外部委託業者の募集

References: IO/24/OT/10028594/AJI

"Procurement of 316L(N)-IG shaped beams and rolled plates for ITER Diagnostics ISS/PCSS structures"

（ITER 計測 ISS/PCSS 構造物のための 316L(N)-IG 成形ビームと圧延板の調達）

IO 締め切り 2024 年 11 月 12日(火)

○はじめに

本事前情報通知（PIN）は、作業契約の入札授与および実行につながる公開入札調達プロセスの最初のステップです。

本文書の目的は作業範囲と入札プロセスに関する技術的な内容の基本的な要約を提供することです。

国内機関は、次回の入札に先立って、これらのサービス/工事を提供することができる企業、機関またはその他の団体が入札の詳細を事前に通知する前に、この情報を公表するよう求められます。

○背景

ITER は平和利用の核融合発電の科学的および技術的な実現可能性の実証を目的とした、国際共同研究開発プロジェクトです。ITER 機構の 7 つのメンバーは、;欧州連合（EURATOM が代表）、日本、中華人民共和国、インド、大韓民国、ロシア連邦、および米国です。

ITER の敷地はフランス南東部のブーシュデュローヌ地区にあり、ITER 本社（HQ）もあるフランス CEA サン・ポール・レ・デュランス に近いところに位置しています。詳細については、ITER のウェブサイト http://www.iter.org を参照して下さい。

○作業範囲

現在の入札プロセスは、計測装置ISS/PCSS構造用の316L(N)-IGステンレス鋼成形ビームおよび圧延板の調達に関する供給契約の設定を目的としています。ITER機構内では、計測プログラムがこの契約の実施を担当します。

サプライヤーは、ISS/PCSS用の316L(N)-IG成形ビームおよび圧延板の製造と完成、ITERサイトへの納品を行い、製品が本技術仕様書に定義された技術要件を満たすことを保証する責任があります。

○調達プロセスと目的

目的は、競争入札プロセスを通じて供給契約を落札することです。

この入札のために選択された調達手続きは公開入札手続きと呼ばれます。

オープン入札手順は、次の 4 つの主要なステップで構成されています。

- ステップ 1-事前情報通知（PIN）

  事前情報通知は公開入札プロセスの第一段階です。IO は、関心のある企業、機関又はその他の団体に事前に入札機会について通知するために、国内機関に対し、今後の入札に関する情

報を公表するよう正式に要請します。**関心のある入札者は、下記の調達スケジュールに示された日付までに、電子メールで関心表明書（付属書 I）を返送してください。**

- ステップ 2-入札への招待（ITT）
  事前指示通知（PIN）の公表から 14 日以内に、入札への招待（ITT）が公告されます。この段階では、PIN を見た関心のある入札者が入札書類を入手し、入札説明書に従って提案書を作成して提出することができます。

- ステップ 3-入札評価プロセス
  入札者の提案は、IO の公平な評価委員会によって評価されます。入札者は、技術的範囲に沿って、かつ、入札への招待（ITT)に記載された特定の基準に従って作業を実施するために、技術的遵守を証明する詳細を提供しなければなりません。

- ステップ 4-落札
  認定は、公開されている入札への招待（ITT)に記載されている、コストに見合った最適な価格または技術的に準拠した最低価格に基づいて行われます。

〇概略日程

概略日程は以下の通りです：

マイルストーン	暫定日程
事前指示書（PIN）の発行	2024 年 9 月 27 日
関心表明フォームの提出	2024 年 11 月 12 日
提案リクエスト（RFP）と入札への招待（ITT）の発行	2024 年 11 月 16 日
明確化のための質問（もしあれば）	2024 年 11 月 18 日
明確化のための質問回答	2024 年 11 月 20 日
iProc で入札提出	2024 年 11 月 30 日
入札評価と契約授与	2024 年 12 月
契約調印	2024 年 12 月

〇契約期間と実行

予想される契約期間は15か月の予定です。契約の最終調印前の作業はありません。

〇経験

契約者は以下についての提供できることが期待されています：

- 核融合または核分裂炉プロジェクト、またはその他の厳しく規制された科学・工業プロジェクト向けに成形ビーム、圧延板、またはその他の大型ステンレス鋼構造物を製造した経験。
- 技術仕様書に従い、不純物含有量が管理された大量の生ステンレス鋼材料を供給した実績（316L(N)-IG、ITER グレード、コバルト、ニオブおよびタンタルの制限付き）。

- 適用される基準に従って成形ビーム（押出し、溶接など）の製造プロセスの資格認定に関する実績。
- 安全性（PIC および PIA）、品質、文書、物流などに関する一般的な ITER 要件の管理および遵守に関する経験。
- 契約者の職員は、IO の規則および手続きに従ってサービスを実施するための資格、専門能力、および経験を有していること。

〇候補

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法人は、単独で、またはコンソーシアムパートナーとして、同じ契約の複数の申請または入札に参加することはできません。共同事業体は、恒久的な、法的に確立されたグループ又は特定の入札手続のために非公式に構成されたグループとすることができます。

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どのコンソーシアムメンバーも IPROC に登録する必要があります。

【※　詳しくは添付の英語版技術仕様書「Procurement of 316L(N)-IG shaped beams and rolled plates for ITER Diagnostics ISS/PCSS structures」をご参照ください。】

ITER 公式ウェブ　http://www.iter.org/org/team/adm/proc/overview からもアクセスが可能です。

「核融合エネルギー研究開発部門」の HP：　http://www.fusion.qst.go.jp/ITER/index.html では ITER 機構からの各募集（IO 職員募集、IO 外部委託、IO エキスパート募集）を逐次更新しています。ぜひご確認ください。

イーター国際核融合エネルギー機構からの外部委託
に関心ある企業及び研究機関の募集について

＜ITER 機構から参加極へのレター＞

以下に、外部委託の概要と要求事項が示されています。参加極には、提案された業務に要求される能力を有し、入札すべきと考える企業及び研究機関の連絡先の情報を ITER 機構へ伝えることが求められています。このため、本研究・業務に関心を持たれる企業及び研究機関におかれましては、応募書類の提出要領にしたがって連絡先情報をご提出下さい。

china eu india japan korea russia usa
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PRIOR INDICATIVE NOTICE (PIN)

OPEN TENDER SUMMARY

IO/24/OT/10028594/AJI

for

Procurement of 316L(N)-IG shaped beams and rolled plates for ITER Diagnostics ISS/PCSS structures

Abstract

The purpose of this summary is to provide prior notification of the IO intention to launch a competitive Open Tender process in the coming weeks. This summary provides some basic information about the ITER Organisation, the technical scope for this tender, and details of the tender process for the procurement of 316L(N)-IG stainless steel shaped beams and rolled plates for ISS/PCSS structures.

1 Introduction

This Prior Indicative Notice (PIN) is the first step of an Open Tender Procurement Process leading to the award and execution of a Service Contract.
The purpose of this document is to provide a basic summary of the technical content in terms of the scope of work, and the tendering process.
The Domestic Agencies are invited to publish this information in advance of the forth-coming tender giving companies, institutions or other entities that are capable of providing these supplies prior notice of the tender details.

2 Background

The ITER project is an international research and development project jointly funded by its seven Members being, the European Union (represented by EURATOM), Japan, the People's Republic of China, India, the Republic of Korea, the Russian Federation and the USA. ITER is being constructed in Europe at St. Paul–Lez-Durance in southern France, which is also the location of the headquarters (HQ) of the ITER Organization (IO).

For a complete description of the ITER Project, covering both organizational and technical aspects of the Project, visit www.iter.org.

3 Scope of Work

The present tender process aims to set up a Supply Contract for the procurement of 316L(N)-IG stainless steel shaped beams and rolled plates for the Diagnostics ISS/PCSS structures. Within the ITER Organization, The Diagnostic program will be in charge of implementing this Contract.
The Supplier is responsible for completing and manufacturing of 316L(N)-IG shaped beams and rolled plates for ISS/PCSS, its delivery to the ITER Site, and ensuring that the product meets the technical requirements defined in this Technical Specification.

4 Procurement Process & Objective

The objective is to award a Supply Contract through a competitive bidding process.

The Procurement Procedure selected for this tender is called the Open Tender procedure.

The Open Tender procedure is comprised of the following four main steps:

- Step 1- Prior Indicative Notice (PIN) :
  The Prior Indicative Notice is the first stage of the Open Tender process. The IO formally invites the Domestic Agencies to publish information about the forth-coming tender in order to alert companies, institutions or other entities about the tender opportunity in advance. **Interested tenderers are kindly requested to return the expression of interest form (Annex I) by e-mail by the date indicated in the procurement timetable below.**

- Step 2 - Invitation to Tender (ITT) :
  Within 14 days of publishing the Prior Indicative Notice (PIN), the Invitation to Tender (ITT) will be advertised. This stage allows interested bidders who have seen the PIN to obtain the tender documents and prepare and submit their proposals per the tender instructions.

- Step 3 – Tender Evaluation Process :
  Tenderers' proposals will be evaluated by an impartial, professionally competent technical evaluation committee of the ITER Organization. Tenderers must provide details demonstrating their technical compliance to perform the work in line with the technical scope and per the criteria listed in the invitation to tender (ITT).

- Step 4 – Contract award :
  A Supply contract will be awarded based on the best value for money according to the evaluation criteria and methodology described in the Invitation to tender (ITT).

5 Procurement Timetable

The tentative timetable is as follows:

Milestone	Date
Publication of the Prior Indicative Notice (PIN)	27-Sept-24
Deadline for Submission of Expression of Interest Form	11-Oct-24
Request for Proposals (RFP)- Invitation to Tender (ITT) advertisement	16-Oct-24
Clarification Questions (if any) and Answers deadline	18-Nov-24
Answers to Clarifications	20-Nov-24
Tender Submission in IPROC	30-Nov-24
Tender Evaluation & Contract Award	Dec-24
Contract Signature	Dec-24

6 Quality Assurance Requirements

Prior to the commencement of any work under this Contract, the selected Contractor shall produce a "Quality Plan" and submit it to the IO for approval, describing how they will implement the ITER Procurement Quality Requirements.

7 Contract Duration and Execution

The duration shall be for 15 months. No work shall commence before the date of final signature of the Contract.

8 Experience

The Contractor is expected to provide in the following:

-
- Experience in manufacturing shaped beams, rolled plates, or other large stainless steels structures for nuclear fusion or fission reactors projects, or other highly regulated scientific/industrial projects,
- Demonstrated experience in supplying large quantities of raw stainless steel materials with controlled impurities content, as per technical specifications (316L(N)-IG, ITER grade, with cobalt, niobium and tantalium restriction),
- Demonstrated experience in qualification of processes used for manufacturing shaped beams (extrusion, welding….) and rolled plates as per applicable standards.

- Experience in managing and following the general ITER requirements relative to safety (PIC and PIA), quality, documentation, logistics…
- Contractor's personnel shall possess the qualifications, professional competence and experience to carry out services in accordance with IO rules and procedures.

9 Candidature

Participation is open to all legal entities participating either individually or in a grouping/consortium. A legal entity is an individual, company, or organization with legal rights and obligations established within an ITER Member State.

Legal entities cannot participate individually or as a consortium partner in more than one application or tender of the same contract. A consortium may be a permanent, legally-established grouping, or a grouping constituted informally for a specific tender procedure. All consortium members (i.e. the leader and all other members) are jointly and severally liable to the ITER Organization.

In order for a consortium to be acceptable, the individual legal entities included therein shall have nominated a leader with authority to bind each member of the consortium, and this leader shall be authorised to incur liabilities and receive instructions for and on behalf of each member of the consortium.

It is expected that the designated consortium lead will explain the composition of the consortium members in a covering letter at the tendering stage. Following this, the Candidate's composition must not be modified without notifying the ITER Organization of any changes. Evidence of any such authorisation shall be submitted to the IO in due course in the form of a power of attorney signed by legally authorised signatories of all the consortium members.

10 Sub-contracting Rules

All sub-contractors who will be taken on by the Contractor shall be declared with the tender submission in IPROC. Each sub-contractor will be required to complete and sign forms including technical and administrative information, which shall be submitted to the IO by the tenderer as part of its tender.
The IO reserves the right to approve (or disapprove) any sub-contractor which was not notified in the tender and request a copy of the sub-contracting agreement between the tenderer and its subcontractor(s). Rules on sub-contracting are indicated in the RFP itself.

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04 Jul 2024 / 1.1 / Approved
EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

55.Q0_Technical Specification for the supply of 316L(N)-IG austenitic stainless steel shaped beams for ISS-PCSS

Technical Specification for the supply of 316L(N)-IG austenitic stainless steel shaped beams for ISS and PCSS of diagnostics ports.

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1 Preamble

This Technical Specification is to be read in combination with the General Management Specification for Service and Supply (GM3S) – Ref [1] that constitutes a full part of the technical requirements.

In case of conflict, the content of the Technical Specification supersedes the content of Ref [1].

2 Purpose

This Specification covers the supply of rods, bars and shaped beams made of 316L(N)-IG austenitic stainless steel for the Interspace Support Structures (ISS) and Port Cell Support Structures (PCSS) of Diagnostics Ports.

The shaped beams have profiles with different cross-sections (L, I, H, U-shape…) and can be manufactured by different processes (extrusion, rolling, drawing, welding…).

Generally, 316L(N)-IG (ITER Grade) steel is grade 316L steel with narrower alloying element ranges and with controlled impurities. The closest analogy is X2CrNiMo17-12-2 with controlled nitrogen content austenitic stainless steel described in the RCC-MR Code, Edition 2007.

This Specification is based on the product procurement specification RM 0320 in RCC-MR 2007 for Rolled or Forged Bars and Flats bars, plus additional requirements arising from diagnostics ports components. The bars and semi-finished products are considered for equipment Class 2 (in accordance with RCC-MR classification).

The supply covers the following items:

- Manufacture of the total quantity of stainless steel rod/bars and shaped semi-finished products of grade 316L(N)-IG.
- Organization of quality at works.
- Elaboration of all procedures required for the manufacturing, inspection (including analyses), cleanliness, packaging, storage and delivery.
- Time schedules and documentation.
- To perform all the inspections and tests during and after manufacturing envisaged in this specification.

3 Acronyms & Definitions

3.1 Acronyms

The following acronyms are the main one relevant to this document.

Abbreviation	Description
BoQ	Bill Of Quantities
CRN	Contractor Release Note
CRO	Contract Responsible Officer
DR	Delivery Report
DRR	Delivery Readiness Review
EBW	Electron Beam Welding
GM3S	General Management Specification for Service and Supply
IO	ITER Organization

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ISS	Interspace Support Structure
KOM	Kick-Off Meeting
LBW	Laser Beam Welding
LP	Liquid Penetrant
MIP	Manufacturing and Inspection Plan
MTP	Material Test Plan
NDE	Non Destructive Examination
NDT	Non Destructive Test
PCSS	Port Cell Support Structure
PIA	Protection Important Activity
PIC	Protection Important Component
PL	Packing List
PNI	ITER Part Number
PQR	Procedure Qualification Records
PRO	Procurement Responsible Officer
SIC	Safety Important Class
VT	Visual Test
WDP	Welding Data Package
WPQ	Welder Performance Qualification
WPS / pWPS	Welding Procedure Specification / preliminary Welding Procedure Specification

3.2 Definitions

Contractor: shall mean an economic operator who have signed the Contract in which this document is referenced.

Certificate: a certification, that the material was manufactured, sampled, tested and inspected in accordance with requirements of the material Specification and has been found to meet those requirements shall be supplied to the purchaser.

4 Applicable Documents & Codes and standards

4.1 Applicable Documents

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.

This Technical Specification takes precedence over the referenced 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.

Ref	Title	IDM Doc ID	Version
[1]	General Management Specification for Service and Supply (GM3S)	82MXQK	v1.4

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[2]	55.Q0_Bill of Quantities for the supply of 316L(N)-IG austenitic stainless steel shaped beams for ISS-PCSS	AM7J5M	*as per Purchase Order*
[3]	Working Instruction for the Delivery Readiness Review (DRR)	X3NEGB	v2.0

4.2 Applicable Codes and Standards

4.2.1 Design and Construction Codes

- RCC-MR, Edition 2007.
- RCC-MR, 2007, Section 2 – Materials, Chapter RM 0320.
- Applicable requirements of RM 0100 of RCC-MR, Edition 2007 must be respected.

4.2.2 EN and ASTM Standards

- **ISO 16143-2** Stainless steels for general purpose-Corrosion-resistant semi-finished products, bars, rods and sections.
- **EN 10365:2017** Hot rolled steel channels, I and H sections — Dimensions and masses.
- **EN 10056-1** Structural steel equal and unequal leg angles - Part 1: Dimensions.
- **EN 10056-2** Structural steel equal and unequal leg angles - Part 2: Tolerances on shape and dimensions.
- **EN 10279** Hot rolled steel channels - Tolerances on shape, dimensions and mass.
- **EN 10034** Structural steel I and H sections - Tolerances on shape and dimensions.
- **NF EN 10088-3 Stainless steels - Part 3:** Technical delivery conditions for finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes.
- **ISO 6929** Steel products-Vocabulary.
- **NF-EN ISO 643: 2013** Steels - Micrographic determination of the apparent grain size.
- **ASTM E45-18a** Standard test methods for determining the inclusion content of steel.
- **ASTM A342-14** Standard Test Methods for Permeability of Feebly Magnetic Materials.
- **ISO 377**, Steel and steel products — Location and preparation of samples and test pieces for mechanical testing.
- **ISO 3651-2**, Determination of resistance to intergranular corrosion of stainless steels — Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels — Corrosion test in media containing sulfuric acid.
- **ISO 6506-1**, Metallic materials — Brinell hardness test — Part 1: Test method.
- **ISO 6892-1**, Metallic materials — Tensile testing — Part 1: Method of test at room temperature.
- **ISO 6892-2**, Metallic materials — Tensile testing — Part 2: Method of test at elevated temperature.
- **ISO 10474**, Steel and steel products — Inspection documents.
- **NF-EN 10204:2004 :** Metallic Products — Type of Inspection documents**.**
- **ISO 14284**, Steel and iron — Sampling and preparation of samples for the determination of chemical composition.

EN, ISO and ASTM standards mentioned in this Specification may be considered in their last revision at the time of the sign of the contract provided that equivalency is demonstrated.

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In case of change of edition year or issuing standard which supersede above mentioned, the use of new Standards is allowed only in case of demonstration of equivalency with prior written Client's approval.

The use of EN but non NF Standards is also allowed demonstrating equivalence with the corresponding NF version of the Standard.

Other equivalent national or international standards and codes proposed by the supplier may be acceptable with prior written Client's approval, provided conformity assessment to all criteria is satisfied.

4.2.3 Applicable standards for welding

- Welding operations shall follow the applicable code for manufacturing operations RCC-MR 2007 for class 2 box structures. Section 4 of the Code, devoted to welding constitutes the main reference regarding welding requirements.
- Besides, as the section 5.7 on welding also refers to some European and ISO Standards, they shall be considered as complementary applicable documents in terms of welding requirements.

5 Scope of Work

This section defines the specific scope of work, in addition to the contract execution requirements as defined in GM3S Ref [1].

5.1 Description

This Specification covers the supply of rods, bars and shaped beams made of 316L(N)-IG austenitic stainless steel for the Interspace Support Structures (ISS) and Port Cell Support Structures (PCSS) of Diagnostics Ports.

The shaped beams have profiles with different cross-sections and can be manufactured by different processes (extrusion, rolling, drawing, welding).

5.2 Bill of Quantities

The quantities applicable to this procurement contract are defined in the Bill of Quantities – Ref [2].

The final quantities to be ordered will be defined in the Purchase Order. They shall stay within a range of ± 10 % around the quantities of the BoQ [2].

5.3 Components Classification

The shaped beams are for use in the ISS and PCSS located in ex-vessel area (Port Interspace and Port Cell). The classification is as follows.

- Quality class: QC-1.
- Safety class: SIC-2.
- Vacuum quality class: not applicable.
- PE/NPE class: not applicable.
- Seismic class: not applicable.
- Tritium class: not applicable.

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5.4 Dimensional requirements

5.4.1 Dimensions and tolerances

Refer to the Bill of Quantities [2] for the list of items with dimensions.

The supply covers shaped beams with different cross sections (L, I, H, U-shape…).

The applicable standards for dimensions and tolerances are:

- **U-shape profiles:** dimensions as per EN 10365 / tolerances as per EN 10279.
- **H/I-shape profiles:** dimensions as per EN 10365 / tolerances as per EN 10034.
- **L-shape profiles:** dimensions as per EN 10056-1 / tolerances as per EN 10056-2.

Each shaped beam shall be delivered with a unit length of 6 meters with a typical tolerance of +0/+50 mm.

Some beams require to have a unit length > 6 meters. These items will be defined by IO in the Bill of Quantities [2].

5.4.2 Dimensional control

The final dimensions of the products shall be controlled and recorded against the applicable standards.

5.5 Chemical requirements and physico-chemical characteristics

5.5.1 Chemical requirements

The 316L(N)-IG (ITER Grade) steel is grade 316L(N) steel with narrower alloying element ranges and controlled impurities. The closest analogy is X2CrNiMo17-12-2 controlled nitrogen content austenitic stainless steel described in the RCC-MR Code, Edition 2007.

The chemical composition determined by ladle and product analyses, shall comply with the requirements given in Table 1. The maximum content of impurities (Co, Nb, Ta) meets the **Chemical composition and impurity requirements for materials (REYV5V v2.3).**

Table 1. Chemical composition

Element	Alloying elements and impurities content, wt. %.	
	Minimum	**Maximum**
C		0.030
Mn	1.60	2.00
Si		0.50
P		0.025
S		0.010
Cr	17.00	18.00
Ni	12.00	12.50
Mo	2.30	2.70
N	0.060	0.080
B		0.0020
Cu		0.30
Co		0.05

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Nb		0.01
Ti		0.10
Ta		0.01

5.5.2 Chemical analysis

The Steelmaker shall supply a ladle analysis certified by the Mill Manager or his duly accredited representative. A product analysis is made per heat.

This analysis may be performed on metal discards taken from mechanical test specimens. Chemical analyses and crosschecks shall be performed in a laboratory of Steelmaker choice, according to that laboratory's usual method. These analyses shall be performed in compliance with the requirements of RMC 1000 of RCC-MR 2007.

5.5.3 Ferrite content and magnetic permeability

The ferrite content evaluated using the Schaeffler diagram, modified by Pryce and Andrews (Figure RMC 1341.2, Section 3, RCC-MR 2007) and measured on a solution annealed product must be equal or less than 0.5 %.

The ferrite content shall be measured per lot in the mechanical test specimen sampling zone. Method of testing is RMC 1340 of RCC-MR, Edition 2007 or by method agreed between the Client and the Supplier.

The relative magnetic permeability of the finished product shall be measured at room temperature after solution annealing. The value measured shall be equal or lower than 1.03 (for fields of over 80000 A/m (1000 Oe) as per Test method 2 or measured with a low μ permeability indicator as per method 3 of ASTM A342-14 (see note). Specimen for testing shall be cut as described in the previous paragraph. Measurements of permeability made with other physical methods (e.g. permascope, magnetoscope, etc.) are accepted provided information about type and trade mark of apparatus uses and information about calibration.

5.5.4 Structure

A micrographic examination, with photographs, shall be performed parallel to the main direction of extension. The structure must be homogeneous.

5.5.4.1 Grain size

The grain size number as determined in accordance with NF-EN ISO 643:2013 shall be greater than 2. The grain size homogeneity shall be ±1 around the true average value. The grain size is determined on a test sample taken close to the mechanical test specimens.

5.5.4.2 Non-metallic inclusions

- Amount and definition shall meet standard ASTM E45-13.
- **Macroinclusions** (exogenous inclusions from entrapped slag or refractories):
  - They are strictly forbidden and are cause of rejection.
- Test shall be done from one edge of bars.

5.6 Manufacturing requirements

The overall ratio of reduction calculated in accordance with RM 0380 of RCC-MR 2007 shall be greater than 3.

SUPPLY

5.6.1 Melting process

The steel shall be made using an electric furnace or by any other technically equivalent process.

For ISS/PCSS application and to meet requirements for structure and inclusion contents in this specification the melting of steel should be completed by a suitable secondary metallurgy treatment. The refining processes are argon-oxygen decarburization (AOD), vacuum oxygen de-carbonised (VOD).

Supplier shall propose refining method, which shall be agreed with the Client.

5.6.2 Manufacturing programme

Before the beginning of manufacturing operations, the foundry shall draw up a manufacturing programme. This programme shall include the following:

- Identification of melting process.
- Drawing of parts as-rolled, profiles for heat treatment, non-destructive examination and delivery.
- Conditions for intermediate heat treatments and for final heat treatment.
- Position of acceptance test samples on the part.
- Dimensional drawing with position of test specimens on samples.

The various heat treatments, sampling and non-destructive examination operations shall be presented in chronological order.

The program shall be agreed with the Client.

5.6.3 Delivery condition

Bars shall be delivered in the solution heat treated condition.

5.6.3.1 Solution heat treatment

Solution heat treatment shall consist of holding at a temperature between 1050°C and 1150°C followed by water cooling. The thermal cycles shall be recorded and the records kept shall be presented in the test report.

5.6.3.2 Machining - surface conditions

The bars shall be machined to its as-delivered profile.

The surface condition determined in accordance with RMC 7200 of RCC-MR 2007 shall meet the following requirement:

- Roughness (Ra) shall not exceed 10 microns.
- Measured by roughness meter.

5.7 Welding requirements

This section is applicable only if the manufacturing process includes welding operations.

5.7.1 Welding Procedure Qualifications (WPS)

Welding Procedure Qualifications shall be performed in accordance with requirements defined in proper Welding Procedure Specifications (WPS) that ensure during production weld soundness, which means absence of defects as well as an acceptable microstructure after the execution. Welding procedure qualification tests shall be performed in accordance with the full requirements of Standard NF EN ISO 15614 (relevant section depending on welding technique)

taking into account the stipulations listed in RCC-MR section 4 RS 3200 which clarify or complete those contained in the Standard.

For the special case of qualification of Electron Beam Welding (EBW) or Laser Beam Welding (LBW), the standard NF EN ISO 15614-11 is applicable to the qualification by a preliminary welding procedure specification (pWPS) following NF EN ISO 15609-3 in case of EBW welds and NF EN ISO 15609-4 in case of LBW welds for metallic materials without limitations.

Additional prescriptions in RS 3560 and RS 3570 shall apply as well.

5.7.1.1 Pre Welding Procedure Specifications (pWPS)

For each joint to be welded a procedure welding specification (WPS) will be developed by the Manufacturer (note: welding activities cannot be subcontracted to other companies).

A preliminary WPS proposal will be firstly issued (pWPS) summarizing the welding parameters/variables related to the procedure. Weldability of material shall be demonstrated according to RS 1200 in RCC-MR 2007. These pWPS have to be taken as a project of WPS and therefore.

The code defines all the welding parameters and variables to consider in the pWPS proposals.

5.7.1.2 Procedure Qualification Records (PQR)

Every pWPS has to be qualified through a test coupon welded according to parameters and variables previously defined in the pWPS. These coupons will be tested according to the destructive and non-destructive tests specified in the prescriptive Codes and standards The WPS is valid for an unlimited time on condition that it is not invalidated by the appearance of repeated welding defects during manufacturing or in welding production test coupons.

Particular situations involving more than one single weld, like overlapping welds shall be qualified taking into account equivalent conditions as those present in production welds.

Qualification coupons meeting all requirements in RS 3200 of RCC-MR 2007, as well as inspections and tests to be performed, shall be proposed by the Manufacturer and subjected to the Client’s approval.

Results of tests performed on the coupons shall be recorded in the Procedure Qualification Records.

If tests are successfully passed according to the criteria stated in reference C&Ss, the initial pWPS will be rewritten into a Welding Procedure Specification (WPS) where the essential welding variables and their allowed ranges according to RS 3200 of RCC-MR 2007.

Therefore, each WPS shall be supported by one or more Procedure Qualification Record (PQR or WPQR).

The PQR constitutes the record of the test weld performed and tested (more rigorously) to ensure that the proposed procedure is capable produce sound welds.

5.7.1.3 Qualified Welding Procedure Specifications (WPS)

The pWPS is qualified to be a WPS if results of destructive tests and non-destructive examinations are within allowable values specified in RS 3200 of RCC-MR 2007.

The qualification coupon shall be subjected to all the non-destructive examinations specified for the manufacture of the joints qualified by it and the coupon shall also comply with the Class 1 requirements set out in RS 7710. Acceptance criteria shall be those specified in RS 7714.

In case of destructive tests acceptance limits in RS 3234 shall apply.

Requirements for test on coupons and allowable ranges for essential variables will follow the section RS 3200 (RS 3560 and RS 3570 in case of EBW and LBW welds respectively) and examination and testing conducted according to section 3 of RCC-MR 2007.

SUPPLY

Additionally, the following requirements apply as well:

- Transverse and longitudinal tensile strength shall not be less than parent material.
- In impact test the absorbed energy shall be in the accordance with the parent material standard.
- In case filler material is used:
  - Ferrite content allowed in the weld metal is 5-12%, preferably less than 10% for the specific approval of conventional filler material equivalent to ER316L.
  - Ferrite content allowed in the weld metal is max 0.5%, for the specific approval of low ferrite content filler material equivalent to ER317L (Mod).
- In micrographic examination, no cracks are allowed, no detrimental Phases, no presence of oxidation in the material.

Testing personnel must be qualified. Requirements on this point can be found in RF 8000 of RCC-MR 2007 (EN-ISO 9712:2012).

Destructive and non-destructive test shall follow the procedures and meet the requirements included in Examination section.

5.7.2 Qualification of welders and operators (WPQ)

Individual welders shall be certified with a qualification test documented in a Welder Performance Qualification (WPQ) that prove they have the understanding and demonstrated ability to work within the specified WPS.

Qualification of welders and welding operators shall be carried out in accordance with section RS 4000 of RCC-MR 2007. Regardless code requirements, following supplementary requirements apply to the qualification of welders and operators:

- Any change in the procedural conditions (manual, part mechanized, mechanized, automatic, etc.), shall require the welder to be re-qualified.
- If using partially mechanized welding process, the qualification should be made like for welder.
- For a full-penetration T-Butt joint in plate, the range of approval for thickness applies to the thickness of the bevelled plate.
- Each qualification test coupon with full-penetration butt welds shall be subjected to radiographic examination.

No production welding operation shall be undertaken unless the specified qualifications have been completed. The qualification of welders shall be established under the Manufacturer's responsibility. The technical skill of the welders is the responsibility of the Manufacturer. Adequacy and validity shall be checked by the Client before start of production welds. The conditions governing the renewal of qualifications are defined in RS 4200. They also apply to test coupons and qualifications obtained in compliance with RS 4300.

5.7.3 Welding manufacturing Plan

No requirement in this contract.

5.7.4 Weld Production preparation

5.7.4.1 Preparation and examination of edges and surfaces for welding

The surfaces to be welded shall be prepared according to RS 7300.

They shall be thoroughly cleaned of oxide, scale, oil grease or other foreign substance and free of defects such as inclusions, cracks, and laminations to avoid any detrimental effect on weld quality.

Cleaning conditions during welding shall comply with RF 6000 cleanliness class B requirements in RCC-MR. See work are level II requirements and additional rules for cleanliness section.

5.7.4.2 Base material joint preparation

The surface edges of parts to be joined by welding are prepared by machining, grinding, or thermal cutting. When thermal cutting is used, all scales shall be removed by grinding the base metal by a minimum of 1 mm. Requirements of RS 7300 and RC 4430 shall apply.

Defects beyond the acceptance criteria shall be removed by grinding or machining. Any local loss of thickness shall be justified by stress analysis and shall not exceed 10 percent of the parts thickness. In the event of repair by welding the Supplier shall issue a nonconformity report subject to the Client's approval.

5.7.4.3 Base material joint cleaning

Prior to welding, surfaces for welding shall be clean and free from paint, oil, rust, scale, slag, grease, marking materials or other foreign materials that can be detrimental during the welding cycle. Cleaning shall comply with RF 6000 cleanliness class B requirements in RCC-MR.

5.7.4.4 Joint Fit-Up and alignment

Requirements of RS 7370, RS 7410 and RS 7420 apply.

The edges to be welded shall be kept in the position, either by mechanical means, temporary attachments, by tack welding or by a combination.

During the whole welding operation, the edges to be welded shall be held so that the alignment tolerances are satisfied.

A special procedure to apply for EBW welds where edge tolerances and alignment become critical for the quality of the weld. The typical fit-up tolerance for EBW shall be 0.1 mm and a special procedure should be developed for this operation.

The root opening and fit-up tolerances shall be arranged in order to comply with RS 7370 requirements, welding procedure qualification tests, non-destructive examination methods and meet final tolerances specified in drawings. In any case for plate welds, the maximum offset will not exceed 4 mm.

For thickness transition a maximum slope of 1:4 is allowed. Other cases should be justified by detail calculation according to RCC-MR 2007 rules.

Inspections before and after alignment shall be carried out as specified in RS 7360 and RS 7380.

5.7.5 *Execution of Production Welds*

5.7.5.1 Tack weld requirements

Tack welds do not form part of the joint. They shall be removed before or during the welding of the joint, and their complete removal shall be ensured. However, for certain welds without backing runs and for materials other than low-alloy steels over 20 mm thick, tack welds may be incorporated in the joint subject to exemptions listed in RS 7410.

Execution of tack welds shall meet requirements stated in RS 7400 with supplementary requirements in RC 4440 and AP19.4100.

The procedure of welding of tack welds, attachments, supports and stiffeners shall be qualified (RS 3000) and welders of tack welds shall also be qualified (RS 4000).

SUPPLY

5.7.5.2 Welding of permanent and temporary attachments

Welding, removal, and inspection after removal requirements for temporary or permanent attachments shall be in accordance RS 7420 requirements. Welded attachments of jigs will not cross or cover other welds present in the assembly and will be compatible with the performance of required NDT.

Temporary attachments shall be removed using a technique which does not affect the properties of the metal of the part to which they are welded. Care shall be taken that the area of the removed attachment is free of surface cracks. Grinding is allowed only with vacuum compatible grinding wheels.

Visual and surface examination shall be performed on the area where the temporary attachment has been removed to ensure that permanent materials are not gouged, nicked, or otherwise damaged.

5.7.5.3 Execution of welds

Complete cleaning of surfaces near the weld is mandatory before assembly, tack welding and welding. Any rest of dust, oil and fluids can generate oxidation problems specially in not accessible areas.

Visual and dimensional control shall be conducted according to RS 7460 before the execution of other non-destructive examination (LP and volumetric) after possible heat treatment, if necessary, and before any machining or grinding operations of weld surfaces. It is mandatory to do VT of the weld one by one.

Inspection of Fusion Welded Joints After any post weld treatment as for example heat treatment, only if necessary, shall be subject to the following tests:

- Visual examination (in accordance with ISO 17637).
- Dye Penetrant testing (in accordance with ISO 3452) if permitted. (Inspection using Photothermal camera is permitted in the case where the manufacturer has qualified the method/acceptance criteria prior to the weld).
- Radiographic examination (in accordance with ISO 17636) and / or Ultrasonic examination (in accordance with ISO 17640 and ISO 22825 for austenitic steels and nickel alloys).

In addition, Production welding operations may only be undertaken provided the following requirements are met (RS 7410):

- Is forbidden to weld if the room temperature is below -10°C. The part must be kept at a temperature of at least + 5°C and cooling after welding shall be sufficiently slow to avoid cracking due to internal stress.
- All welding operations shall be performed under cover from bad weather in case of field or outdoors welds.

Special suitable tool sets shall be dedicated for use only on stainless steel welds. Contact with carbon steel shall be prohibited during welding operations. Transport clamps, hooks, and other devices shall either be stainless steel or be protected with plastic or cardboard to prevent carbon steel contamination.

Expected Welding distortions must be considered during the definition of the welding plan (involved procedures, welding variables and welding sequence) in order to control them so that the final distortions achieved are compatible with component tolerance requirements. Selection of weld procedure, Jigs, stiffeners, sequence, machining process after welding to compensate these distortions and rest of manufacturing steps must be studied taking weld distortions into consideration.

SUPPLY

Following the completion of a welding operation (welded joints, weld cladding, repairs), a production weld data sheet according to RS-7470 shall be prepared for each operation or group of operations involving the same welding procedure.

Preheating (RS 7520), when required by the welding procedure, shall be performed in such a way that the properties of the metal in the preheated zones are not affected. The welding procedure shall indicate the minimum and maximum preheat temperature.

Dimensional stability heat treatments on welded subassemblies shall be performed prior to the final machining in a non-oxidizing, non-carbonizing neutral atmosphere.

Post-forming or post-weld heat treatment is not required or recommended for the fabrication of SS 316 L(N) stainless steel components.

Weld over thicknesses shall not exceed the tolerances given in RS 7461. If they exceed grinding or machining should applied. Special care shall be taken to prevent the contamination of the particles of carbon steel. If a final cosmetic pass is used to improve weld surface finish, it must be covered by the relevant welding procedure qualification.

5.7.6 Additional notes for Weld surface finish, visual and dimensional examinations

Weld surface finishing shall be compatible with the performance of non-destructive examination.

Requirements in RS 7450 in RCC-MR 2007 are applicable.

After welding and heat treatments the surfaces of the welds and adjacent areas shall be finished so that the required NDT can be properly performed. This means removing of spatters, slag, scaly oxides, grease etc. liable to interfere with the inspections and NDT. Surface roughness R_a shall not exceed 10 μm in the testing areas in case the weld is inspected by ultrasounds.

For liquid penetrant testing, weld surfaces at the final or intermediate stage (root of filler passes) shall be left as welded. Cleaning for the liquid penetrant testing should be made in a way that it doesn't mask discontinuities by plastic deformation or clogging from abrasive materials.

Visual and dimensional control shall be conducted according to RS 7460 before the execution of non-destructive examination after possible heat treatment and before any machining or grinding operations of weld surfaces.

Dimensional examination methods must be defined by the Manufacturer and shall meet the requirements in appendix in this specification.

Visual testing (methods shall be in accordance with RMC 7100) shall cover all the welds and both weld and root surfaces when accessible. Areas from where temporary attachments have been removed shall also be inspected.

5.7.7 Non-destructive examination of production welds

Surface examination can be done by liquid penetrant (RES) or photothermal camera (PTC) examination. In this case, tables RS 7720.3a, b and c are applicable by changing "RES" by "PTC or RES" (AP19.4200). Requirements in parts in parts RS 7720, AP19.4200 and RC 4460 of RCC-MR 2007 shall also be applicable.

Part RS 7724 defines the acceptance criteria applicable to the examinations prescribed.

5.7.8 Repair by Welding

In the case of need of repair for surface defects of parent material or weld defects, repairing procedure shall follow prescriptions stated RS 7600 of RCC-MR 2007. All repair welding operations on welds, on parts or products shall meet the same requirements as those applied to production welds.

SUPPLY

Two repair welding operations may be performed at the same point. A third one is not allowed. The Manufacturer shall not make further welds until he has prepared a report analyzing the cause of these successive repairs. The same applies to repairs which occur too regularly or to the detection of defects which might invalidate the conditions of application of the procedure, or the qualification itself of the welding procedure.

If the extent of the repairs to be carried out on a weld performed by an automatic process is likely to exceed one fifth of its length and half of its thickness, the weld shall be carried out a second time and retested.

It is forbidden to repair defects detected during the final non-destructive examination. The size and cause of these defects shall be explained in the NDT report.

To qualify the welding procedure for repairs the dimensions of the production weld test coupons shall satisfy the requirements of the welding procedure qualification test coupon and additional requirements stated in document. They shall be sufficiently long so that all the tests, retests and simulated repairs (specified in RS 3111) required for qualification can be performed.

5.7.9 Production Weld Test Coupons

No requirement in this contract.

5.7.10 Welding data package (WDP)

A detailed welding data package (WDP) must be issued after completion of all welding operations according to RS 1120. It shall include:

- The manufacturing plan as described in this document.
- A catalogue of all joints. For each welded joint, the following shall be provided:
  - A dimensional sketch.
  - Base materials certificates. Conformity with the relevant requirements this Technical Specification can be certified by the Supplier through an inspection certificate 3.1 in accordance with EN 10204 and an inspection report in case he is in possession of an appropriate quality-assurance system, certified by a competent body. Otherwise inspection certificate type 3.2 in accordance with EN 10204:2005 can be provided after agreement with the Client.
  - Filler materials certificates. Conformity with the relevant requirements this Technical Specification can be certified by the Supplier through an inspection certificate 2.2 in accordance with EN 10204.
  - The welding procedure or procedures used and the relevant welding procedure data sheets.
  - The cumulated heat treatments.
  - The properly referenced qualification test coupon or test coupons which validate the welding procedure.
  - The type and scope of non-destructive examinations carried out and their results.
- Qualifications and certification of NDE personnel according to RMC 8000 (to be done by a certified company).
- All non-conformity reports.

This document will be reviewed by the Client before each delivery.

SUPPLY

5.8 Mechanical properties

5.8.1 Required values

Mechanical strength requirements shall comply with values given in Table 2.

Table 2. Mechanical properties.

Tensile properties			
Test temperature (°C)	**Tensile Strength, (Rm) min (MPa)**	**Yield Strength ($Rp_{0.2\%}$) min (MPa)**	**Elongation A, (5d) min (%)**
Room	525-700	220	45
250	415	135	-

Note: Yield strength at 1% offset ($Rp_{1.0\%}$) shall be given for information purposes as the tensile strength (Rm) for tension testing at high temperature.

5.8.2 Sampling

Test samples shall be cut after the bar or semi-finished product has undergone solution heat treatment; they shall be appropriately marked.

The size of the test samples shall be such that they can provide enough test specimens for all tests and retests.

Sampling procedures are defined in § 8.3 of the standard NF-EN 16143-2.

5.8.3 Retreatment testing in solution heat treated condition

Tests shall be performed on test specimens which were not subjected to heat treatment after sampling.

5.8.3.1 Definition a lot

A lot shall comprise parts of similar shape, cross-section and diameter, as defined below:

$$Ø_{max}/ Ø_{min} \leq 1.1 \; ; \; e_{max}/ e_{min} \leq 1.1 \; ; \; S_{max}/ S_{min} \leq 1.25$$

These parts are produced from the same heat, have been subjected to the same manufacturing cycle and form part of the same furnace charge or the same heat treatment cycle. A lot shall be restricted to 3000 kg.

5.8.3.2 Number and content of tests

One series of tests shall be performed per lot for parts weighting 500 kg or less and two series of tests shall be performed for parts weighting more than 500 kg. A test series shall comprise:

- Tension testing at room temperature.
- Tension testing at high temperature.

5.8.3.3 Test procedure

5.8.3.3.1 Tension testing at room temperature

- **Test specimen:**

  Test specimens shall have a circular section. Their normal diameter shall be 10 mm and their dimensions as specified in Appendix D of NF-EN 10002-1:2001. For details see RMC 1211 of RCC-MR 2007.

- **Test method:**

SUPPLY

The tension test shall be performed in compliance with NF-EN 10002-1:2001.

The following values shall be recorded:

- Yield strength at 0.2% offset, in MPa.
- Yield strength at 1% offset, in MPa.
- Ultimate tensile strength, in MPa.
- Percentage elongation after fracture.
- Percentage reduction of area after fracture.

- **Results:**

  Results obtained shall meet the requirements given in Table 2 (percentage of reduction of area and yield strength at 1% offset shall be given for information purposes).

  If this is not the case and the test specimen has a physical defect (which does not affect the usefulness of the product) or if unsatisfactory test results are due to incorrect mounting of the specimen or a testing machine malfunction, the test shall be repeated using another specimen. If the results of the second test are satisfactory, the piece and/or lot shall be accepted; if not, the following paragraph shall apply.

  When unsatisfactory results cannot be attributed to any of the above mentioned causes, two retests may be performed for each unsatisfactory result obtained. The second set of test specimen shall be taken close to those which were defective. If the results of the retest are satisfactory, the piece and/or lot shall be accepted; if not, it shall be rejected, see chapter “Retreatment”.

5.8.3.3.2 Tension testing at high temperature

- **Test specimen:**

  The nominal diameter shall be 10 mm. The dimensions are as specified in NF-EN 10002-5:1992. For details see RMC 1212 of RCC-MR 2007.

- **Test methods:**

  The tension test shall be performed in compliance with NF-EN 10002-5:1992. The rate of stressing shall not exceed 80 MPa per minute up to yield strength. For details see RMC 1212 of RCC-MR 2007.

- **Results:**

  Yield strength at 0.2% offset obtained shall meet the requirements given in Table 2. If this not a case, the paragraph ”Results” of chapter “Tension test at room temperature” shall be followed.

5.8.4 Retreatment

Lots rejected on the basis of unsatisfactory results for one or more mechanical tests may be retreated (solution heat treatment). Retreatment conditions shall be described in the test report.

In such cases, test specimens shall be taken in the same conditions as specified in chapter 5.8.2. Test performed shall be the same as those described in chapter 5.8.3.

No more than one retreatment shall be allowed.

5.9 Surface examination - surface defects

Surfaces shall be thoroughly examined during all phases of production and machining to check the soundness of metal.

The bars shall be sound and free of scale, strings, tears, nicks or other injurious defects.

SUPPLY

A visual examination shall be performed on all parts and this shall be followed by a liquid penetrant examination in accordance with RMC 4000 of RCC-MR 2007.

The following recordable conditions and examination criteria shall be applied:

- Any defects with one dimension of 1 mm or more.
- All defects which the following indications shall be unacceptable:
  - Linear indications.
  - Rounded indications with one dimension greater than 3 mm.
  - 3 or more indications aligned less than 3 mm apart edge to edge.
  - or more grouped indications within a rectangular area of 100 cm^2, whose greater dimension shall not exceed 20 cm, taken in the most unfavourable location relative to the indication being evaluated.

When the examination described above indicate the presence of unacceptable defects on the part, the instruction of chapter “Removal of unacceptable areas” shall apply.

5.10 Volumetric ultrasonic examination

Research of internal defects shall be carried out by ultrasonic examination.

5.10.1 Degree ant time of examination

This examination shall be performed after heat treatment and machining to delivery dimension.

5.10.2 Procedures

Ultrasonic examination procedures are specified in RMC 2310 and standard NF-EN 10228-4:1999 shall apply. Probe characteristics shall normally be 2 MHz.

5.10.3 Scanning plane and degree of examination

The entire volume of the part shall be subject to ultrasonic examination.

100% scanning coverage defined in §12.4 of EN 10228-4:1999 shall be performed.

Part type is 1.

5.10.4 Evaluation of indications

Indications shall be evaluated in accordance with the requirements of RMC 2310.

5.10.5 Recordable conditions and examination criteria

The ranges considered and the acceptance criteria which depend on thickness of the part examined, shall be those defined by the standard NF-EN 10228-4:1999 for normal probe. The quality class 2 shall be adopted.

For thickness above or equal to 75 mm, concerning the loss of back echo, the recommended attenuation range is $R< 0.12$ with no acceptability limit.

5.11 Removal of unacceptable areas

The mill may eliminate surface defects by grinding, provided the dimensional tolerances of the part in the as-delivered condition are respected.

After grinding, a liquid penetrant examination shall be performed in accordance with RMC 4000 of RCC-MR 2007.

Examination criteria shall be those defined in chapter “Surface examination - surface defects”.

No repairs by welding shall be permissible.

5.12 Marking

The requirements of general GM3S specification Ref [1] (section 9) and following requirements are applicable.

The Supplier shall specify the identification and marking method used, in compliance with RC 1300 of RCC-MR 2007.

In addition to the standard marking, an ITER part number (PNI) will be marked on each item.

The Contractor shall receive from the IO the catalogued Part Numbers of ITER (PNI) for the scope of supply, prior to the packaging.

Marking shall include:

- Manufacturer name or symbol.
- Bar number or unique identification number related to quality history.
- Grade of material.
- Heat number.
- PNI number.

Markings or codes which provide clear reference to documents containing the information required for production control will always be acceptable.

Samples delivered with the part shall be marked in accordance with provisions of the purchaser order.

5.13 Cleanliness, packaging, preservation & shipping

The requirements of general GM3S specification Ref [1] (section 10) and following requirements are applicable.

- The supplier shall also consider the requirements of RF 6000 of RCC-MR 2007.
- Prior to the shipments of the material, the supplier shall ensure that each beam shall confirm the identification marking with respect to delivery reports/documents to ensure the traceability. The DRR deliverables (Contractor Release Note, Delivery Report, Packing List) shall be approved prior to the delivery, as per GM3S specification Ref [1] (section 10).
- Suitable precautions shall be taken to prevent from damage, corrosion and contamination of the material during transit. The deliverable material shall be subject to control and inspection.

6 Location for Scope of Work Execution

The Contractor can perform the work at their own location.

7 IO Documents & IO Free issue items

No input nor free issue item is expected from IO.

8 List of deliverables

The Supplier shall provide IO with the documents and data required in the application of this technical specification, the GM3S Ref [1] and any other requirement derived from the application of the contract.

SUPPLY

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

SUPPLY

Technical Design Family (TDF)	Generic Document Title (GDT)	Deliverable Title (further description)	Expected Timing
Quality Plan	Quality Plan	**Quality Plan**	Prior to the KoM
Other Manufacturing Input	Manufacturing Inspection Plan-MIP	**Manufacturing and Inspection Plan (MIP)**	Prior to the commencement of the manufacturing
	Factory Qualification Tests Plan	**Material Testing Plan (MTP)**	
	Manufacturing Plan	**Manufacturing Programme**	
Other Manufacturing Output	Material Certificate	**Material certificate EN-10204 type 3.1**	Prior to the delivery
	Material Certificate	**Material certificate EN-10204 type 3.2**	
	Manufacturing Dossier-MD	**End of Manufacturing Report**	
Shipping or Logistics Record	Contractor Release Note	**Contractor Release Note (CRN)**	
	Delivery Report	**Delivery Report (DR)**	
	Packing List	**Packing List (PL)**	
	Storage and Preservation document	**Equipment Storage & Preservation Requirements**	

Supplier shall prepare their document schedule based on the above and using the template available in the GM3S Ref [1] appendix II (click here to download).

8.1 Documentation and test report

- Prior to the commencement of the production, a "**Manufacturing and Inspection Plan (MIP)"** as part of the Project Execution Plan shall be produced by the Supplier in accordance to the requirements set out in the document ITER_D_22MDZD. It shall encompass the whole scope of the Framework Contract and range from review of drawing, verification of materials, manufacturing operations, inspection and final acceptance test to delivery.
- Supplier shall also produce the detailed "**Material Testing Plan (MTP)**" following the requirements stipulated in this document and in applicable codes and standards.
- The Supplier shall provide the **Material Certificate type 3.1** in accordance with NF-EN 10204:2004. The Certificate is accepted only provided the Material Manufacturer has an appropriate quality-assurance system, certified by a competent body established within the European Community and having undergone a specific acceptance for materials.
- The **Material Certificate type 3.2** in accordance with NF-EN 10204:2004 can be provided by Supplier after agreement with the Client, providing justification that the Accepted Notified Body or another Authorised Third Party Organisation followed the testing as specified in accordance with NF-EN 10204:2004.
- The **End of Manufacturing Report** shall be issued by the Supplier prior to the deliveries, and shall comprise at least:
    - Material Test Report and certificates:
        - Ladle and product analyses.
        - Melting process method.

SUPPLY

- Records of micrographic examination, inclusions and grain size.
- Ferrite content and permeability.
- Results of mechanical property tests.
- Non-destructive examination.
- Dimensional check.
- Record of heat treatment.

- Material designation and marking.
- The heat number and part reference number.
- Identification of the Supplier.
- Identification of the purchase order number.
- Name of the Inspection Agency, where applicable.
- Test and retest results together with required values.
- Welding Data Package (WDP) is applicable.
- Packaging data.

- The **deliverables for the DRR** shall be issued by the Supplier prior to the deliveries, as per section 12, and shall comprise:
  - The Contractor Release Note (CRN),
  - The Delivery Report (DR),
  - The Packing List (PL),
  - The Equipment Storage & Preservation Requirements Form.

All documents shall be in the English language and all measures shall be given in the metric system SI. Each document shall be provided as an electronic file in PDF format.

9 Quality Assurance requirements

The scope under this contract covers PIC components under SIC-2 classification.

Therefore, the Quality Class under this contract is **QC-1**, and GM3S [Ref 1] section 8 applies in line with the defined Quality Class.

The Supplier shall implement an adequate and currently operational quality control system capable of ensuring that:

- Contract requirements will be met.
- Evidence of such compliance will be maintained.

The quality control system implemented by the Supplier shall:

- Be based on recognized quality standards.
- Encompass all activities performed in connection with the contract.
- Be described in a manual to be submitted to the Client at the start of the work.

The Supplier shall ensure that each subcontractor implements an effective quality control system. Failing this, the Supplier shall undertake all necessary actions to establish and maintain quality control in the subcontractors' premises.

The quality organisation shall comply with the requirements defined in the contract.

10 Safety requirements

10.1 Nuclear class Safety

The nuclear safety class of the shaped beams is **SIC-2.**

The scope under this contract covers for PIC and **PIA**, therefore GM3S [Ref 1] section 5.3 applies.

10.2 Seismic class

No specific seismic requirement.

11 Specific General Management requirements

Requirement for GM3S [Ref 1] section 6 applies in full.

11.1 CAD design requirements

This contract does not imply CAD activities.

12 Delivery Readiness Review – Authorization for shipping

The DRR Gate is an official Hold Point (HP) and therefore must be approved prior to the start of transportation. The purpose of the DRR is to review and validate Contractor's documents. This includes providing the DRR mandatory documents as specified in the Ref [3]: Contractor Release Note (CRN), Delivery Report (DR), Packing List (PL), Equipment Storage & Preservation Requirements Form.

The document Ref [3] is applicable, as well as its templates for issuing CRN, PL and DR.

All of these DRR deliverables shall be approved prior pickup or collection at the Contractor's designated facility for delivery to ITER or other agreed location. After both the Release Note and Delivery Reports are approved, this signifies that the delivery may proceed as planned. The Contractor has to account for sufficient time for submission of the DRR documents (minimum 15 working days).

13 Delivery Time

The delivery period and maximum duration of this contract are as per BoQ – reference [2].

The items supplied may be separated in different batches that shall be defined by the IO at the commencement of the contract.

14 Delivery place

The delivery location is ITER Organization site, Cadarache, France.

IDM UID
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VERSION CREATED ON / VERSION / STATUS
04 Jul 2024 / 1.0 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

55.Q0_Technical Specification for the supply of 316L(N)-IG austenitic stainless steel rolled plates for Ex-Vessel

Technical Specification for the supply of 316L(N)-IG austenitic stainless steel rolled plates for Ex-Vessel components of diagnostics ports.
The specification covers plates with thickness comprised between 0.5 mm and 100 mm.

SUPPLY

Table of Contents

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1 Preamble

This Technical Specification is to be read in combination with the General Management Specification for Service and Supply (GM3S) – Ref [1] that constitutes a full part of the technical requirements.

In case of conflict, the content of the Technical Specification supersedes the content of Ref [1].

2 Purpose

This Specification covers the supply of 316L(N)-IG austenitic stainless steel rolled plates between 0.5 mm and 100 mm thick intended to be used as raw material for the manufacturing of ex-vessel structures in the ITER diagnostics ports (for Interspace Support Structure (ISS), Port Cell Support Structures (PCSS), bridge structures, walkway, casings, cable trays, etc…).

The 316L(N)-IG steel specified here is grade 316L(N) steel with narrower alloying element ranges and controlled impurities. The closest analogy is X2CrNiMo17-12-2 with controlled nitrogen content austenitic stainless steel described in the RCC-MR Code, Edition 2007.

This Specification is based on the product procurement specifications of RCC-MR (Edition 2007):

- RM 3331 and RM 3332 for plates with: 3 mm ≤ thickness ≤ 100 mm.
- RM 3333 for plates with: 0.5 mm ≤ thickness < 3 mm.

The plates are considered for equipment Class 2 (in accordance with RCC-MR classification).

The supply covers the following items:

- Manufacture of the total quantity stainless steel plates of grade 316L(N)-IG.
- Organization of quality at works.
- Elaboration of all procedures required for the manufacturing, inspection (including analyses), cleanliness, packaging, storage and delivery.
- Time schedules and documentation.
- All the inspections and tests during and after manufacturing envisaged in this specification.

3 Acronyms & Definitions

3.1 Acronyms

The following acronyms are the main one relevant to this document.

Abbreviation	Description
BoQ	Bill Of Quantities
CRN	Contractor Release Note
CRO	Contract Responsible Officer
DR	Delivery Report
DRR	Delivery Readiness Review
GM3S	General Management Specification for Service and Supply
IO	ITER Organization
ISS	Interspace Support Structure
KOM	Kick-Off Meeting

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MIP	Manufacturing and Inspection Plan
MTP	Material Test Plan
PCSS	Port Cell Support Structure
PIA	Protection Important Activity
PIC	Protection Important Component
PL	Packing List
PNI	ITER Part Number
PRO	Procurement Responsible Officer
SIC	Safety Important Class

3.2 Definitions

Contractor: shall mean an economic operator who have signed the Contract in which this document is referenced.

Certificate: a certification, that the material was manufactured, sampled, tested and inspected in accordance with requirements of the material Specification and has been found to meet those requirements shall be supplied to the purchaser.

4 Applicable Documents & Codes and standards

4.1 Applicable Documents

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.

This Technical Specification takes precedence over the referenced 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.

Ref	Title	IDM Doc ID	Version
[1]	General Management Specification for Service and Supply (GM3S)	82MXQK	v1.4
[2]	55.Q0_Bill of Quantities for the supply of 316L(N)-IG austenitic stainless steel shaped beams and rolled plates for Ex-Vessel	AM7J5M	*as per Purchase Order*
[3]	Working Instruction for the Delivery Readiness Review (DRR)	X3NEGB	v2.0

4.2 Applicable Codes and Standards

4.2.1 Design and Construction Codes

- RCC-MR, Edition 2007.
- RCC-MR, Edition 2007, Section 2 – Materials, Chapters RM 3331, RM 3332, RM 3333.
- RCC-MR, Edition 2007, chapter RM 0100.

4.2.2 EN and ASTM Standards

- **NF-EN 10088-2: 2005** Stainless Steels. Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes.
- **EN ISO 6892-1** Tensile testing at ambient temperature.
- **EN ISO 6892-2** Tensile testing at elevated temperature.
- **NF-EN 10307: 2002** Ultrasonic testing of austenitic and austenitic-ferritic stainless steels. Flat products of thickness equal to or greater than 6 mm.
- **NF-EN 10204: 2004** Metallic products: Type of inspection documents.
- **NF-EN 10029: 2011** Hot rolled steel plates 3 mm thick or above - Tolerances on dimensions, shape and mass.
- **NF-EN ISO 643: 2013** Steels - Micrographic determination of the apparent grain size.
- **NF-EN ISO 4288:1998** Geometrical product specifications (GPS). Surface texture: Profile method. Rules and procedures for the assessment of surface texture.
- **ASTM E45-13** Standard test methods for determining the inclusion content of steel.
- **ASTM A342-14** Standard Test Methods for Permeability of Feebly Magnetic Materials.

In case of change of edition year or issuing standard which supersede above mentioned, the use of new Standards is allowed only in case of demonstration of equivalency with prior written Client's approval.

The use of EN but non NF Standards is also allowed demonstrating equivalence with the corresponding NF version of the Standard.

Other equivalent national or international standards and codes proposed by the supplier may be acceptable with prior written Client's approval, provided conformity assessment to all criteria is satisfied.

5 Scope of Work

This section defines the specific scope of work, in addition to the contract execution requirements as defined in GM3S Ref [1].

5.1 Bill of Quantities

The quantities applicable to this procurement contract are defined in the Bill of Quantities – Ref [2].

The final quantities to be ordered will be defined in the Purchase Order. They shall stay within a range of ± 10 % around the quantities of the BoQ [2].

5.2 Components Classification

The plates are for use in the Ports ex-vessel areas for various components classified as SIC-2 and SR (Safety Relevant). The most stringent classification of SIC-2 is then applied to all plates.

- Quality class: QC-1.
- Safety class: SIC-2.
- Vacuum Quality class: not applicable.
- PE/NPE class: not applicable.
- Seismic class: not applicable.
- Tritium class: not applicable.

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5.3 Dimensions and tolerances

Refer to the Bill of Quantities [2] for the list of plates with dimensions.

The dimensions of the plates shall comply with requirements of the purchase order. The tolerances for thickness, length, width, flatness, edge camber and out of squareness shall comply with NF-EN 10029:2011.

The following are requirements for tolerances:

- Thickness tolerance - Class C as in NF-EN 10029:2011.
- Flatness tolerances - Class S as in NF-EN 10029:2011.
- Edge camber shall be limited to 0.2% of the actual length of plate and out-of-squareness limited to 1% of actual width (G), as specified in NF-EN 10029:2011.

5.4 Chemical requirements and physico-chemical characteristics

5.4.1 Chemical requirements

The 316L(N)-IG (ITER Grade) steel is grade 316L(N) steel with narrower alloying element ranges and controlled impurities. The closest analogy is X2CrNiMo17-12-2 controlled nitrogen content austenitic stainless steel described in the RCC-MR Code, Edition 2007.

The chemical composition determined by ladle and product analyses, shall comply with the requirements given in Table 1. The maximum content of impurities (Co, Nb, Ta) meets the **Chemical composition and impurity requirements for materials (REYV5V v2.3).**

Table 1. Chemical composition

Element	Alloying elements and impurities content, wt. %.	
	Minimum	**Maximum**
C		0.030
Mn	1.60	2.00
Si		0.50
P		0.025
S		0.010
Cr	17.00	18.00
Ni	12.00	12.50
Mo	2.30	2.70
N	0.060	0.080
B		0.0020
Cu		0.30
Co		0.05
Nb		0.01
Ti		0.10
Ta		0.01

5.4.2 Chemical analysis

The Steelmaker shall supply a ladle analysis certified by the Mill Manager or his duly accredited representative. In addition they shall provide a product analysis taken from each rolled plate. This latter analysis may be performed on metal discards taken from mechanical test specimens.

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Chemical analyses and crosschecks shall be performed in a laboratory of Steelmaker choice, according to that laboratory's usual method. These analyses shall be performed in compliance with the requirements of RMC 1000 of RCC-MR 2007.

5.4.3 Ferrite content and magnetic permeability

The ferrite content evaluated using the Schaeffler diagram, modified by Pryce and Andrews (Figure RMC 1341.2, Section 3, RCC-MR 2007) and measured on a solution annealed product must be less or equal than 0.5 %.

The ferrite content shall be measured at the surface of each heat treated rolling sheet or strip, at one quarter width at the top and bottom, close to mechanical test specimens. Method of testing is RMC 1340 of RCC-MR, Edition 2007 or by method agreed between the Client and the Supplier.

The relative magnetic permeability of the finished plates shall be measured at room temperature after solution annealing. The value measured shall be lower than or equal to 1.03 (for fields of over 80000 A/m (1000 Oe) as per Test method 2 or measured with a low μ permeability indicator as per method 3 of ASTM A342-14. Specimen for testing shall be cut as described in the previous paragraph. Measurements of permeability made with other physical methods (e.g. permascope, magnetoscope, etc.) are accepted provided information about type and trade mark of apparatus uses and information about calibration.

5.4.4 Structure

A micrographic examination, with photographs, shall be performed parallel to the rolling direction of each heat treated plate rolling sheet or strip. The structure must be homogeneous.

5.4.4.1 Grain size

The grain size number as determined in accordance with NF-EN ISO 643:2013 shall be greater than 2. The grain size homogeneity shall be ±1 around the true average value. The presence of a few grains of index 1 or 0 is tolerated.

The determination is performed on test samples taken from the immediate vicinity of the mechanical test specimens.

5.4.4.2 Non-metallic inclusions

- Amount and definition shall meet standard ASTM E45-13.
- **Macroinclusions** (exogenous inclusions from entrapped slag or refractories):
  - They are strictly forbidden and are cause of rejection.
- Test shall be done from one edge of each heat-treated plate rolling sheet or strip.

5.5 Manufacturing requirements

5.5.1 Melting process

The steel shall be made using an electric furnace or by any other technically equivalent process.

For ISS/PCSS application and to meet requirements for structure and inclusion contents in this specification the melting of steel should be completed by a suitable secondary metallurgy treatment. The refining processes are argon-oxygen decarburization (AOD), vacuum oxygen de-carbonised (VOD).

Supplier shall propose refining method, which shall be agreed with the Client.

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5.5.2 Manufacturing programme

Before the beginning of manufacturing operations, the material supplier shall draw up a manufacturing programme. This programme shall include the following:

a. Identification of melting process.
b. Ingot weight and type.
c. Identification of main hot-working operations.
d. In case of continuing casting, the discard parameters, weight of blooms, etc.
e. Top and bottom end discard percentages.
f. Position of plate in the ingot, in particular the final rolling direction in relation to the ingot axis.
g. Indication of the main rolling direction.
h. Conditions for intermediate heat treatments and for final solution heat treatment (in particular, temperature, holding time and cooling method).
i. Position of acceptance test samples on the plate.
j. Dimensional drawing with position of test specimens in these samples.

The various heat treatments, sampling and non-destructive examination operations shall be presented in chronological order. For plates less than 80 mm thick, points b/, c/ and e/ of aforementioned manufacturing programme are not required. The program shall be agreed with the Client.

5.5.3 Delivery condition

The plates shall be delivered in the solution heat treated condition, pickled and passivated condition, equivalent to 1D finish according to NF-EN 10088-2:2005.

5.5.3.1 Solution heat treatment

Solution heat treatment shall consist of holding at a temperature between 1050°C and 1150°C followed by water cooling. The thermal cycles shall be recorded and the records kept shall be presented in the test report.

5.5.3.2 Pickling-passivation - surface conditions

The pickling-passivation treatment shall be performed in compliance with the requirements of RF 6000. No trace of oil or grease must remain on the surface of the metal in the as-delivered condition.

The surface condition of the plates evaluated in accordance with RMC 7200 of RCC-MR 2007 must on average be at least that defined by scale N9 of LCA-CEA plate No.3, that is, a roughness value of about 6.3 μm.

If in doubt, this comparative examination shall be supplemented by a measurement using a roughness meter. The result of this measurement must be ≤ 9 μm.

Method of testing shall be proposed by Supplier and agreed with the Client. Roughness measurement in accordance with NF-EN ISO 4288:1998 can be used.

5.6 Mechanical properties

5.6.1 Required values

Mechanical strength requirements shall comply with values given in Table 2.

Table 2. Mechanical properties.

Tensile properties

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Test temperature (°C)	Tensile Strength, (Rm) min (MPa)	Yield Strength ($Rp_{0.2\%}$) min (MPa)	Elongation A, (5d) min (%)
Room	525-700	220	45
250	415	135	-

Note: Yield strength at 1% offset ($Rp_{1.0\%}$) shall be given for information purposes as the tensile strength (Rm) for tension testing at high temperature.

5.6.2 Sampling

Test samples shall be taken after the plate has been subjected to solution heat treatment. They shall be appropriately marked and show the final rolling direction.

The size of test samples shall be such that they can provide enough test specimens for all test and retests. Test samples shall be taken halfway between the edge and the axis of the plate centerline. Specimens shall not be taken closer to the edge of the sample than a distance equal to the thickness of the plate. The longitudinal axis of the test specimens shall be parallel to the rolling skins and perpendicular to the final rolling direction.

The longitudinal axis for tension test specimens is located as follows:

- For plates 30 mm thick or less, at mid-thickness.
- For plates thicker than 30 mm, at quarter thickness.
- For plates less than 10 mm thick, the thickness of the test specimen shall be equal to the thickness of the plate (specimen with rectangular cross-section).

The tests shall be performed on specimens taken from samples subjected to no heat treatment after sampling.

5.6.3 Number and content of tests

The tests shall be performed on specimens taken from samples subjected to no heat treatment after sampling.

The number of tests to be performed is given in Table 3.

Table 3. Number of and content of test – sampling

				Top end			Bottom end			Number of specimens	
Name of test	**Test temperature (°C)**	**Weight of plate**	**Thickness t**	**Full thick-ness**	**Mid-thick-ness**	**Quarter thick-ness**	**Full thick-ness**	**Mid-thick-ness**	**Quarter thick-ness**	**Per heat**	**Per rolled sheet**
Solution heat treated (SHT)											
	Room	≤ 3000 kg	< 10 mm	1							1
			10 mm ≤ t < 30 mm		1						1
			> 30 mm			1					1
			< 10 mm	1			1				2

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Tensile	**Room**	> 3000 kg	10 mm ≤ t < 30 mm		1			1			2
			> 30 mm			1			1		2
	250	Regardless of weight	< 10 mm	1						1	
			10 mm ≤ t < 30 mm		1					1	
			> 30 mm			1				1	

SHT – solution heat treated

5.6.3.1 Test procedure

5.6.3.1.1 Tension testing at room temperature

- **Test specimen:**

  Test specimens shall have a circular section. Their normal diameter shall be 10 mm and their dimensions as specified in Appendix D of NF-EN 10002-1:2001. For plates less than 20 mm thick, the cylindrical test specimen may be replaced by a specimen with a rectangular section. For details see RMC 1211 of RCC-MR 2007.

- **Test method:**

  The tension test shall be performed in compliance with NF-EN 10002-1:2001.

  The following values shall be recorded:

  - Yield strength at 0.2% offset, in MPa.
  - Yield strength at 1% offset, in MPa.
  - Ultimate tensile strength, in MPa.
  - Percentage elongation after fracture.
  - Percentage reduction of area after fracture.

- **Results:**

  Results obtained shall meet the requirements given in Table 2 (percentage of area reduction and yield strength at 1% offset shall be given for information).

  If this is not the case and the test specimen has a physical defect (which does not affect the usefulness of the product) or if unsatisfactory test results are due to incorrect mounting of the specimen or a testing machine malfunction, the test shall be repeated using another specimen. If the results of the second test are satisfactory, the part and /or the lot shall be accepted; if not, the following paragraph shall apply.

  When unsatisfactory results cannot be attributed to any of the above-mentioned causes, two retests may be performed for each unsatisfactory result obtained. The second set of test specimen shall be compared to the defective ones. If the results of the retest are satisfactory, the rolled sheet shall be accepted; if not, it shall be rejected, see chapter “Retreatment”.

5.6.3.1.2 Tension testing at high temperature

- **Test specimen:**

  The nominal diameter shall be 10 mm. The dimensions are as specified in NF-EN 10002-5:1992. For plates less than 20 mm thick, the cylindrical test specimen may be replaced by a specimen with a rectangular section. For details see RMC 1212 of RCC-MR 2007.

- **Test methods:**

  The tension test shall be performed in compliance with NF-EN 10002-5:1992. The rate of stressing shall not exceed 80 MPa per minute up to yield strength. For details see RMC 1212 of RCC-MR 2007.

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- **Results:**

  Yield strength at 0.2% offset obtained shall meet the requirements given in Table 2. If this not a case, the paragraph ”Results” of chapter 5.6.3.1.1 “Tension test at room temperature” shall be followed.

5.6.4 Retreatment

Rolled plates rejected on the basis of unsatisfactory results for one or more mechanical tests may be retreated (solution heat treatment, section 5.5.3.1). Retreatment conditions shall be described in the test report.

In such cases, test specimens shall be taken in the same conditions as specified in chapter 5.6.2 “Sampling”. Test performed shall be the same as those described in chapter 5.6.3 “Tests”.

No more than one retreatment shall be allowed.

5.7 Surface examination - surface defects

Plates shall be visually examined. Their surfaces shall be plain, uniform and free from wrinkles, buckles, blowholes, tears, cracks and inclusions. After cutting to the delivery dimensions, the edges shall be visually examined in accordance with RMC 7100 of RCC-MR 2007. The absence of cleavage or lamination (for example comprised by a fine layer of inclusions drawn out during rolling) shall be checked. If in doubt, a liquid penetrant examination shall be performed in accordance with RMC 4000 of RCC-MR 2007..

Criteria:

Indications with one dimension exceeding 1 mm shall be considered as a recordable condition. The following are acceptable:

- Linear indications of 8 mm or less for plates 40 mm thick or less, and of 10 mm or less for plates more than 40 mm thick.
- As the operating conditions of the plates could lead to a risk of lamellar tear, the only acceptable indications are those with a cumulative length over the most densely covered meter as follows:
  - Less than 30 mm for plates up to 40 mm thick.
  - Less than 40 mm for plates over 40 mm thick.

Two separate indications are considered as one if the distance between them is less than twice the length of the smaller of the two. The length of the indication is then equal to the sum of the length of the two indications plus the distance between them.

If these criteria are not respected, no repair welds shall be authorized and the part is rejected.

However, if there are special and highly localized indications (which can be checked by shear wave ultrasonic examination) this zone can be eliminated by grinding and the plate accepted if its dimensions remain within the acceptable tolerances.

Note: if during use, cleavage or lamination appears, the plate shall be discarded.

5.8 Volumetric ultrasonic examination

An ultrasonic examination shall be performed in compliance with RMC 2400 of RCC-MR 2007, which states the condition for application of standard EN 10307.

The examination shall only be carried out for parts at least 30 mm thick, in accordance with the scanning plan and the criteria given in standard NF-EN 10307:2002, quality class S2 for plate body and quality class E3 for plate edges.

The scan plans utilised for the examination of the rolled plates shall be as a part of the final reports.

5.9 Removal of unacceptable areas

This section applies only to plates with 3 mm ≤ thickness ≤ 100 mm.

5.9.1 Removal by grinding

The Supplier may remove surface defects by grinding, providing that:

- The remaining thickness is within the tolerances specified by the drawing or the purchase order.
- The cavity blends smoothly with the surrounding surface.
- After removal, the surface is subject to liquid penetrant examination in accordance with RMC 4000 of RCC-MR 2007.

The following criteria shall be applied for the liquid penetrant examination. An indication greater than 1 mm shall be considered recordable conditions.

The following are unacceptable:

- Linear indications.
- Rounded indications with one dimension greater than 2 mm.

5.9.2 Repair welding

As general rule, the Rolling Mill shall not be authorised to perform welding repairs.

5.10 Marking

The requirements of general GM3S Ref [1] (section 9) and following requirements are applicable.

The Supplier shall specify the identification and marking method used, in compliance with RB, RC and RD 1300 of RCC-MR 2007.

In addition to the standard marking, an ITER part number (PNI) will be marked on each item.

The Contractor shall receive from the IO the catalogued Part Numbers of ITER (PNI) for the scope of supply, prior to the packaging.

Each plate shall be legibly identified with following information:

- Manufacturer name or symbol.
- Plate number or unique identification number related to quality history.
- Grade of material.
- Heat number.
- PNI number.

Markings or codes which provide clear reference to documents containing the information required for production control will always be acceptable.

Samples delivered with the part shall be marked in accordance with provisions of the purchaser order.

5.11 Cleanliness, packaging, preservation & shipping

The requirements of general GM3S Ref [1] (section 10) and following requirements are applicable.

- The supplier shall also consider the requirements of RF 6000 of RCC-MR 2007.
- Prior to the shipments of the material, the supplier shall ensure that each beam shall confirm the identification marking with respect to delivery reports/documents to ensure the traceability. The DRR deliverables (Contractor Release Note, Delivery Report,

Packing List) shall be approved prior to the delivery, as per GM3S specification Ref [1] (section 10).

- Suitable precautions shall be taken to prevent from damage, corrosion and contamination of the material during transit. The delivered items shall be subject to control and inspection.

6 Location for Scope of Work Execution

The Contractor can perform the work at their own location.

7 IO Documents & IO Free issue items

No input nor free issue item is expected from IO.

8 List of deliverables

The Supplier shall provide IO with the documents and data required in the application of this technical specification, the GM3S [1] and any other requirement derived from the application of the contract.

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

Technical Design Family (TDF)	Generic Document Title (GDT)	Deliverable Title (further description)	Expected Timing
Quality Plan	Quality Plan	**Quality Plan**	Prior to the KoM
Other Manufacturing Input	Manufacturing Inspection Plan-MIP	**Manufacturing and Inspection Plan (MIP)**	Prior to the commencement of the manufacturing
	Factory Qualification Tests Plan	**Material Testing Plan (MTP)**	
	Manufacturing Plan	**Manufacturing Programme**	
Other Manufacturing Output	Material Certificate	**Material certificate EN-10204 type 3.1**	Prior to the delivery
	Material Certificate	**Material certificate EN-10204 type 3.2**	
	Manufacturing Dossier-MD	**End of Manufacturing Report**	
Shipping or Logistics Record	Contractor Release Note	**Contractor Release Note (CRN)**	
	Delivery Report	**Delivery Report (DR)**	
	Packing List	**Packing List (PL)**	
	Storage and Preservation document	**Equipment Storage & Preservation Requirements**	

Supplier shall prepare their document schedule based on the above and using the template available in the GM3S Ref [1] appendix II (click here to download).

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8.1 Documentation and test report

- Prior to the commencement of the production, a "**Manufacturing and Inspection Plan (MIP)"** as part of the Project Execution Plan shall be produced by the Supplier in accordance to the requirements set out in the document ITER_D_22MDZD. It shall encompass the whole scope of the Framework Contract and range from review of drawing, verification of materials, manufacturing operations, inspection and final acceptance test to delivery.
- Supplier shall also produce the detailed "**Material Testing Plan (MTP)**" following the requirements stipulated in this document and in applicable codes and standards.
- The Supplier shall provide the **Material Certificate type 3.1** in accordance with NF-EN 10204:2004. The Certificate is accepted only provided the Material Manufacturer has an appropriate quality-assurance system, certified by a competent body established within the European Community and having undergone a specific acceptance for materials.
- The **Material Certificate type 3.2** in accordance with NF-EN 10204:2004 can be provided by Supplier after agreement with the Client, providing justification that the Accepted Notified Body or another Authorised Third Party Organisation followed the testing as specified in accordance with NF-EN 10204:2004.
- The **End of Manufacturing Report** shall be issued by the Supplier prior to the deliveries, and shall comprise at least:
    - Material Test Report and certificates:
        - Ladle and product analyses.
        - Melting process method.
        - Records of micrographic examination, inclusions and grain size.
        - Ferrite content and permeability.
        - Results of mechanical property tests.
        - Non-destructive examination.
        - Dimensional check and roughness.
        - Record of heat treatment.
    - Material designation and marking.
    - The heat number and part reference number.
    - Identification of the Supplier.
    - Identification of the purchase order number.
    - Name of the Inspection Agency, where applicable.
    - Test and retest results together with required values.
    - Packaging data.
- The **deliverables for the DRR** shall be issued by the Supplier prior to the deliveries, as per section 12, and shall comprise:
    - The Contractor Release Note (CRN),
    - The Delivery Report (DR),
    - The Packing List (PL),
    - The Equipment Storage & Preservation Requirements Form.

All documents shall be in the English language and all measures shall be given in the metric system SI. Each document shall be provided as an electronic file in PDF format.

9 Quality Assurance requirements

The scope under this contract covers PIC components under SIC-2 classification.

Therefore, the Quality Class under this contract is **QC-1**, and GM3S [Ref 1] section 8 applies in line with the defined Quality Class.

SUPPLY

The Supplier shall implement an adequate and currently operational quality control system capable of ensuring that:

- Contract requirements will be met.
- Evidence of such compliance will be maintained.

The quality control system implemented by the Supplier shall:

- Be based on recognized quality standards.
- Encompass all activities performed in connection with the contract.
- Be described in a manual to be submitted to the Client at the start of the work.

The Supplier shall ensure that each subcontractor implements an effective quality control system. Failing this, the Supplier shall undertake all necessary actions to establish and maintain quality control in the subcontractors' premises.

The quality organisation shall comply with the requirements defined in the contract.

10 Safety requirements

10.1 Nuclear class Safety

The nuclear safety class of the plates is **SIC-2.**

The scope under this contract covers for PIC and PIA, therefore [Ref 1] GM3S section 5.3 applies.

10.2 Seismic class

No specific seismic requirement.

11 Specific General Management requirements

Requirement for [Ref 1] GM3S section 6 applies in full.

11.1 CAD design requirements

This contract does not imply CAD activities.

12 Delivery Readiness Review – Authorization for shipping

The DRR Gate is an official Hold Point (HP) and therefore must be approved prior to the start of transportation. The purpose of the DRR is to review and validate Contractor's documents. This includes providing the DRR mandatory documents as specified in the Ref [3]: Contractor Release Note (CRN), Delivery Report (DR), Packing List (PL), Equipment Storage & Preservation Requirements Form.

The document Ref [3] is applicable, as well as its templates for issuing CRN, PL and DR.

All of these DRR deliverables shall be approved prior pickup or collection at the Contractor's designated facility for delivery to ITER or other agreed location. After both the Release Note and Delivery Reports are approved, this signifies that the delivery may proceed as planned. The Contractor has to account for sufficient time for submission of the DRR documents (minimum 15 working days).

13 Delivery Time

The delivery period and maximum duration of this contract are as per BoQ – reference [2].

SUPPLY

The items supplied may be separated in different batches that shall be defined by the IO at the commencement of the contract.

14 Delivery place

The delivery location is ITER Organization site, Cadarache, France.

ANNEX I

EXPRESSION OF INTEREST & PIN ACKNOWLEDGEMENT

To be returned by e-mail to: amankumar.joshi@iter.org cc: Chloe Perret to chloe.perret@iter.org

TENDER No.	**IO/24/OT/10028594/AJI**
DESIGNATION of SERVICES:	**Procurement of 316L(N)-IG shaped beams and rolled plates for ITER Diagnostics ISS/PCSS structures**
OFFICER IN CHARGE:	**Aman Kumar Joshi – Procurement Division ITER Organization**

☐ WE ACKNOWLEDGE HAVING READ THE PIN NOTICE FOR THE ABOVE-MENTIONED TENDER

☐ WE INTEND TO SUBMIT A TENDERs

☐ WE WILL NOT TENDER FOR THE FOLLOWING REASONS:

……

Signature: COMPANY STAMP

Name: .....

Position: .....

Tel: .....

E-mail.....

Date: .....

55.Q0_Bill of Quantities for the supply of 316L(N)-IG austenitic stainless steel shaped beams and rolled plates for Ex-Vessel

Document UID: ITER_D_AM7J5M

Applicable technical specification:

55.Q0_Technical Specification for the supply of 316L(N)-IG austenitic stainless steel shaped beams for ISS-PCSS

Document UID: *ITER_D_AM7H27*

																				TOTAL ORDER QUANTITIES FOR BATCH#1 (FIRM)						TOTAL ORDER QUANTITIES FOR BATCH#1 (FIRM) + BATCH#2 (OPTIONAL)						
Commodity Code	**Commodity Code description**	***IDENT CODE (PNI)***	***Item ref.***	**TYPE**	**COMPONENT DESCRIPTION**	**DIM1 (mm)**	**DIM2 (mm)**	**DIM3 (mm) thickness**	**DIM4 (mm) thickness**	**Delivery Length (m)**	**Unit Weight (kg/m)**	**MATERIAL GRADE**	**DIMENSIONAL STD**	**TOLERANCES STD**	**NPE nuclear level**	**PED category**	**PIC Safety class**	**ITER Quality Class**	**ITER Vacuum Quality Class**	**Heat analysis restrictions**	**Additional requirements**	**TOTAL ORDER QUANTITY (m)**	**TOTAL ORDER QUANTITY (pieces)**	**TOTAL WEIGHT (kg)**	**Price EUR/m**	**Price EUR/kg**	**TOTAL PRICE (EUR)**	**TOTAL ORDER QUANTITY (m)**	**TOTAL ORDER QUANTITY (pieces)**	**TOTAL WEIGHT (kg)**	**Price EUR/m**	**Price EUR/kg**	**TOTAL PRICE (EUR)**	**Delivery Period (*) and Batches (as per columns AN to AP)**
SSBFEWA5LCZ	*HEB ITER STD. 316L(N)-IG CAT1*	*I17551732*	*B#1*	BEAM	**HEB_100X100X6X10**	100	100	6	10	6	20.65	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10034	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	114	19	2354				114	19	2354				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBFEWA5LCZ	*HEB ITER STD. 316L(N)-IG CAT1*	*I17551734*	*B#2*	BEAM	**HEB_120X120X6.5X11**	120	120	6.5	11	6	26.97	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10034	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	114	19	3075				114	19	3075				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBFEWA5LCZ	*HEB ITER STD. 316L(N)-IG CAT1*	*I17551738*	*B#3*	BEAM	**HEB_200x200x9**	200	200	9	15	6	17	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10034	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	0	0	0				30	5	510				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBJEWA5LCZ	*IPE ITER STD. 316L(N)-IG CAT1*	*I17551756*	*B#4*	BEAM	**IPE_100x55x4.1**	100	55	4.1	5.7	6	8.1	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10034	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	0	0	0				60	10	486				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBJEWA5LCZ	*IPE ITER STD. 316L(N)-IG CAT1*	*I17551757*	*B#5*	BEAM	**IPE_120X64X4.4X6.3**	120	64	4.4	6.3	6	10.48	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10034	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	0	0	0				228	38	2389				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBJEWA5LCZ	*IPE ITER STD. 316L(N)-IG CAT1*	*I17551761*	*B#6*	BEAM	**IPE_200x100x5.6x8.5**	200	100	5.6	8.5	6	22.4	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10034	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	30	5	672				54	9	1210				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBJEWA5LCZ	*IPE ITER STD. 316L(N)-IG CAT1*	*I17551763*	*B#7*	BEAM	**IPE_240X120X6.2X9.8**	240	120	6.2	9.8	6	31.02	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10034	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	42	7	1303				282	47	8748				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBMEWA5LCZ	*UPE ITER STD. 316L(N)-IG CAT1*	*I17551787*	*B#8*	BEAM	**UPE_80x50x4**	80	50	4	7	6	17	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	0	0	0				78	13	1326				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBMEWA5LCZ	*UPE ITER STD. 316L(N)-IG CAT1*	*I17551774*	*B#9*	BEAM	**UPE_100x55x4.5x7.5**	100	55	4.5	7.5	6	17	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	36	6	612				60	10	1020				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBMEWA5LCZ	*UPE ITER STD. 316L(N)-IG CAT1*	*I17551775*	*B#10*	BEAM	**UPE_120x60x5x8**	120	60	5	8	6	12.23	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	48	8	587				48	8	587				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBMEWA5LCZ	*UPE ITER STD. 316L(N)-IG CAT1*	*I17551776*	*B#11*	BEAM	**UPE_140x65x5x9**	140	65	5	9	6	15	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	30	5	450				30	5	450				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBMEWA5LCZ	*UPE ITER STD. 316L(N)-IG CAT1*	*I17551777*	*B#12*	BEAM	**UPE_160X70X5.5X9.5**	160	70	5.5	9.5	6	17.19	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	48	8	825				210	35	3610				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBMEWA5LCZ	*UPE ITER STD. 316L(N)-IG CAT1*	*I17551780*	*B#13*	BEAM	**UPE_220X85X6.5X12**	220	85	6.5	12	6	26.86	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	54	9	1450				54	9	1450				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBMEWA5LCZ	*UPE ITER STD. 316L(N)-IG CAT1*	*I17551786*	*B#14*	BEAM	**UPE_400x115x13.5x18**	400	115	13.5	18	6 and 9	72.2	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27 3 beams with 9 m length in Batch#2, other beams are 6 m long	0	0	0				123	19	8881				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBHEWA5LCZ	*UPN ITER STD. 316L(N)-IG CAT1*	*I17551803*	*B#15*	BEAM	**UPN_50x38x5x7**	50	38	5	7	6	5.59	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	0	0	0				72	12	402				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBHEWA5LCZ	*UPN ITER STD. 316L(N)-IG CAT1*	*I17551788*	*B#16*	BEAM	**UPN_100x50x6x8.5**	100	50	6	8.5	6	10.6	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	0	0	0				90	15	954				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBHEWA5LCZ	*UPN ITER STD. 316L(N)-IG CAT1*	*I17551802*	*B#17*	BEAM	**UPN_400x110x14x18**	400	110	14	18	6 and 7.5	70.62	316L(N)-IG (1.4404) with impurity control	EN-10365	EN-10279	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27 2 beams with 7.5 m length in Batch#1, other beams are 6 m long	39	6	2754				93	15	6568				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBAEWA5LCZ	*ANG. ITER STD. 316L(N)-IG CAT1*	*I17551929*	*B#18*	BEAM	**L_30X30X4**	30	30	4		6	1.73	316L(N)-IG (1.4404) with impurity control	EN-10056-1	EN-10056-2	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	0	0	0				900	150	1557				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBAEWA5LCZ	*ANG. ITER STD. 316L(N)-IG CAT1*	*I17551932*	*B#19*	BEAM	**L_35X35X4**	35	35	4		6	2.12	316L(N)-IG (1.4404) with impurity control	EN-10056-1	EN-10056-2	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	198	33	420				468	78	992				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBAEWA5LCZ	*ANG. ITER STD. 316L(N)-IG CAT1*	*I17551939*	*B#20*	BEAM	**L_40X40X5**	40	40	5		6	3	316L(N)-IG (1.4404) with impurity control	EN-10056-1	EN-10056-2	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	138	23	414				138	23	414				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBAEWA5LCZ	*ANG. ITER STD. 316L(N)-IG CAT1*	*I17551968*	*B#21*	BEAM	**L_60X60X8**	60	60	8		6	7.16	316L(N)-IG (1.4404) with impurity control	EN-10056-1	EN-10056-2	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	450	75	3222				450	75	3222				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBAEWA5LCZ	*ANG. ITER STD. 316L(N)-IG CAT1*	*I17551976*	*B#22*	BEAM	**L_65X65X6**	65	65	6		6	5.97	316L(N)-IG (1.4404) with impurity control	EN-10056-1	EN-10056-2	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	72	12	430				72	12	430				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
SSBAEWA5LCZ	*ANG. ITER STD. 316L(N)-IG CAT1*	*I17551978*	*B#23*	BEAM	**L_65X65X8**	65	65	8		6	7.81	316L(N)-IG (1.4404) with impurity control	EN-10056-1	EN-10056-2	N/A	N/A	SIC-2	QC-1	N/A	Co ≤ 0.05% in wt. Ta ≤ 0.01% in wt. Nb ≤ 0.01% in wt.	ITER_D_AM7H27	54	9	422				54	9	422				Batch#1 (firm, IO): 14 months Batch#2 (option, RFDA): 10 months
																							18990						*51056*			

Acronyms

N/A Not applicable

TBD To Be Defined

(*) Maximum duration from the date of commencement of the contact. The supplier shall propose a delivery schedule with the best optimization considering the total delivery period of the contract.