

Technical Summary

1. Purpose

The purpose of this procurement is to establish a contract to provide mechanical and electrical plant installation works in the following areas on the ITER Site in Saint-Paul Lez Durance, France:

- Building 64 – Water Treatment Facility;
- Building 67 – Cold Basin and Cooling Towers;
- Building 68A – Cooling Water Pumping Station CCWS-2D
- Building 68B – Cooling Water Pumping Station CCWS-1
- Building 69 – HRS Heat Exchanger's area.



Figure 1 Site layout and area of interest

The installation activities will include:

Equipment	Building
Piping spools	64, 67, 68, 69
Insulation	64, 67, 68, 69
Pipe supports and steel structures	64, 67, 68, 69
Grouting for pipe support base plates and components foundations.	64,67,68,69
Cooling Towers (Wet type induced draft)	67
Stop log gates and coarse screens (for hot basin)	67
Manual and control valves	64, 67, 68, 69
Pumps (Vertical turbine & centrifugal)	67, 68
Pressurizers	68A, 68B
Heat Exchangers	67, 68, 69
Chemical dosing systems	64
Cables	64, 67, 68, 69
Cable Trays	64, 67, 68, 69
Instrumentation	64, 67, 68, 69
Motor Control Centres (MCC)	64, 68
Control Cubicles	64, 68

Table 1 Type of scope and location

2. Background

ITER is based on the 'Tokamak' concept of magnetic confinement, in which the plasma is contained in a doughnut-shaped vacuum vessel. The fuel - a mixture of Deuterium and Tritium, two isotopes of Hydrogen - is heated to temperatures in excess of 150 million °C, forming a hot plasma. Strong magnetic fields are used to keep the plasma away from the walls; these are produced by superconducting coils surrounding the vessel, and by an electrical current driven through the plasma.

ITER is a large research facility made of a combination of large conventional industrial equipment such as the cooling water system and challenging new high tech components such as diagnostics, superconductive magnets, etc. To ensure the future operation of all ITER subsystems a large amount of power and control cables will have to be designed, identified, routed and installed.

For more information on ITER Project please visit our web site www.iter.org.

3. Scope of Work

All the equipment to be installed shall be handed over by the ITER Organization (IO) to the Contractor, except for the components listed in the column “to be procured” in the tables below, that shall be procured by the selected Contractor.

The preliminary bill of materials and components to be installed is given below and is divided into (Procure) equipment to be supplied, or (Install) equipment for installation only.

Also included in the scope are all the associated finishing works and the testing for mechanical and electrical completion of the installation:

1. Mechanical completion of the Structural, Mechanical & Piping includes, but is not limited to:
 - Verification that the piping systems, mechanical equipment and their supporting structure are correctly installed.
 - Non-destructive examination
 - Hydrostatic tests.
 - Technical cleaning (foreign material exclusion, dust control, flushing or others)
2. Electrical completion of installed equipment includes, but is not limited to:
 - Normal inspection of all cables, wiring & termination
 - Normal inspection of cable and tray support, tray (fill), grounding, integrity.
 - Check of stress core installation for MV & HV cable
 - Check of bend radius of cables
 - Tests of continuity and megger testing (insulation)
3. Completion for instrumentation systems includes verification and validation of the instruments and valves and its comparison with the original design data to assure their process flow condition will be met. This verification and validation include, but it is not limited to:
 - All wiring checked & verified
 - Inspection for continuity & insulation
 - Control system loop checking for confirmation (with specific mock-up)
 - Checking of boards, modules and cubicles.
 - Hydraulic & pneumatic tubing cleaning, flushing and pressure testing to assure that there are no leaks and that the cleanliness meets required quality.

Description	Install	Procure
Cables		
Power < 16mm ²	14 km	
16 mm ² <Power < 70 mm ²	16 km	
Power > 70 mm ²	4 km	
I&C < 16 cores	38 km	
I&C > 16 cores	22 km	
Fibre optic	0.3 km	
Cable Trays and Conduits		
Cable Trays	200 m	200 m
Supports for Cable Tray	40 each	40 each
Conduits	1576 m	1576 m
Instrumentation & Control (I&C) and Electrical Components		
Pressure Gauge	32	
Pressure Transmitter	11	
Temperature Gauge	7	
Temperature Transmitter	14	
Differential Pressure Switch	10	
Flow Transmitter	9	
Other Instrument Transmitters	11	
Valve Positioner, Position Switch, Open/Close Command	67	
Local Control Panel (600 w x 1100 d x 500 h)	10	
Cubicles (800 w X 800 d X 2200 h)	6	
Junction Box	35	
Horn, Bell, Alarm	5	
Public Address Loudspeaker	28	
Emergency Phones	6	
Instrument tubing (including fittings)	350 m	350 m
Instrument supports	94	94

Table 2 Electrical and I&C scope BoM

Mechanical Components		
Cooling Towers Cells (16000 L X 16000 W X 21000 H)	10	
Hot Basin gates (3200 W X 3100 H 4000Kg weight)	10	
Hot basin screens (3200 W X 3100 H 2500Kg weight)	10	
Plate Type Heat Exchangers Design Standard ASME Section VIII, Div-1, API662, PED/ESP (6387 L X 1135 W X 3520 H 20000 kg weight) (4980 L X 1415 W X 3868 H 21600 kg weight)	14 3	
Horizontal Centrifugal Pumps (Design Standard API 610/ISO13709/ HIS) (4516 L X 2010 W X 1730 H 16000 kg weight) (3873 L X 1790 W X 1635 H 11000 Kg weight)	6 4	
Vertical Turbine Pumps (Design Standard API 610/ISO13709/ HIS) (13750 L X 2000 D 24500 kg weight) (13660 L X 2000 D 21500 Kg weight)	10 3	
Pressurizer (3450 D X 5850 L 14000 kg weight) (2300 D X 4150 L 4400 kg weight)	2 1	
Caustic addition System (875 D X 1000 H 2000 Kg weight)	2	
Acid Dosing System (2300 L X 2100 W X 1914 H 3200 kg weight))	1	
Chemical Dosing System (3700 W x 5900 D x 2000 H 3500 kg weight)	1	
Scale corrosion and Inhibitor dosing system (875 D X 1000 H 2300 Kg weight)	2	
Ozonator Package (12200 L X 9700 W X 2200 H 65000 Kg)	1	
Water Polishing Unit (3100 W x 2700 D x 2100 H 2000 kg weight)	1	
Self-Cleaning Filter (Make up water filter) (2300 L X 1300 W X 3640 H 2700Kg weight)	1	
Self-Cleaning Filter (Side stream filter) (2100 L X 1300 W X 3680 H 2450 Kg weight)	1	

Table 3 Mechanical components scope BoM

Grouting for baseplates and foundations		
Supports anchored to baseplates	480	
Components installed in foundations needing grouting	60	

Table 4 Overall amount of grouting activity

In line components			
15	GATE VALVE DN15- 900#	2	
20	GATE VALVE DN20- 900#	140	
25	GATE VALVE DN25- 900#	84	
50	GATE VALVE DN50- 900#	41	
80	GATE VALVE DN80- 150#	4	
100	GATE VALVE DN100-150#	5	
150	GATE VALVE DN150-150#	1	
450	BUTTERFLY VALVE DN450 -150 RF	1	
500	BUTTERFLY VALVE DN500 -150 RF	56	
550	BUTTERFLY VALVE DN550 -150 RF	6	
600	BUTTERFLY VALVE DN600 -150 RF	14	
650	BUTTERFLY VALVE DN650 -150 RF	1	
750	BUTTERFLY VALVE DN750 -150 RF	2	
800	BUTTERFLY VALVE DN800 -150 RF	16	
850	BUTTERFLY VALVE DN850 -150 RF	6	
900	BUTTERFLY VALVE DN900 -150 RF	4	
1200	BUTTERFLY VALVE DN1200 -150 RF	4	
1600	BUTTERFLY VALVE DN1600 -150 RF	1	
15	GLOBE VALVE DN15 – 900#	1	
25	GLOBE VALVE DN25 – 900#	6	
50	GLOBE VALVE DN50 – 900#	3	
150	GLOBE VALVE DN150 – 150#	1	
15	LIFT CHECK VALVE DN15 – 900#	2	
25	LIFT CHECK VALVE DN25 – 900#	2	
50	LIFT CHECK VALVE DN50 – 900#	1	
600	DUAL PLATE CHECK VALVE DN600 – 150#	4	
800	DUAL PLATE CHECK VALVE DN800 – 150#	10	
850	DUAL PLATE CHECK VALVE DN850 – 150#	6	
900	DUAL PLATE CHECK VALVE DN900 – 150#	3	
50X80	PRESSURE RELIEF VALVES DN 50 X 80 – 150#	3	
600	T – TYPE STRAINERS DN600 – 745 KG	10	

Table 5 In line components scope BoM

Carbon Steel Spools			
DN	Specification	Install	Procure
15	Carbon steel spool Length L<1 m	7	
	Carbon steel spool Length 1-3 m	8	
	Carbon steel spool Length 3-6 m	6	
	Carbon steel spool Length 6-12 m	19	
20	Carbon steel spool Length 3-6 m	1	
25	Carbon steel spool Length L<1 m	160	
	Carbon steel spool Length 1-3 m	1	
	Carbon steel spool Length 3-6 m	30	
50	Carbon steel spool Length L<1 m	59	
	Carbon steel spool Length 1-3 m	5	
	Carbon steel spool Length 3-6 m	18	
	Carbon steel spool Length 6-12 m	3	
80	Carbon steel spool Length L<1 m	2	
	Carbon steel spool Length 1-3 m	5	
	Carbon steel spool Length 3-6 m	3	
	Carbon steel spool Length 6-12 m	1	
100	Carbon steel spool Length L<1 m	7	
	Carbon steel spool Length 1-3 m	13	
	Carbon steel spool Length 3-6 m	5	
	Carbon steel spool Length 6-12 m	17	
150	Carbon steel spool Length L<1 m	3	
	Carbon steel spool Length 1-3 m	0	
	Carbon steel spool Length 3-6 m	2	
	Carbon steel spool Length 6-12 m	0	
200	Carbon steel spool Length L<1 m	1	
	Carbon steel spool Length 1-3 m	0	
	Carbon steel spool Length 3-6 m	2	
	Carbon steel spool Length 6-12 m	3	
250	Carbon steel spool Length L<1 m	0	
	Carbon steel spool Length 1-3 m	4	
	Carbon steel spool Length 3-6 m	4	
	Carbon steel spool Length 6-12 m	0	
400	Carbon steel spool Length L<1 m	0	
	Carbon steel spool Length 1-3 m	5	
	Carbon steel spool Length 3-6 m	3	
	Carbon steel spool Length 6-12 m	9	
450	Carbon steel spool Length L<1 m	0	
	Carbon steel spool Length 1-3 m	0	
	Carbon steel spool Length 3-6 m	0	
	Carbon steel spool Length 6-12 m	1	
500	Carbon steel spool Length L<1 m	96	

Carbon Steel Spools			
DN	Specification	Install	Procure
	Carbon steel spool Length 1-3 m	165	
	Carbon steel spool Length 3-6 m	138	
	Carbon steel spool Length 6-12 m	11	
600	Carbon steel spool Length L<1 m	32	
	Carbon steel spool Length 1-3 m	48	
	Carbon steel spool Length 3-6 m	15	
	Carbon steel spool Length 6-12 m	7	
650	Carbon steel spool Length L<1 m	1	
	Carbon steel spool Length 1-3 m	3	
	Carbon steel spool Length 6-12 m	1	
700	Carbon steel spool Length L<1 m	15	
	Carbon steel spool Length 1-3 m	5	
	Carbon steel spool Length 3-6 m	6	
	Carbon steel spool Length 6-12 m	5	
750	Carbon steel spool Length L<1 m	0	
	Carbon steel spool Length 1-3 m	1	
	Carbon steel spool Length 3-6 m	3	
	Carbon steel spool Length 6-12 m	6	
800	Carbon steel spool Length L<1 m	26	
	Carbon steel spool Length 1-3 m	42	
	Carbon steel spool Length 3-6 m	8	
850	Carbon steel spool Length L<1 m	12	
	Carbon steel spool Length 1-3 m	12	
	Carbon steel spool Length 3-6 m	0	
	Carbon steel spool Length 6-12 m	0	
900	Carbon steel spool Length L<1 m	2	
	Carbon steel spool Length 1-3 m	11	
	Carbon steel spool Length 3-6 m	0	
	Carbon steel spool Length 6-12 m	0	
1000	Carbon steel spool Length L<1 m	3	
	Carbon steel spool Length 1-3 m	2	
	Carbon steel spool Length 3-6 m	1	
	Carbon steel spool Length 6-12 m	3	
1200	Carbon steel spool Length L<1 m	2	
	Carbon steel spool Length 1-3 m	8	
	Carbon steel spool Length 3-6 m	4	
	Carbon steel spool Length 6-12 m	10	
1400	Carbon steel spool Length L<1 m	2	
	Carbon steel spool Length 1-3 m	6	
	Carbon steel spool Length 3-6 m	2	
	Carbon steel spool Length 6-12 m	33	

Carbon Steel Spools			
DN	Specification	Install	Procure
1600	Carbon steel spool Length L<1 m	1	
	Carbon steel spool Length 1-3 m	5	
	Carbon steel spool Length 3-6 m	2	
	Carbon steel spool Length 6-12 m	34	
1800	Carbon steel spool Length L<1 m	0	
	Carbon steel spool Length 1-3 m	1	
	Carbon steel spool Length 3-6 m	5	
	Carbon steel spool Length 6-12 m	23	
2000	Carbon steel spool Length L<1 m	0	
	Carbon steel spool Length 1-3 m	0	
	Carbon steel spool Length 3-6 m	0	
	Carbon steel spool Length 6-12 m	3	

Table 6 Carbon steel spools scope BoM

Stainless Steel Spools			
DN	Specification	Install	Procure
15	Stainless steel spool Length L<1 m	3	
	Stainless steel spool Length 1-3 m	3	
	Stainless steel spool Length 3-6 m	6	
	Stainless steel spool Length 6-12 m	9	
25	Stainless steel spool Length L<1 m	21	
	Stainless steel spool Length 1-3 m	3	
	Stainless steel spool Length 3-6 m	4	
	Stainless steel spool Length 6-12 m	8	
40	Stainless steel spool Length L<1 m	1	
	Stainless steel spool Length 1-3 m	3	
	Stainless steel spool Length 3-6 m	1	
	Stainless steel spool Length 6-12 m	4	
50	Stainless steel spool Length L<1 m	6	
	Stainless steel spool Length 1-3 m	0	
	Stainless steel spool Length 3-6 m	1	
	Stainless steel spool Length 6-12 m	2	
80	Stainless steel spool Length L<1 m	2	
	Stainless steel spool Length 1-3 m	5	
	Stainless steel spool Length 3-6 m	1	
	Stainless steel spool Length 6-12 m	5	
100	Stainless steel spool Length L<1 m	3	
	Stainless steel spool Length 1-3 m	4	
	Stainless steel spool Length 3-6 m	1	
	Stainless steel spool Length 6-12 m	7	
200	Stainless steel spool Length L<1 m	0	
	Stainless steel spool Length 1-3 m	0	
	Stainless steel spool Length 3-6 m	10	
	Stainless steel spool Length 6-12 m	0	
250	Stainless steel spool Length L<1 m	0	
	Stainless steel spool Length 1-3 m	0	
	Stainless steel spool Length 3-6 m	0	
	Stainless steel spool Length 6-12 m	0	
300	Stainless steel spool Length L<1 m	1	
	Stainless steel spool Length 1-3 m	0	
	Stainless steel spool Length 3-6 m	0	
	Stainless steel spool Length 6-12 m	0	
1400	Stainless steel spool Length L<1 m	0	
	Stainless steel spool Length 1-3 m	0	
	Stainless steel spool Length 3-6 m	0	
	Stainless steel spool Length 6-12 m	1	

DN	Specification	Install	Procure
1800	Stainless steel spool Length L<1 m	0	
	Stainless steel spool Length 1-3 m	0	
	Stainless steel spool Length 3-6 m	0	
	Stainless steel spool Length 6-12 m	1	

Table 7 Stainless steel spools scope BoM

For the above equipment, the Contractor shall be responsible to provide and install consumables and accessories, including:

- Welding consumables.
- Grouting for anchored plates.
- Anchor bolts for piping supports structures.
- Terminals and Connections,
- Cable/Wiring Core Ferruling,
- Labels,
- Flexible Conduit,
- Cable Glands,
- Earthing and Bonding,

The Contractor shall also be responsible for the following activities:

- Provide any required temporary works including, but not only, the means of protection and the tools needed to properly manage and perform the different stages of work in the buildings and on site,
- Perform the complete installation (including the thermal insulation and the final coating if necessary),
- Scaffolding for the required areas
- Lifting and handling equipment required for the installation of the described items.
- Perform final installation tests (mechanical & electrical completion) and verifications,
- Issue all necessary documentation for the works, such as Quality Plan. Health and Safety plan, Workforce planning (Installation sequence and Level 4 Schedule) and the List of documents to be issued for the execution of the works.
- Provide the records of NDE's and all the information required for the Pressure Equipment Regulation
- Issue the As-Built documents,
- Provide support during commissioning phase with a minimum number of resources The duration and specific resources will be specified during Call for Tender

All above mentioned site works shall be performed by the Contractor within ITER Site at Saint Paul-lez-Durance in France.

4. Interfaces with other companies

It is expected some coactivity with other Contractors working on the ITER site around the Buildings and also inside the Buildings involved in these installation activities.

To manage the coactivity and the Installation schedule IO is currently working with a Construction Management-as Agent (CMA). The CMA will oversee these tasks on behalf of IO-CT:

- Project management,
- Site coordination (including permit to work)
- Material management,
- Work supervision, quality control, record keeping
- Management of installation Completion Activities.

The CMA acts as the Engineer for this Works Contract under the FIDIC “Red Book”.

5. Timetable

The tentative timetable is as follows:

Issue of Pre-Qualification	April 2017
Invitation to Tender	May 2017
Tender Submission	End July 2017
Contract Award	September 2017
Start of the Works	November 2017

The contract duration is estimated to be between 24 and 36 months for the whole installation works, including testing and preparation of the final documentation.

6. Nuclear and Quality Requirements

The ITER Organization is the nuclear operator of the ITER nuclear fusion facility (INB 174) under French nuclear law.

Most of ITER mechanical and piping components have to be installed in conformance with ASME B31.3-2010 Category M fluid and appropriate ASTM standards and for part of the scope to comply with ESP and ESPN French regulations and the French Order of 7th February 2012.

For the scope of this contract there are not **ESPN** neither **Protection Important Components** components, however there are ESP pipe spools and components.

The Contractor shall install piping components in conformance with ASME B31.3-2010 Category M fluid and appropriate ASTM standards and for part of the scope to comply with ESP regulations. The Contractor will have to provide an evidence of implemented Quality Assurance System required for installing of nuclear components The Quality requirements imposed by the French regulations will be detailed at the Call for Tender stage.