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EXTERNAL REFERENCE / VERSION

Technical Specifications (In-Cash Procurement)

Technical Summary for PCCF tie-rods insertion tools

This document is prepared for the market survey of PCCF tie-rods insertion tools.
This tools has to be provided by IO to SMPA contractor.

To develop and qualify the tools, the market survey is planned to be launched.

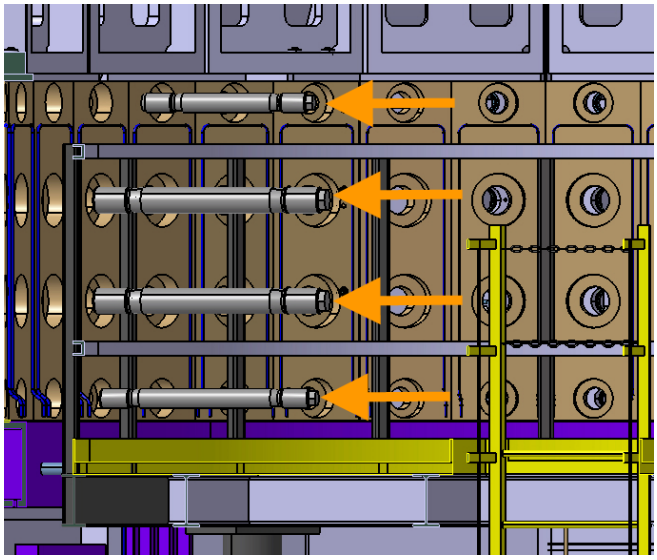
Table of Contents

1 Purpose

This technical summary is to provide main requirement of the tie-rod insertion tools for the market survey in order to develop, qualify, and supply the tools.

2 Overview

The tie-rod insertion tools are used to insert the tie-rod through PCCF and to screw it into the pre-mounted nut.



The main functions of the tools are: to provide sliding guide of the tie-rod through PCCF holes, guide of screwing the tie-rod into the pre-mounted nut, and turning power.

There are four different configurations for the tools:

- M110 tie-rod + pre-mounted nut
- M80 long tie-rod + pre-mounted nut
- M80 short tie-rod + M80/M110 insert (located below PCR)
- M80 short tie-rod + M80/M110 insert (located over PCR)

3 Information of Components and Assembly Configuration

3.1 Tie-rods

There are three types of tie-rods as follows:

- M110 tie-rod: M110/φ110mm x 1010mm, 77.8kg, Inconel 718
- M80 long tie-rod: M80/φ80mm x 940mm, 37.8kg, Inconel 718
- M80 short tie-rod: M80/φ80mm x 745mm, 30.2kg, Inconel 718

Details are found in Appendix 1.

3.2 Pre-mounted nut and M80/M110 insert

There are two types of pre-mounted nuts and a M80/M110 insert.

- M110 Flexnut, Inconel 718
- M80 Flexnut, Inconel 718

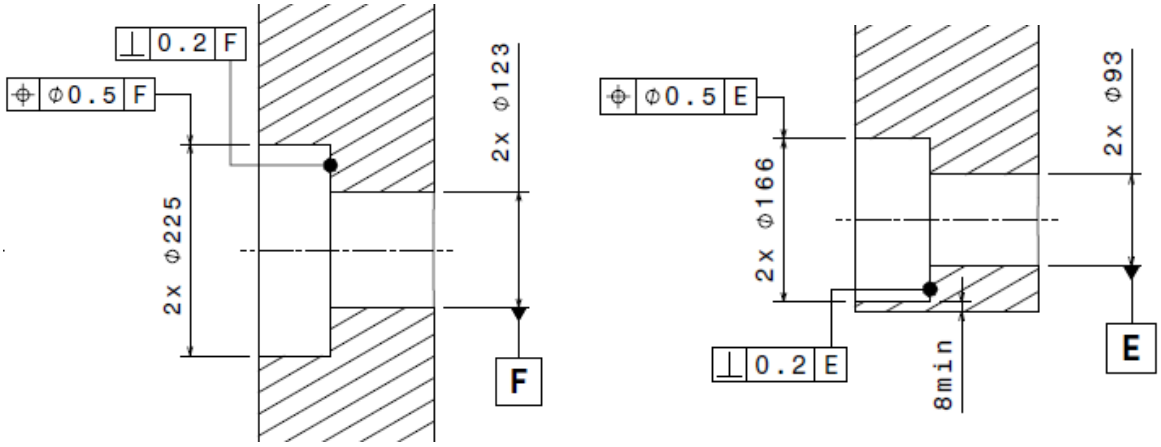
- M80/M110 insert, Inconel 718

Details are found in Appendix 2.

3.3 Pre-Compression Counter Flange (PCCF)

PCCF dimensions are found in Appendix 3. There are four though holes where the tie-rods are inserted as follows:

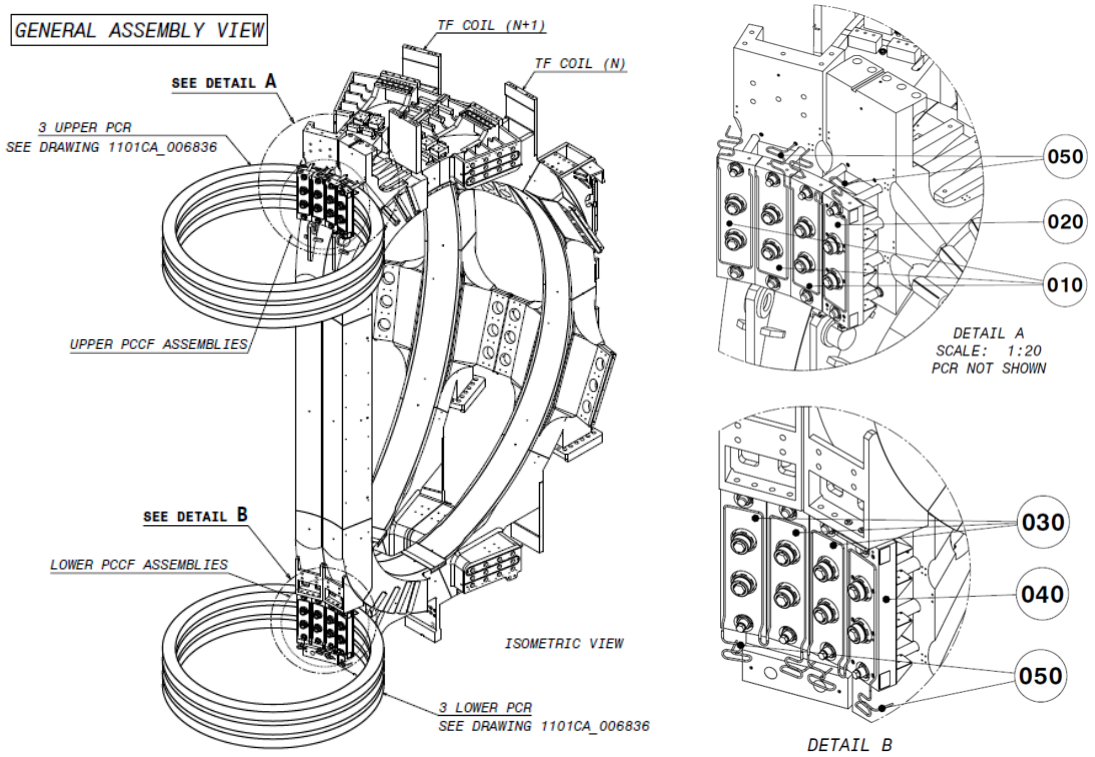
- φ225 bore hole + φ123 though hole, depth of bore is 77mm for M110 tie-rods
- φ166 bore hole + φ93 though hole, depth of bore is 77mm for M80 tie-rods



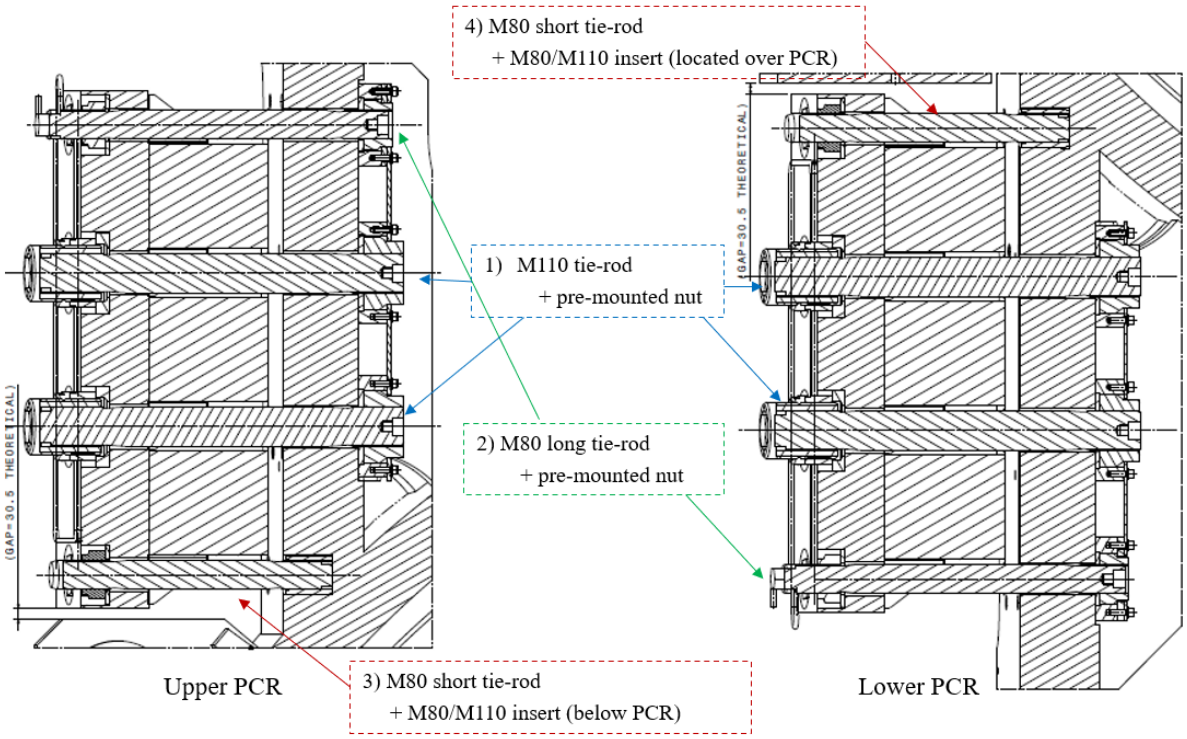
3.4 Assembled configurations

There are two different assembled configurations, one for Upper PCR and Lower PCR.

The working platforms are erected to insert the tie-rods, which are located below the PCCF. Regarding the configuration of "M80 short tie-rod + M80/M110 insert", access conditions differ according to the location of the platforms. For Upper PCR configuration, M80/M110 inserts can be seen from the platform, but it can not be seen directly in case of Lower PCR configuration.



The inner radius of the PCCF is approximately 2290mm. This circular space can be available for the tools.



Several 3D screen shots of Upper and Lower PCR working environments are found in Appendix 4.

For Lower PCR, it is assumed that M80 short tie-rods are inserted at first, befor insertion othere tie-rods in order to access to M80/M110 inserts.

3.5 Jib cranes

Jib cranes are provided by IO. The capacity of the crane is 250kg maximum.

This capacity has to be taken into account in the design of the tie-rods insertion tools.

4 Requirement for Tie-rods insertion process and tools

This section defines the functional, operational, and environmental requirements for the tie-rod insertion tools. Suppliers shall ensure that their proposed concepts comply with the following conditions.

4.1 Functional Requirements

The tools shall guide the tie-rod smoothly through the PCCF bore and into the pre-mounted nut or M80/M110 insert.

The tools shall support manual rotation of the tie-rod for the initial 3–4 turns of thread engagement.

After initial engagement, the tools shall allow continued rotation using a powered wrench or equivalent device.

Rotation rollers or low-friction pads shall be incorporated to reduce friction during tie-rod rotation.

4.2 Lifting and Handling Requirements

The tie-rod shall be suspended horizontally using a single-point lift with the provided jib crane (maximum capacity 250 kg).

The lifting point shall allow insertion of at least 16 mm of the threaded portion into the pre-mounted nut.

The jib crane shall not approach closer than 100 mm to the PCCF front face; tool design shall consider counterweight dimensions and mass accordingly.

Sliding rollers or low-friction pads shall be installed in the PCCF bore to prevent contact between the tie-rod and PCCF.

4.3 Fine adjusting Requirements

A positioning rod shall be attachable to the M30 threaded hole at the tip of the tie-rods for fine alignment, except for the M80 short tie-rod + M80/M110 insert configuration.

For M80 short tie-rods inserted into the M80/M110 insert, a dedicated fine-adjustment device shall be provided, as the positioning rod cannot be used.

4.4 Environmental and Material Requirements

Tools shall not use lubricants or hydraulic systems, considering the cleanliness requirements of the PCR environment.

All materials in contact with the tie-rods or PCCF shall be chloride-free to avoid corrosion risks.

Tools shall be designed for use in confined spaces within the Upper and Lower PCR, as shown in Appendix 4.

4.5 Interface Requirements

Tools shall be compatible with the PCCF bore dimensions: φ225 bore + φ123 through hole for M110 tie-rods, φ166 bore + φ93 through hole for M80 tie-rods.

Tools shall not interfere with the jib crane operation or exceed the crane’s maximum load capacity of 250 kg.

4.6 Configuration-Specific Requirements

Suppliers shall consider the following four configurations:

- M110 tie-rod + pre-mounted nut
- M80 long tie-rod + pre-mounted nut
- M80 short tie-rod + M80/M110 insert (below PCR)
- M80 short tie-rod + M80/M110 insert (over PCR)

For the Lower PCR configuration, the M80/M110 insert is not directly visible; tools shall enable alignment without direct visual access as shown in Appendix 4(2/2). To make it easier, M80 short tie-rods shall be inserted first to secure access to the inserts.

5 Scope of Supply

Suppliers are requested to submit conceptual designs and technical information for tie-rod insertion tools corresponding to the four configurations listed in Section 4.6. The technical proposal shall include, at minimum, the following items.

5.1 Tool Concepts

For each configuration, suppliers shall provide:

- Conceptual design drawings or sketches of the insertion tool
- Description of the guiding mechanism (sliding guide, rotation rollers, low-friction pads, etc.)
- Description of the fine-adjustment device (where applicable)
- Interface description with PCCF, tie-rods, and pre-mounted nuts/inserts

5.2 Technical Specifications

- Overall tool dimensions
- Estimated weight of each tool
- Material specifications, including confirmation of chloride-free materials
- Maximum load applied to the jib crane (if applicable)
- Expected operational clearances within the PCR environment

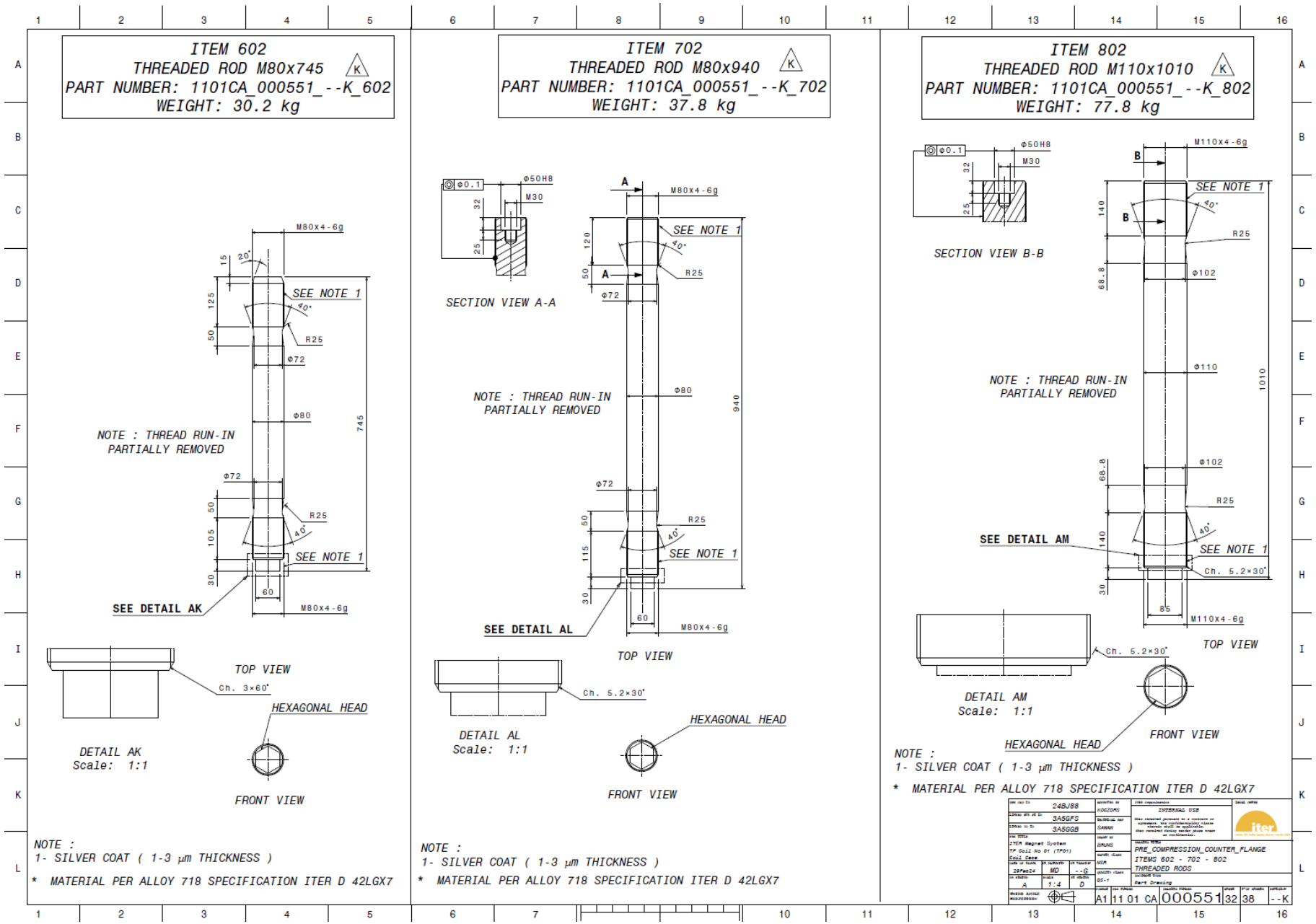
5.3 Operational Description

- Step-by-step description of the insertion and alignment process
- Required manpower and operator positions
- Use of positioning rod or alternative alignment devices
- Compatibility with powered wrench or equivalent tools

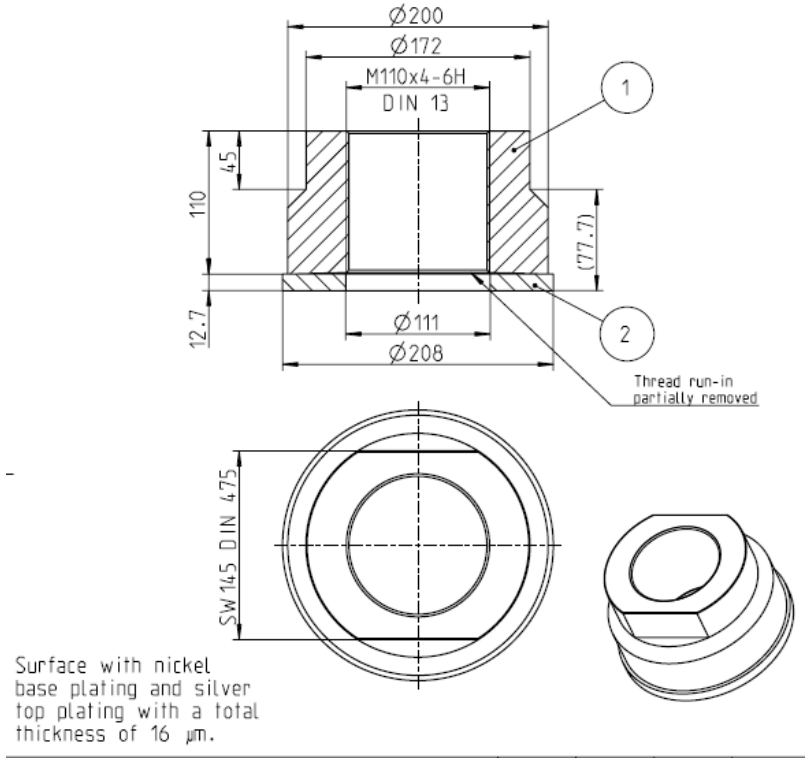
5.4 Safety and Environmental Considerations

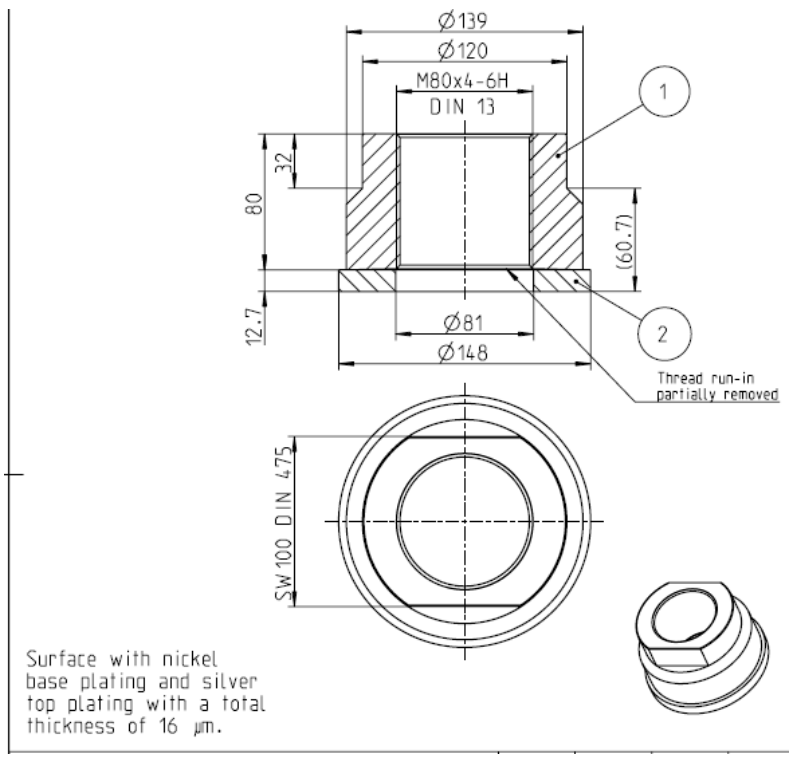
- Identification of potential hazards during operation
- Measures to prevent contact between tie-rod and PCCF
- Confirmation that no lubricants or hydraulic systems are used
- Cleanliness considerations for PCR environment

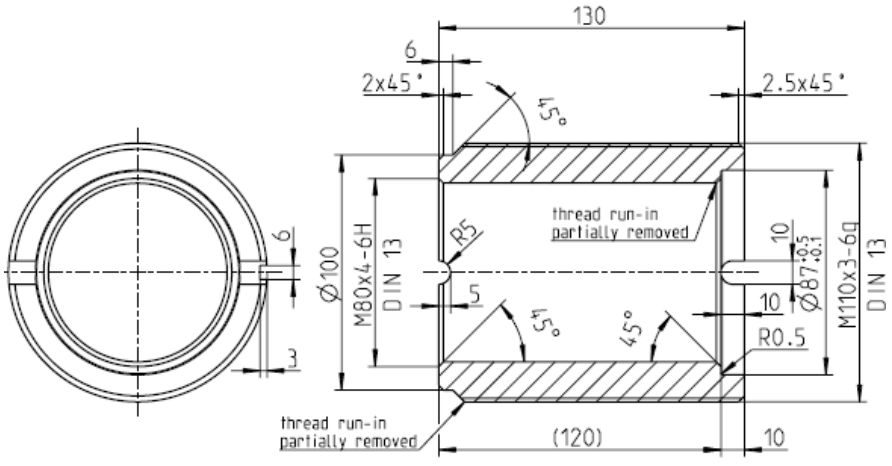
Appendix 1 Tie-rods drawing


ITEM 602
THREADED ROD M80x745 K
PART NUMBER: 1101CA_000551_--K_602
WEIGHT: 30.2 kg
M80x4-6g
SEE NOTE 1
R25
Φ72
Φ80
NOTE : THREAD RUN-IN PARTIALLY REMOVED
SEE DETAIL AK
TOP VIEW
Ch. 3×60°
HEXAGONAL HEAD
DETAIL AK
Scale: 1:1
FRONT VIEW
NOTE :
1- SILVER COAT (1-3 µm THICKNESS)
* MATERIAL PER ALLOY 718 SPECIFICATION ITER D 42LGX7
ITEM 702
THREADED ROD M80x940 K
PART NUMBER: 1101CA_000551_--K_702
WEIGHT: 37.8 kg
Φ0.1
Φ50H8
M30
SECTION VIEW A-A
NOTE : THREAD RUN-IN PARTIALLY REMOVED
SEE DETAIL AL
TOP VIEW
Ch. 5.2×30°
DETAIL AL
Scale: 1:1
FRONT VIEW
NOTE :
1- SILVER COAT (1-3 µm THICKNESS)
* MATERIAL PER ALLOY 718 SPECIFICATION ITER D 42LGX7
ITEM 802
THREADED ROD M110x1010 K
PART NUMBER: 1101CA_000551_--K_802
WEIGHT: 77.8 kg
SECTION VIEW B-B
M110x4-6g
NOTE : THREAD RUN-IN PARTIALLY REMOVED
SEE DETAIL AM
TOP VIEW
DETAIL AM
Scale: 1:1
FRONT VIEW
NOTE :
1- SILVER COAT (1-3 µm THICKNESS)
* MATERIAL PER ALLOY 718 SPECIFICATION ITER D 42LGX7
PRE_COMPRESSION_COUNTER_FLANGE
ITEMS 602 - 702 - 802
THREADED RODS
Part Drawing
A1 11 01 CA 000551 32 38 --K

Appendix 2 Pre-mounted nuts and M80/M110 insert drawings







Surface with nickel base plating and silver top plating with a total thickness of 16 µm.

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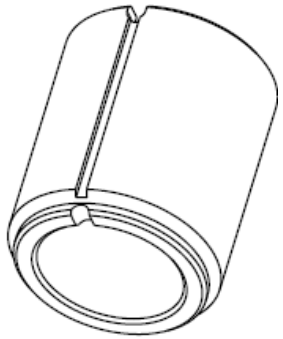
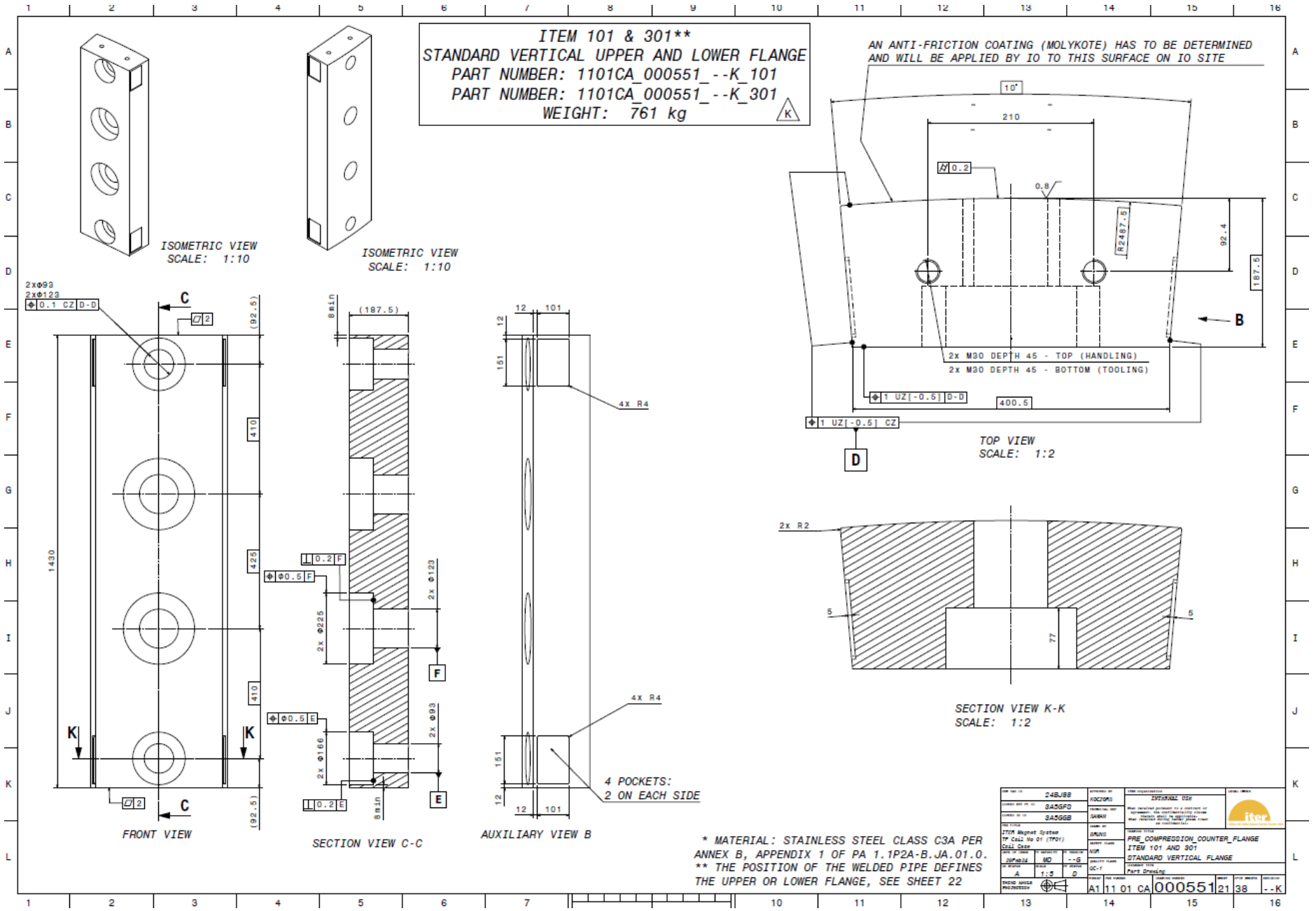
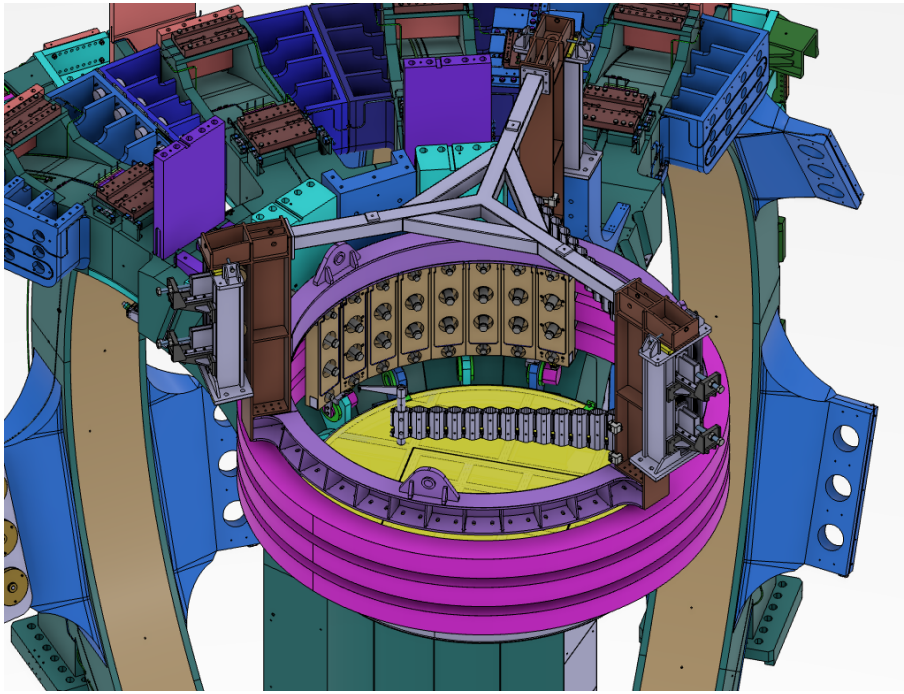
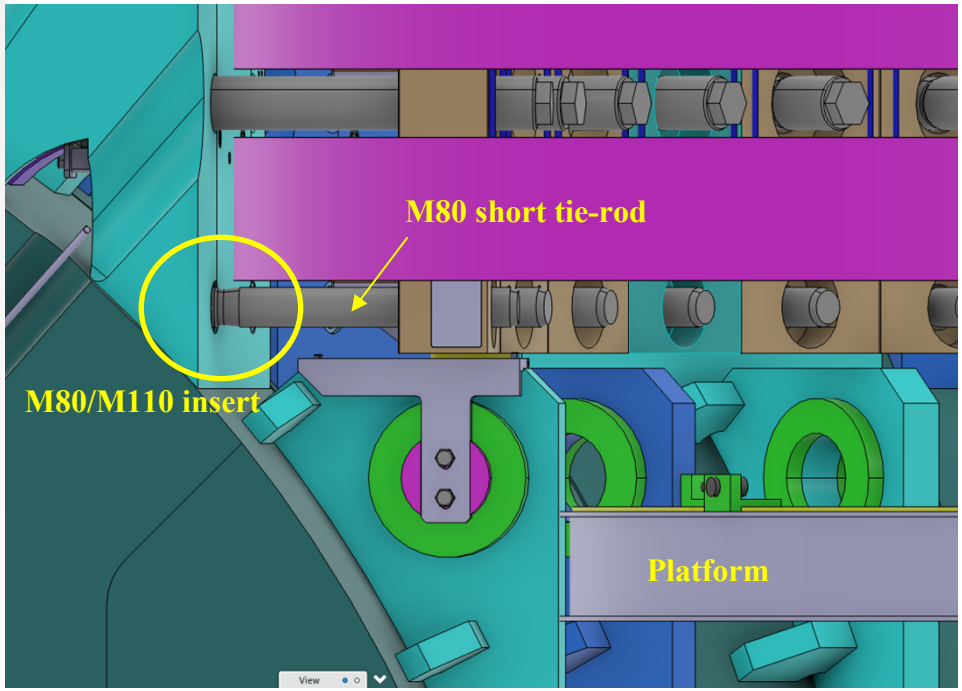


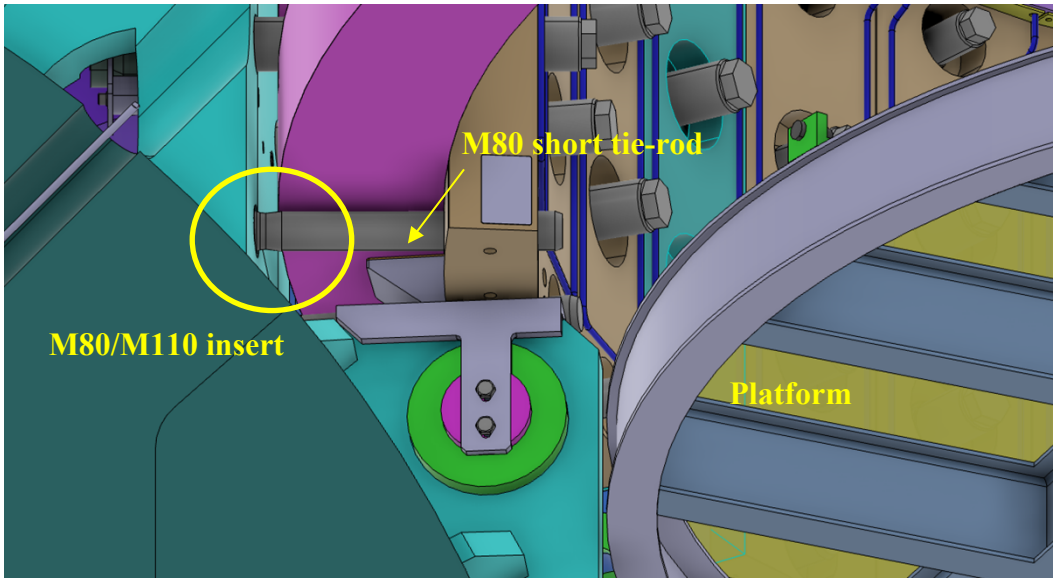
Appendix 3 Pre-mounted nuts and M80/M110 insert drawings


ITEM 101 & 301**
STANDARD VERTICAL UPPER AND LOWER FLANGE
PART NUMBER: 1101CA_000551_--K_101
PART NUMBER: 1101CA_000551_--K_301
WEIGHT: 761 kg
K
AN ANTI-FRICTION COATING (MOLYKOTE) HAS TO BE DETERMINED AND WILL BE APPLIED BY IO TO THIS SURFACE ON IO SITE
ISOMETRIC VIEW SCALE: 1:10
ISOMETRIC VIEW SCALE: 1:10
TOP VIEW SCALE: 1:2
FRONT VIEW
SECTION VIEW C-C
AUXILIARY VIEW B
SECTION VIEW K-K SCALE: 1:2
4 POCKETS: 2 ON EACH SIDE
* MATERIAL: STAINLESS STEEL CLASS C3A PER ANNEX B, APPENDIX 1 OF PA 1.1P2A-B.JA.01.0.
** THE POSITION OF THE WELDED PIPE DEFINES THE UPPER OR LOWER FLANGE, SEE SHEET 22
2x M30 DEPTH 45 - TOP (HANDLING)
2x M30 DEPTH 45 - BOTTOM (TOOLING)
PRE_COMPRESSION_COUNTER_FLANGE
ITEM 101 AND 301
STANDARD VERTICAL FLANGE
Part Drawing
A1 11 01 CA 000551 21 38 --K

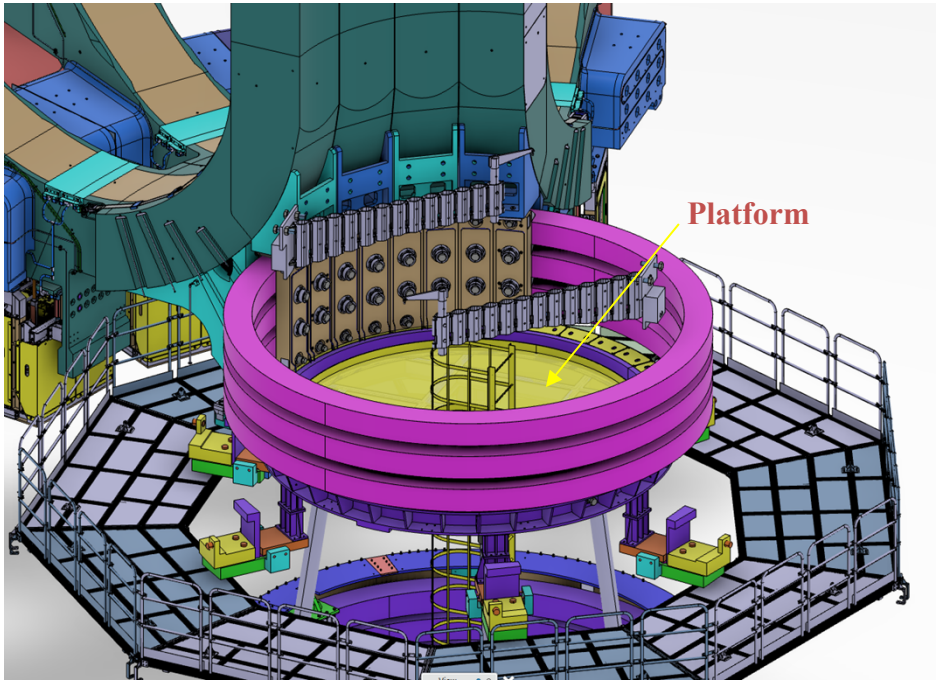
Appendix 4(1/2) Upper PCR working environment

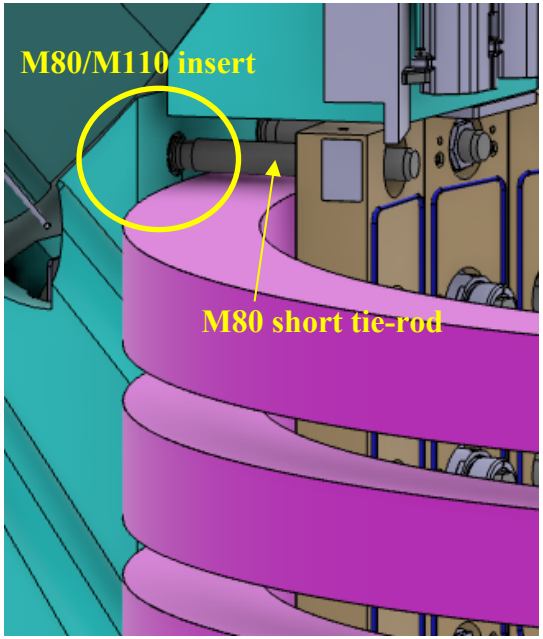


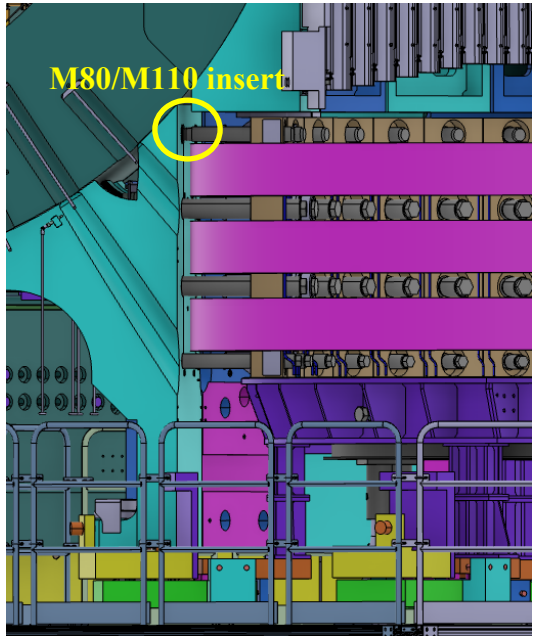


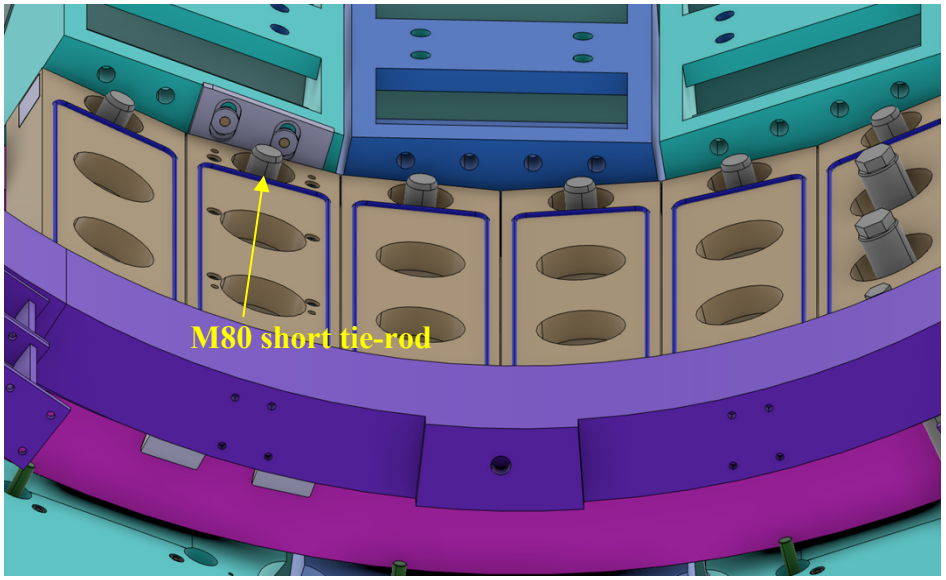

M80 short tie-rod
M80/M110 insert
Platform

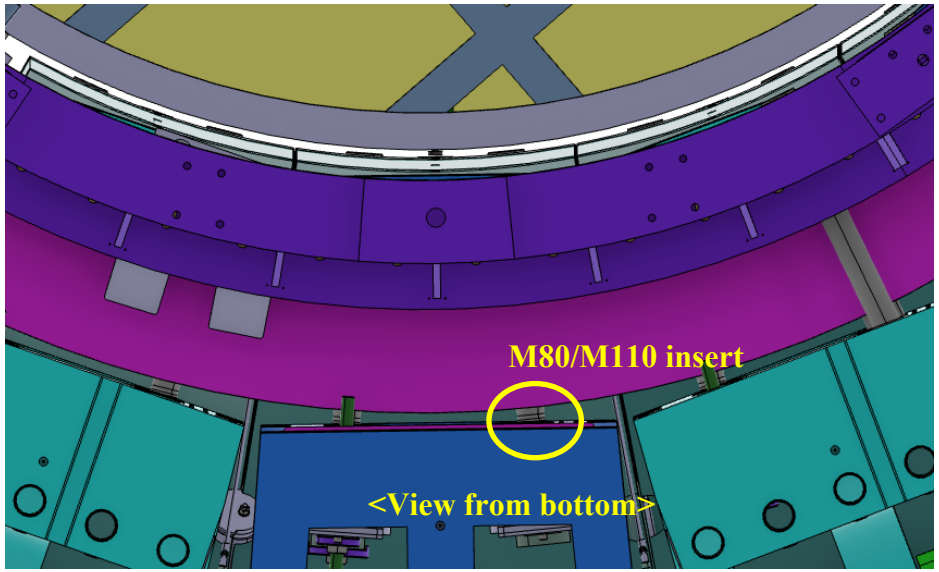
Appendix 4(2/2) Lower PCR working environment








M80 short tie-rod


M80/M110 insert
<View from bottom>