerances	18
5.4.4	Supply condition	18
5.4.5	Marking.....	19
5.4.6	Testing.....	19
5.4.7	Inspection	19
5.4.8	Reports/Documents	19
5.5	Fasteners (Bolts/Studs, Nuts, & Washers) SA-193 B8 Class 2.....	20
5.5.1	Material and Dimensions	20
5.5.2	Chemical and Mechanical Properties.....	21
5.5.3	Dimensions and Tolerances	21
5.5.4	Supply condition	21
5.5.5	Marking.....	21
5.5.6	Testing.....	22
5.5.7	Inspection	23
5.5.8	Reports/Documents	23
5.6	Fasteners (Bolts/Studs, Nuts, & Washers) SA-453 Grade 660	24
5.6.1	Material and Dimensions	24
5.6.2	Chemical and Mechanical Properties.....	24
5.6.3	Chemical and Mechanical Properties for washer of material ASTM A 479 grade 316L 24	
5.6.4	Dimensions and Tolerances	25
5.6.5	Supply condition	25
5.6.6	Marking.....	25
5.6.7	Testing.....	25
5.6.8	Testing requirement for Washer of material ASTM A 479 grade 316L.....	26
5.6.9	Inspection	26
5.6.10	Reports/Documents	26
5.7	Other General Requirements.....	27
6	LOCATION FOR SCOPE OF WORK EXECUTION	27
7	IO DOCUMENTS	27
8	DELIVERABLES AND SCHEDULE MILESTONES	28
8.1	Schedule for delivery	28
8.2	List of deliverable documentation.....	28
9	QUALITY ASSURANCE REQUIREMENTS.....	30
10	SAFETY REQUIREMENTS	30

10.1	Nuclear class Safety	30
10.2	Seismic class	31
11	SPECIFIC GENERAL MANAGEMENT REQUIREMENTS	31
11.1	Contract Gates	31
11.2	Work Monitoring	31
11.3	CAD design requirements	31
11.4	Subcontracting.....	31
11.5	Documents.....	31
11.6	Deliveries	32
11.7	Access to Contractor’s Premises	32

1 Preamble

This Technical Specification is to be read in combination with the General Management Specification for Service and Supply (GM3S) ref. [29] that constitutes a full part of the technical requirements.

In case of conflict, the content of the Technical Specification supersedes the content of the General Management Specification for Service and Supply (GM3S) ref. [29].

2 Purpose

This document is a technical specification of the supply contract #2 for the procurement of flanges, related gaskets, related fasteners (nuts, bolts & washers and pins), blind plates, paddle spacers, and flow restrictors for the CWS project of the ITER plant.

3 Acronyms & Definitions

3.1 Acronyms

The following acronyms are the main one relevant to this document. For a complete list of ITER abbreviations, see ITER abbreviations ref. [27].

Abbreviation	Description
ANSI	American National Standards Institute
ASNR	Autorité de sureté nucléaire et de radioprotection
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BOM	Bill of Material
CWS	Cooling Water System
DN	Nominal Diameter
ESP	Equipement Sous Pression (Pressure Equipment)
ESPN	Equipement Sous Pression Nucléaire (Nuclear Pressure Equipment)
ESR	Essential Safety Requirement of the applicable regulation
GM3S	General Management Specification for Service and Supply
HRA	Hazard and Risk Analysis
IDM	ITER Document Management (system)
IO	International Organization
ISO	International Organization for Standardization
ITER	International Thermonuclear Experimental Reactor
KoM	Kick off Meeting
MPBP	Main Pressure Bearing Parts
MIP	Manufacturing and Inspection Plan
NDT	Non-Destructive Test
NPMA	Nuclear Particular Material Appraisal
OP	Other Parts

PED	Pressure Equipment Directive
PIA	Protection Important Activity
PIC	Protection Important Component
PP	Pressurized parts
QA	Quality Assurance
QC	Quality Class
SIC	Safety Important class
Wt	Weight

3.2 Definitions

ANB: Notified Body approved by ASNR to perform the conformity assessment of NPE.

As Low as Reasonably Achievable (ALARA): means making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as practical, consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.

Contract: An all-inclusive term used to cover all legal obligations between the IO and the Contractor for the performance of part or whole work defined in the present document. These obligations are enforceable immediately at its date of entry into force, including any amendment(s). Refer to contract conditions for more details.

Contractor: Economic operator who have signed the Contract in which this document is referenced. The Contractor is responsible for the performance of a portion of the work or the whole work defined in the present document.

Contractor's Premises: Any location, apart from the Site, where the Contractor or Subcontractors carry out any work defined in the present document.

Delivery Location: Location specified by the IO where the supplies will have to be delivered by the Contractor.

Documentation: The procedures, test reports, certifications, manuals, instructions, and other data specified to be delivered by the Contractor.

Nuclear Particular Material Appraisal (EPMN French Acronym): Specific Assessment of Nuclear Material. - French Environmental Code article L557 and R557 ref.[2], concerning equipment at risk which is a transposition of PED (2014/68/UE) ref. [1].

French ESPN Order related to NPE: French Order dated 30 December 2015 concerning nuclear pressure equipment ref. [3]. The ESPN follows a pressure classification and conformity assessment procedure that is in many cases based on PED assessment modules. It is the responsibility of the Manufacturer to comply with all requirements of this Order.

Heat: a generic term denoting a specific lot of steel, based up on steelmaking and casting considerations.

Heat number: the alpha, numeric, or alphanumeric designator used to identify a specific heat of steel.

INCOTERM Named Place: A location specified for the collection/delivery location of the goods.

ITER Organization (IO): As used in this specification, IO is the owner and Operator of the ITER research facility. Also, in accordance with PED and ESPN definitions, IO is the Manufacturer of the component procured per this technical specification.

ITER Site: ITER construction site located at the following address: ITER WORKSITE RD 952 - Entrée Nord - CS 80 001 -13066 Saint Paul les Durance Cedex.

Manufacturer: The Manufacturer is the IO. The Manufacturer is the legal entity which assumes responsibility for the design and manufacture of a product to be marketed under its name or trademark following [1] and [3].

Notified Body (NB): Technical organization approved in an EU state, either for approval and monitoring of the Manufacturer's quality assurance system or for direct product inspection.

Nuclear Regulatory Authorities/ Nuclear Regulator: referred to in this Specification are mainly MSNR (Office of the Ministries in charge of nuclear safety and radioprotection), ASNR Autorité de Sûreté Nucléaire et de Radioprotection, French Nuclear regulator).

Plant Breakdown Structure (PBS): The PBS is the hierarchical breakdown of the ITER Plant into distinct ITER elements. The PBS identifies the links between parent/child elements, so that there is only one rooting between a parent element and one of its child elements (and vice versa).

Pressure Equipment Directive (PED): European Directive 2014/68/UE related to Pressure Equipment.

Product: Any type of deliverable, goods and services resulting from the Technical Specification.

Protection Important Component (PIC): component important for protecting the interests of public security (including nuclear safety, radioprotection and prevention and fight against malevolent acts and civil security actions in the case of an accident), health and sanitation, the protection of nature and of the environment, i.e. any structure, equipment, system (programmed or not), material, component or software that is present in the basic nuclear installation or that is under the responsibility of the nuclear operator and that implements a function required for the demonstration mentioned under the second paragraph of Article L. 593-1 of the Environmental Code or that ensures that this function is implemented per articles 1.3 and 2.5.1 of Order 7th February 2012 ref. [4].

Quality Assurance Program: A controlled system of planned and systematic actions required to provide adequate confidence that an item designed and constructed is in accordance with

Code requirements. - Quality Assurance Manual: A written document that describes a Quality Assurance Program.

Safety Importance Class (SIC): a classification scheme for structures, systems, and components of ITER that perform a safety function and contribute towards meeting the General Safety Objectives at IO during incident/ accident situations.

Subcontractor: An entity furnishing services, materials, or components required to perform the work to the Contractor.

Supplier: See definition of “Contractor”.

Third Party: Is someone who may be indirectly involved but is not a principal party with a vested interest in carrying out the requirements of this Specification.

4 Applicable Documents & Codes and standards

The following documents are to be respected on the understanding that they prevail on each other in the following order:

- Decrees and Ministerial Orders,
- Standards and Rules whose application has been made mandatory by a Ministerial decision.
- Specific quality rules from the IO
- Standards and Rules whose application has not been made mandatory by a Ministerial decision.

In the case where the codes, standards and the relevant regulations would be modified after the base date of the economic conditions of this contract, the Manufacturer has the obligation to inform IO immediately to define by mutual agreement the following decision to take.

This is the responsibility of the Contractor to identify and request for any documents that would not have been transmitted by IO, including the below list of reference documents.

In case of conflicting information, this is the responsibility of the Contractor to seek clarification from IO.

Upon notification of any revision of the applicable document transmitted officially to the Contractor, the Contractor shall advise within 4 weeks of any impact on the execution of the contract. Without any response after this period, no impact will be considered.

4.1 Applicable Reference for Regulations Requirements

- [1]. Directive 2014/68/UE of the European Parliament and Council dated 15 May 2014 on the harmonization of the laws of the member states relating to the market availability of pressure equipment (PED)
- [2]. French Regulation for Pressure Equipment (transposition of PED in French law), French Environmental Code, Articles L557 and R557
- [3]. French Order dated 30 December 2015 on Nuclear Pressure Equipment (ESPN), modified

- [4]. Order 2012 February 7 setting the general rules relative to basic nuclear installations

4.2 Applicable Reference for Codes and Standards

For each European standard, the latest version issued by the European Committee for Standardization on the date of contract notification is applicable.

- [5]. ANSI/ASME B 16.5: Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24 Metric/Inch Standard
- [6]. ASME B16.48: Line Blanks (Spectacle blank, Paddle blank, Paddle spacer)
- [7]. ASTM A182M F304/F304L, edition 2009: Stainless Steel Flange
- [8]. ANSI/ASME B 16.20: Metallic Gaskets for Pipe Flanges (Ring-Joint, Spiral-Wound, and Jacketed)
- [9]. ISO 4014-2011 - Hexagon head bolt
- [10]. ISO 724: 1993 - Stud bolt
- [11]. ISO 4033-2012 – Hexagon type nuts (style 2) - Product grades A and B
- [12]. ISO 7089-2000 – Washers - Normal series - Product grade A
- [13]. BS EN 22340 : 1992 / ISO 2340 : 1986 Clevis pins without head
- [14]. ASME B 18.2.1-2012 (inch series) – Hexagon head bolt
- [15]. ASME-B18.31.2-2014 (inch series), UNC Thread - Stud bolt
- [16]. ASME B 18.2.2-2015 (inch series) – Hexagonal Type Nuts and lock nuts
- [17]. ASME B 18.22.1 - Plain washers (Helical Spring-Lock and Plain Washers)
- [18]. ASTM A745M-12 “Standard Practice for Ultrasonic Examination of Austenitic Steel Forgings”
- [19]. ASTM E21-09 “Standard Test Methods for Elevated Temperature Tension Tests of Metallic Materials”
- [20]. ASTM A370-09, “Standard Test Methods and Definitions for Mechanical Testing of Steel Products”
- [21]. EN 10204 (2005) Metallic products - Types of inspection documents
- [22]. EN1591-1:2024 flanges and their joints. Design rules for gasketed circular flange connection

4.3 Applicable References for Safety Requirements

- [23]. Quality Requirements for IO Performers , [ITER_D_22MFG4](#),

- [24]. ITER Policy on Safety, Security and Environment Protection Management, [ITER_D_43UJN7](#)
- [25]. Procedure for management of Nonconformities, [ITER_D_22F53X](#),
- [26]. Provisions for Implementation of the Generic Safety Requirements by the External Interveners, [ITER_D_SBSTBM](#),
- [27]. Safety Important Functions and Components Classification Criteria and Methodology, [ITER_D_347SF3](#)

4.4 Applicable References for General Requirements

The applicable version of the following documents is the last approved version available at the signature of the contract subject of this Technical Specification.

- [28]. ITER Abbreviations , [ITER_D_2MU6W5](#),
- [29]. General Management Specification for Service and Supply (GM3S) (82MXQK)
- [30]. ITER Quality Assurance Program (QAP), [ITER_D_22K4QX](#),
- [31]. Quality Management System Audits, ITER_D_2DQTA8
- [32]. Procedure for the management of Deviation Request , [ITER_D_2LZJHB](#),
- [33]. Technical Specification for Coating and Tagging, [ITER_D_S9YVVG](#),
- [34]. IO / In-Cash Contractor Documentation Exchange and Storage Working Instruction, [ITER_D_G8UMB3](#)
- [35]. Implementation plan for design & manufacture of PE/NPE, [ITER_D_VE2DSP](#),
- [36]. List of manufacturing documents to prepared and stored for PE and NPE, [ITER_D_WDBC7H](#)
- [37]. Propagation of the Defined Requirements for Protection Important Components Through the Chain of External Interveners (BG2GYB v3.3)
- [38]. Working Instruction for the Delivery Readiness Review (DRR) (X3NEGB v3.0)
- [39]. Procedure for Reception of Components at the ITER Site (RXCTBZ v3.2)
- [40]. Procedure for Transportation of Components to ITER Site (RY5C6Q v3.1)
- [41]. ITER Numbering System for Components and Parts (28QDBS v5.1)

4.5 Applicable Reference for IO Technical Requirements

The applicable version of the following documents is the last approved version available at the signature of the contract subject of this Technical Specification.

- [42]. Impurity controls requirements for PBS26 (9LPHJE v3.0)

- [43]. Equipment Specification for piping materials used in the design of process piping systems (SJE6S7 v2.14)
- [44]. PBS26.TCWS Bill of Material for Flanges, Blind Flanges, Paddle Spacer/Blind and Spectacle Blind assembly (2JH9YH v4.7)
- [45]. NPMA ASTM A182 F304L - pipe flanges (28NELT v1.2)
- [46]. NPMA ASTM A193 gr B8 cl 2 /A194 gr.8 - bolts and nuts for flanges (82L2U8 v1.2)
- [47]. Preliminary NPMA ASTM A453 gr.660 - Pressure Equipment (2U63AG v2.2)

5 Scope of Supply

5.1 Background

The ITER Project is constructing an experimental nuclear fusion reactor in south of France.

The ITER Cooling Water System (CWS) is designed to control the main thermal hydraulic parameters of the systems (e.g. in-Vessel Components and Power Supplies) and to reject their heat loads to the environment when the plasma will be heated at 50 MW and the D-T fusion power heat will reach 500 MW with an amplification factor Q 10. In that condition, CWS shall remove a peak heat load of about 1150 MW.

The IO has already progressed in the procurement and construction of the CWS. Indeed, the IO has already completed the final design phase of the CWS systems. And the IO has the responsibility to bring the design to the level of Construction design, which is already the case for some parts of the CWS. Other parts are already installed in the ITER site. This contract aims at procuring piping parts and accessories for the portions of the CWS which will be fabricated from September 2026 and beyond.

5.2 Description

The scope of this contract is the procurement of the following types of components:

- Flanges
- Gaskets
- Fasteners (nuts, stud bolts & washers and pins)
- Blind plates
- Paddle spacers
- Spectacle blinds

The components required may be either:

- **Standard Components**, which are catalogue (off-the-shelf) components of the selected Contractor without any modification, or
- **Non-Standard Components**, which will be customised to meet specific requirements (i.e. flow restrictors).

The Bill of Materials provided together with this Technical Specification lists all the components included in the scope of supply of this contract. The requirements for the components included in the scope of supply of this contract are defined in the present Technical Specification. The technical requirements listed in the NPMA ASTM A182 F304L - pipe flanges ref. [45] and NPMA ASTM A193 gr B8 cl 2 /A194 gr.8 - bolts and nuts for flanges ref. [46] takes precedence on the technical requirements listed in the present Technical Specification.

In this frame, the contractor shall execute the following scopes:

- a) Contract management including submission of the documentations related to the components delivered and the contract execution
- b) Manufacturing (or procurement for COTS)
- c) Inspection before shipment
- d) Packing and delivery to the ITER site.

5.3 Flanges and forgings

5.3.1 Material and Dimensions

Material Grade	ASTM A182M F304L, ASME SEC II If not otherwise specified in the BoM
Dimension standard	ASME B16.5: Pipe flanges and flanged fittings ASME B16.48: Line Blanks (Spectacle blank, Paddle blank, Paddle spacer)
Type	WNRF - Weld neck raised face RF - Raised face
Face finish	Serrated finish
Size, pressure rating class & Qty.	Defined in the BoM

5.3.2 Chemical and Mechanical Properties

- The Chemical properties of material shall follow the requirements defined in the table hereafter:

Grade	C max	Si max	Mn max	P max	S max	Cr	Ni	N max
F304L	0.030	1.00	2.00	0.045	0.015	18.0-19.50	8.0-10.0	0.11

However, it shall also comply with the limits given for radio protection requirement in the below table.

Category for radio protection requirement	Stainless Steel (SS) Element - Maximum concentration (%)
Category 2 (with high dose areas)	Cobalt (Co) – max 0.20 wt. % Niobium (Nb) – max 0.10 wt. % Tantalum (Ta) – max 0.05 wt. %

- Mechanical properties shall be as per Table 3 of SA182M, ASME SEC II.
- To Comply with Essential Safety Requirements for pressure bearing materials, Minimum requirements, as per ASTM A370-09 & per ASTM E21-09 (at elevated temperatures) shall be met as per following table.

Temperature (TS)	Rm (MPa)	Rp1.0 (MPa) min	Rp0.2 (MPa) min
RT	500-700	230	200
190 °C	409	150	123
400 °C	386	116	101

- At room temperature, Longitudinal elongation $\geq 40\%$ and Transversal elongation $\geq 35\%$ with the test sample A_{5d} or $A_{5.65} \cdot SQRT(S_0)$ shall be required.
- Impact test shall be carried out according to EN ISO 148-1:2016, with ISO V test sample

10x10mm. The results shall be longitudinal KV \geq 100J at 0°C (or lower) and transversal KV \geq 60J @ 0°C (or lower). Where full size sample in not practical, CLAP guideline X163 applies.

- All the chemical and mechanical properties along with additional requirements as above shall be reported in material certificates type 3.1/3.2.

5.3.3 Dimensions and Tolerances

- Forgings: Tolerances on dimension of forging shall be as per provided drawings.
- Flanges
 - o Dimensions of flange as per ASME B16.5 (Tables are given according to pressure rating class for flange dimension in ASME B16.5) and tolerances of ASME standard flanges shall be section 7 of ASME B16.5.
 - o Dimensions and tolerances of non-standard body flanges shall be as per provided drawings.
 - o Flange Facing shall be as below as per section 6.4 of ASME B16.5.

Pressure rating	Raise face thickness in addition to the minimum flange thickness, t_f
Classes 150 and 300	1.5 mm
Classes 400, 600, 900, 1500, and 2500	6.4 mm

- o All flanges facing shall be serrated finish having a resultant surface finish from 3.2 μ m to 6.3 μ m average roughness.
- o Surface roughness Ra of inner surface shall be $<6.3 \mu$ m.
- Line Blank (Spectacle blank, Paddle blank, Paddle spacer)
 - o The gasket-seating surface and dimensions for line blanks used with raised face flanges shall be in accordance with ASME B16.5.
 - o Dimensions of Class 150 to 2500 Blanks for use with Raised Face Flanges shall be in accordance with Tables 4.3.1-1 through 4.3.1-6 of ASME B16.48.
 - o The height of the raised faces shall be in addition to the thicknesses, t, listed in Tables 4.3.1-1 through 4.3.1-6 of ASME B16.48 - 2020.

Pressure rating	Raise face thickness in addition to the minimum flange thickness, t_f
Classes 150 and 300	1.5 mm
Classes 400, 600, 900, 1500, and 2500	6.4 mm

- o Dimension tolerances shall be as per section 5.2 of ASME B16.48.
- o The handle or web (tie bar) may be integral or attached to the line blank or spacer. The web and its attachment shall be capable of supporting the weight of the blank or spacer in all orientations without permanent deformation to the web.
- o All facing shall be serrated finish having a resultant surface finish from 3.2 μ m to 6.3 μ m average roughness.

- Surface roughness Ra of inner surface shall be <6.3 um.

5.3.4 *Supply conditions*

- Forgings
 - Heat treatment shall confirm to the section 7 of SA 182M, ASME SEC II.
 - No Weld repairs on Forgings are permitted.
 - Forgings shall be packed and intact during transport to avoid material damage.
 - Labelling on packing as per project requirement if required (it will be confirmed during contract execution).
- Flanges
 - Heat treatment shall confirm to the section 7 of SA 182M, ASME SEC II.
 - No Weld repairs on Flanges are permitted.
 - Welding end preparation for WNRF flange shall be done as per section 6.7 of ASME B16.5.
 - Each flange shall be wrapped separately to avoid denting, detritions of surface, scratches on the surface due to rubbing with each other during packing and transit.
 - Labelling on packing as per project requirement if required (it will be confirmed during contract execution).
 - Serration type shall be confirmed by vendor either serrated concentric OR Serrated spiral finish.
- Line Blank (Spectacle blank, Paddle blank, Paddle spacer)
 - Surfaces shall be free of projections that would interfere with gasket seating.
 - Other requirements, same as flanges
 - Serration type shall be confirmed by vendor either serrated concentric OR Serrated spiral finish.

5.3.5 *Marking*

- Forgings
 - Marking shall be done by Engraving or low stress punch on each forging. Chemical etching not acceptable.
 - Stainless steel forgings shall be properly marked with followings as per clause 19 of SA 182M & clause 20 of SA 961M:
 - The manufacturer's name or trademark
 - The heat number or manufacturer's heat identification
 - Specification number
 - The grade of material and size/class
 - Additional marking & tagging as per project requirement if required (it will be confirmed during contract execution)

- Flanges
 - Marking shall be done by Engraving or low stress punch on each flange. Chemical etching not acceptable.
 - Stainless steel forged flanges shall be properly marked as per section 4 of ASME B16.5:
 - Manufacturer's name or trademark
 - ASME specification number with grade (ex. A182 Gr. F304L)
 - Flange/collar type
 - DN size & NPS size
 - Pressure rating class
 - Wall thickness
 - The designation B16.5 (preferably located adjacent to the class designation, to indicate conformance to this Standard)
 - The heat number or manufacturer's heat identification
 - Additional marking & tagging as per project requirement if required (it will be confirmed during contract execution).

- Line Blank (Spectacle blank, Paddle blank, Paddle spacer)
 - Marking shall be done by Engraving or low stress punch as per section 7 of ASME B16.48. Chemical etching not acceptable.
 - Line blanks shall be marked as follows:
 - Manufacturer's name or trademark
 - Material, specification, and grade or class
 - DN size & NPS size
 - Pressure rating class
 - The designation B16.48 (preferably located adjacent to the class designation, to indicate conformance to this Standard)
 - The heat number or manufacturer's heat identification
 - ring number (if applicable)
 - Additional marking & tagging as per project requirement if required (it will be confirmed during contract execution)
 - In order to differentiate between an installed paddle spacer and a paddle blank, it is required that there be an externally visible distinction between the two as required by paras. 8.2 and 8.3 of ASME B16.48.

5.3.6 Testing

- Ultrasonic testing shall be carried out for thicknesses ≥ 8 mm as per ASTM A388: 16 & ASTM A745: 09 for the proof machined forging before any mechanical operation (e.g. drilling & final machining).

Test Program	Acceptance criteria
Per ASTM A745:09	Each forging/bar: acceptance criteria in accordance with QL-1
Per ASTM A388:16	For all thickness forgings 8 mm and over in nominal thickness

- Visual examination shall be carried out 100% as per ASTM A961:07. Acceptance criteria as per ASME B31.3 Section 344.2
- Dye penetrant testing shall be carried out on bevel edges of flange in accordance with Test Method E165.
- Impact test shall be carried out according to EN ISO 148-1:2016, with ISO V test sample 10x10mm. The results shall be longitudinal KV \geq 100J at 0°C (or lower) and transversal KV \geq 60J @ 0°C (or lower). Where full size sample in not practical, CLAP guideline X163 applies.
- Heat treatment shall be done as per ASME reference standard as per section 3.1 of this MTL
- One sample per heat/cast/lot shall be IGC tested as per Practice E of ASTM A262:10.
- Grain size measurement as per EN ISO 643. Grain size shall be > 2 .
- Chemical and mechanical properties of material as per section 3.1 of this MTL.
- Vendor shall carry out heat wise product analysis, chemical composition and tensile test at ambient and Design/elevated temperature (190°C and 400°C) and testing result shall meet as per section 3.1 of this MTL. (Elongation and tensile values shall also be reported for tensile test at design/elevated temperature).
- Non-destructive testing (NDT) shall be performed by level 2 qualified personnel as per ISO 9712. All NDT (UT, DP, and VT) procedure shall be approved by Level 3 certified as per ISO 9712.
- All the test results shall be provided in manufacturer material test certificate type EN 10204-3.1 OR EN 10204-3.2.

5.3.7 Inspection

All materials shall conform to the Essential Safety Requirements of the applicable European Pressure Equipment Directive (PED) 2014/68/EU and ESPN requirement.

Manufacturer’s test certificates shall be as per DIN EN 10204 - 3.1 or 3.2. All lab tests shall be covered under the main Manufacturer test certificate

Certification shall be supplied along with heat/cast & product analysis showing chemical

and mechanical properties, all required tests (i.e. tensile test, Hardness etc.), heat treatment details, and heat no. / lot no. etc. for correlating details with material.

5.3.8 Reports/Documents

- For all tests as per ASTM A182M F304L for ASME material
- Yield strength (Rp0.2 and Rp1.0) at room temp & elevated temperature (190°C and 400°C)
- Ultimate tensile strength (Rm) at room temperature & elevated temperature (190°C and 400°C)
- Chemical composition with composition of Co, Nb & Ta
- Impact test (longitudinal and transversal) as per EN ISO 148-1:2016
- Grain size measurement as per EN ISO 643
- Roughness measurement for flange facing and inner surface
- Visual & Dimensional inspection
- Inter granular corrosion
- Dye penetrant test
- Ultrasonic examination
- Three copies of manufacturer's test certificates (Original +2 copies) to be supplied along with material. All test certificates shall comply with the material with which it is manufactured & tested in accordance with this specification, together with report of the result required by the specification shall be furnished along with supply.

5.4 Gaskets

5.4.1 Material and Dimensions

Description	UNIT	
Service fluid		Water/Nitrogen/Steam or as per enquiry
Temperature (maximum)	°C	400 or as per enquiry
Temperature (minimum)	°C	0 or as per enquiry
Leak tightness class		L0.001 (As per EN 13555)
Irradiation	MGy	1.5
Maximum irradiation dose rate	kG/y	3.2
Design life & corresponding periodicity of replacement of gaskets		Vendor to provide
Thickness	mm	As per reference standard or as per mutually agreed in case of non-standard gasket
Gasket MOC		Metal (SA 240M Gr 304/304L)
Filler material		Graphite
Gasket type		SW with centering ring and inner ring
Size and pressure class		As per Bill of Material
Quantity		As per Bill of Material

- Gasket material shall be free of halogen, mercury or asbestos.
- Gasket shall be compatible with fluid temperature from 0°C to 400°C and up to 5.0MPa

5.4.2 Chemical and Mechanical Properties

- The chemical properties of Grade 304/304L material shall be as per Table 1 of referenced ASME SA 240M (ASME Sec II Part-A) specification.
- Mechanical properties of Gr 304/304L material shall be as per Table 2 of referenced ASME SA 240M (ASME Sec II Part-A) specification.

5.4.3 Dimensions and Tolerances

- The dimensions and tolerances of spiral wound gaskets, centering rings and inner rings shall be in accordance with section SW-2 of ASME B16.20: 2017.

5.4.4 Supply condition

- It should be properly packed in polyethylene bags to protect from dust / foreign particles & to protect against damage during transportation.
- Each gasket should be separated with plastic clamp to avoid any damage during transportation.
- In case multiple gaskets dispatched in single lot packed and stacked one upon another, this packed lot should be locked with wooden box /container to restrict movement within box

during transportation. Similarly, wooden box also needs to be tied properly on transport vehicle to avoid movement. Final packing must be rigid and intact before dispatch.

5.4.5 *Marking*

- Marking shall be done as per SW-4 of ASME B16.20: 2017 and shall include followings:
 - The manufacturer's name or trademark
 - Flange size (NPS)
 - Pressure class
 - The winding material abbreviation
 - The filler material abbreviation
 - The Centering and inner ring metal abbreviation
 - Flange identification
 - ASME B16.20 designation

5.4.6 *Testing*

- Chemical and mechanical properties of material as per section 5.4.2 of this document.
- All the test results shall be provided in manufacturer material test certificate type EN 10204-3.1 or EN 10204-3.2.

5.4.7 *Inspection*

All materials shall conform to the Essential Safety Requirements of the applicable European Pressure Equipment Directive (PED) 2014/68/EU and ESPN requirement.

Manufacturer's test certificates should be as per DIN EN 10204 - 2.2 (Test Certificate Requirement - All lab tests values need to be added under the main Manufacturer test certificate).

Certification shall be supplied along with heat/cast & product analysis showing chemical and mechanical properties, all required tests (i.e. tensile test, Hardness etc.), heat treatment details, and heat no. / lot no. etc. for co-relating details with material.

5.4.8 *Reports/Documents*

- Material test certificates as per DIN EN 10204 - 3.1/3.2
- Datasheet according to EN-13555 (in order to perform the verification\ qualification based on EN-1591-1) is required
- Mechanical properties
- Chemical composition with composition of Co, Nb & Ta
- Test certificate of filler material showing halogen, mercury and asbestos content

- Visual and dimensional check
- All the test results shall be provided in Material certificate type 2.2.

Three copies of manufacturer’s test certificates (Original +2 copies) to be supplied along with material. All test certificates shall comply with the material with which it is manufactured & tested in accordance with this specification, together with report of the result required by the specification shall be furnished along with supply.

5.5 Fasteners (Bolts/Studs, Nuts, & Washers) SA-193 B8 Class 2

5.5.1 Material and Dimensions

Item/type	Dimension Standard ¹	Material specification standard & Grade
Hexagon Head Bolt	ISO 4014: 2011	ASTM A 193/ SA 193M B8 Class 2
Stud bolt	ISO 724: 1993	ASTM A 193/ SA 193M B8 Class 2
Hexagonal Type Nuts	ISO 4033-2012 (style 2) - Product grades A and B	ASTM A 194/ SA 194M grade 8
Washers (Helical Spring-Lock and Plain Washers)	DIN 6796 : 2009	SS 304 or equivalent
	ISO 7089: 2000 Normal series, product grade A	
Clevis Pins	BS EN 22340 : 1992 / ISO 2340 : 1986 Clevis pins without head	SS 304 or equivalent

Item/type	Dimension Standard ¹	Material specification standard & Grade
Hexagon Head Bolt	ASME B 18.2.1-2012 (inch series)	ASTM A 193/ SA 193M B8 Class 2
Stud bolt	ASME-B18.31.2-2014 (inch series), UNC Thread ²	ASTM A 193/ SA 193M B8 Class 2
Hexagonal Type Nuts and lock nuts	ASME B 18.2.2-2015 (inch series)	ASTM A 194/ SA 194M grade 8
Washers (Helical Spring-Lock and Plain Washers)	ASME B18.21.1-2009 (inch series)	SS 304 or equivalent

Notes:

- 1- Mentioned edition or latest edition of codes to be use.

- 2- Consider 8UN thread for the bolt sizes where UNC not available as per ASME B18.31.2 or not feasible.

5.5.2 Chemical and Mechanical Properties

- Chemical properties of material shall be as per Table 1 of referenced material specification standard ASTM A 193 or SA 193M.
- Mechanical properties of material shall be as per Table 3 of referenced material specification standard ASTM A 193 or SA 193M. Minimum requirements, as per ASTM A370-05 & per ASTM E21-17 (at elevated temperatures) shall be met as per following table.

Bolt Diameter (mm)	Temperature (TS)	Rm (MPa) min	Rp0.2 (MPa) min
t ≤ 19	0 °C / @ RT	860	689
	400 °C	-	393
19 ≤ t ≤ 25	0 °C / @ RT	795	552
	400 °C	-	315
25 ≤ t ≤ 32	0 °C / @ RT	725	448
	400 °C	-	255
32 ≤ t ≤ 38	0 °C / @ RT	690	345
	400 °C	-	197

- At room temperature following SA 193M, elongation, min 14% with the test sample A5d or A5.65*SQRT (S0) shall be required.
- The minimum reduction of area shall be higher than 0.45 as per Table-3 of SA 193M, if elongation (A) is lower than or equal to 14%.

5.5.3 Dimensions and Tolerances

- Dimensions and tolerances of fasteners shall comply with reference Dimension standard as mentioned in Table 3.2 or 3.3 of this specification.
- Dimensions and tolerances of fasteners will be mutually agreed when it is not provided in reference Dimension standard.

5.5.4 Supply condition

- All fasteners should be thoroughly checked for visual inspection for any surface discontinuities and mechanical marks.
- Base material for fasteners shall not have any repair welds.

5.5.5 Marking

- Marking shall comply the requirements of reference material specification standard. It should include following detail.
 - o Manufacturer’s name, trademark or logo

- Grade Symbol & class

5.5.6 Testing

- All tests as per reference Material specification standard.
- Chemical and mechanical properties of material as mentioned in section 3.1 of this specification.
- Mechanical properties at room temperature and design temperature 400°C or as given in inquiry. Test result value at test temperature shall comply with value given in material standard.
- Hardness test of fasteners shall be performed as per test method ASTM A-370. Acceptable values are provided in below table as per reference material standard.

	Hardness, (max)
For Bolts, A193 Gr B8 Class 2:	Max 35 HRC or Max 321 HBW
For Nut, A 194 gr8	Brinell Hardness : 126 to 300 HB

- Impact test shall be carried out according to EN ISO 148-1:2016, with ISO V test sample 10x10x55mm. The results shall be KV ≥ 50J at RT (for materials with austenitic structure) and KV ≥ 40J @ 0°C (or lower). Where full size sample in not practical, CLAP guideline X163 applies.
- Penetrant Testing examination shall be done 100% as per ASTM A962-16. Acceptance Criteria as per S57 of A962.
- Proof loads (For Nut material) shall be as per Table 3 or 4 of SA 194M. Acceptance Criteria as per S11 of A962.
- All bolts, studs, and nuts greater than 50 mm (2 in.) nominal bolt size shall be ultrasonically examined over the entire surface prior to threading in accordance with section 3.7.2 of ASME VIII Div.2:2021 [(1) Examination shall be carried out by the straight beam, radial scan method. (2) Examination shall be performed at a nominal frequency of 2.25 MHz with the search unit not to exceed 645 mm² (1 in.²) in area.(3) Calibration sensitivity shall be established by adjustment of the instrument so that the first back screen reflection is 75% to 90% of full screen height. (4) Any discontinuity which causes an indication in excess of 20% of the height of the first back reflection or any discontinuity which prevents the production of the first back reflection of 50% of the calibration amplitude is not acceptable.]
- Vendor shall carry out heat wise product analysis, chemical composition and tensile test at ambient and design temperature at 400 °C and testing result shall meet the requirements of this material specification.
- 100% Visual Examination

- All the test results shall be provided in Material certificate type 3.1/3.2.

5.5.7 Inspection

All materials shall conform to the Essential Safety Requirements of the applicable European Pressure Equipment Directive (PED) 2014/68/EU and ESPN requirement.

Manufacturer's test certificates shall be as per DIN EN 10204 - 3.1 or 3.2. All lab tests shall be covered under the main Manufacturer test certificate.

Certification shall be supplied along with heat/cast & product analysis showing chemical and mechanical properties, all required tests (i.e. tensile test, Hardness etc.), heat treatment details, and heat no. / lot no. etc. for correlating details with material.

Vendor to provide Manufacturing and Inspection Plan (MIP) considering PED & ESPN requirement for INOX approval.

5.5.8 Reports/Documents

- For all tests as per reference Material specification standard
- Chemical composition with composition of Co, Nb and Ta
- Mechanical properties at room temperature and design temperature
- Hardness test
- Proof load test (for nut)
- Impact test
- Penetrant Testing examination
- UT Examination
- Visual and dimensional inspection

Three copies of manufacturer's test certificates (Original +2 copies) to be supplied along with material. All test certificates shall comply with the material with which it is manufactured & tested in accordance with this specification, together with report of the result required by the specification shall be furnished along with supply.

5.6 Fasteners (Bolts/Studs, Nuts, & Washers) SA-453 Grade 660

5.6.1 Material and Dimensions

Item/type	Dimension Standard ¹	Material specification standard & Grade
Hexagon Head Bolt	ASME B 18.2.1-2012 (inch series)	ASTM 453/ SA 453M, Grade 660
Stud bolt	ASME-B18.31.2-2014 (inch series), UNC Thread ²	ASTM 453/ SA 453M, Grade 660
Hexagonal Type Nuts	ASME B 18.2.2-2012 (inch series)	ASTM 453/ SA 453M, Grade 660
Washers (Helical Spring-Lock and Plain Washers)	ASME B 18.21.1-2009 (inch series)	ASTM 453/ SA 453M, Grade 660 or ASTM A 479 grade 316L

Notes:

- 1- Mentioned edition or latest edition of codes to be use.
- 2- Consider 8UN thread for the bolt sizes where UNC not available as per ASME B18.31.2 or not feasible.

5.6.2 Chemical and Mechanical Properties

- Chemical properties of material shall be as per Table 1 of referenced material specification standard ASTM 453 or SA 453M.
- Mechanical properties of material shall be as per Table 5 of referenced material specification standard ASTM 453 or SA 453M. Minimum requirements, as per ASTM A370-09 & per ASTM E21-17 (at elevated temperatures) shall be met as per following table.

Temperature (TS)	Rm (MPa) min	Rp0.2 (MPa) min
0 °C / @ RT	895	585
400 °C	836	522

- At room temperature following SA 453M, elongation, min 15% with the test sample A_{5d} or $A_{5.65} \cdot \sqrt{S_0}$ shall be required.
- The minimum reduction of area shall be 18% as per SA 453 for Grade 660, class B.

5.6.3 Chemical and Mechanical Properties for washer of material ASTM A 479 grade 316L

- Chemical properties of material shall be as per Table 1 of referenced material specification standard ASTM 479 or SA 479M.

- Mechanical properties of material shall be as per Table 2 of referenced material specification standard ASTM 479 or SA 479M. Minimum requirements, as per ASTM A370-09 & per ASTM E21-17 (at elevated temperatures) shall be met as per following table.

Temperature (TS)	Rm (MPa) min	Rp0.2 (MPa) min
@ RT	485	170

5.6.4 Dimensions and Tolerances

- Dimensions and tolerances of fasteners shall comply with reference Dimension standard as mentioned in the table in section 5.6.1 of this specification.
- Dimensions and tolerances of fasteners will be mutually agreed when it is not provided in reference Dimension standard.

5.6.5 Supply condition

- All fasteners should be thoroughly checked for visual inspection for any surface discontinuities and mechanical marks.
- Base material for fasteners shall not have any repair welds.

5.6.6 Marking

- Marking shall comply the requirements of reference material specification standard. It should include following detail.
 - o Manufacturer's name, trademark or logo
 - o Grade Symbol & class

5.6.7 Testing

- All tests as per reference Material specification standard.
- Chemical and mechanical properties of material as mentioned in section 5.6.2 of this specification.
- Mechanical properties at room temperature and design temperature 400°C or as given in inquiry. Test result value at test temperature shall comply with value given in material standard.
- Hardness test of fasteners as per section 8.3 of ASTM 453 or SA 453M, following test method ASTM A-370. (Acceptable Brinell hardness number is 248-341).
- Impact test shall be carried out according to EN ISO 148-1:2016, with ISO V test sample 10x10mm. The results shall be KV \geq 50J at RT (for materials with austenitic structure) and KV \geq 40J @ 0°C (or lower). Where full size sample in not practical, CLAP guideline X163 applies.

- Penetrant Testing examination shall be done 100% as per ASTM A962-16. Acceptance Criteria as per S57 of A962.
- All bolts, studs, and nuts greater than 50 mm (2 in.) nominal bolt size shall be ultrasonically examined over the entire surface prior to threading in accordance with section 3.7.2 of ASME VIII Div.2:2021 [(1) Examination shall be carried out by the straight beam, radial scan method. (2) Examination shall be performed at a nominal frequency of 2.25 MHz with the search unit not to exceed 645 mm² (1 in.²) in area.(3) Calibration sensitivity shall be established by adjustment of the instrument so that the first back screen reflection is 75% to 90% of full screen height. (4) Any discontinuity which causes an indication in excess of 20% of the height of the first back reflection or any discontinuity which prevents the production of the first back reflection of 50% of the calibration amplitude is not acceptable.]
- Vendor shall carry out heat wise product analysis, chemical composition and tensile test at ambient and design temperature at 400 °C and testing result shall meet the requirements of this material specification.
- 100% Visual Examination
- All the test results shall be provided in Material certificate type 3.1/3.2.

5.6.8 Testing requirement for Washer of material ASTM A 479 grade 316L

- All tests as per reference Material specification standard ASTM A 479 grade 316L.
- Chemical and mechanical properties of material as mentioned in section 3.1.1 of this specification.
- Mechanical properties at room temperature. Test result value at test temperature shall comply with value given in material standard.
- All the test results shall be provided in Material certificate type 3.1/3.2.

5.6.9 Inspection

All materials shall conform to the Essential Safety Requirements of the applicable European Pressure Equipment Directive (PED) 2014/68/EU and ESPN requirement.

Manufacturer's test certificates should be as per DIN EN 10204 - 3.1 or 3.2. All additional lab tests need to be added under the main Manufacturer test certificate

Certification shall be supplied along with heat/cast & product analysis showing chemical and mechanical properties, all required tests (i.e. tensile test, Hardness etc.), heat treatment details, and heat no. / lot no. etc. for correlating details with material.

5.6.10 Reports/Documents

- For all tests as per reference Material specification standard

- Chemical composition with composition of Co, Nb and Ta
- Mechanical properties at room temperature and design temperature
- Hardness test
- Proof load test (for nut)
- Impact test
- Penetrant Testing examination
- UT Examination
- Visual and dimensional inspection

Three copies of manufacturer's test certificates (Original +2 copies) to be supplied along with material. All test certificates shall comply with the material with which it is manufactured & tested in accordance with this specification, together with report of the result required by the specification shall be furnished along with supply.

5.7 Other General Requirements

Besides, regarding all stainless steel material covered by this specification, contractor shall ensure that stainless steel is not in contact with any other metals (especially carbon steel), at any stage of the whole manufacturing process (in particular during raw material storage, manufacturing itself, final product storage) and shipping as well, by ensuring a proper segregation with non stainless steel material. The purpose is to avoid cross contamination of stainless steel by other metallic products. This proper segregation of stainless steel and carbon steel materials shall be described through a dedicated procedure.

In case of proven contamination of stainless steel by carbon steel, contractor shall perform pickling and passivation of the contaminated material.

The final product shall also have clean surface from halogen and carbon steel.

6 Location for Scope of Work Execution

The Contractor will perform the work at their own premises from the KOM to the shipment. The list of main manufacturing activity locations shall be communicated to IO in the qualified supplier list. Change of one of location shall be timely notified to IO.

7 IO Documents

Under this scope of work, IO will deliver the following documents by the stated date:

Ref	Title	Doc ID	Expected date
1	Technical Specification of the Contract #2 for Procurement of Flanges, Gaskets and fasteners for PBS26 CWS	FCGFEL	Tender package
2	NPMA ASTM A182 F304L - pipe flanges	28NELT	Tender package
3	NPMA ASTM A193 gr B8 cl 2 /A194 gr.8 - bolts and nuts for flanges	82L2U8	Tender package
4	PBS26.TCWS Bill of Material for Flanges, Blind Flanges, Paddle Spacer/Blind and Spectacle Blind assembly	2JH9YH	Tender package

8 Deliverables and Schedule Milestones

8.1 Schedule for delivery

The maximum expected duration from the contract signature to the supply of the scope of work is 24 months. Please find hereafter the expected detailed schedule:

Schedule Milestones	Description	Is Contract Gate? (Y/N)	Expected Timing (T0+x) *
#1	Lot 1 – B2M	N	20 weeks
#2	Lot 2 – L3\L4	Y	50 weeks
#3	Lot 3 – Port Cells	N	80 weeks

* TO = KOM date.

8.2 List of deliverable documentation

The Supplier shall provide IO with the documents and data required in the application of this technical specification, the GM3S ref. [29] and any other requirement derived from the application of the contract.

You can find here below a minimum list of documentation, but not limited to, that are required within the expected timing:

Category	Document Type	Further Description	Expected Timing
QA	Quality Plan	A plan to illustrate how the Contractor ensure the good quality of the supply under this Contract	KoM
Contract management	Contractor’s Delivery Plan	For each item indicated in Bill of Material, the Contractor will specify	KoM

		the delivery date, the transportation mean and lifting gear. It shall also specify the list and number of packages prior to delivery.	
Manufacturing	Manufacturing and Inspection Plan (MIP) if applicable	Manufacturing and Inspection Plan (MIP) mutually agreed between contractor and IO shall be provided in case that new roll production is planned for this contract. This is not applicable for the inventory supply, provided that in that case all the traceability must be secured in accordance with this Technical Specifications.	KoM
Manufacturing	Material certificate	As per standard EN 10204	Before shipment of each lot
Manufacturing	Material Chemical Composition and Impurity analysis	As per chemical composition requirements. To be submitted for each item type under same heat number. To be included in the MTC.	Before shipment of each lot
Delivery	Packing List	In this document the Contractor will specify the content of each shipment planned.	Before shipment of each lot
Delivery	Declaration of Conformity	The Contractor shall enclose to the packing list a declaration of conformity specifying that items that have been sent are conform with the contract signed by IO	Before shipment of each lot
Delivery	Release Note and delivery report	The contractor shall issue a release note and a delivery report	Before shipment of each lot

Supplier shall prepare their document schedule based on the above and using the template available in the GM3S ref. [29] appendix II.

9 Quality Assurance requirements

All components in this scope of supply are Quality Class 1 (this is because of interchangeability of the flanges). Consequently, the Quality class under this contract is QC-1, GM3S section 8 ref. [29] applies in line with the defined Quality Class. The Contractor's QAP shall be applied to the entire Product under this Specification and shall be submit to the IO.

10 Safety requirements

10.1 Nuclear class Safety

The flanges supplied under this supply contract are classified SIC-1 for interchangeability purpose according to Safety Important Functions and Components Classification Criteria and Methodology from ref. [27].

The scope under this contract covers for PIC and/or PIA and/or PE/NPE components, GM3S section 5.3 ref. [29] applies.

Under French Order 7 February 2012 ref.[4], the PICs require control and guaranty of the quality of the PICs during the design and manufacturing phase to ensure its safety functions can be maintained in all postulated situations. This is accomplished through the guidelines provided for in the Management of Propagation of Nuclear Safety Requirements in the Contractor Chain ref. [37] regarding:

- Policy on Protection of the Interests
- Quality management system
- Supervision
- Execution and supervision of the PIA
- Skills and qualification of the interveners
- Records
- Non-conformities
- Lesson learned
- Safety demonstration

In this contract, the consequence is the flanges must be manufactured in compliance with nuclear particular material appraisal (NPMA) in line with requirements ref. [45][46]. All tests which are specified in the NPMA's ref. [45][46] shall be carried out. Each Material Test Certificate (MTC) shall refer to a NPMA, which will be issued as either a Type 3.1 or Type 3.2 inspection certificate.

Marking requirements: each component shall be marked with a heat number and/or lot number to ensure traceability to the test certificates and additionally a PNI (Part Number Identification) shall be applied in line with ref. [41].

In the contracts passed down to the subcontractors, it shall be clearly stated that in addition to technical requirements, defined requirements on Protection Important Components (PIC) and Protection Important Activities (PIA) must be monitored by the IO. The subcontractor must possess a quality system in agreement with the importance of the equipment being delivered and for the follow-up of the PIA corresponding to the PIC to be provided under the contract. This system shall be included in the MIP or Quality Plan.

10.2 Seismic class

The flanges supplied under this supply contract are classified SC1(s) according to Safety Important Functions and Components Classification Criteria and Methodology from ref. [27]. This classification does not impose any additional requirements to the components procured under the present specification.

11 Specific General Management requirements

Requirement defined in GM3S ref. [29] section 6 applies in full and is completed with the below specific requirements.

11.1 Contract Gates

There are no additional gates that the one defined in GM3S ref. [29] section 6.1.5.

11.2 Work Monitoring

A progress review meeting is to be held on a weekly basis between the Contractor representative and CRO with the appropriate support of relevant stakeholders. The Contractor shall ensure the timely submission of the Progress Report during the progress meeting.

The Contractor shall create and maintain a list of open action items assigned to the Contractor or the IO. The list shall identify the action to be taken, category (critical or non-critical), responsible Party or individual, and the date the required action is to be completed. Due dates shall be met to maintain project schedules and proper work sequence.

11.3 CAD design requirements

This contract does not include any CAD activities or transfer of CAD data.

11.4 Subcontracting

GM3S ref. [29] chapter 6.4 applies. When a document is sub-contracted, there is no maximal versions of the documents before IO approval. The Contractor shall ensure his sub-contractor perform the work assigned with the best quality to reduce the number of versions.

11.5 Documents

All the manuals (Instruction Manual, Installation Manual, Transport Manual...) shall be written in French and in English.

All documents shall be clean and legible white prints with uniform background density suitable for electronic scanning and subsequent reproduction from an electronic format. Insofar as practical, documentation shall be typed and arranged in a neat and professional manner. Handwritten documents shall conform to the legibility requirements and quality requirements of this section. Any pen and ink changes necessary after printing will be performed by drawing a single strike through line, preserving the original information, with neat ink text initialled and dated. Material certificates with white correction fluids on it will not be accepted.

Documents not meeting the quality requirements specified herein will be returned to the Contractor without IO review for correction and resubmission. Rejected documents will not be a basis for approving schedule extensions or cost increases.

All documents shall use SI units as primary dimensions. Drawings shall follow all normal ISO conventions and standards, in particular those standards used in the power industry, for orientation and rotation of drawings, plan views, dimensioning, symbols, etc.

11.6 Deliveries

The Contractor will be in charge of the supply and delivery of the required good to the destination. The unloading of materials from the trucks will be at charge of IO.

For each delivery, the IO shall confirm the final destination (the address, post code, contact person) before the shipment. The delivery address are expected to be either at

- Saint Paul Lez Durance, France (ITER site) or,
-
- Other places in Europe where the IO's subcontractor for pre-fabrication is located.

The Contractor is expected to provide by default in his quotation the price for the shipment to the IO premises (ITER site, Saint Paul Lez Durance, France) and separately the maximum additional cost for the delivery to another plate in Europe for one small shipment only (i.e. a maximum of 20 flanges assemblies).

The delivery terms shall be DAP in accordance with Incoterms 2010.

11.7 Access to Contractor's Premises

The Contractor shall take all necessary measures to allow IO unrestricted access to all of the Contractor's documentation, premises and personnel (including that of its Sub-Contractors) during all stages of the Contract for the purpose of such audit, review, surveillance and inspection as IO may consider necessary.

IO reserves the right to make unscheduled visits to the Site or the Contractor or Sub-Contractors' work premises, and free access must be provided at all reasonable times.

IO shall have the right to have permanent inspectors working inside the Contractor's premises. Should this be required, the Contractor shall reserve an office inside its workshops for the inspectors, equipped with a telephone and facsimile with international access, and computers with internet access.

IO or its representatives shall be permitted to take photographs and / or video recordings of any activity relating to the Contract. The material obtained will remain confidential.