

Technical Specifications (In-Cash Procurement)

**Technical Summary for Framework Contract to Purchase
Various Complex Penetrations**

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1. Background and Objectives

ITER is an international research and development Project that aims to demonstrate the scientific and technical feasibility of fusion power: it is being constructed in Europe, at Cadarache in the South-East of France.

In the ITER buildings, many systems need to be routed in between the different rooms. Each room might have the different fire, radiologic or ventilation requirements. In order to cross these rooms, openings are made in the concrete and the corresponding penetrations will be installed.

The objective of this specification is to specify the technical requirements for the framework contract for the fabrication and supply of complex penetrations. This specification includes the requirements for material, fabrication, machining, welding, delivery schedule, transportation, quality control, etc.

A Framework Contract will be used by IO to place the Task Order (TO) for the need of the fabrication of each complex penetration. Each request will be contractualized through a Task Order (TO) to be placed by IO.

2. Scope of Work

The entire work of this framework contract includes the supply and fabrication all the complex penetrations listed in **Annex A**. The unit weights given in the table of Annex A are just for cost estimation. Since the design is not yet finalized, the unit weight of each penetration is subject to change. The table of Annex A is not exhaustive; the items of the table might be changed as the design progresses.

Two or three framework contract holders will be selected for this framework contract.

To determine the final executor of each Task Order (TO), the contractors will receive Task Requests, each of which will include the detailed information, drawings, additional requirements (if any) of related complex penetration(s).

A Mini Competition between the two framework contract holders will be carried out to determine the final executor of the Task Order.

During the Mini Competition, 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, and the detail of the estimate that shall breakdown into the Material Costs, Labor Costs, Machine costs, Engineering costs, Quality costs, Tooling and Consumable Costs, outside service costs, and Overhead Costs, etc.

Finally, the winner of the Mini Competition will perform the fabrication work specified by the Task Order, which includes, for each complex penetration, preparation of the shop drawings, procurement of requisite materials, workshop fabrication, inspection, testing, quality control, documentation, packaging and delivery to IO.

3. Definitions

Term / acronym	Definition
Contractor	Responsible for execution of manufacture, testing, cleaning, packaging and delivery of components
IO	ITER Organization
MIP	Manufacturing & Inspection Plan
PIC	Protection Important Component
PIA	Protection Important Activity

For a complete list of ITER abbreviations see: ITER_D_2MU6W5 – ITER abbreviations.

4. Technical Requirements

4.1 Material

- Unless otherwise specified in the drawings, the stainless steel components should be manufactured from the materials listed in Table 2.

Table 2: Material list

Type	Material	Standard
Plate, sheet and strip	304L	ASTM A240M or equivalent
Pipe	304L	ASTM A312M or equivalent
Rod and bar	304L	ASTM A276M or equivalent

- The material should be supplied with the EN 10204 Type 3.1 inspection certificate.
- Mechanical and other physical properties of the materials shall conform to the requirements of ASTM A240M, ASTM A312M, ASTM A276M and ASTM A480M. All tests as stipulated in the standards shall be carried out.
- Chemical composition shall be as per ASTM A240M, ASTM A312M, and ASTM A276M Grade 304L. Elements such as Carbon, Phosphorous, Sulphur, Silicon and other impurities content in the basic material shall be maintained much on the lower side in accordance with the standards.
- The tie rod will be machined from bar. For some penetrations, the tie rods will be operated at elevated temperature. In such case, the tensile test of the tie rod at elevated temperature shall be performed according to the requirement of individual Task Order. Yield Strength (Sy) shall be retained at elevated temperature.

- Prior to the delivery, the components should have been pickled and passivated in accordance with ASTM A380 to restore the corrosion resistance of the stainless steel which might be impaired by the welding, hot forming or etc.

4.2 Special requirement of elements Co, Nb and Ta

- Some components under this contract will be installed in zone classified as Cat 2. To reduce the dose due to the steel activation, maximum Cobalt (Co) content should be 0.20 wt.%, maximum Niobium (Nb) content should be 0.10 wt.%, and maximum Tantalum (Ta) content should be 0.05 wt.% for these components.

4.3 Fabrication Requirements

- All the metal fabrication processes (cutting, shaping, drilling, folding, welding, etc.) shall conform to the requirements of EN 1090-2. The Execution Class of each component and its parts is EXC 4.
- The quality level of the acceptance criteria for weld joints imperfections, with reference to EN ISO 5817, is designated the highest level “B+” according to the EN 1090-2. Please note that the additional requirements for quality level B+ are listed in Table 17 in EN 1090-2.
- The contractor must be fully experienced in the fabrication of austenitic stainless steel component. The contractor shall ensure that all fabrication processes are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria and other special requirements. All the procedures used during fabrication shall be provided to IO.
- The contractor shall maintain the records showing the date and results of tests which are necessary for the products. These records shall be provided to IO.
- All machined surfaces shall be free of flaws, cracks and machining ridges and shall present a polished appearance.
 - NDT inspection requires 100% visual, 100% surface, and 100% volumetric inspections. For this contract, all fillet welds need 100% visual and 100% dye penetrant tests.

4.4 Certificate of Conformity

- The components shall be supplied with a Certificate of Conformity (or Declaration of Conformity) stating that the components were manufactured, tested and inspected in accordance with standards and with this technical specification.
- The Certificate of Conformity shall identify the material and shall reference the test reports.

5. Safety Requirements

- ITER is a Nuclear Facility identified in France by the number-INB-174

(“Installation Nucléaire de Base”).

- The penetrations are SIC-1.
- The components under the scope of this specification perform a safety function of confinement of hazardous substances and of radiation shielding, and are therefore classified as Protection Important Components (PIC) under the French Order of 7th February 2012, which establishes the general rules for licensed nuclear installations. The Contractors and Sub-Contractors must be informed that:
 - The Order 7th February 2012 applies to all the components important for the protection (PIC) and the activities important for the protection (PIA).
 - The compliance with the INB-order must be demonstrated -throughout the chain of external Contractors.
 - In application of article II.2.5.4 of the Order 7th February 2012, contracted activities for supervision purposes are also subject to supervision performed by the Nuclear Operator.
- All of the components under the scope of this specification shall satisfy the requirements for Quality Class 1 components as defined in [Quality Classification Determination \(ITER_D_24VQES\)](#)
- In order to satisfy the requirements of the INB Order, the Contractor shall comply with the generic safety requirements given in [ITER_D_SBSTBM v2.2 Provisions for Implementation of the Generic Safety Requirements by the External Actors/Intervenors](#).

6. Surveillance Requirements

- The ITER Organization, as the Nuclear Operator, has the ultimate responsibility for the application of the INB Order within the IO and throughout its chain of suppliers. In compliance with the Order, IO performs surveillance on Protection Important Activities (PIAs) related to the construction of PIC components. The surveillance is applied to the complete supply chain involved in the construction of the PIC components.
- In the context of this specification, a PIA means any activity related to the manufacture, testing, cleaning, packaging and delivery which can impact the ability of the components under the scope of this specification to comply with their Defined Requirements.
- For the purposes of performing surveillance, the Contractor shall grant the IO and ASN representatives’ access to its facilities, records and to those of its subcontractors at all stages of the contract. The surveillance shall include follow-up and verification of any corrective actions which are to be implemented.

7. Quality Assurance

- The Contractor’s Quality Assurance Program (QAP) is subject to approval by the IO in accordance with the ITER QA Program, and shall be applied to all work carried out under the scope of this specification.

- The general requirements are detailed the ITER Procurement Quality Requirements [ITER_D_22MFG4 v5.1 - ITER Procurement Quality Requirements](#).
- The Contractor shall ensure that a specific management system is implemented for work on Protection Important Activities (PIA) carried out by the Contractor and by any Subcontractors. The specific requirements for the supervision of subcontractors for Protection Important Components are detailed in [ITER_D_4EUQFL v7.4 - Overall Surveillance Plan of the Chain of External Actors for Protection Important Components, Structures and Systems and Protection Important Activities](#).
- Documentation developed as the result of this task shall be retained by the performer of the task or the DA organization for a minimum of 5 years and then may be discarded at the direction of the IO.

7.1 Quality Plan

- Prior to beginning the work of each Task Order, the Contractor shall produce a Quality Plan in accordance with [ITER_D_22MFMW v4.0 - Requirements for Producing a Quality Plan](#). The plan shall be submitted to the IO for approval.

8. Schedule

- The individual Task Order(s) will be launched, depending on the completeness of the design of the penetration(s), after the framework contract is signed. The duration of each Task Order will be defined in the corresponding Task Order. Normally required duration of each Task Order is around 7 weeks after the approval of the documents, this duration might be adjusted case by case depending on the required quantity and the degree of complexity of each Task Order.

9. Deliverables

- For each Task Order, the Contractor shall submit the following deliverables to the IO for approval:

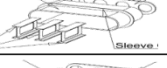
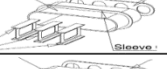

	Document	Due date
Deliverable 1	Quality Plan	1 week after TO issued
Deliverable 2	MIP	2 weeks after TO issued
Deliverable 3	Inspection certificate 3.1	2 weeks after manufacturing

Deliverable 4	Certificate of Conformity	Along With components
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Annex A List of complex penetrations

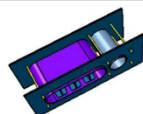
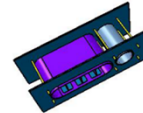
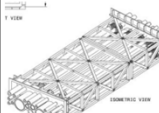
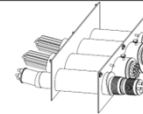
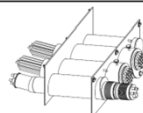
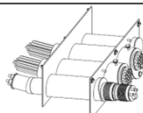
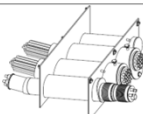
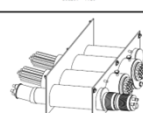
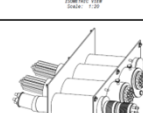
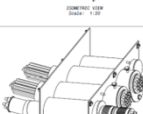
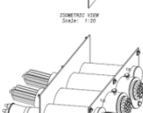
List of complex penetrations

Page 1

Number	Type	PBS	Family	Penetration	Sketch	Weight(kg)	Material
1	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0027		280	SS
2	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0031		280	SS
3	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0032		280	SS
4	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0033		350	SS
5	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0034		280	SS
6	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0035		280	SS
7	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0036		280	SS
8	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0037		280	SS
9	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0038		280	SS
10	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0039		300	SS
11	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0040		280	SS
12	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0068		140	SS
13	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0108		280	SS
14	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0109		150	SS
15	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0128		150	SS
16	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0132		150	SS
17	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0133		290	SS
18	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0134		150	SS
19	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0135		150	SS
20	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0136		150	SS
21	Position1	PBS-26 (TCWS)	PC-VS and VS-Nbcell	6211B1-TW-0139		420	SS

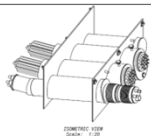
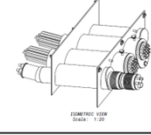
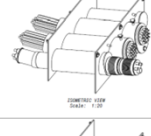
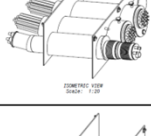
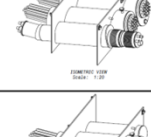
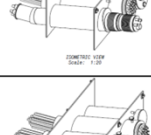
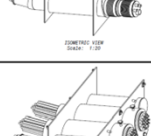
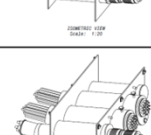
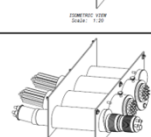
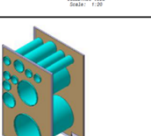
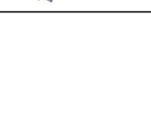
List of complex penetrations

Page 2

Number	Type	PBS	Family	Penetration	Sketch	Weight(kg)	Material
22	Position1	PBS-26 (TCWS)	PC-VS and VS - NBcell	6211L1-TW-0451		834	SS
23	Position1	PBS-26 (TCWS)	PC-VS and VS - NBcell	6211L1-TW-0452		834	SS
24	Position2	PBS-26 (TCWS)	DTR bridge	62112B-TW-0089/6211B2-TW-0163		5262	SS&CS
25	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0001		4800	SS
26	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0002		4800	SS
27	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0003		4800	SS
28	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0004		4800	SS
29	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0005		4800	SS
30	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0006		4800	SS
31	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0007		4800	SS
32	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0008		4800	SS

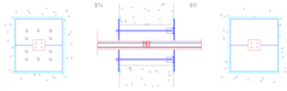
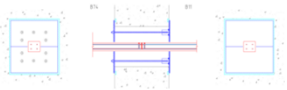
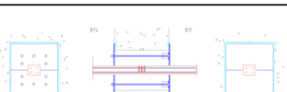
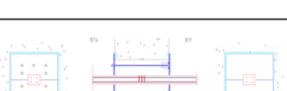
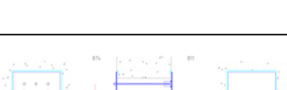

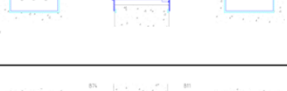
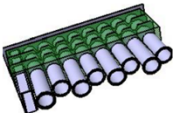
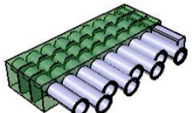
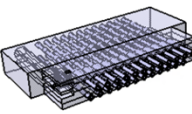
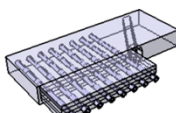
List of complex penetrations

Page 3

Number	Type	PBS	Family	Penetration	Sketch	Weight(kg)	Material
33	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0009		4800	SS
34	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0010		4800	SS
35	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0011		4800	SS
36	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0012		4800	SS
37	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0013		4800	SS
38	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0014		4800	SS
39	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0015		4800	SS
40	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0016		4800	SS
41	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0017		4800	SS
42	Position4	PBS-26 (TCWS)	bio-shield - L3 Upper pipe chase	6211L3-TW-0018		4800	SS
43	Position7	PBS34	last confinement (cryo bridge)	6211L3-TW-0110		5500	SS

List of complex penetrations

Page 4

Number	Type	PBS	Family	Penetration	Sketch	Weight(kg)	Material
44	Position11	PBS-41 (DC BB)	Single various	6211L3-TW-0112		350	CS
45	Position11	PBS-41 (DC BB)	Single various	6211L3-TW-0113		350	CS
46	Position11	PBS-41 (DC BB)	Single various	6211L3-TW-0120		350	CS
47	Position11	PBS-41 (DC BB)	Single various	6211B2-TW-0013		350	CS
48	Position11	PBS-41 (DC BB)	Single various	6211B2-TW-0143		350	CS
49	Position11	PBS-41 (DC BB)	Single various	6211B2-TW-0009		350	CS
50	Position11	PBS-41 (DC BB)	Single various	6211B2-TW-0010		350	CS
51	Position13	PBS-51	last confinement (B11-B13)	6211L1-TW-0030		3830	SS
52	Position13	PBS-51	last confinement (B11-B13)	6211L1-TW-0032		3830	SS
53	Position14	PBS-52	last confinement (B11-B13)	6211L1-TW-0031		850	SS
54	Position14	PBS-52	last confinement (B11-B13)	6211L2-TW-0004		850	SS

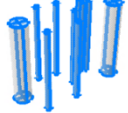
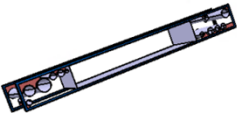
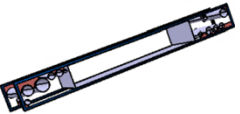
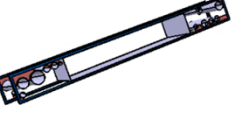
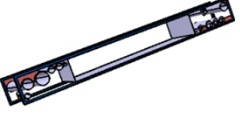
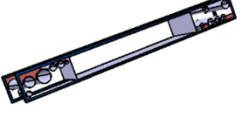
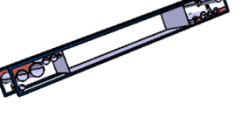
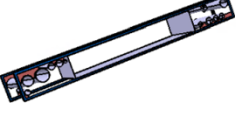
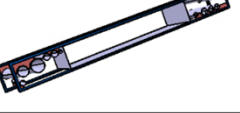
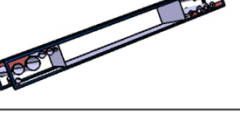
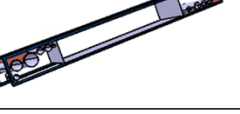
List of complex penetrations

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Number	Type	PBS	Family	Penetration	Sketch	Weight(kg)	Material
55	Position14	PBS-52	last confinement (B11-B13)	6211L2-TW-0007		850	SS
56	Position14	PBS-52	last confinement (B11-B13)	6211L2-TW-0005		850	SS
57	Position14	PBS-52	last confinement (B11-B13)	6211L2-TW-0006		850	SS
58	Position15	PBS-52	Lintel	6211L1-TW-0014		1150	SS
59	Position15	PBS-52	Lintel	6211L2-TW-0012		1150	SS
60	Position15	PBS-52	Lintel	6211L2-TW-0013		1150	SS
61	Position15	PBS-52	Lintel	6211L2-TW-0015		1150	SS
62	Position15	PBS-52	Lintel	6211L2-TW-0016		1150	SS
63	Position18	PBS-53	NBI-PHTS piping through the L3 slab	6211L3-TW-0068		880	SS
64	Position18	PBS-53	NBI-PHTS piping through the L3 slab	6211L3-TW-0077		880	SS
65	Position18	PBS-53	NBI-PHTS piping through the L3 slab	6211L3-TW-0078		880	SS

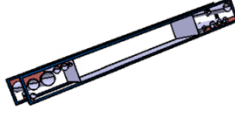
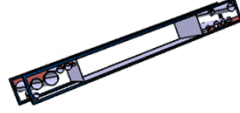
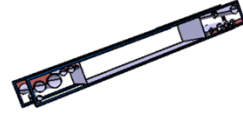
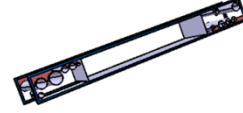
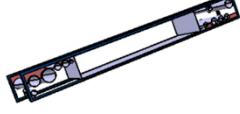
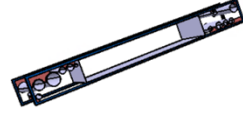
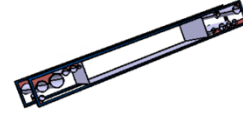
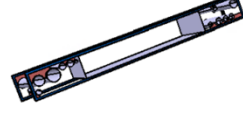
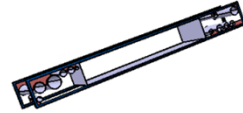
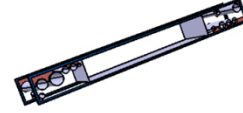
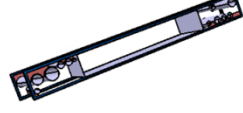
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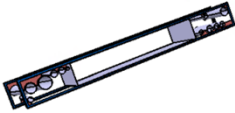
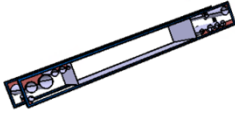
Number	Type	PBS	Family	Penetration	Sketch	Weight(kg)	Material
66	Position18	PBS-53	NBI-PHTS piping through the L3 slab	6211L3-TW-0183		880	SS
67	Position24		Lintel	6211L1-TW-0001		1150	SS
68	Position24		Lintel	6211L1-TW-0002		1150	SS
69	Position24		Lintel	6211L1-TW-0003		1150	SS
70	Position24		Lintel	6211L1-TW-0008		1150	SS
71	Position24		Lintel	6211L1-TW-0009		1150	SS
72	Position24		Lintel	6211L1-TW-0010		1150	SS
73	Position24		Lintel	6211L1-TW-0011		1150	SS
74	Position24		Lintel	6211L1-TW-0012		1150	SS
75	Position24		Lintel	6211L1-TW-0013		1150	SS
76	Position24		Lintel	6211L1-TW-0015		1150	SS

List of complex penetrations

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Number	Type	PBS	Family	Penetration	Sketch	Weight(kg)	Material
77	Position24		Lintel	6211L1-TW-0016		1150	SS
78	Position24		Lintel	6211L1-TW-0017		1150	SS
79	Position24		Lintel	6211L1-TW-0018		1150	SS
80	Position24		Lintel	6211L2-TW-0001		1150	SS
81	Position24		Lintel	6211L2-TW-0002		1150	SS
82	Position24		Lintel	6211L2-TW-0003		1150	SS
83	Position24		Lintel	6211L2-TW-0008		1150	SS
84	Position24		Lintel	6211L2-TW-0009		1150	SS
85	Position24		Lintel	6211L2-TW-0010		1150	SS
86	Position24		Lintel	6211L2-TW-0011		1150	SS
87	Position24		Lintel	6211L2-TW-0014		1150	SS

List of complex penetrations

Number	Type	PBS	Family	Penetration	Sketch	Weight(kg)	Material
88	Position24		Lintel	6211L2-TW-0017		1150	SS
89	Position24		Lintel	6211L2-TW-0018		1150	SS