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VERSION CREATED ON / VERSION / STATUS
08 Aug 2019 / 1.0 / Approved

EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

Divertor CA Integration Technical Overview for Market Survey

This white paper provides background information to facilitate market response to the ITER Organization (IO) market survey (Ref IO/MSY/19/DCA/PMT) regarding the contract for the Divertor Cassette Assembly (CA) Integration. This information is not binding or contractual in any way and will evolve based on the response to the market survey and other information. This document first introduces the technical objectives and scope of the contract and then focuses on the strategy for procurement, ...

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1 Purpose

This white paper provides background information to facilitate market response to the ITER Organization (IO) market survey (Ref IO/MSY/19/DCA/PMT) regarding the contract for the Divertor Cassette Assembly (CA) Integration. This information is not binding or contractual in any way and will evolve based on the response to the market survey and other information.

This document first introduces the technical objectives and scope of the contract and then focuses on the strategy for procurement, including potential risks.

2 Background

The ITER Project aims to demonstrate the scientific and technological feasibility of fusion power for peaceful purposes and to gain the knowledge necessary for the design of the next-stage DEMOnstration fusion power plant.

ITER is a joint international research and development project for which initial construction activities have started. The seven Members of the IO form the seven Domestic Agencies (DA) and include: European Atomic Energy Community (EUDA), Japan (JADA), People's Republic of China (CNDA), Republic of India (INDA), Republic of Korea (KODA), Russian Federation (RFDA) and United States of America (USDA).

ITER is being constructed in Europe, at St Paul Les Durance, in southern France, where the IO has its headquarters.

The main components of the ITER Tokamak are the Magnets, Vacuum Vessel, Cryostat, Blanket and Divertor. As a main component, the Divertor is a Tungsten ring located at the bottom of the vacuum chamber that faces the thermonuclear plasma. It removes most of the impurities coming from the plasma. The figure below shows the Divertor relative to the machine.

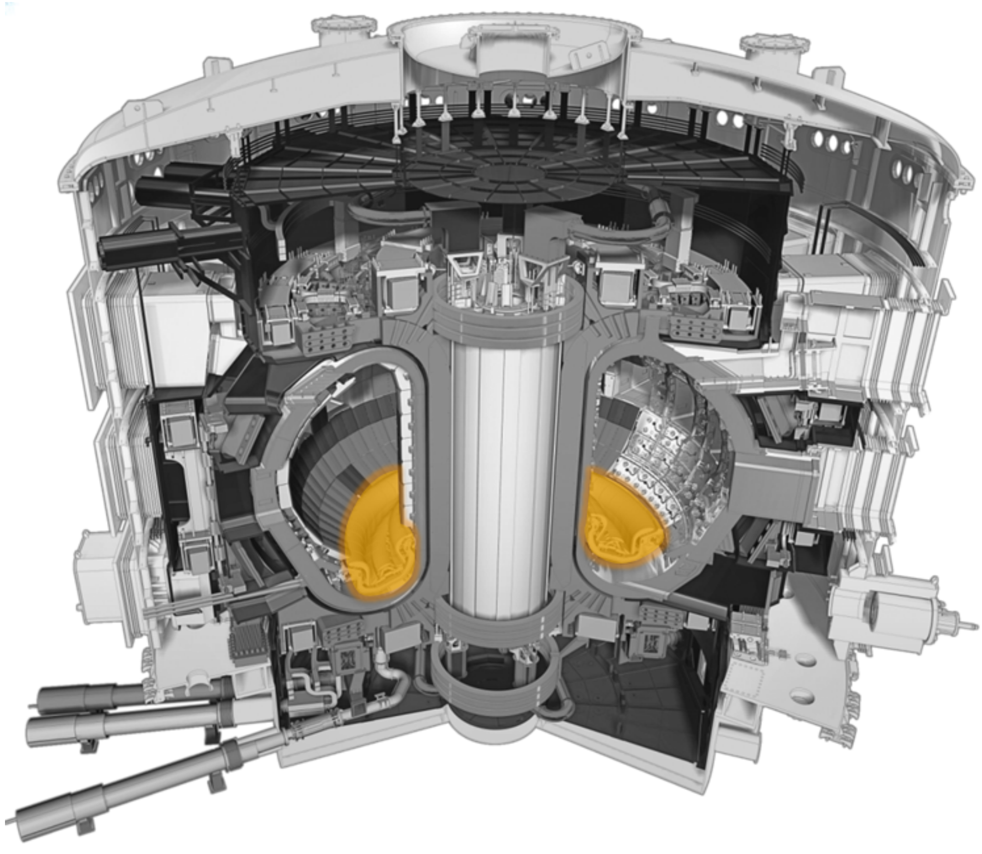


Figure 1: ITER Machine and Main Components

The Divertor consist of 54 CAs that are made of one Cassette Body (CB) and three Tungsten Plasma Facing Components (PFCs), namely from inboard to outboard: Inner Vertical Target (IVT), Dome and Outer Vertical Target (OVT). There are 33 Standard CAs and 21 Non-Standard CAs. As shown in the figure below, the Non-Standard CA is similar to the Standard CA but also includes other components, essentially parts of

Diagnostics and Instrumentation (sensors, looms, connectors, etc). Collectively, the PFCs, Diagnostics and Instrumentation are referred to as Free-Issued Items (FII). Each CA is about 3.3m long, 2.2m tall and weighs around 10tons. The IO will install the Divertor for Pre Fusion Power Operation-1, at the end of Assembly Phase II.

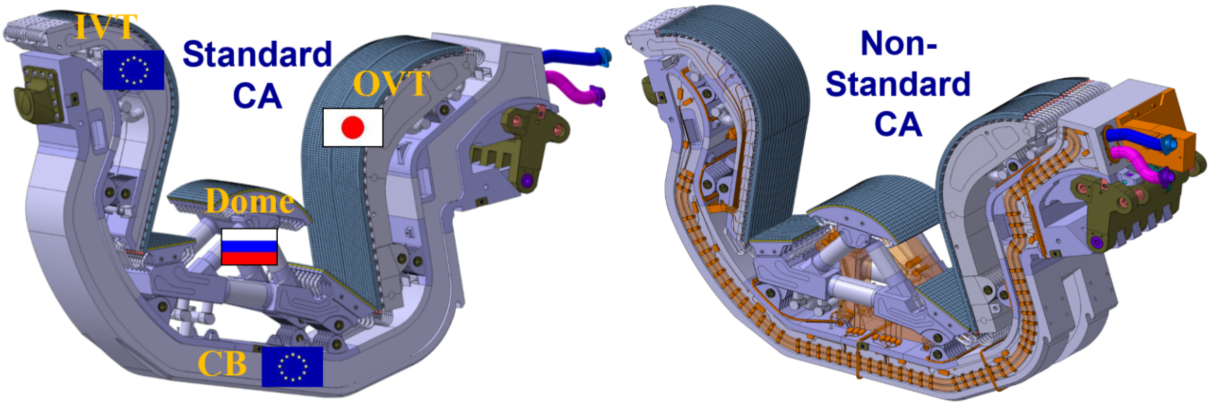


Figure 2: Standard and Non-Standard CAs

The procurement of the FII and CB is at the charge of the DAs via in-kind Procurement Arrangements or direct (in-cash) at the charge of IO (see Table 1 for details).

The IO is considering establishing a long partnership (~10 years) with a single supplier (so-called Integrator in the contract), including a facility/platform (so-called Integration Site in the contract) for the integration activities and executing the activities.

The table below shows the 22 components and stakeholders involved with these activities.

Table 1: Procurement & Maturity of Free-Issued Items

Free – Issued Items	Quantity	PBS	Supplier	FDR	MRR
1. Central Cassette Outer Rail	3	17	EUDA	2018	
2. Divertor Operational Instrumentation	3 Sets	17	IO	2021	
3. Dome	58	17	RFDA	2013	
4. Inner Vertical Target	58	17	EUDA	2013	
5. Outer Vertical Target	58	17	JADA	2013	
6. Cassette Body	58	17	EUDA	2013	2019
7. Bolometers	5 Sets	55.D1	EUDA	2022	2025
8. Diagnostic Electrical Services	17 Sets	55.NE	EUDA	2020	2023
9. Divertor Impurity Monitor	1 Set	55.E4	JADA	2020	2022
10. Divertor Shunts	6 Sets	55.AM	EUDA	2020	2023
11. Dust Monitor	2 Sets	55.G9	IO	2022	2022
12. Equilibrium Coils	6 Sets	55.AL	EUDA	2019	
13. Erosion Monitor	1 Set	55.G8	IO	2021	2024
14. Langmuir Probes	5 Sets	55.G7	CNDA	2021	2022
15. Lower Vertical Neutron Camera	1 Set	55.B2	RFDA	2021	2024
16. Poloidal Polarimeter	1 Set	55.C6	JADA	2020	2024
17. Pressure Gauges	4 Sets	55.G3	EUDA	2021	2023
18. Rogowski Coils	6 Sets	55.AN	IO	2024	2025
19. Thermocouples	3 Sets	55.G2	IO	2021	2024
20. Thomson Scattering	2 Sets	55.C4	RFDA	2022	2024
21. Lost Alpha Monitor	2 Sets	55.B9	IO	2022	2023
22. Toroidal Coils	6 Sets	55.AO	EUDA	2019	

2.1 Technical Scope

The following summarizes the full scope of work required for integrating and preparing the CAs for installation in the Tokamak machine:

- Acceptance Tests of the FII and CBs
- Integration of the FII and CBs to form the CAs
- Factory Acceptance Tests of the CAs
- Functional Tests (Knuckle Test for the CB, Instrumentation and Diagnostics)

- Customization, welding and testing of cooling pipes on CA
- Cleaning, packaging and delivery of the CAs to IO
- Storage of FII and CAs (as needed)

This scope of work is organized into Stages and may not all be under the responsibility of the Integrator. Refer to Section 2.4 for more information.

From a technical standpoint, these components are all classified Quality Class 1 and Vacuum Quality Class 1. These components are outside the scope of the ESPN regulation and classified non-Protection Important Components. Additionally, a number of them are classified Metrology Class 1. Overall, the manufacturing of these items requires state of the art industrial codes and standards.

2.1.1 Acceptance Tests of Free-Issued Items

The Acceptance Tests of the FII and CB at the Integration Site consists of the following:

- Visual Inspection and review of accelerometers
- Cold He Leak Test (as applicable)
- 3D Geometrical Survey (as applicable)
- Functional Tests (Knuckle Test for the CB, Instrumentation and Diagnostics)

2.1.2 Integration of CAs

The overall integration for completion of a CA for installation in the Tokamak consists in

- Mounting the PFCs onto the CB using the multilink and swaging procedure
- Welding the PFC cooling pipes to the CB cooling pipes
- Installing (for the non-standard CA) the Diagnostics and Instrumentation (welding sensors, boxes, connectors, looming cables)
- Customizing and welding cooling pipes on the CA

The figures below show a summary for integration of a Standard CA. Refer to Annex 2 for the full sequence of Non-Standard CA #41 (based on 2014 baseline). The technical specification for the contract will specify conceptual assembly sequences for each CA. The Integrator will have the charge to develop the detailed assembly sequences.

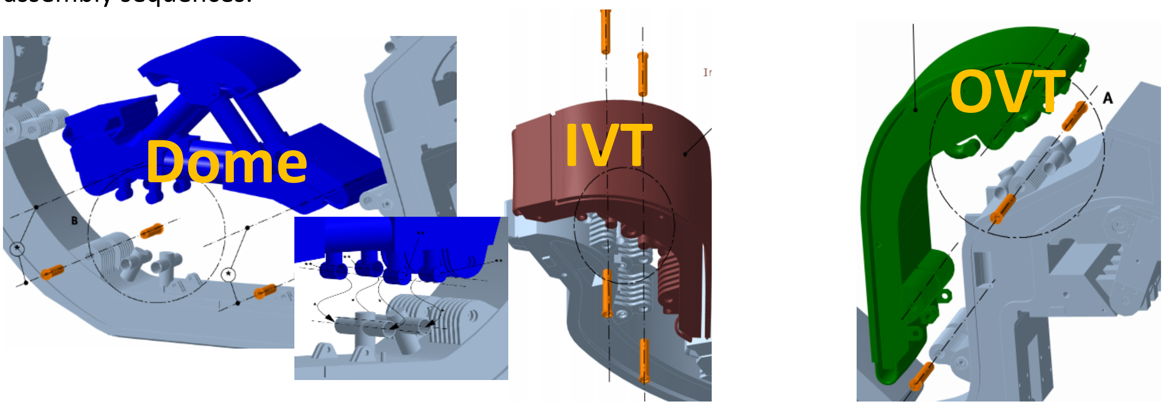


Figure 3: Mounting and Welding Cooling Pipes of Dome, IVT and OVT on CB

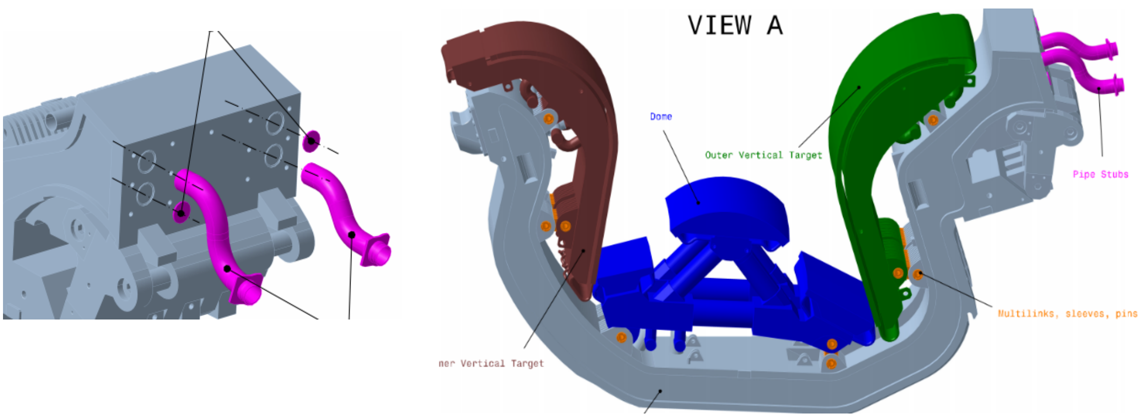


Figure 4: Welding of Customized Cooling Pipes and Complete Standard CA

2.1.3 Factory Acceptance Tests of the CAs

The Factory Acceptance Test of each CA following integration include:

- Cold Water Flow Test
- Hydraulic Pressure Test
- Cold Helium Leak Test (with local heating of welds)
- 3D Geometrical Survey
- Functional Tests

2.2 Skills and Equipment

As part of the past Divertor R&D, mock ups of the components were used to demonstrate the concept for integration of a standard CA. Based on this information and lessons learned in the prototyping and handling of the CB, the following technical skills and equipment are highlighted as key for performing the integration work, handling such heavy equipment, meeting tight tolerances and performing required testing:

- Special Equipment: 5 axis milling machine, etc
- Manufacturing/Assembly Skills:
    - Welding
    - Dimensional Inspections to perform reverse engineering
    - Vacuum Technique
    - Cleanliness
    - Milling and customization
- Engineering Skills

Based on current experience in managing interfaces and interactions with 20+ stakeholders and lessons learned from ITER facilities, the following project management skills are required:

- High quality communication
- High quality, clear procedures
- Flexibility to understand and manage the various maturity of the components and stages
- Allow visits of the various TROs and DAs to the Integration Site

2.3 Integration Site

A single Integration Site fully equipped and capable of performing the full activities is envisioned. The allowable distance between the Integration and ITER Sites will be controlled. This is technically necessary in order to credit the Factory Acceptance Tests as Site Acceptance Tests (SAT). The purpose of the SAT would be to confirm that there was no damage during the transportation of the CAs to the ITER Site. If the distance to the ITER Site after the Factor Acceptance Test is controlled, the risk of damaging a CA during transportation is mitigated and the SAT are technically not needed.

2.4 Stages

The following five stages summarize the integration activities:

1 Prototype – Standard CA (PFC + CB)
  a) Reception and Acceptance Tests of PFC + CB
  b) Integration of Prototype
  c) Factory Acceptance Tests of CA
  d) Cleaning and packaging

2 Prototype – Non-Standard CA (Free-Issued Items + CB)
  a) Reception and Acceptance Tests of Non-Standard FII
  b) Dismounting of Standard CA Prototype
  c) Integration of Non-Standard CA

3 Series – Standard CA (PFCs + CB)
  a) Reception and Acceptance Tests of PFC + CB
  b) Integration of Series Standard CA
  c) Factory Acceptance Tests of CAs

d) Cleaning, packaging and delivery

4 Series – Non-Standard CA (Free-Issued Items + CB)

a) Reception and Acceptance Tests of PFC + CB + Non-Standard FII
b) Functional Tests of Diagnostics and Instrumentation
c) Integration of Series Non-Standard CA
d) Factory Acceptance Tests of CAs
e) Cleaning, packaging and delivery

5 Storage (as needed)

The tasks for Stages 2, 3 and 4 are similar and build on the lessons learned from Stage 1. For the purpose of the Market Survey, the Integrator is only responsible for providing basic services and support (water, electricity, time and space) for the performance of the functional tests of the Instrumentation and Diagnostics. IO is responsible for performing the actual functional tests, which consist of electrical tests, optical alignments and temperature response tests.

3 Risks

The challenge for this procurement is to develop a collaborative interplay between IO, the DAs, suppliers and the Integrator, while keeping an intricate schedule and addressing technical requirements deviations or non-conformities.

Depending on the procurement strategy, three parent risks can classify from high to medium: Schedule, Non-conformities of Free-Issued Items or CB and Stakeholder Management.

Schedule – As implied in Table 1, the schedule for design, manufacturing and delivery of the Free-Issued Items do not progress at the same rate. Some Items are just finishing the preliminary design and others are readying for series manufacturing. This represents a challenge for delivering final information at the beginning of the contract, including delivery dates of the actual Items. A staged and flexible arrangement with the Integrator will help address this risk.

Non-Conformities of Free-Issued Items – The clearances and tolerance requirements of the CAs are very tight, motivated by functional requirements. As a result, seemingly acceptable non-conformities of individual Free-Issued Items can have serious consequences when considering the build-up of the non-conformities and tolerances. In an extreme case, an Item out of tolerance can prevent proper alignment or even installation of other PFCs, Diagnostics or Instrumentation. Furthermore, most of the Items are first-of-a-kind with a long lead-time and high cost for manufacturing another. A technical Integrator with proper equipment for repairing or addressing non-conformities will help mitigate this risk.

Stakeholder Management – The large number of stakeholders represents a risk because given the different components, technical requirements, schedules, TROs and teams, there is a high probability for miscommunication, inefficiencies, delays and technical issues. However, a single Integrator that is experienced in multi-cultural project management and communication can maintain a big picture perspective to issue common procedures and strategy, yet be knowledgeable and flexible enough to provide customized solutions to the stakeholders. Additionally, early involvement of the Integrator during the prototype phase is important to facilitate the implementation of lessons learned for series production.

4 Procurement Strategy

A single contract that consists of five stages (Section 2.4) with a duration of 10+ years is proposed.

The stages are defined to build on previous stages with some overlap and parallel activities expected. Each stage will have its own procedures, deliverables, schedule, budget and incentive scheme. Instructions to Proceed (ITP) will be used to confirm the expectations (scope, schedule, deliverables and budget) of a Stage. Readiness Reviews will be used to review procedures, facilities and equipment to authorize the start of actual physical activities (reception, integration, factory acceptance tests, etc). The dates and frequency of these tools (ITPs and Readiness Reviews) will be agreed at the signing of the contract.

Note that an incentive scheme as part of the procurement strategy is important to incentivize the Integrator to identify realistic and implementable lessons learned and address schedule related risks.

Annex 1: Divertor CA Integrator – FAQ

These Frequently Asked Questions provide supporting information for the Divertor Cassette Assembly (CA) Integrator Market Survey. It provides background and supporting information for understanding and responding to the questions of the market survey. Note that this information is not contractual in any way and may evolve and differ significantly at the Call for Tender.

1 **Why does the ITER Organization (IO) aim to place a contract with one single integrator for the full scope of the project?** The stages build on each other, primarily, the series production depends heavily on the qualification and lessons learned from the prototype stages. **Could it be envisaged to place two contracts in parallel for respectively the standard and non-standard CA?** In order to be able to integrate a non-standard CA, a supplier essentially has to qualify a prototype standard CA. This would limit the application of lessons learned and learning curves. This also adds the complication of coordinating the delivery of the Plasma Facing Components and Cassette Bodies to supply both Integration Sites and would probably require some storage at both sites too.

2 **In particular, the storage could be perceived as an independent activity not subject to specific technical expertise which could be contracted from a separate contractor. Would it be acceptable from a technical point of view to store parts with another contractor than the Integrator?** Every time a component is transferred from one entity (supplier, IO or Domestic Agencies), some kind of acceptance check must be done. For the CA components, we are generally talking about a Cold Water Flow Test, a 3D Survey and possible a Knuckle Test. Due to the size of these components, this requires special equipment that the Integrator will already need to have anyway. Expecting a storage supplier to also have this equipment is costly and requires additional time. These requirements could be relaxed at the risk of complicating the transfer of responsibility.

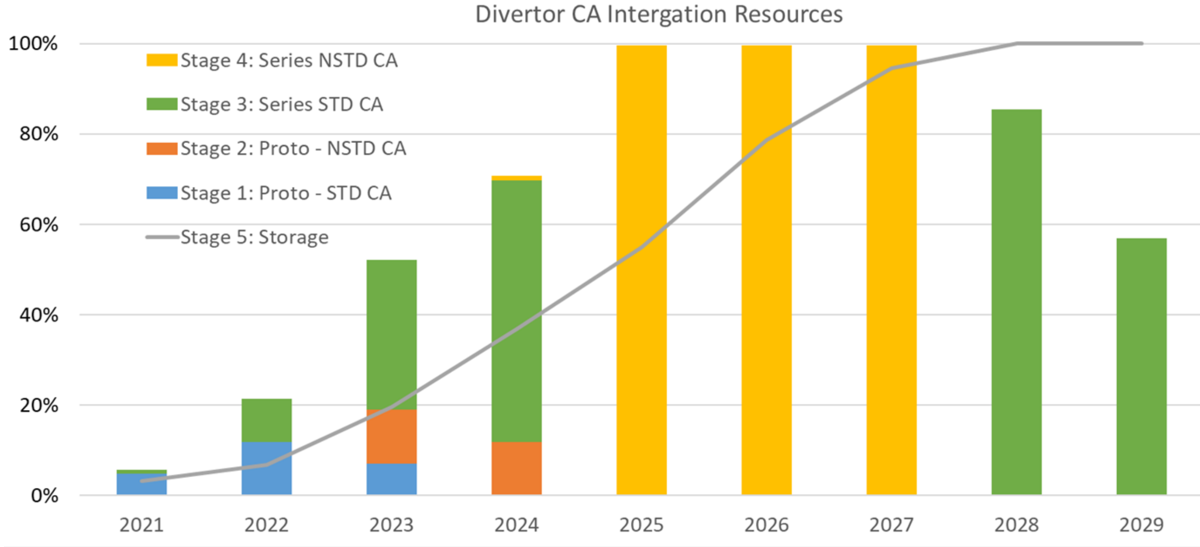
3 **Why do we aim to implement the Prototype for standard CA and non-standard CA sequentially (instead of in parallel)?** The lessons learned and qualification of the prototype standard CA is of high priority so the series production of the standard CA can start as quickly as possible. The non-standard CAs prototype require input from the Diagnostics which will not be mature enough at the time of the contract signature and would cause delays to the prototype standard CA. Furthermore, it is efficient to focus on the integration of a standard CA before adding the various and differing requirements of a non-standard CA. A sequential planning also allows the opportunity to practice dismantling a completed standard CA and rebuilding. This will help address non-conformities of a fully assembled CA.

4 **Why do we aim to alternate the series production of the standard and non-standard CA?** This is due to the schedule. Several simulations were done considering the durations of activities for standard and non-standard activities (non-standard CAs take longer to integrate), delivery schedule of the components and in particular, the scheduling for the non-standard CAs. Ideal scenario would be to do all the standard CAs first and finish with the non-standard CA, but this creates a significant delay in the delivery of CA-54. Scheduling the non-standard CAs in the middle of the standard CAs optimizes the schedule, takes advantage of gaps in the delivery of critical components and optimizes the use of the two integration production lines. This is an example where the exact sequence of activities should be confirmed at the beginning of a stage once we have better confirmation of the delivery dates of the components.

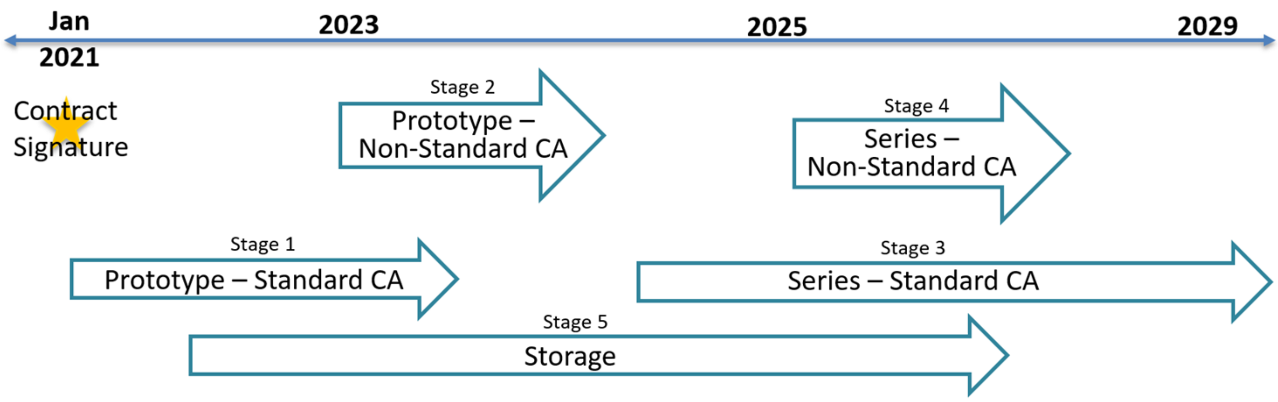
5 **Considering the fact that a constant work distribution would be most cost effective, it is recommended to give the Integrator the possibility to work on several CA in parallel and/or to swap work packages (i.e. allow modification of installation sequence). Are before mentioned options possible?** The Dome always has to be installed first, followed by the OVT and then the IVT. The sequence for the customization and welding the cooling pipes can differ. The sequencing for the non-standard items can be swapped. Note that the current planning assumes two production lines, meaning that two CAs can be integrated at the same time. To try to work on three or more, additional equipment to move, manipulate, and store the other CAs would be needed.

6 **Would it be possible to define all installation work packages upfront and order the work packages on a piece by piece basis?** Advanced conceptual documentation is available, but this needs further work for confirmation. It is only after the prototype of the standard CA that we will have real confirmation of the works needed. For the non-standard CA, due to the maturity of the free-issued items, final and reliable information is not available at this time and will not be available for a while. We can provide conceptual assembly sequences for each CA for the Integrator to complete the detailed sequences.

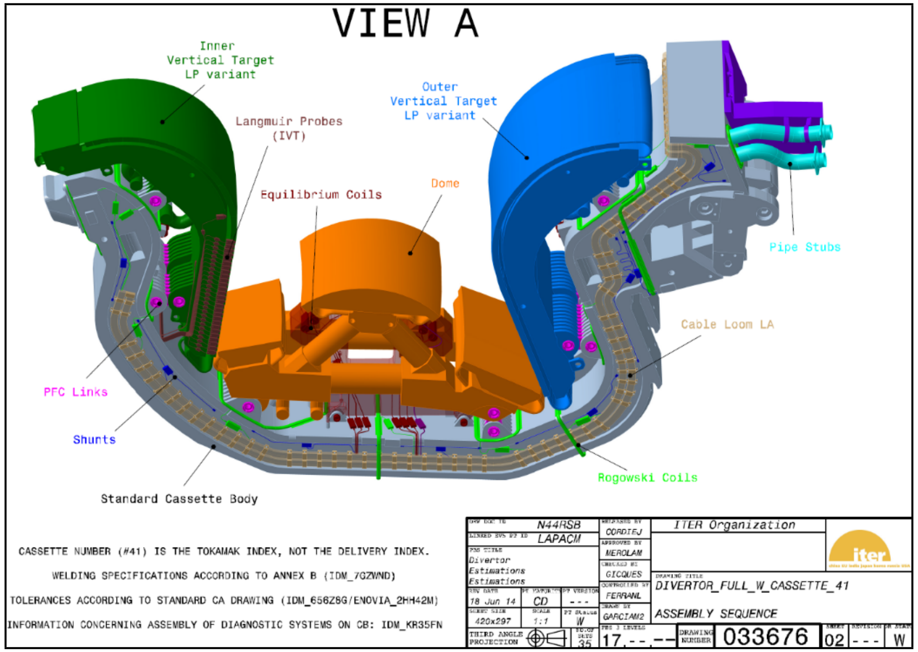
7 **What would the resource load curve look like for this scope of work?** A potential curve is shown below with peak activities between 2025-2027.

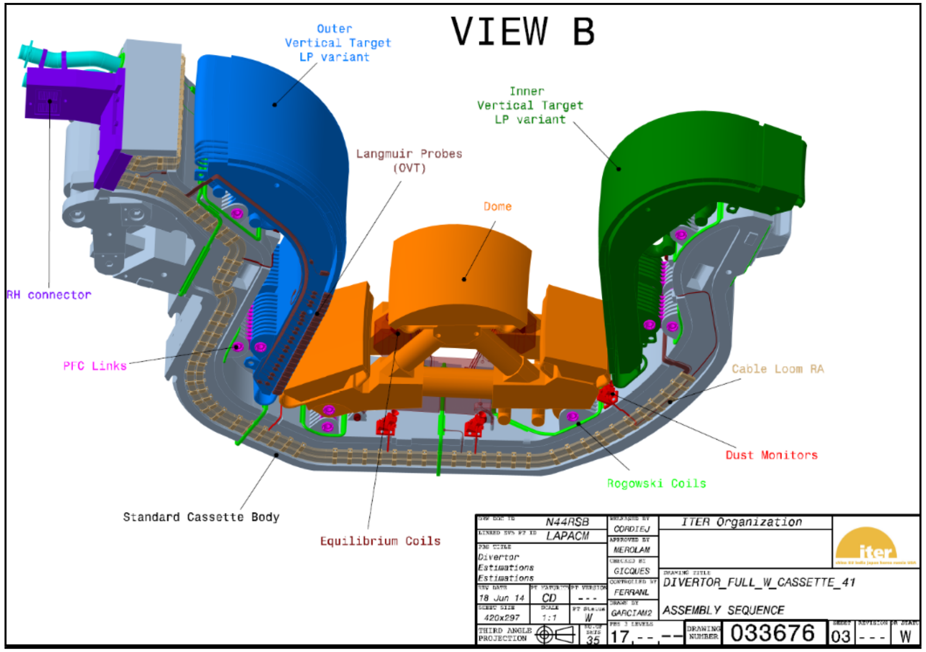


8 **Is a general timeline of the Stages available?** A potential timeline is shown below.



Annex 2: Conceptual Assembly Sequence CA #41





CUT OUTS & STUDS WELDED

Before starting the assembly of Divertor Cassette #41, it is necessary to perform some operations on CB, in order to allow the installation of the Diagnostics systems.

CUT OUTS ON CB

The Divertor Cassette Body #41 needs four types of slots:

A To let room for the set cable loom LA + cable loom RA + RH side Connector three cut outs are required.

B To integrate the Langmuir Probes in the CB two cut outs are required, in order to allow the passage of cables from the Outer and Inner targets to side grooves.

C To allow the passage of the equilibrium and toroidal coils cables to the side groove of CB, four slots are required.

D To mount the Dust Monitors on the CB some different operations are required on the Cassette.

E Some slots are required in order to install properly the Rogowski Coils.

For further information of the CB cut outs: see CUT_OUTS_DRAWING ENOVIA ID: #MPY5YN

STUDS WELDED ONTO CB

The Divertor Cassette #41 requires the positioning of studs along the sideplates and the top of CB for the subsequent installation of the cable loom LA and RA.

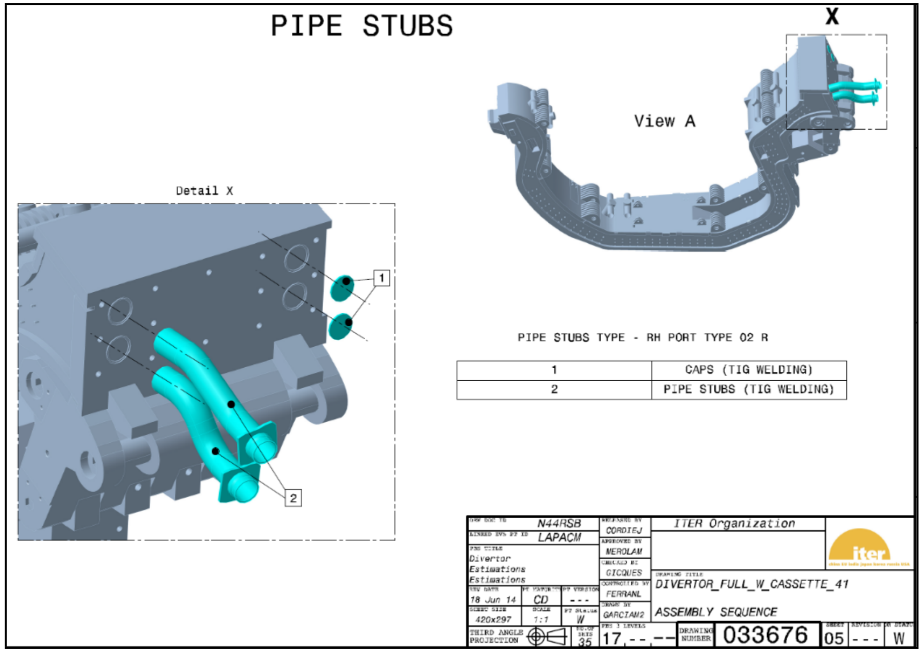
There will be 171 studs welded to the left sideplate of the CB, 171 to the right sideplate and 30 on top of CB (loom studs).

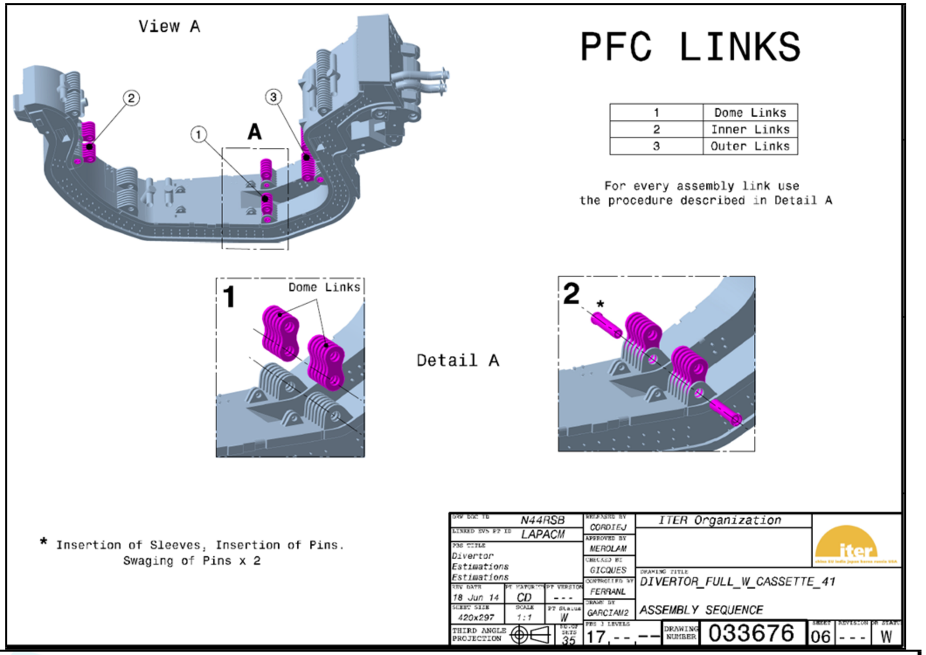
Also, there will be 6 studs welded on CB under IVT and OVT, for Orthogonal coils assembly

16 studs welded are needed to fix the Dust Monitors to CB.

For further information of the studs, their geometry and position: see STUD_WELD_DISTRIBUTION; ENOVIA ID: #MUJBN6

N44RSB LAPACM CORDIEJ MEROLAM GICQUES FERRANL GARCIAM2 — ITER Organization — Divertor Estimations Estimations — 18 Jun 14 — 420x297 — 1:1 — DIVERTOR_FULL_W_CASSETTE_41 — ASSEMBLY SEQUENCE — 17.-- — 033676 — 04




PFC LINKS
View A
A
1	Dome Links
2	Inner Links
3	Outer Links
For every assembly link use the procedure described in Detail A
Dome Links
Detail A
* Insertion of Sleeves, Insertion of Pins. Swaging of Pins x 2
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Divertor Estimations Estimations
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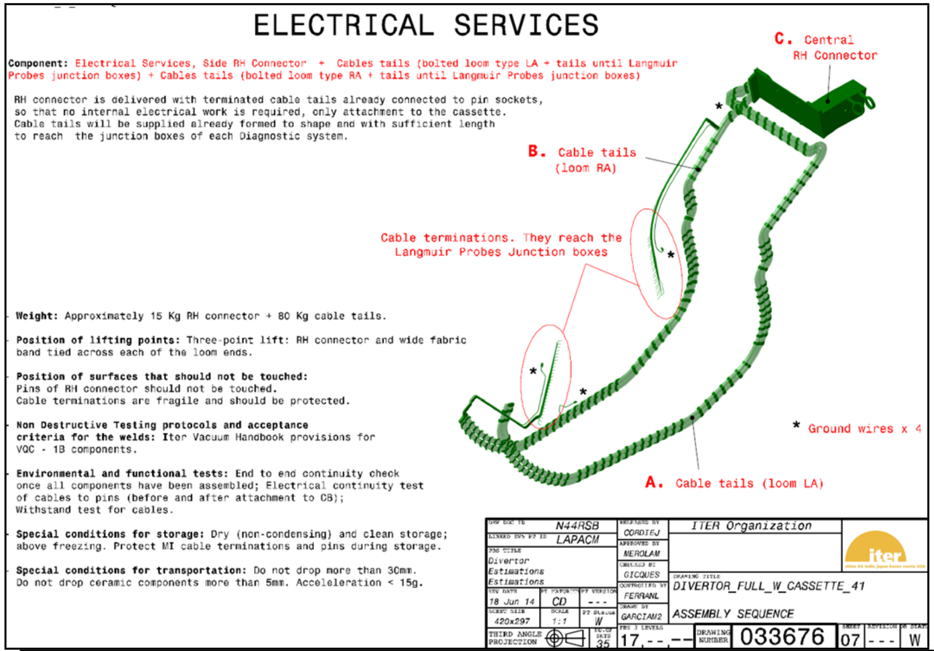
ELECTRICAL SERVICES
Component: Electrical Services, Side RH Connector + Cables tails (bolted loom type LA + tails until Langmuir Probes junction boxes) + Cables tails (bolted loom type RA + tails until Langmuir Probes junction boxes)
RH connector is delivered with terminated cable tails already connected to pin sockets, so that no internal electrical work is required, only attachment to the cassette. Cable tails will be supplied already formed to shape and with sufficient length to reach the junction boxes of each Diagnostic system.
Weight: Approximately 15 Kg RH connector + 80 Kg cable tails.
Position of lifting points: Three-point lift: RH connector and wide fabric band tied across each of the loom ends.
Position of surfaces that should not be touched: Pins of RH connector should not be touched. Cable terminations are fragile and should be protected.
Non Destructive Testing protocols and acceptance criteria for the welds: Iter Vacuum Handbook provisions for VQC - 1B components.
Environmental and functional tests: End to end continuity check once all components have been assembled; Electrical continuity test of cables to pins (before and after attachment to CB); Withstand test for cables.
Special conditions for storage: Dry (non-condensing) and clean storage; above freezing. Protect MI cable terminations and pins during storage.
Special conditions for transportation: Do not drop more than 30mm. Do not drop ceramic components more than 5mm. Acceleration < 15g.
C. Central RH Connector
B. Cable tails (loom RA)
Cable terminations. They reach the Langmuir Probes Junction boxes
* Ground wires x 4
A. Cable tails (loom LA)
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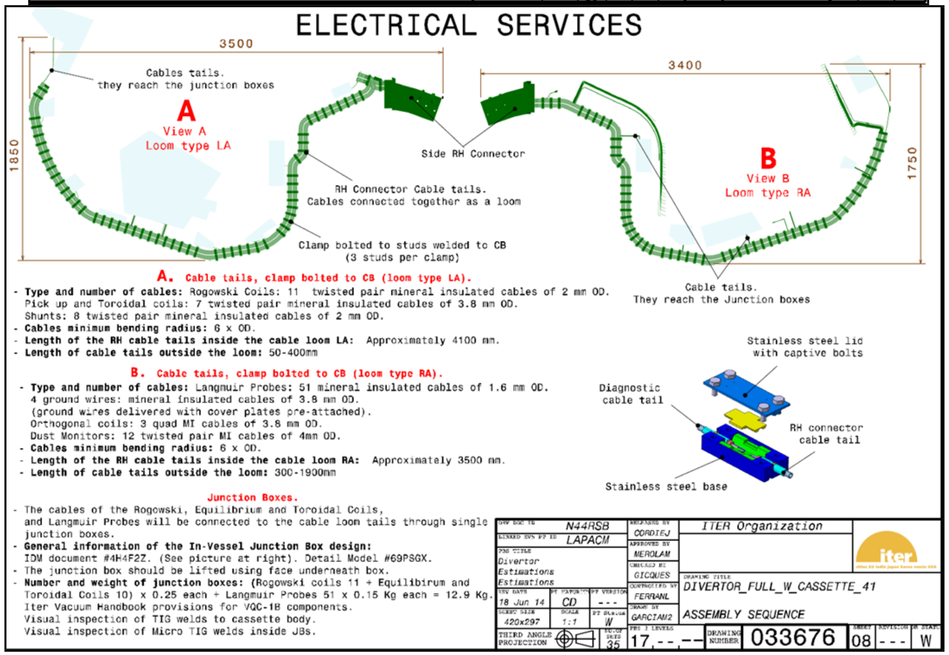
ELECTRICAL SERVICES
3500
Cables tails. they reach the junction boxes
A
View A
Loom type LA
1850
Side RH Connector
RH Connector Cable tails. Cables connected together as a loom
Clamp bolted to studs welded to CB (3 studs per clamp)
3400
B
View B
Loom type RA
1750
Cable tails. They reach the Junction boxes
A. Cable tails, clamp bolted to CB (loom type LA).
- Type and number of cables: Rogowski Coils: 11 twisted pair mineral insulated cables of 2 mm OD. Pick up and Toroidal coils: 7 twisted pair mineral insulated cables of 3.8 mm OD. Shunts: 8 twisted pair mineral insulated cables of 2 mm OD.
- Cables minimum bending radius: 6 x OD.
- Length of the RH cable tails inside the cable loom LA: Approximately 4100 mm.
- Length of cable tails outside the loom: 50-400mm
B. Cable tails, clamp bolted to CB (loom type RA).
- Type and number of cables: Langmuir Probes: 51 mineral insulated cables of 1.6 mm OD. 4 ground wires: mineral insulated cables of 3.8 mm OD. (ground wires delivered with cover plates pre-attached). Orthogonal coils: 3 quad MI cables of 3.8 mm OD. Dust Monitors: 12 twisted pair MI cables of 4mm OD.
- Cables minimum bending radius: 6 x OD.
- Length of the RH cable tails inside the cable loom RA: Approximately 3500 mm.
- Length of cable tails outside the loom: 300-1900mm
Stainless steel lid with captive bolts
Diagnostic cable tail
RH connector cable tail
Stainless steel base
Junction Boxes.
- The cables of the Rogowski, Equilibrium and Toroidal Coils, and Langmuir Probes will be connected to the cable loom tails through single junction boxes.
- General information of the In-Vessel Junction Box design: IDM document #4H4F2Z. (See picture at right). Detail Model #69PSGX.
- The junction box should be lifted using face underneath box.
- Number and weight of junction boxes: (Rogowski coils 11 + Equilibirum and Toroidal Coils 10) x 0.25 each + Langmuir Probes 51 x 0.15 Kg each = 12.9 Kg. Iter Vacuum Handbook provisions for VQC-1B components. Visual inspection of TIG welds to cassette body. Visual inspection of Micro TIG welds inside JBs.
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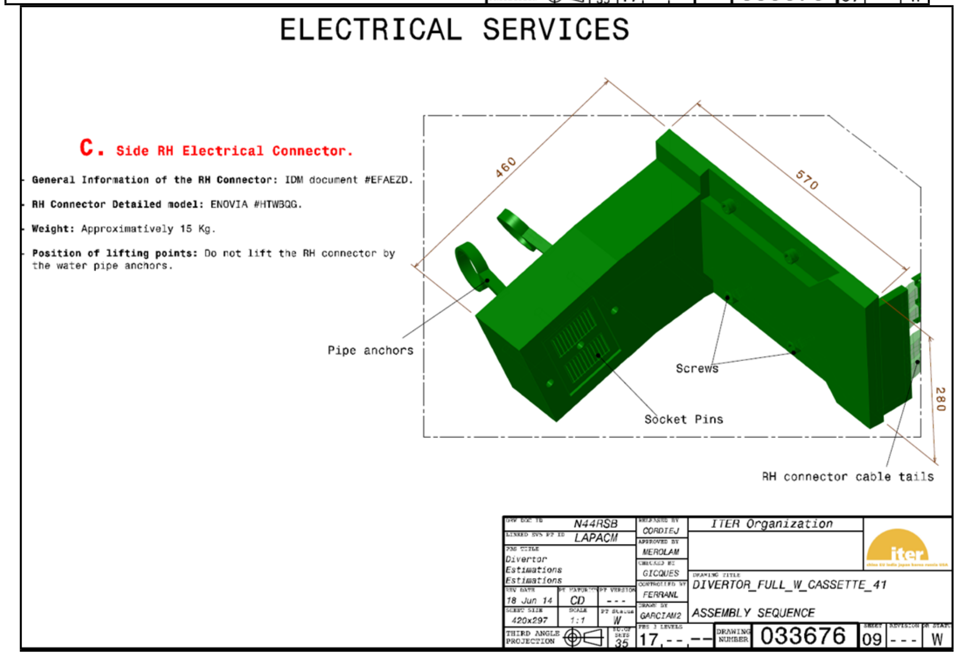
ELECTRICAL SERVICES
C. Side RH Electrical Connector.
General Information of the RH Connector: IDM document #EFAEZD.
RH Connector Detailed model: ENOVIA #HTWBQG.
Weight: Approximatively 15 Kg.
Position of lifting points: Do not lift the RH connector by the water pipe anchors.
460
570
280
Pipe anchors
Screws
Socket Pins
RH connector cable tails
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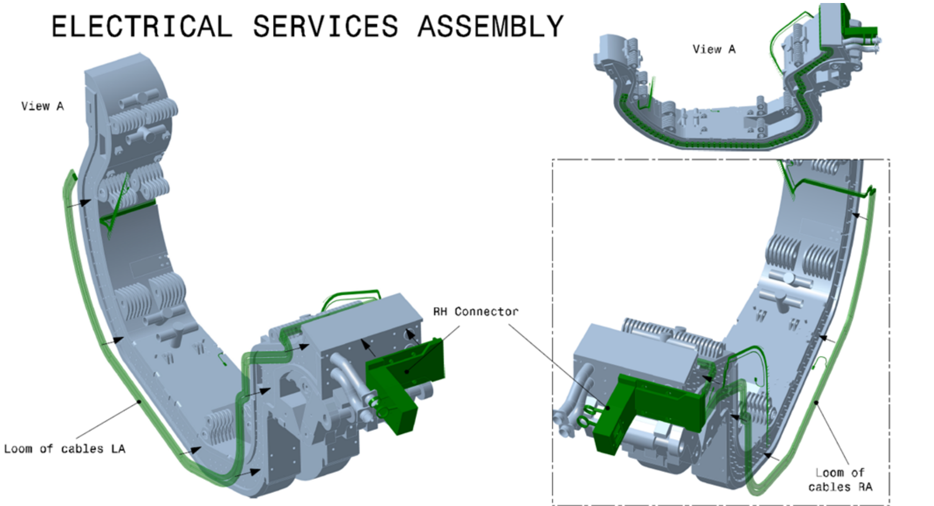
ELECTRICAL SERVICES ASSEMBLY



RH connector is delivered with terminated cable tails already connected to pin sockets, so that no internal electrical work is required, only attachment to the cassette. Cable tails will be supplied already formed to shape and with sufficient length to reach the thermocouples positions.
In order to position the two cable looms (LA & RA) simultaneously inside the side grooves, it will be necessary to bend and unbend one of the looms (TBD).

The free ends of the looms will need some support/protection so that they are not damaged during installation of the Plasma Facing Components and the rest of Diagnostics devices (TBD).

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LINKED SVS PT ID: LAPACM	APPROVED BY: MEROLAM		
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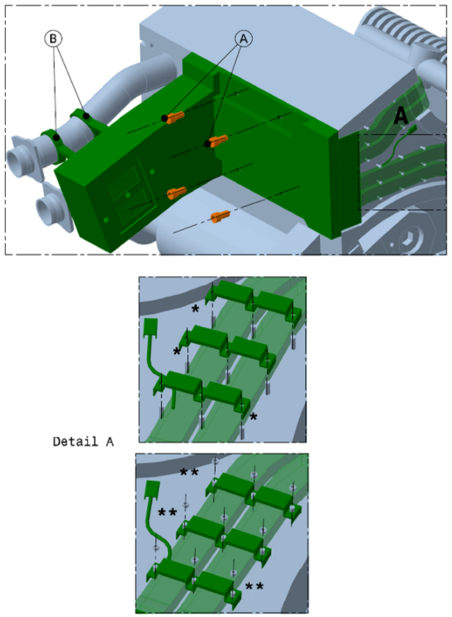
REV DATE: 18 Jun 14 / PT MATURITY: CD / PT VERSION: ---	CONTROLLED BY: FERRANL		
SHEET SIZE: 420x297 / SCALE: 1:1 / PT Status: W	DRAWN BY: GARCIAM2	ASSEMBLY SEQUENCE	
THIRD ANGLE PROJECTION / NO.OF SHTS: 35	PBS 3 LEVELS: 17.--.--	DRAWING NUMBER: 033676	SHEET: 10 / REVISION: --- / DR STATUS: W



Steps:

1- Installation of Side RH Connector

A - Installation of inserts (with two pins) on the Cassette´s corresponding holes, insertion of screws and belleville washers x 4

B - Connection of the pipe anchors to the Cassette Pipes Stubs

2 - Fixation of cable loom LA on CB sideplates and on top of CB

* Place the two cable looms between the studs.
Put the clamps into position x 69.

** Insertion of nuts and Belleville washers x 207.

3 - Fixation of cable loom RA on CB right sideplate

* Place the two cable looms between the studs.
Put the clamps into position x 55.

** Insertion of nuts and Belleville washers x 165.

DWG DOC ID: N44RSB	PREPARED BY: CORDIEJ	ITER Organization	
LINKED SVS PT ID: LAPACM	APPROVED BY: MEROLAM		
PBS TITLE: Divertor Estimations Estimations	CHECKED BY: GICQUES	DRAWING TITLE: DIVERTOR_FULL_W_CASSETTE_41	
REV DATE: 18 Jun 14 / PT MATURITY: CD / PT VERSION: ---	CONTROLLED BY: FERRANL		
SHEET SIZE: 420x297 / SCALE: 1:1 / PT Status: W	DRAWN BY: GARCIAM2	ASSEMBLY SEQUENCE	
THIRD ANGLE PROJECTION / NO.OF SHTS: 35	PBS 3 LEVELS: 17.--.--	DRAWING NUMBER: 033676	SHEET: 11 / REVISION: --- / DR STATUS: W

ELECTRICAL SERVICES ASSY

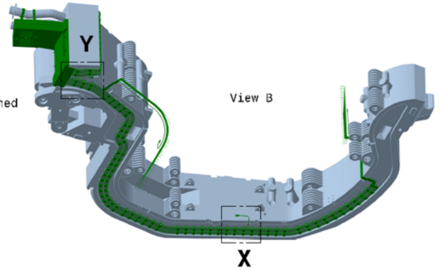
4. Fixation of ground wires.

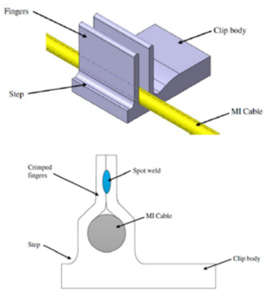
4.1 Once out of the cable loom RA, these ground wires will be attached to CB by single clips. There will be one clip every 30mm.

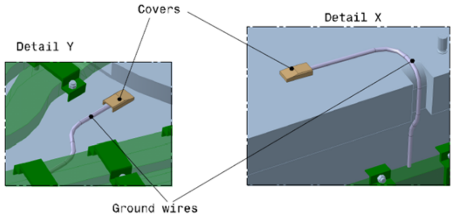
A. Capacitive Discharge (CD) weld to attach the clip body to CB.

B. Insertion of cable.

C. Spot weld to close the clips fingers.







Non Destructive Protocols and acceptance criteria for clip welds:
Iter Vacuum Handbook provisions for VQC-1B components.
Visual inspection of CD clip welds.
If suspect, 2 mm TIG weld of base of clip (side away from the cable).

4.2 Fix the cover plate of the ground wire. Spot welded to CB

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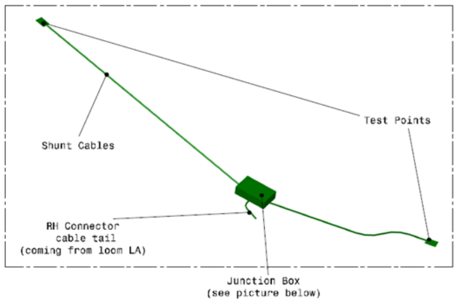
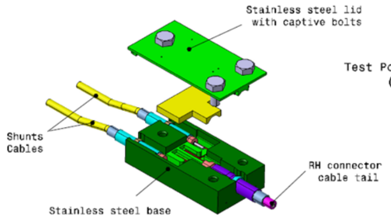
LINKED SVS PT ID: LAPACM	APPROVED BY: MEROLAM		
PBS TITLE: Divertor Estimations Estimations	CHECKED BY: GICQUES	DRAWING TITLE: DIVERTOR_FULL_W_CASSETTE_41	
REV DATE: 18 Jun 14 / PT MATURITY: CD / PT VERSION: ---	CONTROLLED BY: FERRANL		
SHEET SIZE: 420x297 / SCALE: 1:1 / PT Status: W	DRAWN BY: GARCIAM2	ASSEMBLY SEQUENCE	
THIRD ANGLE PROJECTION / NO.OF SHTS: 35	PBS 3 LEVELS: 17.--.--	DRAWING NUMBER: 033676	SHEET: 12 / REVISION: --- / DR STATUS: W

SHUNTS

- **Component:** Shunts (8 sensors).
- **Weight:** Each Set, Shunt + Junction Box = 1 Kg.
  So, the whole system 8 Kg.
- **Environmental and functional tests to be performed on the system:**
  Electrical conduction. Calibration with current pulse through the CB.
- **Type/number of cables:** 2 x Single core mineral insulated cable of 2mm OD per shunt.



- **Component:** Junction Boxes 2 to 1 cables
- **General information of the In-Vessel Junction Box design:**
  IDM document #4H4F2Z. (See picture below). Detail Model #L44ZYG.
- The junction box should be lifted using face underneath box.
- **Number and weight of junction boxes:** 0.25 Kg each x 8 = 2 Kg.
- **Non Destructive Protocols and acceptance criteria for welds:**
  Iter Vacuum Handbook provisions for VQC-1B components.
  Visual inspection of TIG welds to cassette body.
  Visual inspection of Micro TIG welds inside JBs.



Test Points: The cable terminations are attached to a metallic plates.
(cables supplied already attached to the metallic plates).

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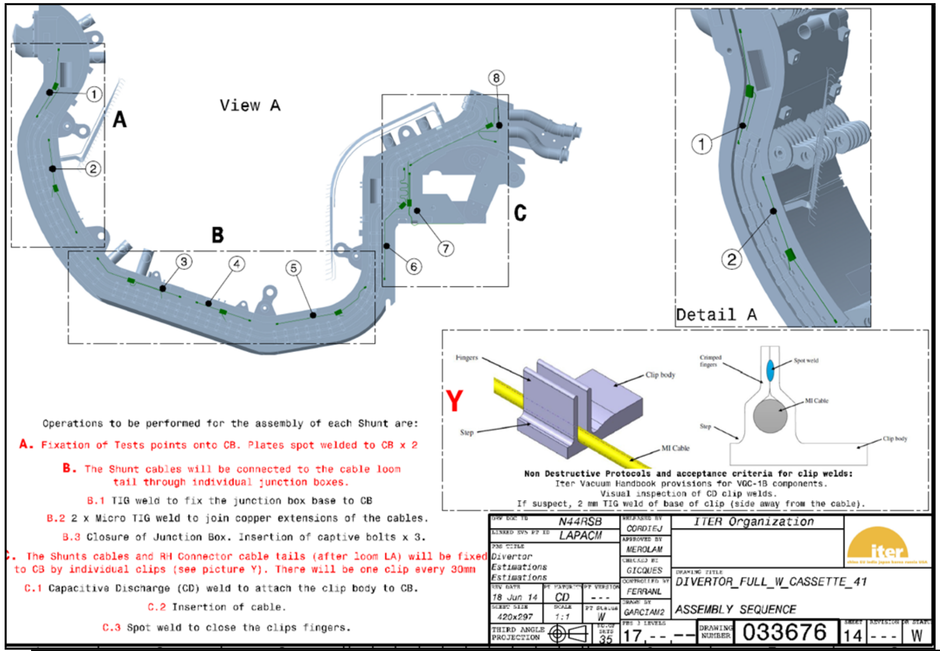
LINKED SVS PT ID: LAPACM	APPROVED BY: MEROLAM		
PBS TITLE: Divertor Estimations Estimations	CHECKED BY: GICQUES	DRAWING TITLE: DIVERTOR_FULL_W_CASSETTE_41	
REV DATE: 18 Jun 14 / PT MATURITY: CD / PT VERSION: ---	CONTROLLED BY: FERRANL		
SHEET SIZE: 420x297 / SCALE: 1:1 / PT Status: W	DRAWN BY: GARCIAM2	ASSEMBLY SEQUENCE	
THIRD ANGLE PROJECTION / NO.OF SHTS: 35	PBS 3 LEVELS: 17.--.--	DRAWING NUMBER: 033676	SHEET: 13 / REVISION: --- / DR STATUS: W


View A
A
B
C
Detail A
Y
Fingers
Clip body
Step
MI Cable
Crimped fingers
Spot weld
Step
MI Cable
Clip body
Non Destructive Protocols and acceptance criteria for clip welds:
Iter Vacuum Handbook provisions for VQC-1B components.
Visual inspection of CD clip welds.
If suspect, 2 mm TIG weld of base of clip (side away from the cable).
Operations to be performed for the assembly of each Shunt are:
A. Fixation of Tests points onto CB. Plates spot welded to CB x 2
B. The Shunt cables will be connected to the cable loom tail through individual junction boxes.
B.1 TIG weld to fix the junction box base to CB
B.2 2 x Micro TIG weld to join copper extensions of the cables.
B.3 Closure of Junction Box. Insertion of captive bolts x 3.
C. The Shunts cables and RH Connector cable tails (after loom LA) will be fixed to CB by individual clips (see picture Y). There will be one clip every 30mm
C.1 Capacitive Discharge (CD) weld to attach the clip body to CB.
C.2 Insertion of cable.
C.3 Spot weld to close the clips fingers.
N44RSB
LAPACM
Divertor
Estimations
Estimations
18 Jun 14
CD
420x297
1:1
W
THIRD ANGLE PROJECTION
CORDIEJ
MEROLAM
GICQUES
FERRANL
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ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
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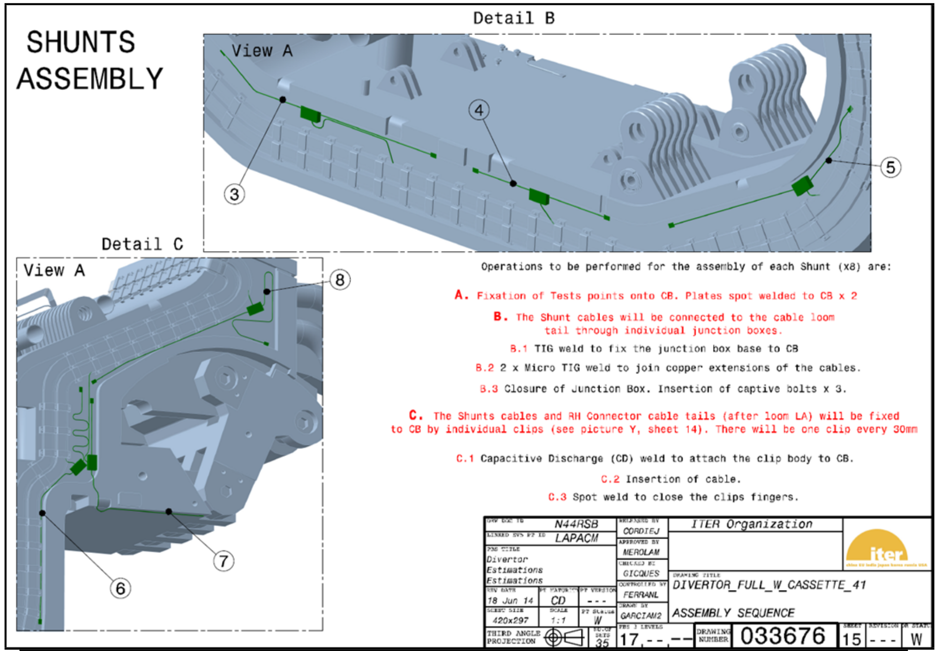
14
W


SHUNTS ASSEMBLY
Detail B
View A
Detail C
View A
Operations to be performed for the assembly of each Shunt (x8) are:
A. Fixation of Tests points onto CB. Plates spot welded to CB x 2
B. The Shunt cables will be connected to the cable loom tail through individual junction boxes.
B.1 TIG weld to fix the junction box base to CB
B.2 2 x Micro TIG weld to join copper extensions of the cables.
B.3 Closure of Junction Box. Insertion of captive bolts x 3.
C. The Shunts cables and RH Connector cable tails (after loom LA) will be fixed to CB by individual clips (see picture Y, sheet 14). There will be one clip every 30mm
C.1 Capacitive Discharge (CD) weld to attach the clip body to CB.
C.2 Insertion of cable.
C.3 Spot weld to close the clips fingers.
N44RSB
LAPACM
Divertor
Estimations
Estimations
18 Jun 14
CD
420x297
1:1
W
THIRD ANGLE PROJECTION
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
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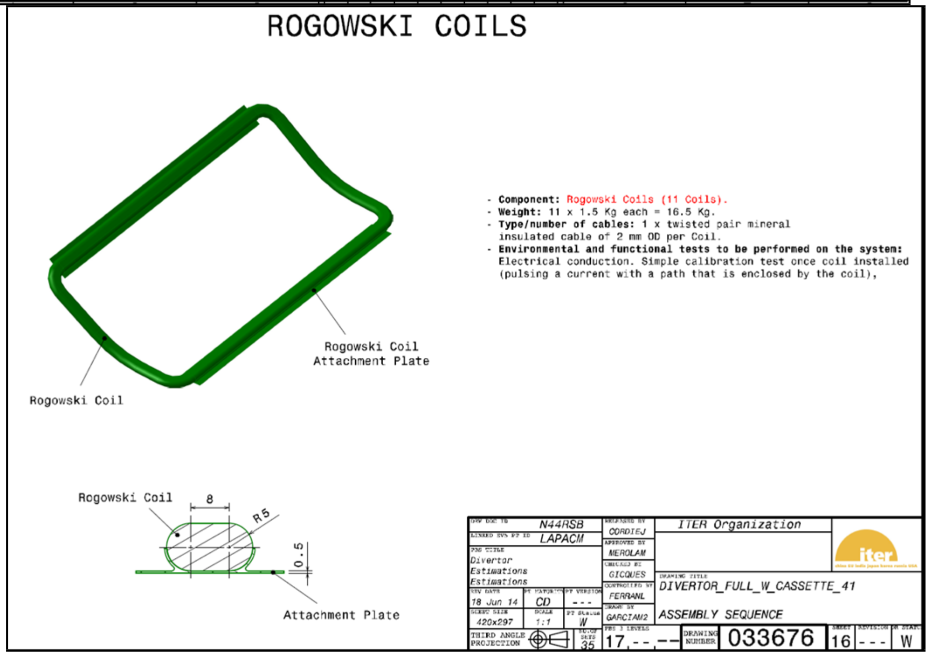
ROGOWSKI COILS
- Component: Rogowski Coils (11 Coils).
- Weight: 11 x 1.5 Kg each = 16.5 Kg.
- Type/number of cables: 1 x twisted pair mineral insulated cable of 2 mm OD per Coil.
- Environmental and functional tests to be performed on the system: Electrical conduction. Simple calibration test once coil installed (pulsing a current with a path that is enclosed by the coil),
Rogowski Coil Attachment Plate
Rogowski Coil
Rogowski Coil
8
R5
0.5
Attachment Plate
N44RSB
LAPACM
Divertor
Estimations
Estimations
18 Jun 14
CD
420x297
1:1
W
THIRD ANGLE PROJECTION
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
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ASSEMBLY SEQUENCE
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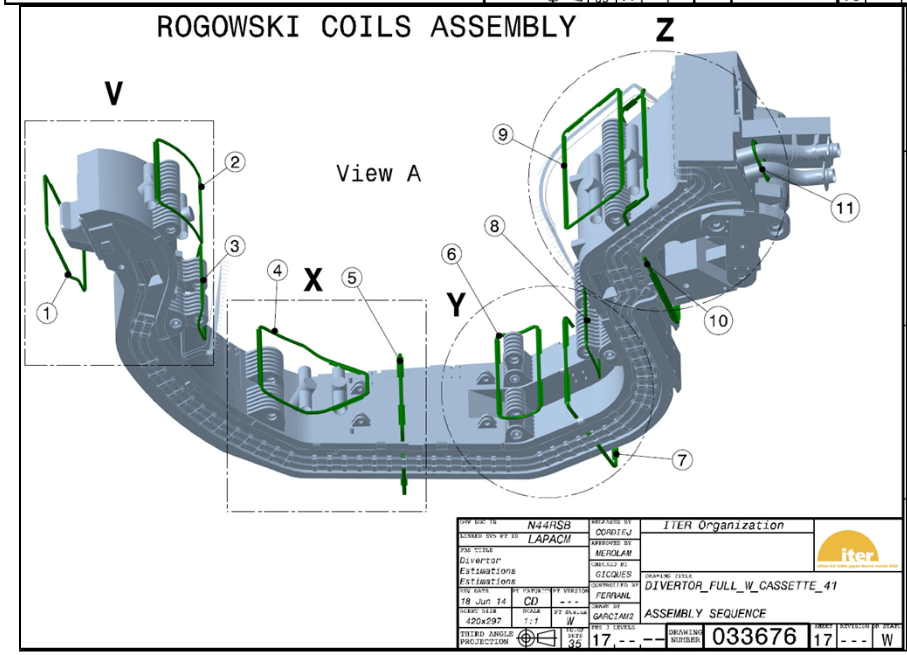
16
W


ROGOWSKI COILS ASSEMBLY
Z
V
View A
X
Y
N44RSB
LAPACM
Divertor
Estimations
Estimations
18 Jun 14
CD
420x297
1:1
W
THIRD ANGLE PROJECTION
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
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DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
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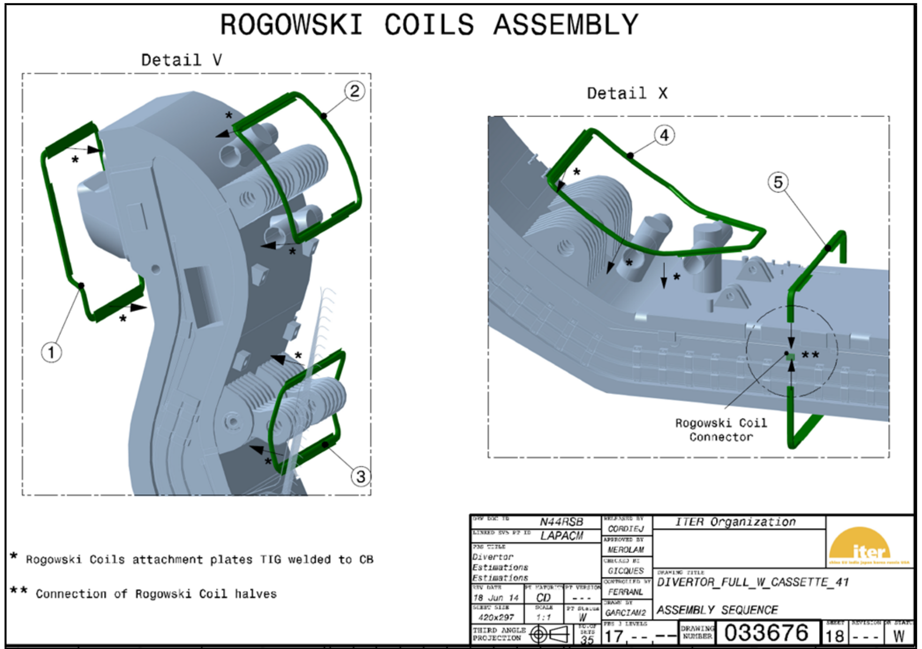
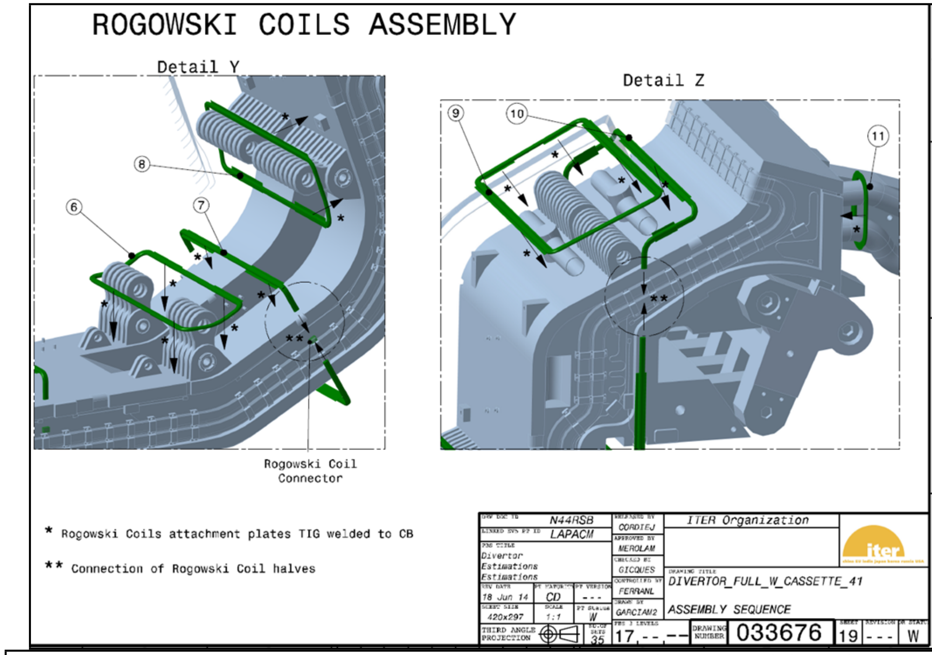
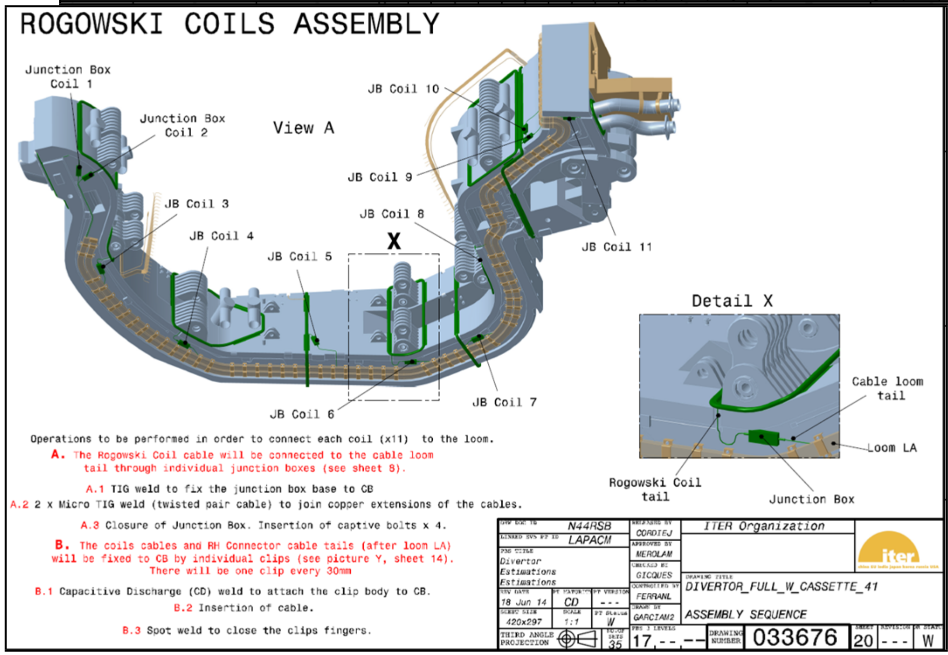
17
W


ROGOWSKI COILS ASSEMBLY
Detail V
Detail X
Rogowski Coil Connector
* Rogowski Coils attachment plates TIG welded to CB
** Connection of Rogowski Coil halves
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
033676
18
W


ROGOWSKI COILS ASSEMBLY
Detail Y
Detail Z
Rogowski Coil Connector
* Rogowski Coils attachment plates TIG welded to CB
** Connection of Rogowski Coil halves
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
033676
19
W


ROGOWSKI COILS ASSEMBLY
Junction Box Coil 1
Junction Box Coil 2
View A
JB Coil 10
JB Coil 9
JB Coil 3
JB Coil 8
JB Coil 4
X
JB Coil 5
JB Coil 11
JB Coil 6
JB Coil 7
Detail X
Cable loom tail
Loom LA
Rogowski Coil tail
Junction Box
Operations to be performed in order to connect each coil (x11) to the loom.
A. The Rogowski Coil cable will be connected to the cable loom tail through individual junction boxes (see sheet 9).
A.1 TIG weld to fix the junction box base to CB
A.2 2 x Micro TIG weld (twisted pair cable) to join copper extensions of the cables.
A.3 Closure of Junction Box. Insertion of captive bolts x 4.
B. The coils cables and RH Connector cable tails (after loom LA) will be fixed to CB by individual clips (see picture Y, sheet 14). There will be one clip every 30mm
B.1 Capacitive Discharge (CD) weld to attach the clip body to CB.
B.2 Insertion of cable.
B.3 Spot weld to close the clips fingers.
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
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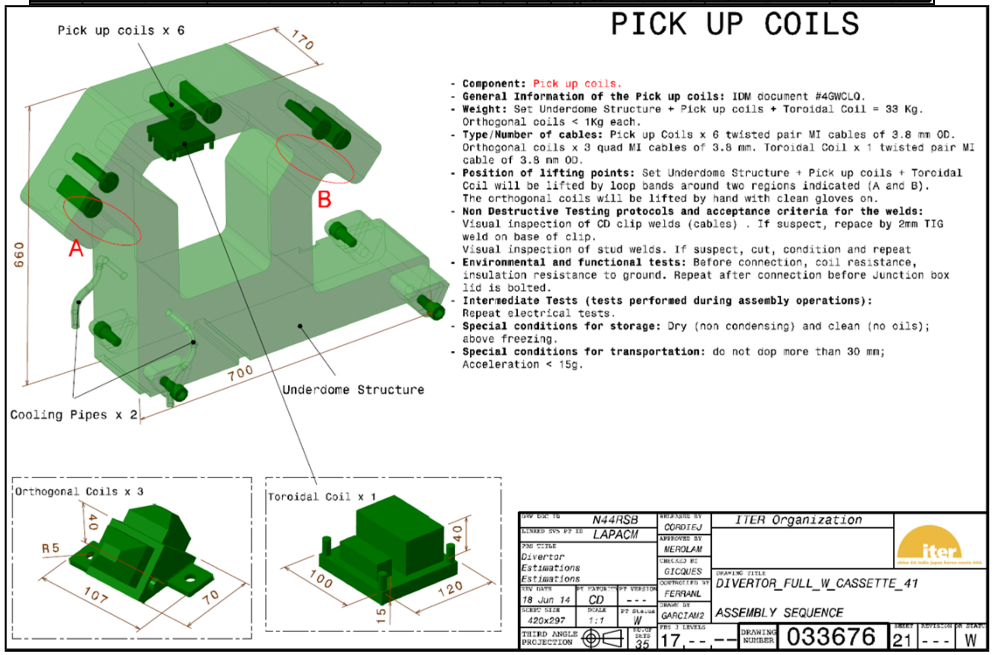
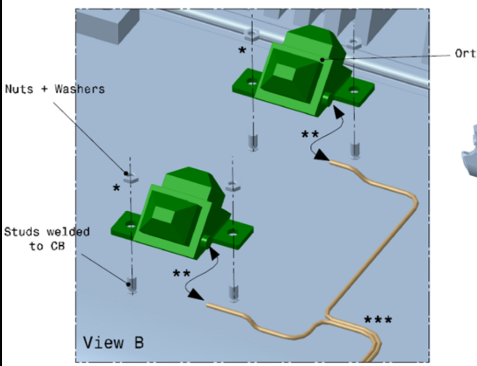
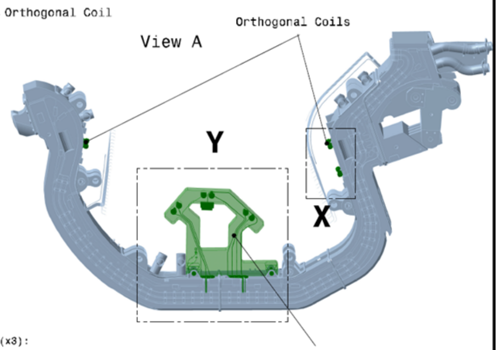
20
W


PICK UP COILS
Pick up coils x 6
170
660
700
A
B
Cooling Pipes x 2
Underdome Structure
- Component: Pick up coils.
- General Information of the Pick up coils: IDM document #4GWCLQ.
- Weight: Set Underdome Structure + Pick up coils + Toroidal Coil = 33 Kg. Orthogonal coils < 1Kg each.
- Type/Number of cables: Pick up Coils x 6 twisted pair MI cables of 3.8 mm OD. Orthogonal coils x 3 quad MI cables of 3.8 mm. Toroidal Coil x 1 twisted pair MI cable of 3.8 mm OD.
- Position of lifting points: Set Underdome Structure + Pick up coils + Toroidal Coil will be lifted by loop bands around two regions indicated (A and B). The orthogonal coils will be lifted by hand with clean gloves on.
- Non Destructive Testing protocols and acceptance criteria for the welds: Visual inspection of CD clip welds (cables). If suspect, repace by 2mm TIG weld on base of clip. Visual inspection of stud welds. If suspect, cut, condition and repeat
- Environmental and functional tests: Before connection, coil resistance, insulation resistance to ground. Repeat after connection before Junction box lid is bolted.
- Intermediate Tests (tests performed during assembly operations): Repeat electrical tests.
- Special conditions for storage: Dry (non condensing) and clean (no oils); above freezing.
- Special conditions for transportation: do not dop more than 30 mm; Acceleration < 15g.
Orthogonal Coils x 3
R5
40
107
70
Toroidal Coil x 1
40
100
120
15
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
033676
21
W

PICK UP COILS ASSEMBLY





Operations to be performed in order to install each Orthogonal coil (x3):

* Installation of Orthogonal Coil, held on with nuts and Belleville washers onto studs (x 2),

** The Orthogonal Coil cable will be connected to the cable loom tail through individual junction boxes (see sheet 8).

Orthogonal coils will be supplied with their cable tails already attached (not shown in Detail X). So, it is only the connection inside the junction box which needs to be made.

1 TIG weld to fix the junction box base to CB

2 4 x Micro TIG weld (quad cable) to join copper extensions of the cables.

3 Closure of Junction Box. Insertion of captive bolts x 4.

*** The Orthogonal cables and RH Connector cable tails (after loom RA) will be fixed to CB by individual clips (see picture Y, sheet 14). There will be one clip every 30mm

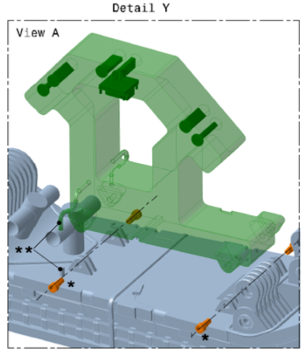
1. Capacitive Discharge (CD) weld to attach the clip body to CB.

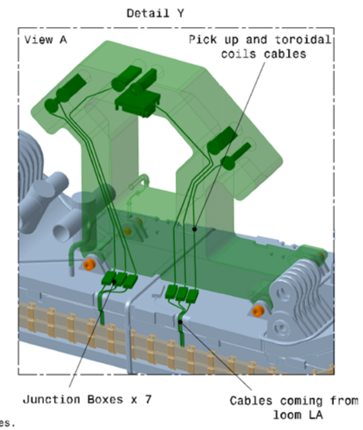
2 Insertion of cable.

3 Spot weld to close the clips fingers.

N44RSB | LAPACM | Divertor Estimations Estimations | 18 Jun 14 | CD | --- | 420x297 | 1:1 | W | THIRD ANGLE PROJECTION | 35 | CORDIEJ | MEROLAM | GICQUES | FERRANL | GARCIAM2 | ITER Organization | DIVERTOR_FULL_W_CASSETTE_41 | ASSEMBLY SEQUENCE | 17,--,-- | 033676 | 22 | --- | W

PICK UP COILS ASSEMBLY





* Insertion of sleeve, insertion of pin, swaging of pin x 4.

** Orbital TIG weld x 2

Operations to be performed in order to connect each coil (x 7) to the loom.

A. The Coil cable will be connected to the cable loom tail through individual junction boxes (see sheet 8).

A.1 TIG weld to fix the junction box base to CB

A.2 2 x Micro TIG weld (twisted pair cable) to join copper extensions of the cables.

A.3 Closure of Junction Box. Insertion of captive bolts x 4.

B. The coils cables and RH Connector cable tails (after loom LA) will be fixed to CB by individual clips (see picture Y, sheet 14). There will be one clip every 30mm

B.1 Capacitive Discharge (CD) weld to attach the clip body to CB.

B.2 Insertion of cable.

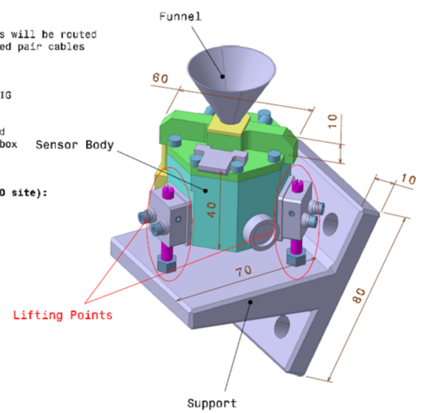
B.3 Spot weld to close the clips fingers.

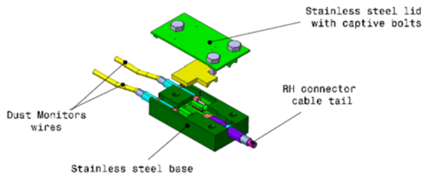
N44RSB | LAPACM | Divertor Estimations Estimations | 18 Jun 14 | CD | --- | 420x297 | 1:1 | W | THIRD ANGLE PROJECTION | 35 | CORDIEJ | MEROLAM | GICQUES | FERRANL | GARCIAM2 | ITER Organization | DIVERTOR_FULL_W_CASSETTE_41 | ASSEMBLY SEQUENCE | 17,--,-- | 033676 | 23 | --- | W

DUST MONITORS

Component: Dust Monitors (x 4).
Weight: Each Dust Monitor 2-3 Kg x 4 = 8-12 Kg.
Position of lifting points: There are three lifting points (see picture).
Position of surfaces that should not be touched: the funnel.
Type/Number of cables: There will be 6 wires per Dust Monitor. These wires will be routed to a Junction box type 2 to 1 cables (see picture below). So only 3 twisted pair cables per monitor will arrive to the loom RE.
Non Destructive Testing protocols and acceptance criteria for the welds:
Iter Vacuum Handbook provision for VQC - 1A.
Visual inspection of CD clip welds (cables) . If suspect, repace by 2mm TIG weld on base of clip.
Visual inspection of stud welds. If suspect, cut, condition and repeat.
Environmental and functional tests: Before connection, wire resistance and insulation resistance to ground. Repeat after connection before Junction box lid is bolted.
Intermediate Tests (tests performed during assembly operations):
Repeat electrical tests.
Integration site Acceptance Tests (tests performed prior to shipment to IO site):
Repeat electrical tests
Special conditions for storage: Dry (non condensing) and clean (no oils); above freezing.
Special conditions for transportation: do not dop more than 100 mm; Acceleration < 15g.

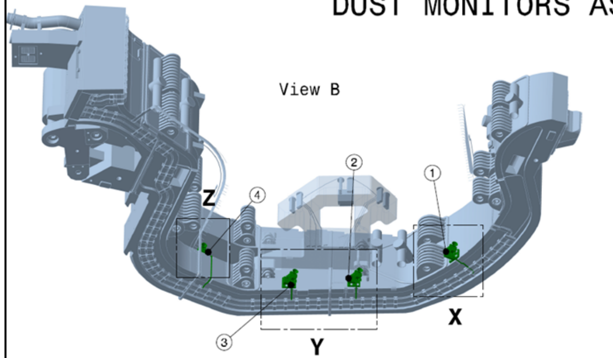
Component: Junction Boxes 2 to 1 cables
General information of the In-Vessel Junction Box design:
IDM document #4H4F2Z. (See picture below). Detail Model #L44ZYG.
The junction box should be lifted using face underneath box.
Number and weight of junction boxes:
0.25 Kg each x 3 per Dust Monitor x 4 Dust Monitors = 3 Kg.
Non Destructive Protocols and acceptance criteria for welds:
Iter Vacuum Handbook provisions for VQC-1B components.
Visual inspection of TIG welds to cassette body.
Visual inspection of micro TIG welds inside JBs.

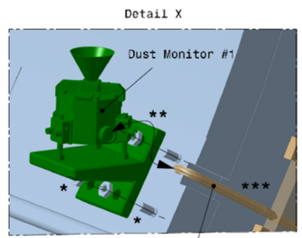




N44RSB | LAPACM | Divertor Estimations Estimations | 18 Jun 14 | CD | --- | 420x297 | 1:1 | W | THIRD ANGLE PROJECTION | 35 | CORDIEJ | MEROLAM | GICQUES | FERRANL | GARCIAM2 | ITER Organization | DIVERTOR_FULL_W_CASSETTE_41 | ASSEMBLY SEQUENCE | 17,--,-- | 033676 | 24 | --- | W

DUST MONITORS ASSEMBLY





Cables coming from loom RE (3 cables)

Operations to be performed in order to install each Dust Monitor (x4):

* Installation of Dust Monitor, held on with nuts and Belleville washers onto studs (x 4),

** The Dust Monitor cables (x6) will be connected to the cable loom tails (x3) through junction boxes (type 2 to 1 cables). There will be 3 Junction Boxes per Monitor.

Dust Monitors will be supplied with their cable tails already attached (not shown in Detail X). So, it is only the connection inside the junction box which needs to be made.

1. TIG weld to fix the junction box base to CB x 3 JB.

2. 2 x Micro TIG weld (twisted pair cable) to join copper extensions of the cables x 3 JB

3. Closure of Junction Box x 3 JB: Insertion of captive bolts x 3.

*** The Dust Monitors cables and RH Connector cable tails (after loom RA) will be fixed to CB by individual clips (see picture Y, sheet 14). There will be one clip every 30mm

1. Capacitive Discharge (CD) weld to attach the clip body to CB.

2 Insertion of cable.

3 Spot weld to close the clips fingers.

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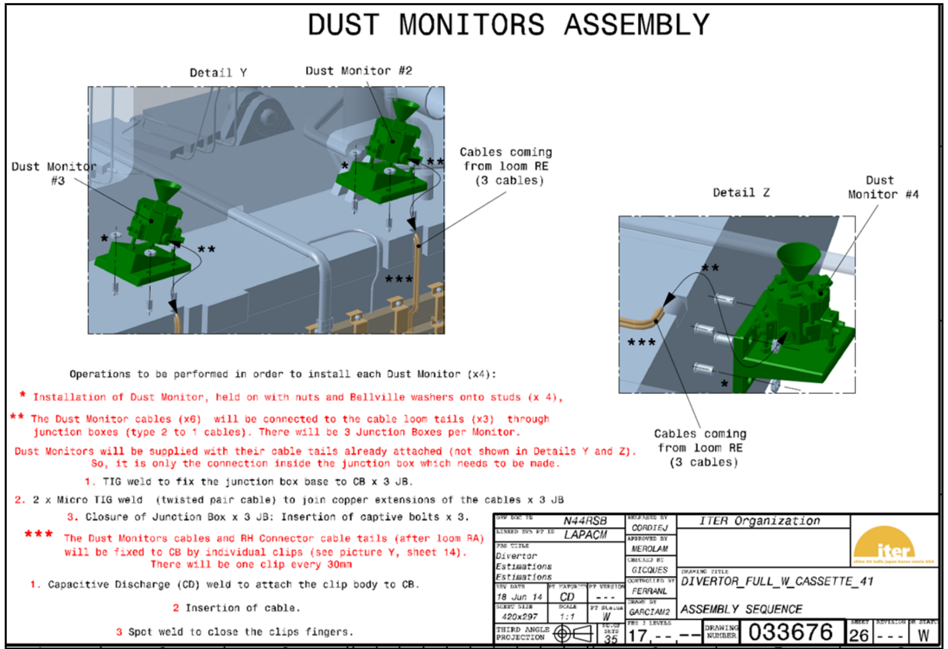
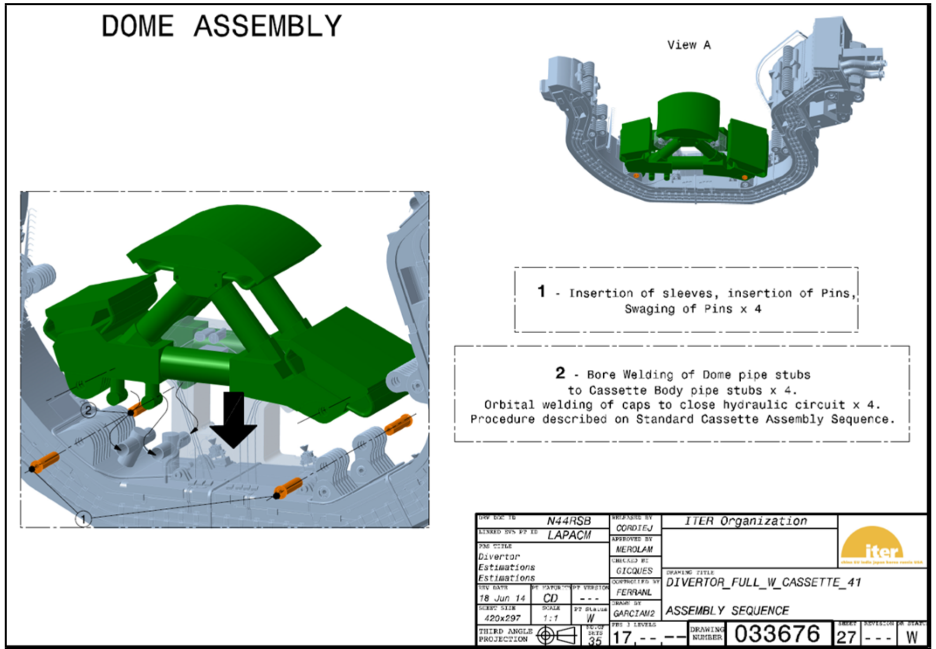
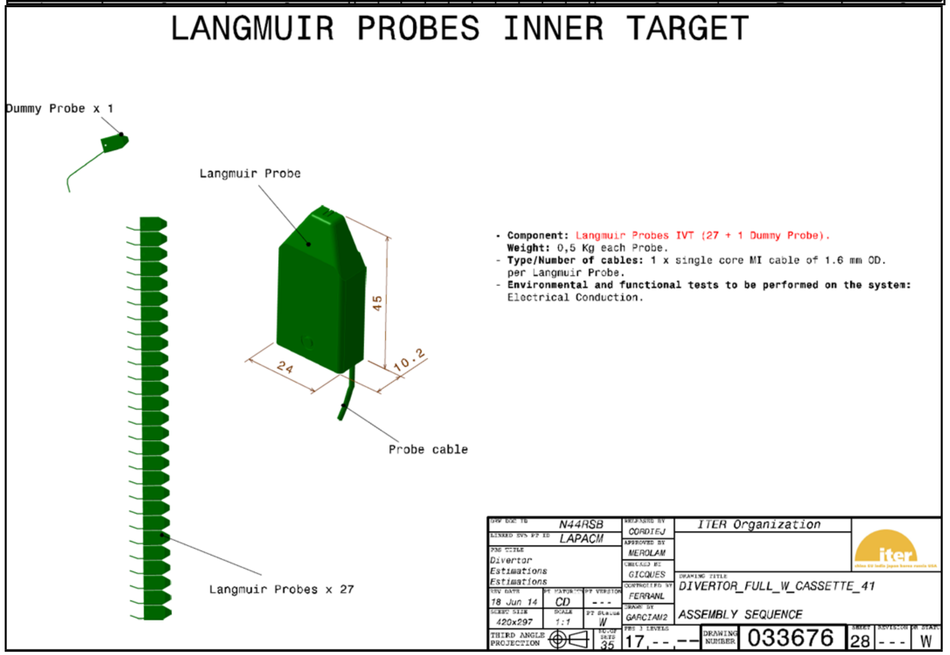
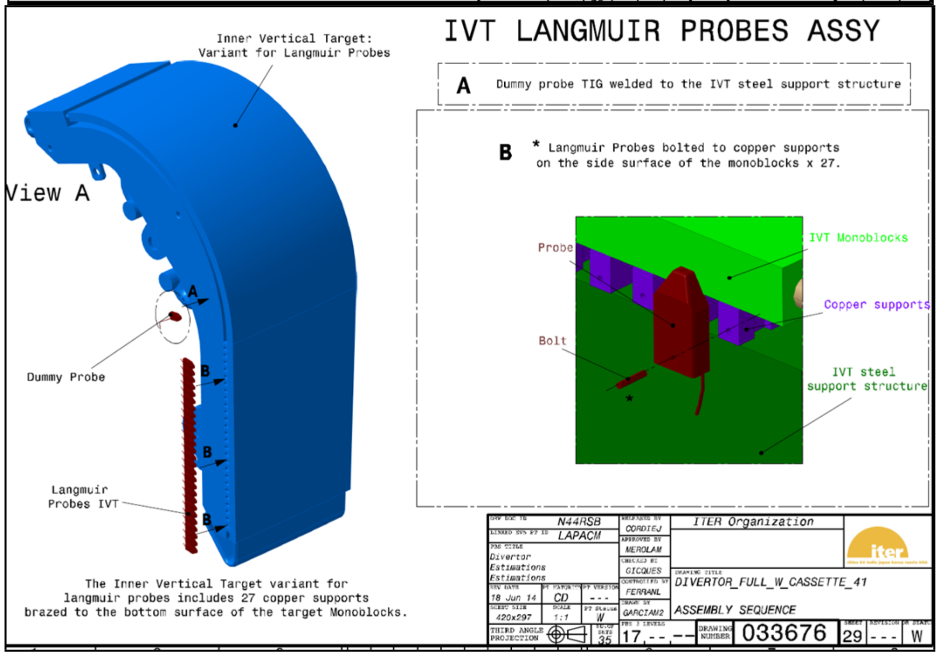
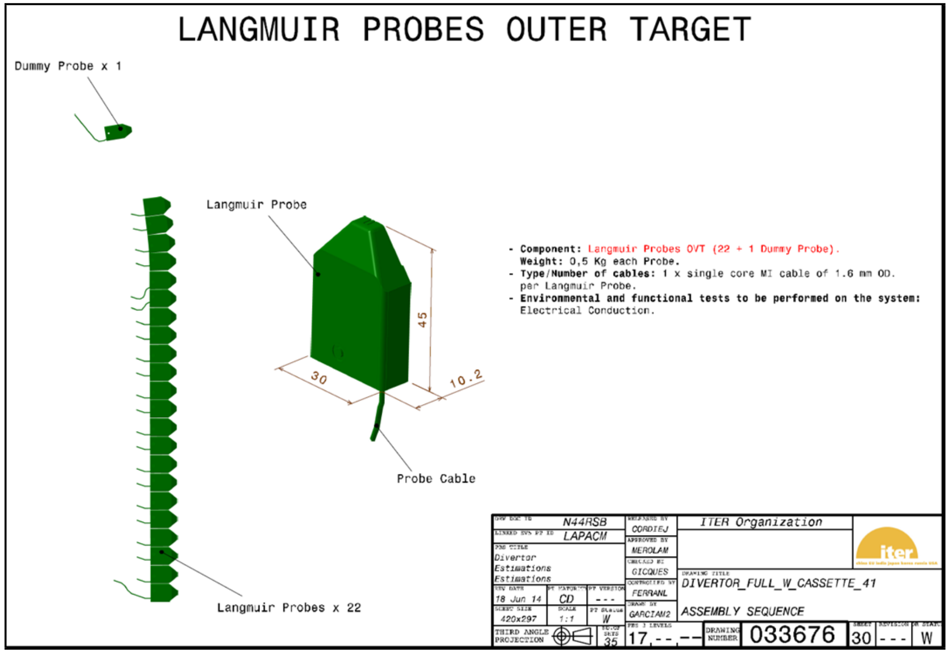

DUST MONITORS ASSEMBLY
Detail Y
Dust Monitor #2
Dust Monitor #3
Cables coming from loom RE (3 cables)
Detail Z
Dust Monitor #4
Cables coming from loom RE (3 cables)
Operations to be performed in order to install each Dust Monitor (x4):
* Installation of Dust Monitor, held on with nuts and Bellville washers onto studs (x 4),
** The Dust Monitor cables (x6) will be connected to the cable loom tails (x3) through junction boxes (type 2 to 1 cables). There will be 3 Junction Boxes per Monitor.
Dust Monitors will be supplied with their cable tails already attached (not shown in Details Y and Z). So, it is only the connection inside the junction box which needs to be made.
1. TIG weld to fix the junction box base to CB x 3 JB.
2. 2 x Micro TIG weld (twisted pair cable) to join copper extensions of the cables x 3 JB
3. Closure of Junction Box x 3 JB: Insertion of captive bolts x 3.
*** The Dust Monitors cables and RH Connector cable tails (after loom RA) will be fixed to CB by individual clips (see picture Y, sheet 14). There will be one clip every 30mm
1. Capacitive Discharge (CD) weld to attach the clip body to CB.
2 Insertion of cable.
3 Spot weld to close the clips fingers.
N44RSB
LAPACM
Divertor Estimations Estimations
18 Jun 14
CD
420x297
1:1
W
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
THIRD ANGLE PROJECTION
35
17
033676
26
W

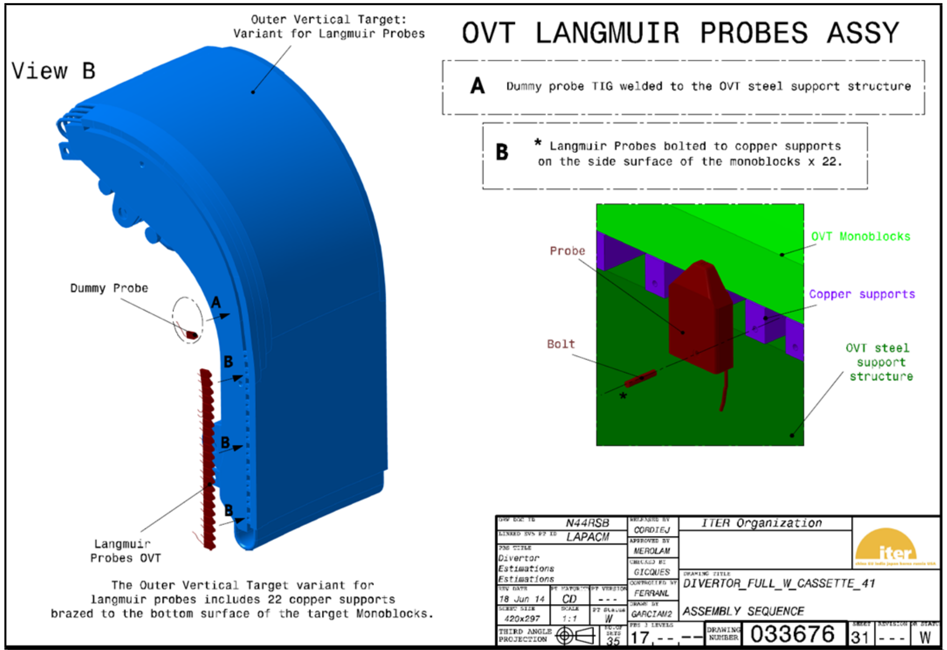

DOME ASSEMBLY
View A
1 - Insertion of sleeves, insertion of Pins, Swaging of Pins x 4
2 - Bore Welding of Dome pipe stubs to Cassette Body pipe stubs x 4. Orbital welding of caps to close hydraulic circuit x 4. Procedure described on Standard Cassette Assembly Sequence.
N44RSB
LAPACM
Divertor Estimations Estimations
18 Jun 14
CD
420x297
1:1
W
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
THIRD ANGLE PROJECTION
35
17
033676
27
W


LANGMUIR PROBES INNER TARGET
Dummy Probe x 1
Langmuir Probe
45
10.2
24
Probe cable
Langmuir Probes x 27
Component: Langmuir Probes IVT (27 + 1 Dummy Probe).
Weight: 0,5 Kg each Probe.
- Type/Number of cables: 1 x single core MI cable of 1.6 mm OD. per Langmuir Probe.
- Environmental and functional tests to be performed on the system: Electrical Conduction.
N44RSB
LAPACM
Divertor Estimations Estimations
18 Jun 14
CD
420x297
1:1
W
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
THIRD ANGLE PROJECTION
35
17
033676
28
W

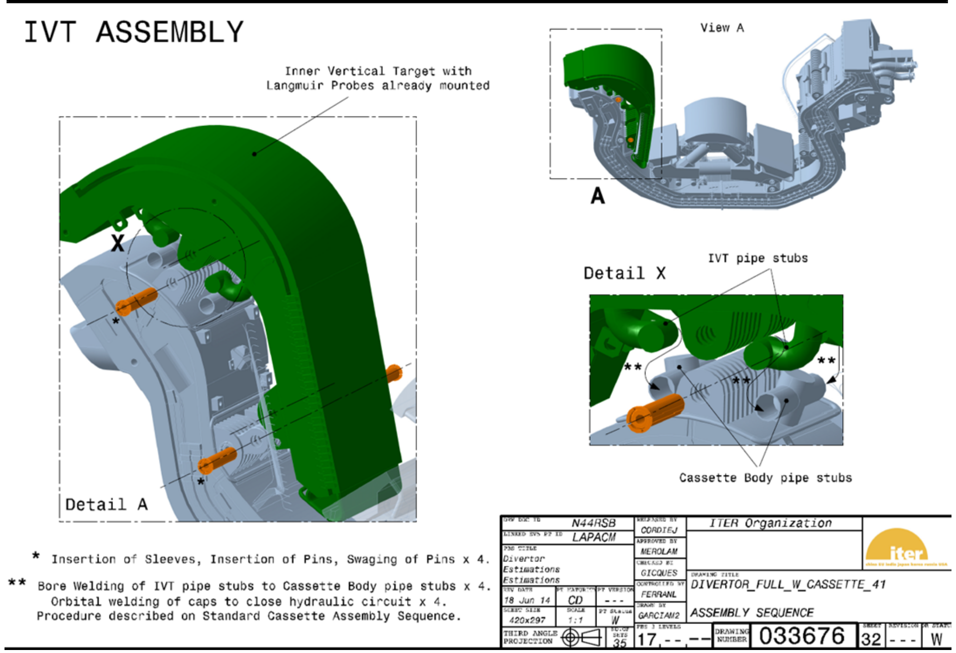

IVT LANGMUIR PROBES ASSY
Inner Vertical Target: Variant for Langmuir Probes
View A
A Dummy probe TIG welded to the IVT steel support structure
B * Langmuir Probes bolted to copper supports on the side surface of the monoblocks x 27.
Probe
IVT Monoblocks
Copper supports
Bolt
IVT steel support structure
Dummy Probe
Langmuir Probes IVT
The Inner Vertical Target variant for langmuir probes includes 27 copper supports brazed to the bottom surface of the target Monoblocks.
N44RSB
LAPACM
Divertor Estimations Estimations
18 Jun 14
CD
420x297
1:1
W
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
THIRD ANGLE PROJECTION
35
17
033676
29
W


LANGMUIR PROBES OUTER TARGET
Dummy Probe x 1
Langmuir Probe
- Component: Langmuir Probes OVT (22 + 1 Dummy Probe).
Weight: 0,5 Kg each Probe.
- Type/Number of cables: 1 x single core MI cable of 1.6 mm OD.
per Langmuir Probe.
- Environmental and functional tests to be performed on the system:
Electrical Conduction.
45
30
10.2
Probe Cable
Langmuir Probes x 22
N44RSB
LAPACM
Divertor
Estimations
Estimations
18 Jun 14
CD
420x297
1:1
W
THIRD ANGLE PROJECTION
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
35
17.--.--
033676
30

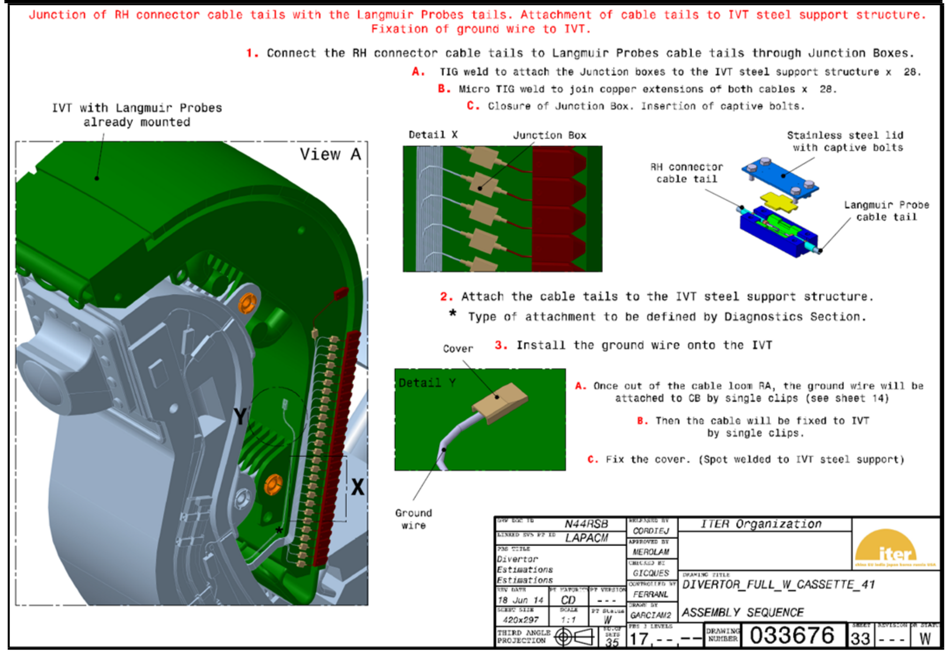
W


Outer Vertical Target:
Variant for Langmuir Probes
View B
OVT LANGMUIR PROBES ASSY
A Dummy probe TIG welded to the OVT steel support structure
B * Langmuir Probes bolted to copper supports
on the side surface of the monoblocks x 22.
Dummy Probe
A
B
B
B
Probe
OVT Monoblocks
Copper supports
Bolt
OVT steel
support
structure
Langmuir
Probes OVT
The Outer Vertical Target variant for
langmuir probes includes 22 copper supports
brazed to the bottom surface of the target Monoblocks.
N44RSB
LAPACM
Divertor
Estimations
Estimations
18 Jun 14
CD
420x297
1:1
W
THIRD ANGLE PROJECTION
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
35
17.--.--
033676
31

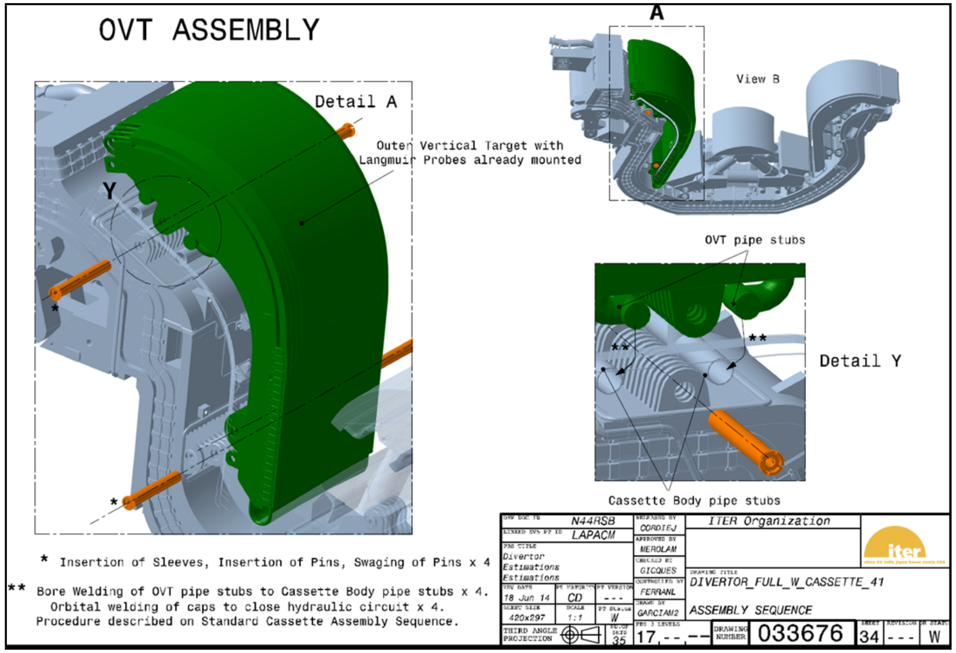
W


IVT ASSEMBLY
Inner Vertical Target with
Langmuir Probes already mounted
View A
A
X
Detail A
Detail X
IVT pipe stubs
Cassette Body pipe stubs
* Insertion of Sleeves, Insertion of Pins, Swaging of Pins x 4.
** Bore Welding of IVT pipe stubs to Cassette Body pipe stubs x 4.
Orbital welding of caps to close hydraulic circuit x 4.
Procedure described on Standard Cassette Assembly Sequence.
N44RSB
LAPACM
Divertor
Estimations
Estimations
18 Jun 14
CD
420x297
1:1
W
THIRD ANGLE PROJECTION
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
35
17.--.--
033676
32

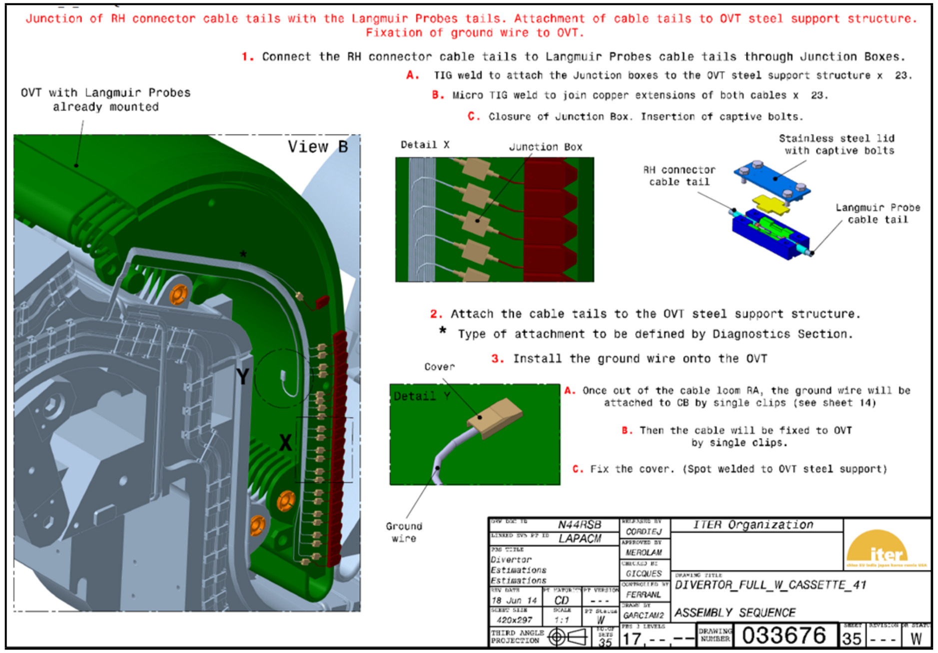
W


Junction of RH connector cable tails with the Langmuir Probes tails. Attachment of cable tails to IVT steel support structure.
Fixation of ground wire to IVT.
1. Connect the RH connector cable tails to Langmuir Probes cable tails through Junction Boxes.
A. TIG weld to attach the Junction boxes to the IVT steel support structure x 28.
B. Micro TIG weld to join copper extensions of both cables x 28.
C. Closure of Junction Box. Insertion of captive bolts.
IVT with Langmuir Probes
already mounted
View A
Detail X
Junction Box
Stainless steel lid
with captive bolts
RH connector
cable tail
Langmuir Probe
cable tail
2. Attach the cable tails to the IVT steel support structure.
* Type of attachment to be defined by Diagnostics Section.
Cover
3. Install the ground wire onto the IVT
Detail Y
A. Once cut of the cable loom RA, the ground wire will be
attached to CB by single clips (see sheet 14)
B. Then the cable will be fixed to IVT
by single clips.
C. Fix the cover. (Spot welded to IVT steel support)
Y
X
Ground
wire
N44RSB
LAPACM
Divertor
Estimations
Estimations
18 Jun 14
CD
420x297
1:1
W
THIRD ANGLE PROJECTION
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAM2
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
35
17.--.--
033676
33

W


OVT ASSEMBLY
A
View B
Detail A
Outer Vertical Target with
Langmuir Probes already mounted
Y
OVT pipe stubs
Detail Y
Cassette Body pipe stubs
* Insertion of Sleeves, Insertion of Pins, Swaging of Pins x 4
** Bore Welding of OVT pipe stubs to Cassette Body pipe stubs x 4.
Orbital welding of caps to close hydraulic circuit x 4.
Procedure described on Standard Cassette Assembly Sequence.
N44RSB
LAPACM
Divertor Estimations Estimations
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAN2
18 Jun 14
CD
420x297
1:1
W
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
THIRD ANGLE PROJECTION
35
17.--.--
033676
34

W


Junction of RH connector cable tails with the Langmuir Probes tails. Attachment of cable tails to OVT steel support structure.
Fixation of ground wire to OVT.
1. Connect the RH connector cable tails to Langmuir Probes cable tails through Junction Boxes.
A. TIG weld to attach the Junction boxes to the OVT steel support structure x 23.
B. Micro TIG weld to join copper extensions of both cables x 23.
C. Closure of Junction Box. Insertion of captive bolts.
OVT with Langmuir Probes
already mounted
View B
Y
X
Detail X
Junction Box
RH connector
cable tail
Stainless steel lid
with captive bolts
Langmuir Probe
cable tail
2. Attach the cable tails to the OVT steel support structure.
* Type of attachment to be defined by Diagnostics Section.
3. Install the ground wire onto the OVT
Cover
Detail Y
Ground
wire
A. Once out of the cable loom RA, the ground wire will be
attached to CB by single clips (see sheet 14)
B. Then the cable will be fixed to OVT
by single clips.
C. Fix the cover. (Spot welded to OVT steel support)
N44RSB
LAPACM
Divertor Estimations Estimations
CORDIEJ
MEROLAM
GICQUES
FERRANL
GARCIAN2
18 Jun 14
CD
420x297
1:1
W
ITER Organization
DIVERTOR_FULL_W_CASSETTE_41
ASSEMBLY SEQUENCE
THIRD ANGLE PROJECTION
35
17.--.--
033676
35

W