

## Technical Specifications (In-Cash Procurement)

# Technical Specification for the Framework Contract for Manufacture and Installation of Common Supports In Building 11

This technical specification provides the technical requirements for the framework contract for manufacture and installation of the common supports to be installed in Buildings 11 of the Tokamak Complex for the ITER Organisation (IO). This includes supports in levels B1 PC, L3 and L4.

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## 1. Purpose

This technical specification provides the technical requirements for the framework contract for manufacture and installation of the common supports to be installed in Building 11 of the Tokamak Complex for the ITER Organisation (IO).

These supports are composed of steel tubes, plates, pins, bolts and pad eyes and are fixed to the building civil structure either by direct welding to embedded plates, bolting to studs welded to embedded plates, through post drill support plates or bolted to Halfen rails.

While the majority of the supports are carbon steel, there are some which may be stainless steel due to material requirements from other PBS.

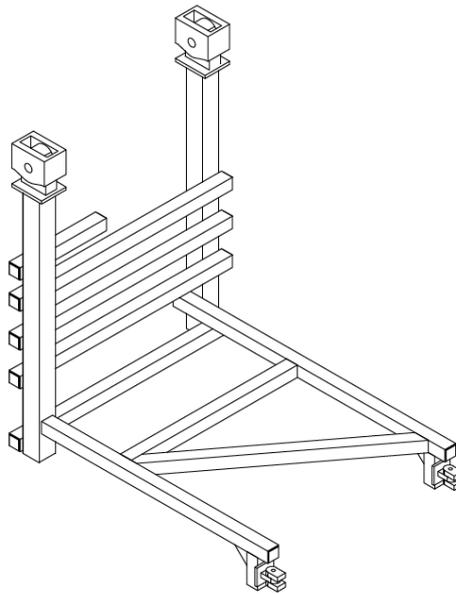


Figure 1 - Example of a Common Support

In this document, the term Contractor is assigned to the company that has been awarded the Contract by the IO to procure, fabricate and install the common supports.

The Contractor shall comply with NF EN 1090 for execution technical requirements and verification of constancy of performance. The common supports categorised as either Safety Related (SR) or Protection Important Class (PIC), shall also comply, with the requirements specified in the ITER Structural Design Code for Buildings (I-SDCB) – Part 2: Construction, section 15, Structural Steel Works (2E2U9X).

The Contractor shall bring to the attention of the IO any discrepancy between the approved drawings, procedures or specifications and the referenced codes and standards. Any possible differences of opinion concerning the interpretation of the requirements shall be considered by the IO and his interpretation shall be final.

None of the requirements of this specification shall exempt the Contractor from his responsibility to carry out, in addition to that stipulated herein, other analyses, tests, inspections or other activities which he considers necessary to ensure that the materials, design and workmanship are suitable for the intended service.

A Framework Contract will be used by IO to place the Task Order (TO) for the need of the manufacturing and installation of Common Supports. Each request will be contractualized through a Task Order (TO) to be placed by IO.

## 2. Scope of Supply and Work

### 2.1. Scope of Contract

This Framework Contract includes the Manufacturing, Delivery and Installation of the Common Supports per Batch/Area listed in Table 1 below. The weights per Batch given in the Table 1 are for cost estimation. Since the design is not yet finalized in some cases, the final weight of each batch and the schedule is subject to change and will be defined in each Task Requests to Task Orders. There may be additional supports added during the frame of the Contract.

The Cobalt content shall be provided in the Material Certificate 3.1 for common supports in the port cells.

Supports are generally fixed to anchor plates by welding, or by bolting to studs that have to be welded to the anchor plates with a stud welding gun. The Contractor shall have the capability to perform stud welding as this activity is part of the scope of the Contract. Alternatively the supports in some cases are fixed to the wall with post drill anchors (e.g. Hilti Anchors).

**Table 1 - Common support batches**

Task Order	Batch	Area	Mass (kg)	Material
Task Order 1	Batch 1	11 L1 PC Supports (9 supports) and 11 L2 PC Supports (8 supports)	2,429 L1 PC 2,102 L2 PC	Painted Carbon Steel
	Batch 2	11 L3 Gallery (1 support) and L1 PC Common Support (1 support)	5,896 L3 300 L1 PC (design ongoing)	Painted Carbon Steel
	Batch 3	11 L3 UPC (2 supports) and DTR (2 supports)	3,015 L3 UPC 465 DTR	Painted Carbon Steel
Task Order 2		11 L4 Common Support (1 support)	1,280 (design ongoing)	Painted Carbon Steel
Task Order 3		11 B1 PC Supports (6 supports)	1,400 (design ongoing)	Painted Carbon Steel (cobalt content under 0.05wt%)

The contractor will receive Task Requests, each of which will include the detailed information, bill of materials, drawings and additional requirements (if any) of related supports. The contractor shall review

the input information provided by Task Request and the specification for the completeness and consistency.

Then the contractor shall submit IO a Quotation for this Task Order in accordance with the Conditions and unit prices of the Framework Contract

Finally, the contractor will perform the work specified by the Task Order, which includes preparation of the shop drawings, procurement of requisite materials, workshop fabrication, inspection, testing, quality control, documentation, packaging, delivery to IO and installation along with all necessary certification and reports.

## **2.2. Works to be performed by Contractor**

The Scope of Work of the Contractor includes but not limited to:

1. Site Survey;
2. Supply of documentation (Refer to 11.4 Document Deliverables);
3. Supply as per Bill of Materials;
4. Qualification of welding procedures;
5. Supply and Manufacture of all required steel materials and components;
6. Transportation and delivery of structures to the IO site;
7. Additional structural elements necessary for the future installation and other lifting elements or transportation devices as defined by the Contractor;
8. The installation of the structures, welding, bolting, drilling and paint touch-up if any.

### 2.3. Limit of Scope and Responsibilities

The Contractor Scope of Work is defined as follows in the Section below. The cross identifies the entity in charge of the activity, being **C=Contractor, IO= ITER Organization, A=CMA**. The responsibilities listed below must be referred to in case of discrepancy or misalignment in the rest of the Contract Documentation.

#### 1.1.1 Contractor Staff Organization

Title and description	C	IO	A
Contractor's Project Management for Contractor's Works on Site and off Site,	X		
Contractor's On Site Engineering for Execution,	X		
Quality management of Contractor's works,	X		
Health and Safety management of Contractor's works,	X		
Site Coordination,			X
Supervision and Surveillance of the Works,		X	
Welding Qualification,	X		
Welders' Qualifications,	X		
NDT operator qualification	X		
All duties regarding Contractor employees mobilization and housing, insurance, fees, taxes, compensations,	X		

#### 1.1.2 Contractor Office Organisation

Title and description	C	IO	A
All consumables and IT tools,	X		
Lockers, showers and catering space for workers		X	

#### 1.1.3 Contractor On Site Area Organization

Title and description	C	IO	A
Dedicated Site area for Contractor storage and workshop		X	
Workshop, office and other temporary facilities in the storage area	X		
Temporary storage of materials handed over to the Contractor	X		
Storage of Contractor's equipment, tools and consumables	X		
Specific storage for dangerous products	X		
All networks needed at the dedicated Site area from the specified delivery points,	X		
Electricity to a single delivery point		X	
Raw water to a single delivery point		X	

Title and description	C	IO	A
Potable water	X		
Cleaning and restoring area at termination	X		

#### 1.1.4 Preparatory activities prior to installation

The principle of this Section is to specify that the Contractor is in charge of setting his installation works out, including all verifications to be done in-situ. The Contractor shall proactively prepare their works in close collaboration with CMA in order to anticipate any risks as early as possible.

The CMA in his role of Site Coordinator will be responsible to coordinate the Contractor's works in order to ensure the timely delivery of utilities, rooms, areas prior to the Contractor's start of works.

The Contractor scope of works, services and documentation is defined as follows:

Title and description	C	IO	A
Electricity at Site distribution boards nearby working areas,		X	
Electrical secondary networks and extensions after distribution boards,	X		
Potable water to a single delivery point,		X	
Demineralized water, when required,		X	
Compressed air, when required,		X	
All general lighting systems, except the specific, if needed,		X	
Additional local lighting for Contractor working area, as necessary,	X		
Scaffolding, upon Contractor's request		X	
Fire and safety guards in Contractor working area,	X		
Verification of conformity of embedded devices (sleeves, etc.),	X		
Verification of openings and equipment locations,	X		
Participation in Site inspection before area/room handover,	X		
Marking of positioning axes on foundation slabs,	X		
Survey implementation for equipment positioning,	X		
Ferro scanning before drilling,	X		
Equipment handling plan (lifting plan, routing, procedures),	X		
Specific detail analysis necessary for installation works activities,	X		
Temporary storage areas close to location of installation activities,	X		
Permit to work authorization,			X
Handover of rooms for equipment Installation works,			X

Title and description	C	IO	A
Ensuring availability of installation works areas and manage the hand over to the Contractor which shall include:			
• Embedded plates and sleeves,			X
• Conformance of equipment foundation slabs,			X
• Rooms provided in required cleanliness state and safe access,			X
• Monorails, overhead cranes,			X

### 1.1.5 Handling and Transportation

Title and description	C	IO	A
Transportation off Site:			
• From IO warehouse to the Contractor fabrication shop,	X		
• From Contractor's offsite workshop to delivery point,	X		
• From Contractor's suppliers to delivery point,	X		
Handling and lifting at the delivery point (unloading operations),	X		
Lifting crane for unloading at delivery point with the operator (through a dedicate framework contract and upon Contractor request),		X	
Handling equipment (Rollers, slings, hydraulic jack, etc.)	X		
Handling of the equipment from the delivery point to the final location,	X		
Lifting equipment (hoisting equipment, elevator, pallet truck, etc.) inside buildings,	X		

### 1.1.6 Fabrication, Assembly and Installation of Supports

The Contractor shall be responsible for the prefabrication, assembly and installation of support steel structures according to drawings issued by IO.

The prefabrication, assembly and erection shall be performed according this Technical Specification and applicable construction codes listed in Chapter 3.

The Contractor shall be responsible also of all preparatory works to be carried out before the final installation, including the installation of post drilled plates or anchor bolts when required.

Once prefabricated and the release note accepted by IO, the Contractor shall be responsible of the transportation from its premises up to the installation location.

Title and description	C	IO	A
– Preparation of Detail Design drawings		X	
– Preparation of workshop drawings	X		
– Procurement of standard steel shapes as per the relevant IO specification	X		
– Procurement of consumable materials as per the relevant IO specification	X		

Title and description	C	IO	A
– Procurement of plates, bolts, nuts, washers, ribs, shims, etc.	X		
– Verification of Embedded plates status and topographic survey of position	X		
– Procurement and installation of post drilled (when required / allowed) plates and anchor bolts	X		
– Ferro scanning prior to post drilling, drilling, and installation of anchors (when required / allowed)	X		
– Prefabrication of sub-assemblies to be installed at site, including welding, bending, cutting and all the required operations.	X		
– Non-destructive tests,	X		
– Release Note submission for IO approval	X		
– Transportation from Contractor workshop to site	X		
– Installation and assembly of sub – assemblies at site	X		
– Surface preparation and painting.	X		
– Finishing works touch up, painting (including touch up on Embedded Plate)	X		

### 1.1.7 Hot Work

Welding and cutting of some materials may generate hazardous gases.

Any kind of hot work like welding, grinding and cutting shall be kept to a minimum, and the work area must be isolated (cocooned) as necessary to prevent any dispersal of contamination to adjacent areas.

CMA will co-ordinate and issue hot work permits for activities on site upon request by the Contractor.

Title and description	C	IO	A
Global ventilation of the buildings (fresh air, extraction, conditioning where needed, etc.),		X	
Backing and shielding gas for welding	X		
Fume extraction for welding (mainly) and construction activities.		X	
Local filtration unit of the fume, exhaust, backing/shielding gas for welding	X		
All the equipment to segregate areas where high level of cleanliness or specific conditions is required. High level of cleanliness will be not applied to a full building level,		X	
Alarms in case of loss of ventilation,		X	
Portable gas detection and relevant PPE for the teams working in the Tokamak complex,	X		
The personal equipment and tools to work in the clean condition as specified in the technical specifications,	X		

### 3. Codes and Standards

	Doc reference number	Version	Title	Used	Description of the data taken from the document
[C-1]	Eurocode 0 NF EN 1990	December 2005	Eurocode - Basis of structural design	Yes	Load combinations
[C-2]	Eurocode 3 Part 1-1 NF EN 1993-1-1	May 2005	Design of steel structures Part 1-1: General rules and rules for buildings	Yes	Steel resistance and properties
[C-3]	Eurocode 3 Part 1-2 NF EN 1993-1-2	April 2005	Design of steel structures Part 1-2: General rules –Structural fire design	Yes	Steel resistance and properties
[C-4]	Eurocode 3 Part 1-8 NF EN 1993-1-8	May 2005	Design of steel structures Part 1-8: Design of Joints	Yes	Design of weld and bolted joints
[C-5]	NF EN 13480-2	December 2017	Metal industrial piping Part 2: Materials	Yes	Mechanical properties
[C-6]	NF EN 10025 Parts 1,2	August 2019	Hot rolled products of structural steels	Yes	Technical Delivery Requirements
[C-7]	NF EN 10162	2003	Cold rolled steel sections. Technical delivery conditions. Dimensional and cross-sectional tolerances	Yes	Technical Delivery Conditions and Dimensional&Tolerance Requirements
[C-8]	NF EN 10210 Parts 1,2	2007	Hot finished structural hollow sections of non-alloy and fine grain steels	Yes	Technical Delivery Conditions and Dimensional &Tolerance Requirements
[C-9]	NF EN 10219 Parts 1,2	2006	Cold formed welded structural hollow sections of non-alloy and fine grain steels	Yes	Technical Delivery Conditions and Dimensional&Tolerance Requirements
[C-10]	NF EN 10088 Part 1, 2, 3	December 2014	Stainless steels. Part 1 - List of stainless steel. Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes. Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire sections and bright products of corrosion resisting steels for general purposes	Yes	Technical Delivery Conditions
[C-11]	NF EN 20898 Parts 1-2,7	1995	Mechanical properties of fasteners: Bolts, screws and studs. Part 1 - Bolts, screws and studs. Part 2 - Nuts with specified proof load values. Coarse thread. Part 7 - Torsional test and minimum torques for bolts and screws with nominal diameters 1 mm to 10 mm.	Yes	Rules for fasteners
[C-12]	EN ISO 898-1	2009	Mechanical properties of fasteners made of carbon steel and alloy steel	Yes	Mechanical properties of bolts
[C-13]	EN ISO 4032	December 2012	Hexagon regular nuts – Product grades A and B	Yes	Geometry of nuts
[C-14]	EN ISO 7089	June 2000	Plain washers – Normal series – Product grade A	Yes	Geometry of washers
[C-15]	NF EN 10204	Janvier 2005	Metallic products: Types of inspection documents	Yes	Inspections

	Doc reference number	Version	Title	Used	Description of the data taken from the document
[C-16]	NF EN 1090 Parts 1,2	2011	Execution of steel structures and aluminium structures. Part 1 - Requirements for conformity assessment of structural components. Part 2 - Technical requirements for steel structures.	Yes	Execution verification of steel structures
[C-17]	NF EN 1011 Parts 1-3	2009	Welding. Recommendations for welding of metallic materials. Part 1 - General guidance for arc welding. Part 2 - Arc welding of ferritic steels. Part 3 - Arc welding of stainless steel.	Yes	Welding recommendations
[C-18]	NF EN ISO 15614 Parts 1,7,8,11,12,13,14	2018	Specification and qualification of welding procedures for metallic materials - Welding procedure test. Part 1 - Arc and gas welding of steels and arc welding of nickel and nickel alloys	Yes	Qualification of welding procedures
[C-19]	NF EN ISO 3834	2006	Quality requirements for fusion welding of metallic materials	Yes	Qualification of welding procedures
[C-20]	NF EN ISO 9692 Parts 1, 2	2014	Welding and allied processes - Types of joint preparation - Part 1 - Manual metal arc welding, gas-shielded metal arc welding, gas welding, TIG welding and beam welding of steels. Part 2 - Submerged arc welding of steels.	Yes	Preparation of joints for welding
[C-21]	NF EN ISO 15609-1	2020	Specification and qualification of welding procedures for metallic materials - Welding procedure specification - Part 1: Arc welding	Yes	Welding specification
[C-22]	NF EN ISO 9606-1		Qualification testing of welders - Fusion welding - Part 1: Steels	Yes	Welders qualification
[C-23]	NF EN 10160	1999	Ultrasonic testing of steel flat product of thickness equal or greater than 6 mm	Yes	Ultrasonic testing methodology
[C-24]	NF EN 10306	2002	Iron and steel. Ultrasonic testing of H beams with parallel flanges and IPE beams	Yes	Ultrasonic testing H beams
[C-25]	NF EN 10308	2002	Non-destructive testing. Ultrasonic testing of steel bars	Yes	Ultrasonic testing steel bars
[C-26]	NF EN ISO 1461	2009	Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods	Yes	Galvanized Coatings
[C-27]	NF EN ISO 8501 Parts 1, 2	2012	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness. Part 1 - Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings. Part 2 - Preparation grades of previously coated steel substrates after localized removal of previous coatings.	Yes	Surface Cleaning
[C-28]	NF EN ISO 8503-2	2012	Preparation of steel substrates before application of paints and related products. Surface roughness characteristics of blast-cleaned steel substrates. Part 2 - Method for the grading of surface profile of abrasive blast-cleaned steel. Comparator procedure	Yes	Surface Cleaning

	<b>Doc reference number</b>	<b>Version</b>	<b>Title</b>	<b>Used</b>	<b>Description of the data taken from the document</b>
[C-29]	NF EN ISO 12944	2018	Paints and varnishes. Corrosion protection of steel structures by protective paint systems	Yes	Painting
[C-30]	NF EN ISO 2808	2019	Paints and varnishes. Determination of film thickness	Yes	Painting
[C-31]	NF EN 13381-4	2013	Test methods for determining the contribution to the fire resistance of structural members. Applied reactive protection to steel members	Yes	Fire protection

## 4. Contract Applicable Documentation

The overall Scope of Work description and Technical Specification is defined by this document and by the documentation including all procedures, lists of equipment, drawings or any other document listed below and in the List of Applicable Documents (LAD) of each Task Request.

In general, the LAD shall include all IO Documents and provisions necessary for the Tenderers to price the works of the Task Request. Documentation includes general rules, procedures, requirements and descriptive documents valid for all ITER Installation Contractors that must be followed by the Contractor. These also provide site coordination rules.

Important note for ref. [14], CMA are only responsible for site coordination in this scope. They will not perform supervision of works.

- [1] Order dated 7 February 2012 relating to the general technical regulations applicable to INB – EN ([ITER\\_D\\_7M2YKF\\_v1.7](#))
- [2] [ITER\\_D\\_22MFMW](#) v4.0 - Requirements for Producing a Quality Plan
- [3] [ITER\\_D\\_22MDZD](#) v3.7 - Requirements for Producing an Inspection Plan
- [4] [ITER\\_D\\_22F53X](#) v8.2 - Procedure for management of Nonconformities
- [5] [ITER\\_D\\_VYJ7U2](#) v1.3- Procedure for Labelling on Physical Items
- [6] [ITER\\_D\\_22F52F](#) v5.0 - Requirements for Producing a Contractors Release Note
- [7] [ITER\\_D\\_QVEKNQ](#) v3.1 - Release Note Template
- [8] [ITER\\_D\\_WZPYVZ](#) v2.3- Delivery Report Template
- [9] [ITER\\_D\\_XBZLNG](#) v1.1- Package & Packing List Template
- [10] [ITER\\_D\\_UKQG8M](#) v1.5 - Work Instruction for Producing of the Manufacturing and Inspection Plan
- [11] [ITER\\_D\\_SBSTBM](#) - Provisions for Implementation of the Generic Safety Requirements by the External Actors/Interveners
- [12] [ITER\\_D\\_2LZJHB](#) - Procedure for the management of Deviation Request
- [13] [ITER\\_D\\_YUDA68](#) – Recommendations for Welding on Embedded Plates
- [14] [ITER\\_D\\_TYLAQ9](#) v4.1 - Specification\_CMA\_General Management Specification for Contractors
- [15] [ITER\\_D\\_RWWAX3](#) v2.0 - ITER Common Site Rules for Construction Site Organization : Contractors Work Handbook
- [16] [ITER\\_D\\_WN4M65](#) v3.0 - Procedure\_CMA\_Foreign Material Exclusion - Deliverable 8.38
- [17] [ITER\\_D\\_U4FKA5](#) v1.5 - Annex 2 - List of PIA for Construction
- [18] [ITER\\_D\\_4LXE4R](#) v1.2 - List of Applicable Documents

## 5. Steel Structure Requirements

### 5.1. Material Type and Grade

Material grade is defined in the applicable drawings and associated Bill of Materials (BOM) for each Task Request. Material type is defined in Section 2.

Material used shall comply with the Technical Delivery Requirements of the European Codes: NF EN 10025-2 for hot rolled steel structures, NF EN 10162 for cold rolled sections and NF EN 10210 or NF EN 10219 for hot finished or cold formed welded structural hollow sections.

The minimum steel quality to be used is JR.

All materials to be used shall be supplied with the testing and inspection according to their manufacturing method. Steel structures, made of materials which have not undergone minimum tension resistance testing, are not allowed.

All material shall be halogen free.

## **5.2. Execution Class and Quality Class**

Supports have different quality class, seismic class or safety class depending on function or location. This is defined in the associated BOM.

As per NF EN 1090, supports with seismic (SC2/SC1) or safety requirements (SR/PIC) shall be EXC3. The rest shall be EXC2.

## **5.3. Manufacturing and Installation Requirements**

The common supports shall be manufactured and installed in accordance with the European Codes, NF EN 1090-1 and NF EN 1090-2. All measurements established in the applicable paragraphs for shaping, adjustment, alignment, weld qualification, marking, weld examination and repairs, heat treatment, etc., must be taken into consideration.

All steel products for use in the common supports shall have been specifically tested in accordance with the appropriate material product standard.

The product manufacturer shall declare the testing results using an inspection certificate based on NF EN 10204. The Contractor shall have access to the inspection documents to NF EN 10204 provided by the manufacturers of all steel products used in the Works. The Contractor shall make these inspection documents available to the IO.

Cutting and shaping of steel may be carried out by sawing, shearing, cropping, thermal cutting, nibbling, planning or machining.

Local extraction shall be used for any welding, drilling or cutting operations on site to avoid contamination of the area and measures shall be taken for foreign material exclusion (FME) [16].

### **1.1.8 Sharp Edges**

Angle points and sharp edges shall be rounded and chamfered, drill holes shall be countersunk and the edges bevelled, and exposed sharp corners and edges shall be rounded or chamfered.

### **1.1.9 Forming**

Heat treatment is required after forming unless tests demonstrate otherwise. Stabilizing heat treatment or normalizing treatment shall be required when non-alloyed steels are formed hot or their elongation after cold forming exceeds 5%.

The tools used to form austenitic stainless steel materials shall not be a source of contamination (cleaning or degreasing) or ferritic incrustations. The Contractor shall take precautions to overcome these risks (use of stainless steel tools, protective paper or coating, etc.)

For cold folded parts, the minimum folding radius shall comply with the values given in the standards for the material in question.

### **1.1.10 Dimensions and Tolerances**

Manufacturing dimensions and tolerances shall comply with NF EN 1090. Specific tolerances, where needed, for installation or manufacture are given on the applicable drawings.

During installation the maximum displacement of the centre line of any common support profile from the established centre line in the design shall be no more than 20 mm at any point in the total height of the column.

The maximum inclination of each common support vertical/horizontal profile shall be within  $L/700$  (0.14%) and 15 mm, with L being the total length of the member in mm.

The attachment position tolerance with respect to the anchor settled point on the fastening system (embedded plate, post drilled plate, etc.) shall be  $\pm 20$  mm unless otherwise specified on the execution drawings, taking care to allow enough distance between the attachment weld and anchor bolt washer, when anchor bolts design applies. In cases that tolerances are not achievable due to the as-built location of the embedded plate, this shall be notified to the IO.

### **1.1.11 Marking**

Individual pieces shall be capable of being positively identified at all stages of fabrication. Completed components shall be marked with a durable and distinguishing erection mark in such a way as not to damage the material.

Every component which is to be individually assembled or erected shall be allocated an erection mark. Components which are nominally identical in all respects may have the same erection mark.

### **1.1.12 Welding**

Qualification of the welding process shall follow recommendation from NF EN 1011 and satisfy the requirements of NF EN ISO 15614 and NF EN ISO 3834.

Qualification and performance of stud welding shall comply with EN ISO 14555.

Welders must be certified to manufacture EXC3 components. A welding coordinator must be appointed and is responsible for overseeing welding operations.

The Contractor shall ensure that materials to be welded are compatible with the welding procedure being used.

The welding connection parts to an assembly shall have the same strength as the parts. Welds connecting the common support to building structures via fastening systems (embedded plates, post drill plates, etc.) shall have the same strength as the common support. The finished surfaces of the weld shall be free of impurities, undercut, slag and spatter.

All field welds shall be clearly identified and meet the minimum weld thickness requirements taking into consideration the thickness of the common support or the fastening system (embedded plates, post drill plates, etc.). When the fastening system thickness is less than required for the weld, the IO shall be notified.

Joints shall be prepared in accordance with NF EN ISO 9692-1 and NF EN ISO 9692-2.

Welders shall be tested to meet the requirements of NF EN ISO 9606-1.

Written welding procedure specifications shall be available in accordance with NF EN ISO 15609-1, and tested in accordance with NF EN ISO 15614-1 [C-18] by the Contractor. They shall comply with the guidance of NF EN 1011-2.

Local extractors shall be used during welding operations in Tokamak Complex.

As described in [13], temperature on the concrete induced by welding operation shall remain:

- Below 200°C for long term situation and uniform distribution of the temperature below the plate: long welding operations (welding requiring long pre-heating (more than 1 hour), welding of massive elements...), plate supporting vibrating equipment or cyclic effort, and/or high preheating temperature (above 100°C).
- Below 270°C, for other cases (short term situation and local elevation of temperature).

The Contractor shall demonstrate how this is taken into account through procedures or WPS.

### **1.1.13 Bolting**

Bolting shall fulfil the requirements of NF EN 1090-2. Torque is defined on applicable drawings.

The Contractor shall make declarations of conformity provided by suppliers of structural fasteners available to the IO, if requested.

Ordinary bolts shall conform to standards NF EN 20898-2 and NF EN ISO 898-1.

The bolted joints shall be made in accordance with standard NF EN 1090-2.

Tightening the bolts will be done by application of torque using a torque wrench set to the specifications of standard NF EN 1090-2, or by controlled rotation of the head of the nut after applying stress due to the torque defined in that standard.

### **1.1.14 Protective Treatment**

#### **1.1.14.1 Surface Preparation**

Subsequent to manufacture, the elements comprising the component supports shall be cleaned to eliminate any contaminants such as dirt, oil residues, metal particles, weld spatter, carbon deposits, incrustations, abrasives, etc.

The surface conditions requirement shall be according NF EN 1090-2.

At the time of coating the surface cleanliness of the steelwork to be coated shall be in accordance with NF EN ISO 8501-1. The minimum standard preparation grade shall be Sa 2 ½. The surface profile of the steelwork to be coated shall be compatible with the coating to be applied in accordance with NF EN ISO 8503-2.

#### **1.1.14.2 Protective Treatment**

Coating of stainless steel surfaces is not permitted.

Threaded connections shall be protected with electro-galvanizing instead of paint. Galvanizing shall be carried out in accordance with NF EN ISO 1461.

Where non-stainless steel for the common support structure requires painting or varnishing for corrosion protection, this shall be in accordance with NF EN ISO 12944. The internal environment category is C2 and the durability requirement is High (H). Paint used in this contract shall be PIC100 qualified.

Where an intumescent coating is specified for a common support, this shall be in accordance with NF EN 1993-1-2 and NF EN 13381-4. Fire insulation shall, additionally, prevent minimum temperatures of the common supports from falling below -20°C in accidental conditions.

The Contractor shall check the thickness of each coat during application using a wet film thickness wheel or comb in accordance with NF EN ISO 2808.

Painting and coating materials shall be halogen-free.

The procedures for the transportation, handling and storage of coated steelwork shall be arranged to minimize the risk of damage to the coating.

The Contractor shall repair any damage to protective treatment.

#### **1.1.14.3 Environmental Conditions**

Surfaces should be clean, dust free and unaffected by moisture or frost. Steel temperature shall be at least 3°C above the dew point, with conditions being stable or improving. Temperature shall not be so high as to cause blistering or wrinkling of the coating. Relative humidity shall be less than 85%.

## **6. Site Constraints**

Final location of the anchor settled points, fastening systems (embedded plates, post drill plates, etc.) may be modified, during construction, with to respect the locations defined in the execution drawings. To avoid misalignments and to consider any discrepancy that may occur due to the real location of the anchor settled points, the Contractor shall comply with the following requirements and consider them previously to the final manufacturing:

- Embedded Plates survey is to be done by the Contractor to avoid misalignments based on the real position of the embedded plates;
- Post drilled plates require a ferrosan of the area to be drilled to verify the position proposed in the execution drawings. Post drilled plates are to be installed following requirements from the code NF EN 1090-2;
- Site inspection is to be done by the Contractor to consider possible erection restrictions that may prevent the common support to be installed in just one piece or base on the field welds recommended in the execution drawings.

The Contractor shall apply the rules strictly according to the requirements in GMS [14] and Contractors Work Handbook [15]. These rules include aspects such as general Site management, construction organisation, health and safety coordination, access control, subcontractor acceptance management etc.

Note, CMA are only responsible for site coordination in this scope. They will not perform supervision of works.

Care shall be taken to not contaminate or damage other components, for example carbon steel contact with stainless steel shall be avoided.

Any damage caused to the building (concrete cracks, paint discolouration, dirt etc.) shall be corrected by the Contractor at their own cost prior to handover of supports to the IO.

## **7. Inspections**

### **7.1. Dimensional Inspection**

Inspections of the erected structure shall comply with the requirements of NF EN 1090-2. All the common supports shall be the subject of dimensional inspections based on a drawing indicating the tolerances to be complied with (dimension, perpendicularity and parallelism).

### **7.2. Weld Inspection**

A preliminary examination shall ensure that the welding area shall be free from any product that could prevent full and complete examination or interpretation of the results.

The welding inspection methods and acceptance criteria shall be carried out following NF EN 1090-2. The examiner shall verify that the welding procedure qualification records are in accordance with NF EN ISO 15614-1.

100% of welds shall be visually examined over their full length. Supplementary NDT must be carried out as detailed in Table 1. If necessary, any additional NDT shall be communicated to the contractor and will be detailed in the applicable documents of the Task Request for specific welds.

In accordance with EN 12062, with the exception of visual inspection, selection of NDT method must be done by personnel qualified to level 3, and carried out by personnel qualified according to level 2, as defined in EN 473.

Table 1 – Percentage of NDT to be performed

Weld Type	EXC2 (non PIC/NSC)			EXC3 (SIC/SC2/SC1)		
	VT%	RT/UT%	PT/MT%	VT%	RT/UT%	PT/MT%
<b>Fillet (a&lt;12mm)</b>	100	0	0	100	0	5
<b>Butt Weld T-joint</b>	100	10	0	100	20	0
<b>Butt Weld Cruciform joint</b>	100	10	0	100	20	0
<b>Butt Weld end to end joint</b>	100	10	0	100	20	0

### 7.3. Defects

The following defects are not acceptable in the support structure, including welds and fasteners:

- Cracks;
- Blisters or inclusions on the surface;
- Bubbling;
- Lack of penetration longer than 10 mm; two defects shall be regarded as forming a single defect if the distance which separates them is less than six times the shortest length;
- Lack of penetration whose cumulated length exceeds 20 mm per weld;
- Undercuts more than 0.5 mm deep;
- Undercuts longer than 20 mm, two defects shall be regarded as forming a single defect if the distance which separates them is less than six times the shortest length.

## 8. Packaging and Handling

Prior to transportation, the Contractor shall prepare:

1. Contractor's Release Note in accordance with [6];
2. Delivery Report in accordance with [8], stating at a minimum:
  - a. The packaging date,
  - b. Reference to Contractor's Release Note,
  - c. Details of the storage and preservation requirements,
  - d. Detailed packing list,
  - e. The full address of the place of delivery and the person responsible to receive the package, and the sender's name and full address,
  - f. The number and type of components contained in the package,
  - g. The enclosed documentation,
  - h. The declaration of integrity of the package prior to shipping,
  - i. The declaration of integrity of the components prior to shipping.

Any additional relevant information on the status of the components. All documentation shall be in English with the International System of Units.

Common support set must be suitably packed to protect them from possible contamination, damage or loss during transport and storage. Contact with any halogens shall be avoided.

All bright metal parts shall be covered before shipment with an approved protective compound and protected adequately during shipment to site. After erection these parts shall be cleaned with an appropriate solvent and polished bright where required. The IO shall have the correct information relating to the necessary removal of solvents required for the protective compounds applied in order to protect the common supports during shipment and storage. These solvents shall be both non-toxic and non-flammable.

Each common support set shall be packed separately.

Small components shall be put into bags, packets or other protective receptacles and placed in the package of the associated set to prevent their deterioration or possible loss.

All packages shall be marked on two opposite sides and on the top, using fade proof, waterproof and salt proof black ink and at least with the following information:

- Client;
- Contract;
- Support number;
- Purchase order number;
- Handling instructions (position for shipment and storage, position of center of gravity, fragile, keep dry, etc);
- Special instructions (inspection, storage, unpacking restrictions, etc);
- Gross weight of each package;
- Net weight of each package;
- Package number and total number of packages;

- Made in;
- Addressee and sender address.

Together with the purchase order, the Contractor will be provided with the Instructions for the Identification and Shipment of Merchandise.

## **9. Shipping, Transportation and Delivery to the ITER Site**

The procedures for and means of transporting, loading and unloading packages shall be consistent with the packing procedures employed. Their structural resistance shall be certified as sufficient to support the loads imposed during transport, loading and unloading.

Instructions shall be prepared for all items that require special handling and shall give weights, sling locations, balance points and other pertinent features to be considered as necessary for safe handling.

Before the shipment, the Release Note shall be approved by IO.

Upon receipt of the package, the IO shall open the package and make a visual inspection to check:

- The integrity of the package, including identifying visible damage;
- The number and type of components contained in the shipment;
- The enclosed documentation;
- The integrity of the components.

In case of anomalies the IO shall make any additional relevant remark on the inspection. A decision on acceptance of the delivery of the components will be made by the IO. If the components are in acceptable condition, the IO will sign the Delivery Report. The signature of Delivery Reports is an IO hold point. The original of the Delivery Report shall be kept by the IO and a copy of it shall be kept by the Contractor.

Declaration of conformity to be signed by the Contractor and enclosed with Packing List.

The Contractor shall deliver the structural material with incoterm 2020 DAP, IO site St Paul les Durance.

## 10. Safety Requirements

In order to satisfy the requirements of the INB Order 7<sup>th</sup> February 2012 [1], the Contractor and its suppliers must implement the generic safety requirements defined in Provisions for Implementation of the Generic Safety Requirements by the External Interveners see [11].

Some of the supports under the scope of this specification are classified Protection Important Components (PIC). Their defined requirements are identified in the Nuclear Safety Control Plans. Activities related to the manufacture, testing, cleaning, packaging, delivery and installation that can affect the final performance of the support is identified as a Protection Important Activity (PIA). Non PIC supports also have some PIA as failure in their structural integrity could impact a PIC component. PIA for construction are defined in [17].

PIA in manufacture and installation includes the following (this list may not be exhaustive depending on manufacturing/installation methods chosen, more details given in the Nuclear Safety Control Plans):

- Raw material procurement;
- Welding of supports (PIC and non PIC);
- Surface treatment (cleaning/painting);
- Handling and Packing;
- Shipping, delivery to site;
- Welding to Embedded Plates (PIC and non PIC);
- Bolting;
- Drilling of concrete;
- Installation of anchor bolts;
- Painting touch up.

The contractor shall prepare a Quality Compliance Record (QCR). The QCR shall define how the Defined Requirements are taken into account for manufacturing and installation. The defined requirements for this scope are listed in the table below:

1. Contractor procedures and specifications affecting PIC SSC shall identify Protection Important Activities (PIA) and be reviewed by the IO and accepted/approved before use
2. The Contractor shall ensure the propagation of these Manufacturing and Installation Defined Requirements to its staff and sub-contractors
3. The Contractor shall make the work area available for inspection to confirm compliance
4. The manufacture and installation of PIC SSCs shall be performed according to approved procedures and/or specification which specifies:
  - a) Manufacturing and installation procedures
  - b) Suitably Qualified and Experienced Personnel (SQEP)
  - c) Certified materials
  - d) Accepted/qualified tools and equipment
  - e) Methods for reporting in-field changes, deviations and non-conformities
  - f) Required testing and inspection (e.g. Inspection and Test Plan)

- g) Contents of an “Installation Package” to be produced at completion
  - h) ITER work site procedures and/or specifications which must be followed
  - i) Transportation/movement requirements
  - j) Storage and preservation requirements
  - k) ESPN equipment, a risk analysis (identifies and mitigates factors which could result in equipment degradation)
5. The manufacture and installation of PIC and non-PIC SSCs shall be performed according to approved procedures and/or specification when there is an attachment or connection to a PIC SSC
  6. The manufacture and installation of PIC and non-PIC SSCs shall be performed without causing damage to PIC SSCs. Damage caused to and defects found in PIC SSCs shall be reported according to approved procedures and/or specification.

Under the INB Order contractors and subcontractors must be informed that:

- The INB Order applies to all protection important components and the protection important activities,
- Compliance with the INB Order must be demonstrated in the chain of external Contractors. This shall be shown in the quality Plan, including supervision of subcontractors.

In application of article II.2.5.4 of the INB Order, the Nuclear Operator (IO) shall undertake surveillance of activities undertaken by external interveners (the Contractor and its subcontractors). The Contractor shall perform supervision on activities of their subcontractors.

The above requirements shall be implemented via the MIP and ITP.

For the purpose of performing surveillance, the Contractor shall grant representatives of the IO, ASN, NB and the French Nuclear Regulator (ASN) access to its facilities, relevant records and to those of its subcontractors at all stages of the contract, Moreover the IO reserves the right to take photographs of the test equipment and apparatus during the Contract life. The surveillance shall include follow-up and verification of any corrective actions that are to be implemented in line with Provisions for Implementation of the Generic Safety Requirements by the External Intervenors see [11].

For the PIA, the Contractor shall ensure that a specific management system is implemented by any subcontractor. This system will be included in the MIP, ITP or Quality Plan.

The MIP and ITP shall contain a dedicated column PIA to be identified by tag yes/no for each task. Each PIA must also have a step dedicated to Technical Control.

These documents shall be submitted for review and approval to the IO prior to the start of fabrication/installation.

## **11. Contract Management**

The Contractor shall designate a Contract Responsible Officer within five (5) working days after award of Contract who will be responsible for the manufacture, installation, factory testing, performance testing, schedule, cost control and dispute resolution. The Contractor shall also identify specific individuals responsible for each aspect of the Work.

### **11.1. Project Kick-off Meeting**

The Contractor shall participate in a Project Kick-off Meeting (KoM). The KoM shall be scheduled at a mutually agreeable time as soon as practical after the signature of the Contract, but not before the Draft Schedule and Draft Quality Plan are submitted by the project manager to the IO representative.

### **11.2. Contractor's reporting**

The Contractor will provide a Monthly Report one working week before the end of each month on the progress of the different tasks, subtasks and the related Deliverables at the cut-off date of the middle of the month. This report shall contain a summary of the activities performed and items accomplished in the 30 last days and 30 days look ahead, percentage of accomplishment per activity and per Deliverable, update of risks issues and concerns, as well as required IO input data that may have impact in current or following activities.

### **11.3. Control Points**

The IO shall ensure a close oversight of the production of its main contractors and subcontractors in accordance with approved MIP and ITPs.

This monitoring shall include Control Points at critical steps in the Contractor's plans. The control points shall be integrated into the agreed schedule.

A Notification Point (NP) is a milestone where the Contractor is required to notify the IO that it has completed a specific task and is proceeding to the next task. A NP shall not affect the production flow of the Contractor that shall continue the work even without a reply from the IO.

A Hold Point (HP) is a milestone where the Contractor is required to notify the IO that it has completed a specific task and must stop the associated processes until a HP clearance is issued.

### **11.4. Document Deliverables**

The Contractor shall be responsible for Submitting all the required documentation for the IO's approval, through IO's Document Management System (hereafter called IDM) in accordance with the validation circuit defined hereinafter.

The Contractor's Responsible Officer will be given access to the Document Exchange area in IDM. The folder structure and the access is an IO responsibility.

The Contractor shall submit its documents in version 01.0 into IDM. The documents will be identified "For approval" or "For information".

In parallel, the Contractor shall send a message (e-mail or IDM message) to the IO representatives involved in the validation circuit in accordance with the distribution list provided by the IO. This message will inform relevant recipients that documents have been uploaded.

The IO review of the document shall begin after the notification done by the Contractor.

The IO will have five (5) working days from the receipt of Contractor's Documents to review, comment on and/or approve/accept them.

If the document is requested for revision or disapproved, the Contractor shall have 5 (five) working days to update the document according to these comments and to re-submit it in updated version for approval following the circuit described above.

The Contractor shall incorporate changes as required by comments on the document. The Contractor shall provide a Resolution Sheet including brief descriptions in line item letter form on how each IO comment was resolved. Corrected documents shall be resubmitted to IO for

review as specified on the document transmittal form. All revisions shall be clearly indicated on the document and the document number and control log shall be updated.

1. Quality Plan (including Quality Plan for any subcontractors);
2. Manufacturing and Installation Schedule;
3. List of applicable documents;
4. Environmental Plan (PRE)/Health and Safety Plan (PPSPS);
5. List of subcontractors;
6. Subcontractor Acceptance Form (SAF), including a SAF for any subcontractors;
7. List of services and utilities to be provided by IO for Contractor works;
8. Quality Compliance Record (refer to Chapter 10 - Safety Requirements);
9. Manufacturing and Inspection Plan (MIP);
10. Inspection and Test Plan (ITP);
11. Installation Method Statement;
12. Lifting/Handling Plan;
13. Welding book that should include the following:
  - a. List of required code and specification;
  - b. Welding map and welding list;
  - c. Management control plan before, during and after welding;
  - d. WPS, PQR, WQTR;
14. NDT procedures to be accepted by IO;
15. Any other applicable procedures (painting, handling, storage etc.);
16. Monthly Progress Report (refer to Chapter 11.2 - Contractor's reporting);
17. 3 weeks look-ahead schedule;
18. Health and Safety monthly report;
19. Reports and Certificates as requested;
20. Risks register;
21. Final Documentation Package, including as-built records (At End of Manufacturing and at End of Erection), including for example (see Chapter 14 Acceptance Criteria Prior to Delivery for more details)
  - a. Material certificates (base and filler material);
  - b. Material test reports;
  - c. Certificates of Conformity;
  - d. Calibration report of the welding equipment;
  - e. Report of the visual inspection and further NDT;
  - f. Report of the repairs (as applicable);
  - g. Actual dimensions of cuts;

h. Etc.

## **12. Quality Assurance (QA) Requirements**

The Contractor shall either have an ISO 9001 accredited quality system, or an ITER approved QA program.

The Contractor shall establish and implement a dedicated quality assurance system equivalent to this ITER Quality Assurance Program, with basic elements included in the Contract which may include the requirements for Quality Plan, Inspection Plan, Deviations & Non-Conformities and Release Note.

Prior to commencement of work under this Specification, a “Quality Plan” must be submitted for the IO review and approval giving evidence of the above and describing the organisation for this work; the skill of workers involved; any anticipated subcontractors; and giving details of who will be the independent checker of the activities. The Quality Plan shall be produced in accordance with [2].

### **12.1. Non-Conformance and Deviation Requests**

Non-conformities shall follow the procedure detailed in the IO document [4].

Non-conforming conditions shall be promptly reported to the IO as per the requirements of [4] upon identification of the non-conforming condition. No further work shall be performed until the IO provides approval of the proposed resolution.

Deviations shall follow the procedure detailed in the IO document [12].

The Contractor shall demonstrate that materials or subcomponents to be incorporated into the initial product are controlled and resources are checked to prevent the inclusion of Counterfeit, Suspect and Fraudulent items (CSFIs) in the manufacturing chain. The Contractor shall also demonstrate how requirements are transmitted to and controlled by sub-suppliers.

### **12.2. Traceability**

The Contractor shall have traceability procedures in place that can guarantee traceability between materials delivered and the EN10204 certificate. Procedures shall be submitted to and approved by the IO prior to that start of manufacturing operations.

Traceability can be maintained by procedural methods that cover receipt, identification, storage, transfer to production, temporary storage, and use in production. The correct inspection documents shall be made available at the final inspection.

The Contractor shall establish and maintain procedures for identifying the material by suitable means from receipt through production.

### **12.3. Audits**

The IO and French regulator (for PIC) reserves the right to conduct announced or unannounced inspections and audits, at the Contractor’s facilities to verify conformance of the work being performed to the requirements of the supply order and this Specification. The ANB shall have free access to perform any inspections there that it deems necessary to check compliance of the requirements stemming from the risk analysis or as applicable that the Contractor properly meets the obligations of the approved quality system.

Both Contractor and its subcontractors are subject to such inspections and audits. No proprietary processes or information shall inhibit the IO, ANB, or other official party from performing its audit or inspection function. The IO, ANB, and French regulator exercise of, or failure to exercise

this right to inspect or witness shall not relieve the Contractor of its obligation to comply with the terms and conditions of the supply order.

### **13. Responsibilities**

The IO and Contractor shall each nominate a representative who shall be responsible for all matters relating to the execution and implementation of this Contract.

## 14. Acceptance Criteria Prior to Delivery

The IO will perform inspections following installation to check:

- The installed quantities according to the BOM;
- The material certificates;
- The NDT of any welds performed during the manufacturing and installation process;
- The torque of any bolts;
- All requirements in this Specification are met;
- The End of Manufacturing report with as-built documentation;

At the end of the reviews and inspection, IO will sign the handover documentation.

All documentation related to the scope of work defined therein shall be provided to IO at the end of work in the package, including information related to the mock-up activities.

As minimum Contractor shall provide following (end of manufacturing and end of erection report):

- Quality Plans;
- ITP/MIPs, completed and closed;
- As-built drawings as applicable;
- Weld Visual Inspection reports;
- Weld Maps and logs as applicable;
- 3.1 Material inspection reports to EN 10204 including mechanical tests as specified in IO Technical Specification;
- Welding Procedure Specification (WPS);
- Welding Procedure Qualification Record (WPQR);
- Welder and Welding Operators Qualification (WQ) or Welder Qualification Test Record (WQTR);
- Non destructive examination readings and reports;
- Final Installation Completion Inspection report;
- Certification of fabrication and installation by Contractor as having met all the requirements of this specification.

## 15. Schedule

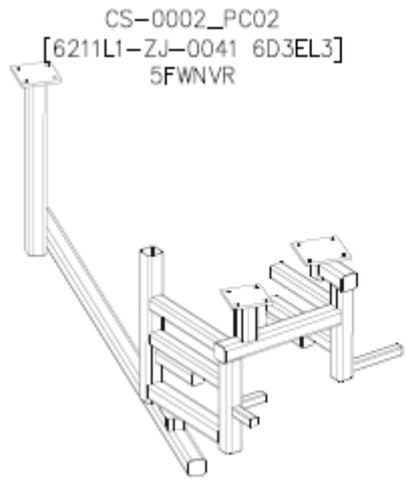
The individual Task Order(s) will be launched, depending on the completeness of the design of each batch (Table 1), after the framework contract is signed. The final duration of each Task Order will be defined in the corresponding Task Order.

The Contractor shall comply with the durations specified in the Task Order however the Contractor shall be capable of manufacturing each task order within three months from Task Order signature to delivery on site.

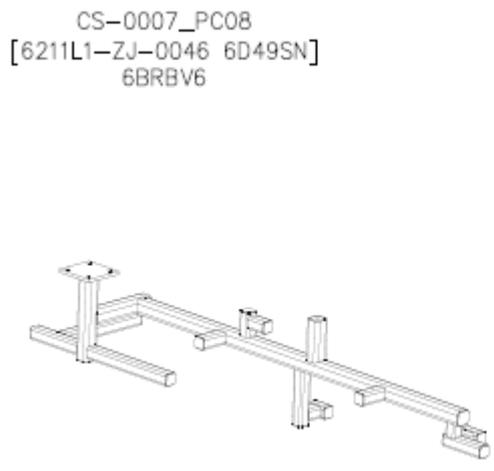
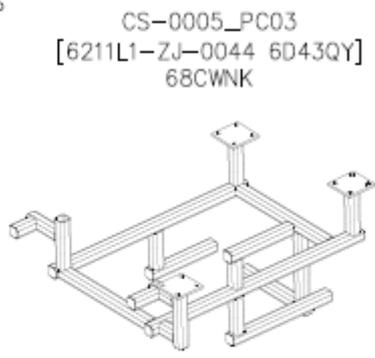
Below is a provisional forecast of the Task Orders:

Batch	Area	Estimated Mass (kg)	Material	Manufacturing End Date	Installation End Date
Task Order 1 Batch 1	11 L1 PC Supports (9 supports) and 11 L2 PC Supports (8 supports)	2,429 L1 PC 2,102 L2 PC	Painted Carbon Steel	January 2024	July 2024
Task Order 1 Batch 2	11 L3 Gallery (1 support) and L1 PC Common Support (1 support)	5,896 L3 300 L1 PC (design ongoing)	Painted Carbon Steel	February 2024	August 2024
Task Order 1 Batch 3	11 L3 UPC (2 supports) and DTR (2 supports)	3,015 L3 UPC 465 DTR	Painted Carbon Steel	February 2024	July 2024
Task Order 2	11 L4 Common Support (1 support)	1,280 (design ongoing)	Painted Carbon Steel	March 2024	August 2024
Task Order 3	11 B1 PC Supports (6 supports)	1,400 (design ongoing)	Painted Carbon Steel or Stainless Steel (cobalt content under 0.05wt%)	August 2024	June 2025

## 16. Appendix – Example of Supports



ISO VIEWS



ISO VIEWS

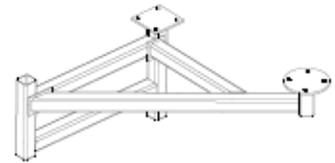
CS-0001\_PC02  
6211L2-ZJ-0059 6KX5D4  
5MW22W



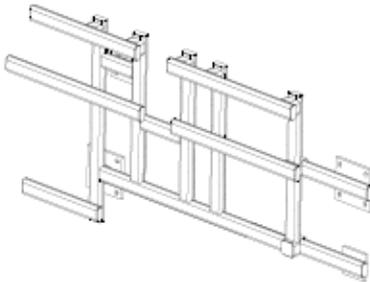
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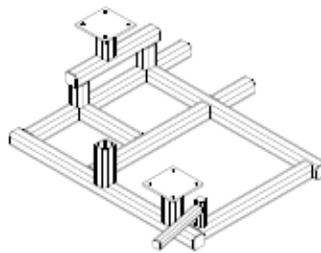
CS-0003\_PC14  
6211L2-ZJ-0061 6KXJTF  
5MW24V



CS-0004\_PC14  
6211L2-ZJ-0067 6MDDCQ  
6QP8UA



CS-0007\_PC01  
6211L2-ZJ-0068 7DRB3W  
72CQM7



CS-0009\_PC10  
6211L2-ZJ-0070 7DS86A  
72CQNS



Figure 2 - L1 and L2 PC Task Order 1

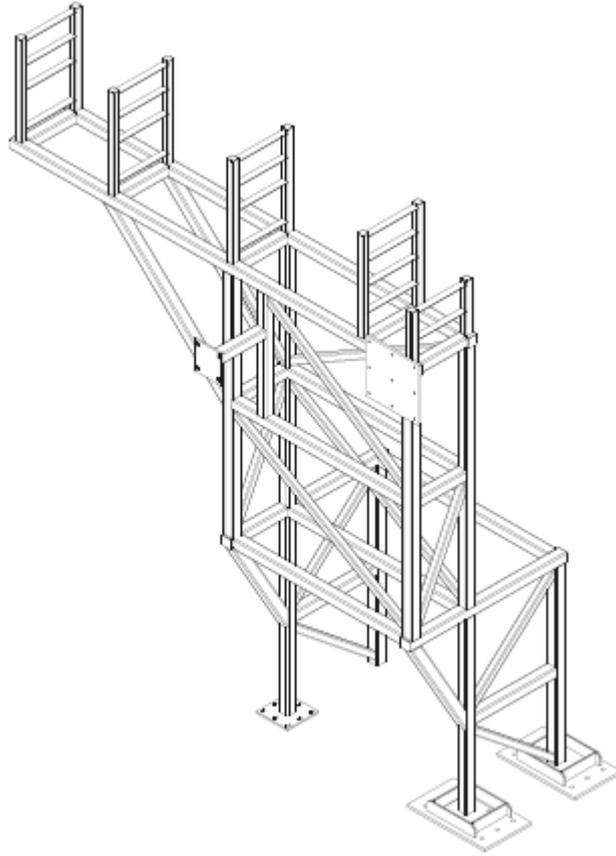
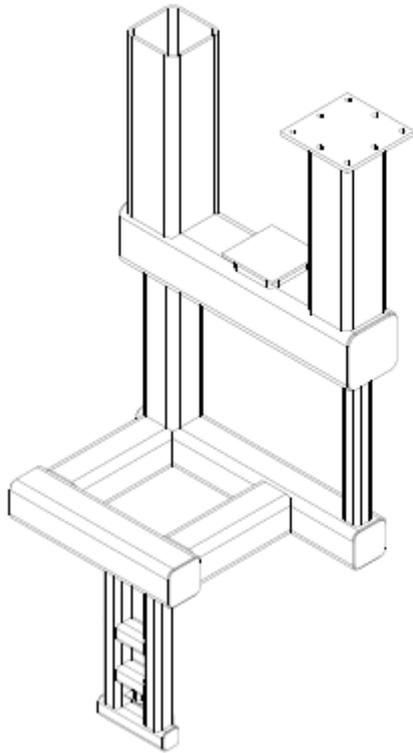


Figure 3 - B11 L3 Task Order 1

REV. 1/12/13

CS-0001  
6211L3-ZJ-0081 6CTUWN  
6LMTYM



CS-0002  
6211L3-ZJ-0082 6CTVQ9  
6LMTX6

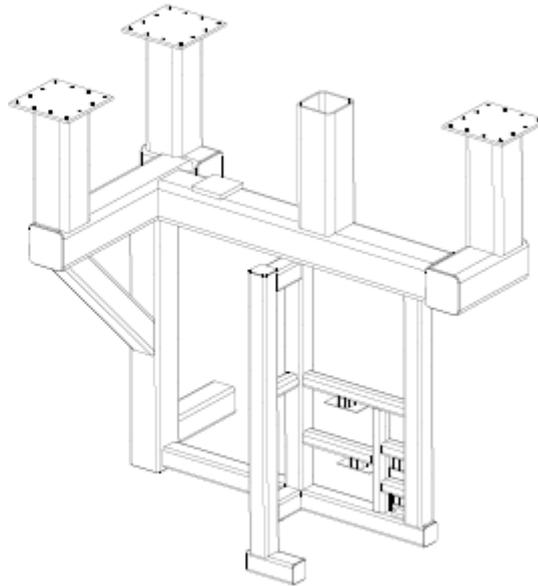


Figure 4 - L3 UPC Task Order 1

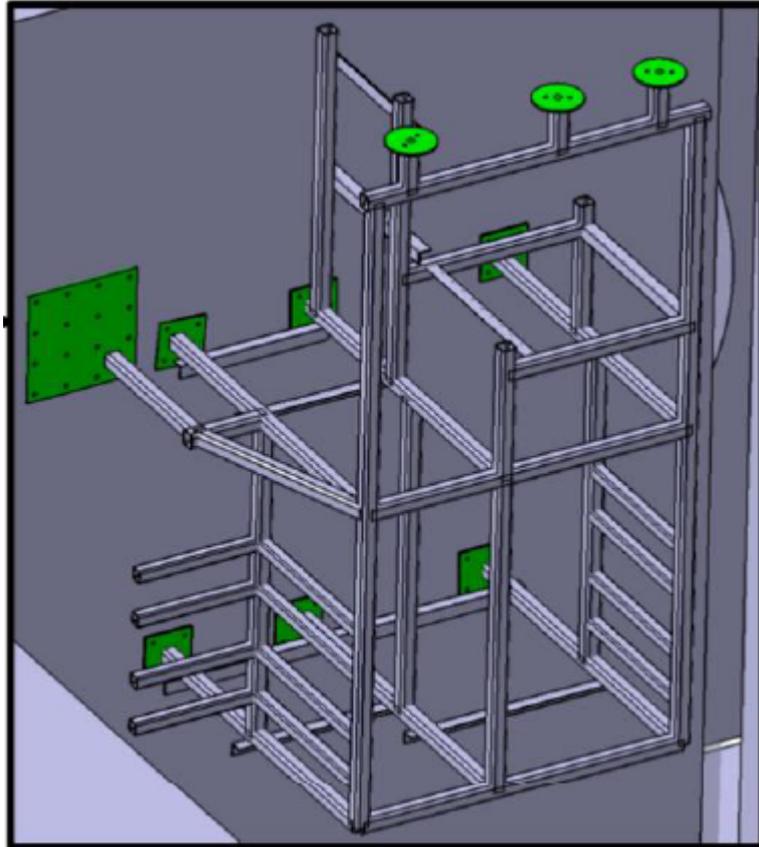


Figure 5 - L4 Task Order 2