



Agenzia Nazionale per le Nuove Tecnologie,
l'Energia e lo Sviluppo Economico Sostenibile



Ministero dello Sviluppo Economico

RICERCA DI SISTEMA ELETTRICO

Disegni costruttivi della Bobina di JT-60SA completi di tutti i particolari quali: doppi pancake della bobina, ingresso di elio di refrigerazione, giunti elettrici intermedi e terminazione riempitivi necessari all'avvolgimento della bobina

A. Cucchiaro, P. Rossi, G.M. Polli, L. Reccia, G. Brolatti

DISEGNI COSTRUTTIVI DELLA BOBINA DI JT-60SA COMPLETI DI TUTTI I PARTICOLARI QUALI:
DOPPI PANCAKE DELLA BOBINA, INGRESSO DI ELIO DI REFRIGERAZIONE, GIUNTI ELETTRICI
INTERMEDI E TERMINAZIONE RIEMPITIVI NECESSARI ALL'AVVOLGIMENTO DELLA BOBINA

A. Cucchiaro, P. Rossi, G.M. Polli, L. Reccia, G. Brolatti (ENEA)

Novembre 2011


Report Ricerca di Sistema Elettrico

Accordo di Programma Ministero dello Sviluppo Economico – ENEA

Area: Governo, gestione e sviluppo del sistema elettrico nazionale

Progetto: Fusione nucleare: Attività di fisica e tecnologia della fusione complementari ad ITER,
denominate "Broader Approach"

Responsabile Progetto: Aldo Pizzuto, ENEA

| | | | |
|---|---|---------------|--------|
|  | Disegni costruttivi della bobina di JT-60SA completi di tutti i particolari quali: doppi pancake della bobina, ingresso di elio di refrigerazione, giunti elettrici intermedi e terminazione riempitivi necessari all'avvolgimento della bobina. | RT-JT60SA-001 | Rev. 0 |
| | | Pag 1 di 47 | |

DISEGNI COSTRUTTIVI DELLA BOBINA DI JT-60SA COMPLETI DI TUTTI I PARTICOLARI QUALI: DOPPI PANCAKE DELLA BOBINA, INGRESSO DI ELIO DI REFRIGERAZIONE, GIUNTI ELETTRICI INTERMEDI E TERMINAZIONE RIEMPITIVI NECESSARI ALL'AVVOLGIMENTO DELLA BOBINA

Rev. 0 31/10/2011

| | | | | |
|------|------------|------------------|----------|-------------------|
| | | | | |
| | | Giorgio Brolatti | | |
| | | Luigi Reccia | | |
| 0 | 31/10/2011 | Gian Mario Polli | | Antonio Cucchiaro |
| | | Paolo Rossi | | |
| rev. | Date | Author | Reviewer | Approver |

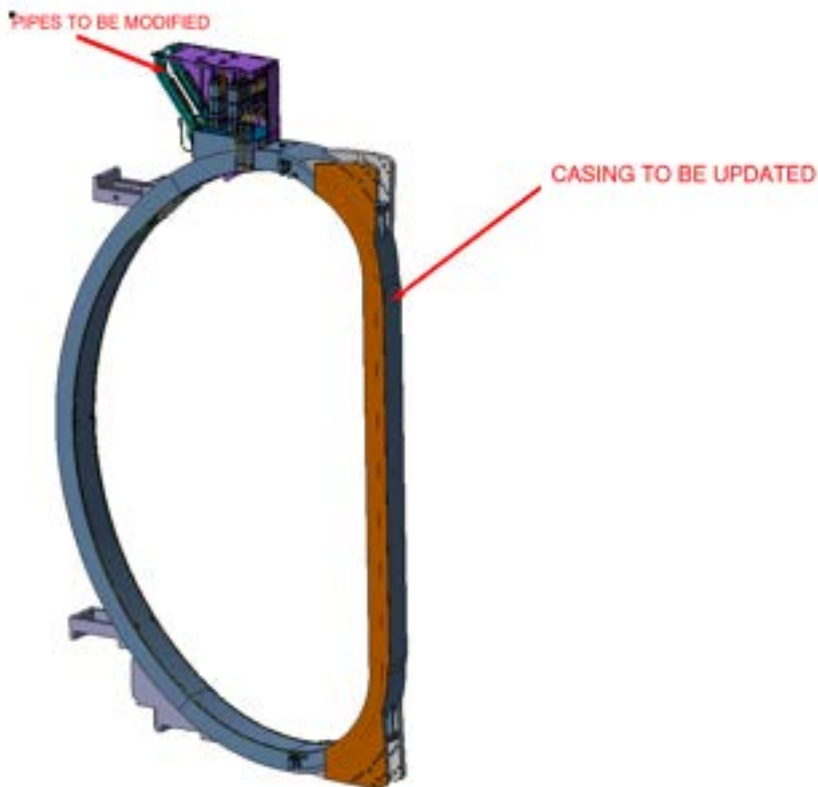
The principal product : 010202-203000_01.CATProduct

TWIN BOX MONOBLOCK version

In this package the following drawing number has been added: 010202-503111 sheet 3 (W.P. tolerance).

drawing number 010202-503108 sheet1 has to be updated according to new helium inlet design already included in the 3D model.

This version must be updated on the components shown:



VARIATIONS BETWEEN ENEA-CEA:

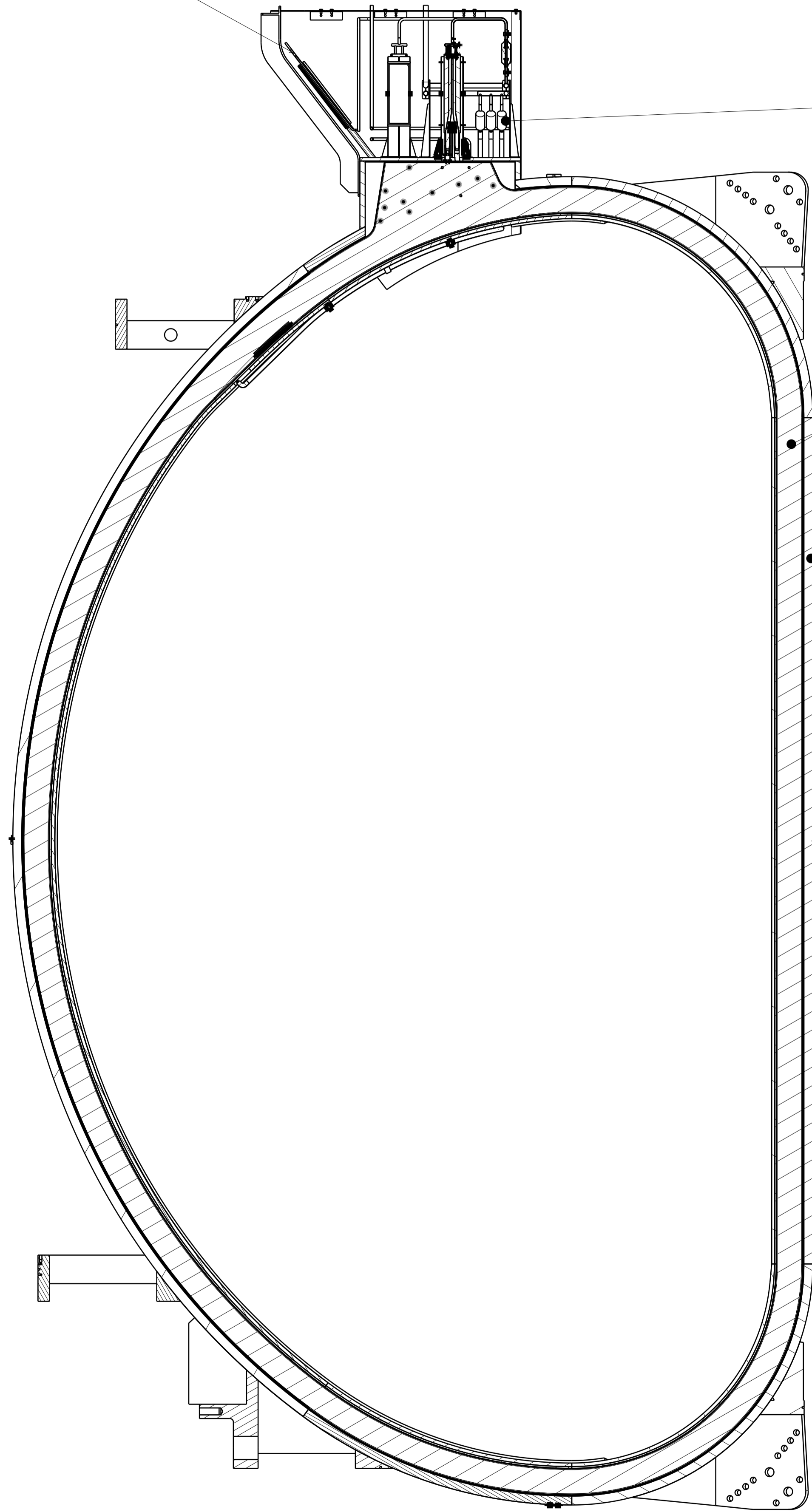
COIL:

Insulation tapes between double pancakes.

CASING:

010202-503200 sheet 1: changed yellow zones

PIPES TO BE MODIFIED



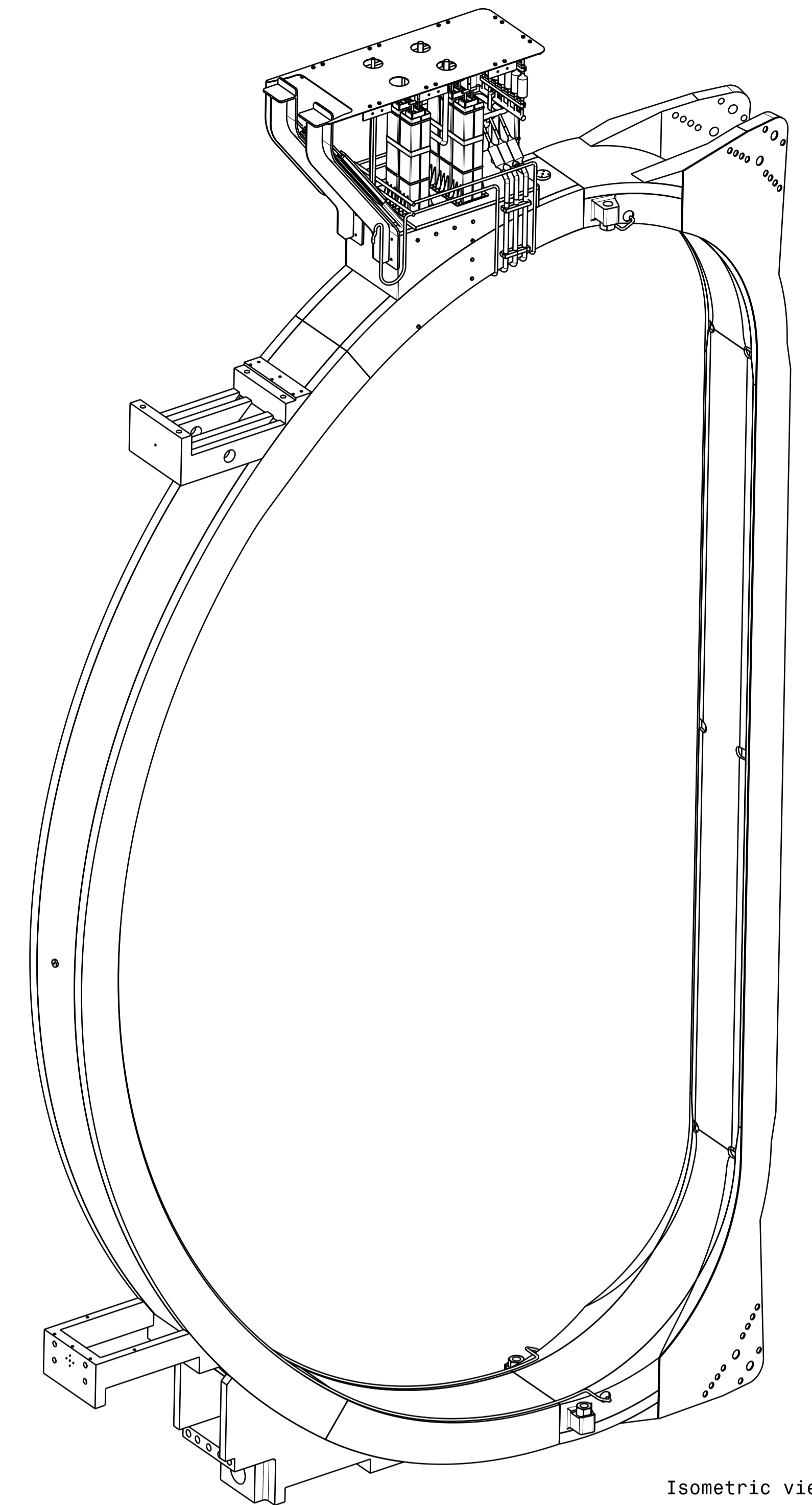
3

1

2

CASING TO BE UPDATED

vertical cross section



Isometric view

| | | | | | |
|--|--|--------------------------------------|--|---------------------------------------|--|
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the SA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | | Ref to 3D CatProduct:010202-203000 | |
| REV DATE 03/10/2011 | | REVIEWED BY | | CUSTOMER: Fusion-for-Energy | |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | | DRAWING TITLE LAYOUT ENEA | |
| SHEET SIZE A1 | | CONTROLLED BY A. CUCCHIARO | | CODE ENEA ID: DD-JT60-NCO | |
| FIRST ANGLE PROJECTION | | DRAWN BY G. BROLATTI | | DRAWING NUMBER 503000 | |
| WBS 3 LEVELS | | 010202 | | SHEET 01 | |
| | | | | REVISION MATURITY 01 | |

| ITEM No | DRAWING No | DESCRIPTION | NO OFF | NO ORDERED | MATERIAL | SUPPLIER | DATE ORDERED | DATE DELIVERED | REMARKS |
|---------|--|-------------------------------------|--------|------------|----------|----------|--------------|----------------|---------------------|
| 1 | from:010202-503100 to:010202-503112 | Winding pack with ground insulation | | | | | | | COIL |
| 2 | from:010202-503200 to:010202-503204 | MACHINING DETAIL INNER-OUTER LEG | | | | | | | CASING |
| 3 | from:010202-503300 to:010202-503303 | WINDING PACK & CASING ARRANGEMENT | | | | | | | WITH HELIUM COOLING |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
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| 24 | | | | | | | | | |

ENEA **Fusion**
Italy-Frascati Research Centre

| | | | | | |
|---------|--------|--|--|--|-------------|
| 00 | 01 | | | | ISSUE |
| 200111 | 031011 | | | | DATE |
| | | | | | MATURITY |
| TITLE:- | | | | | DRN GBROL |
| | | | | | CHKD ACUCCH |
| | | | | | APPO ACUCCH |

CONFIDENTIAL UNLESS AUTHORISED
The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.

CONTRACTOR

ITEM LIST FOR

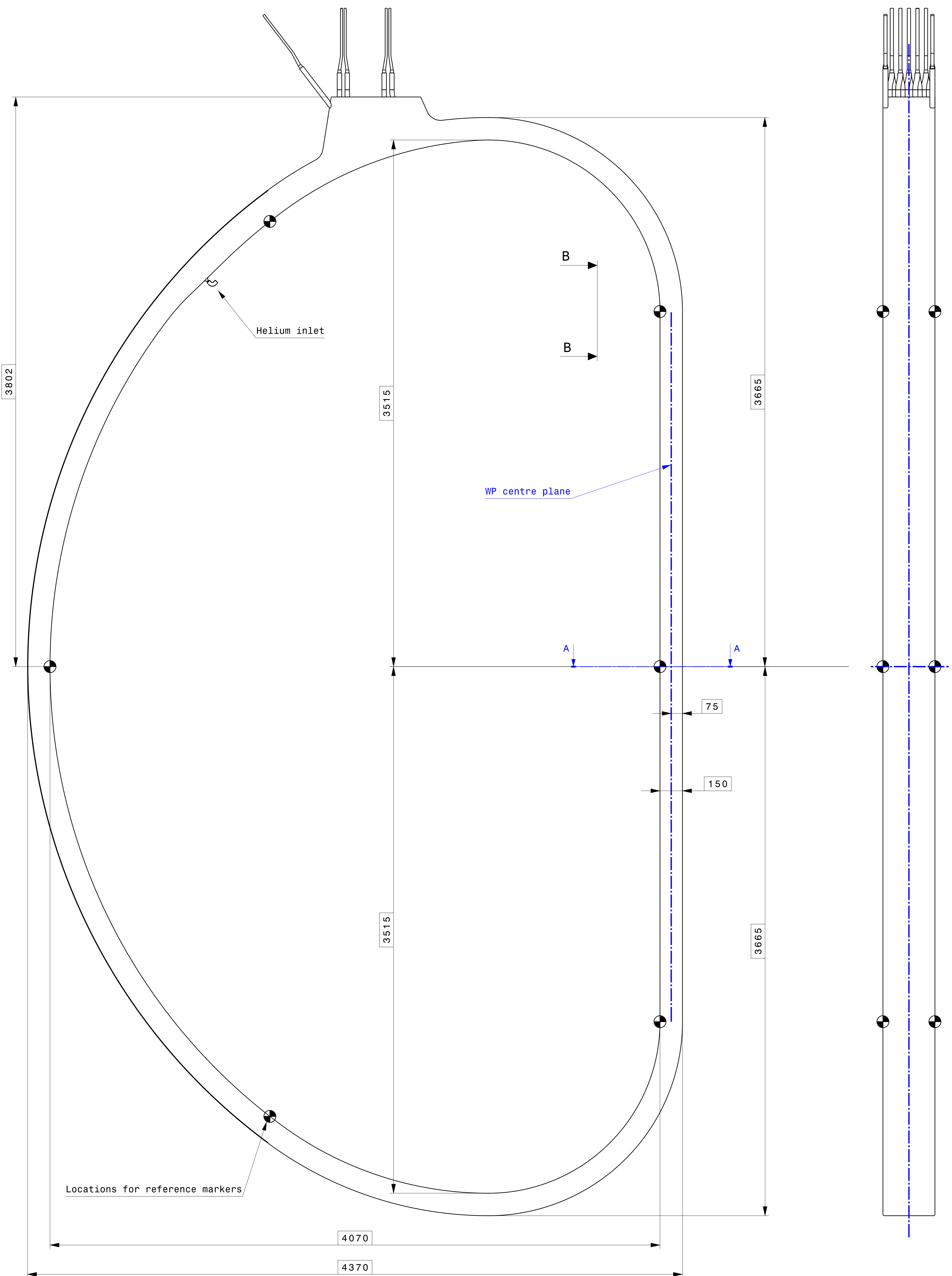
| | |
|-------------|-------------|
| * 010202 | 503000 |
| SHEET NO. 1 | OF 1 SHEETS |

PLANNING NOTES

Item list

JT60-SA TF MODULE COIL

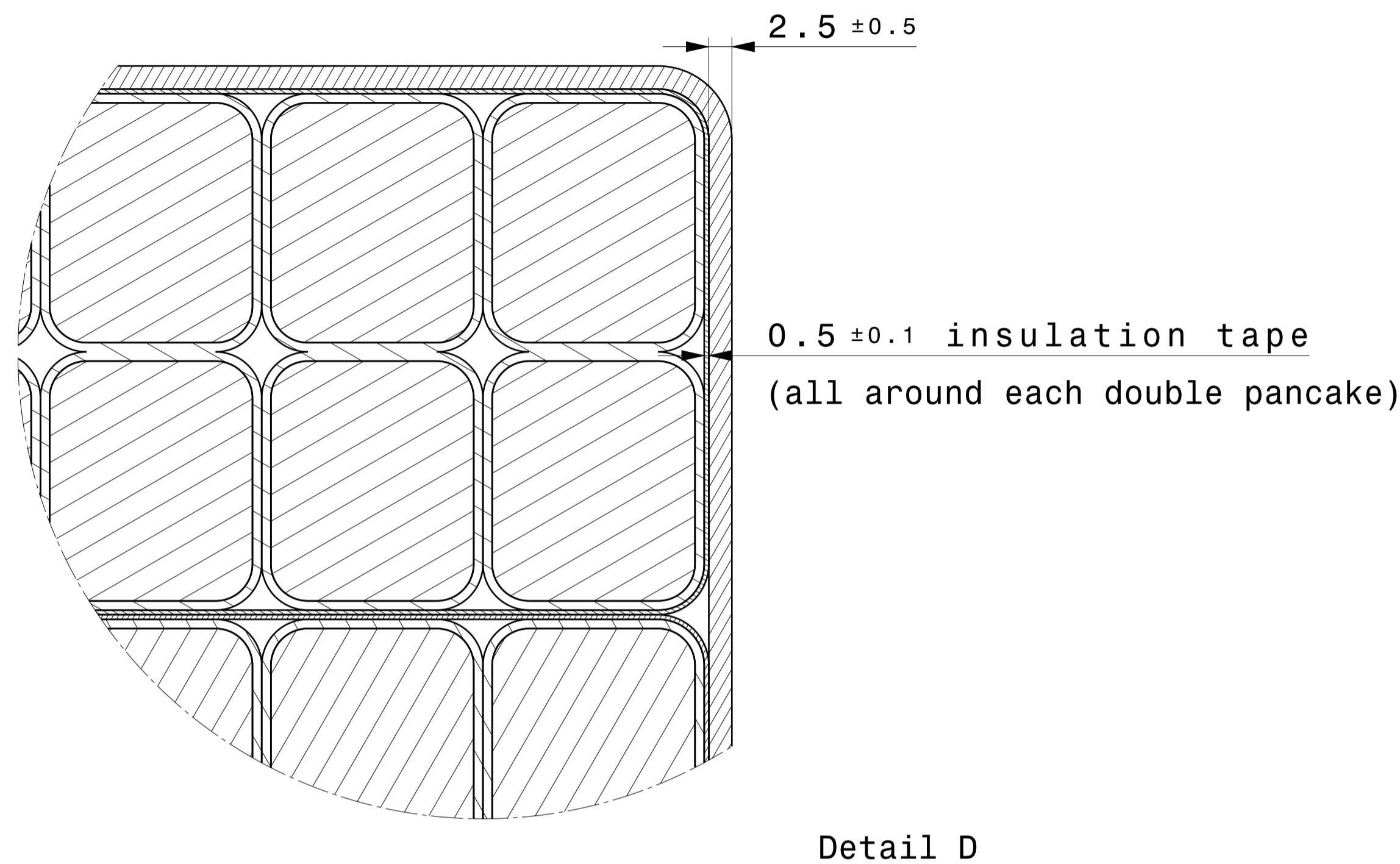
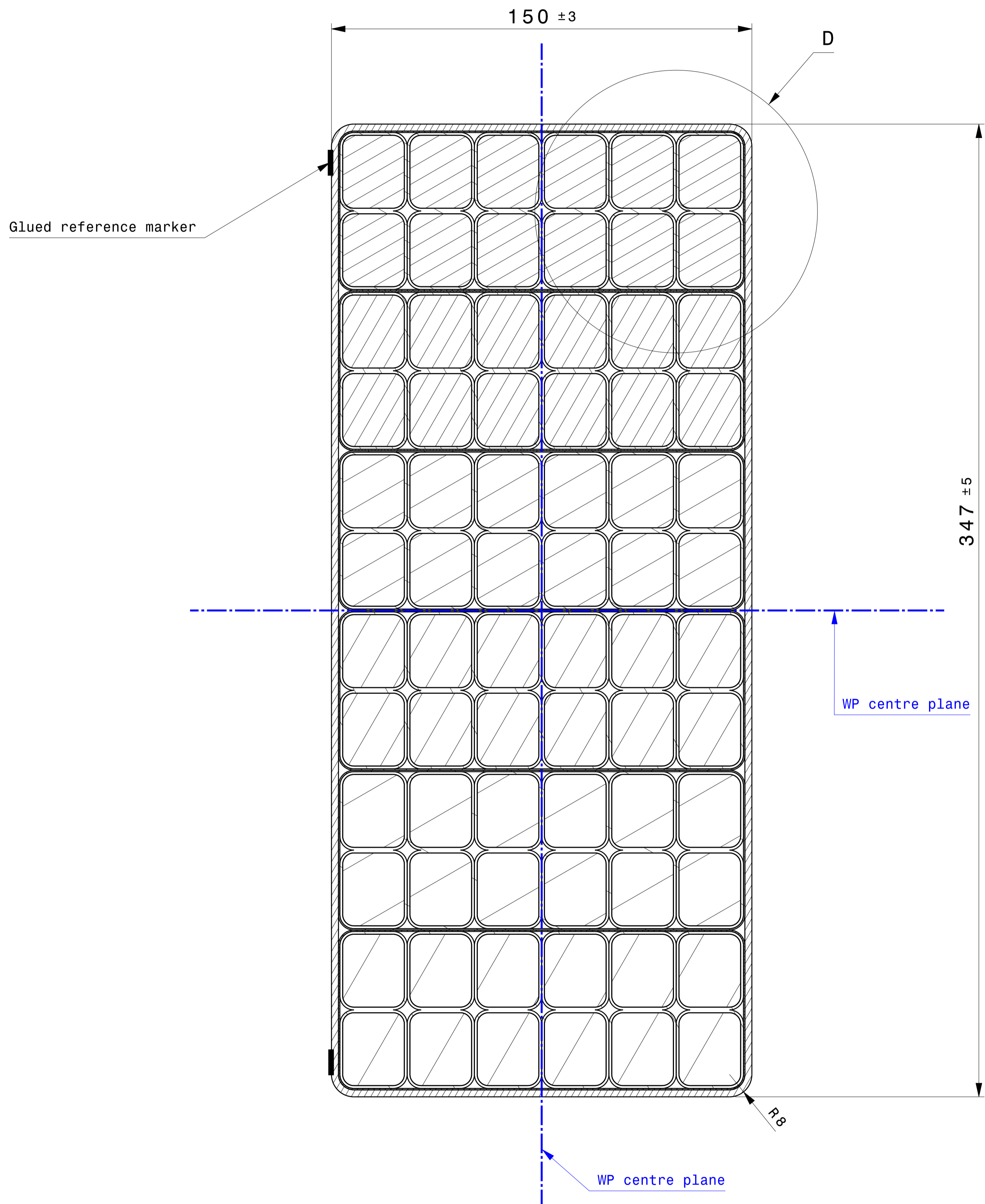
C.A.D. DRAWN NOT TO BE MODIFIED BY HAND



Note: Dimensions for reference only.
 For final winding pack envelope refer
 to drawing 010202-503111


| | | | |
|---|--------------------------------|---------------------------------------|--|
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the SA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | Ref to 3D CatProduct: 010202-203100_01 |
| REV DATE 03-10-2011 | SCALE | CHECKED BY | CUSTOMER: Fusion-for-Energy |
| FIRST ISSUE DATE 20-01-2011 | DRAWN BY G. BROLATTI | CONTROLLED BY A. CUCCHIARO | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Winding pack with ground insulation |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | CODE ENEA ID: DD-JT60TF-NCO | DRAWING NUMBER 503100 |
| WBS LEVELS 3 | | DRAWING NUMBER 010202 | SHEET REVISION MATURITY 01 01 |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

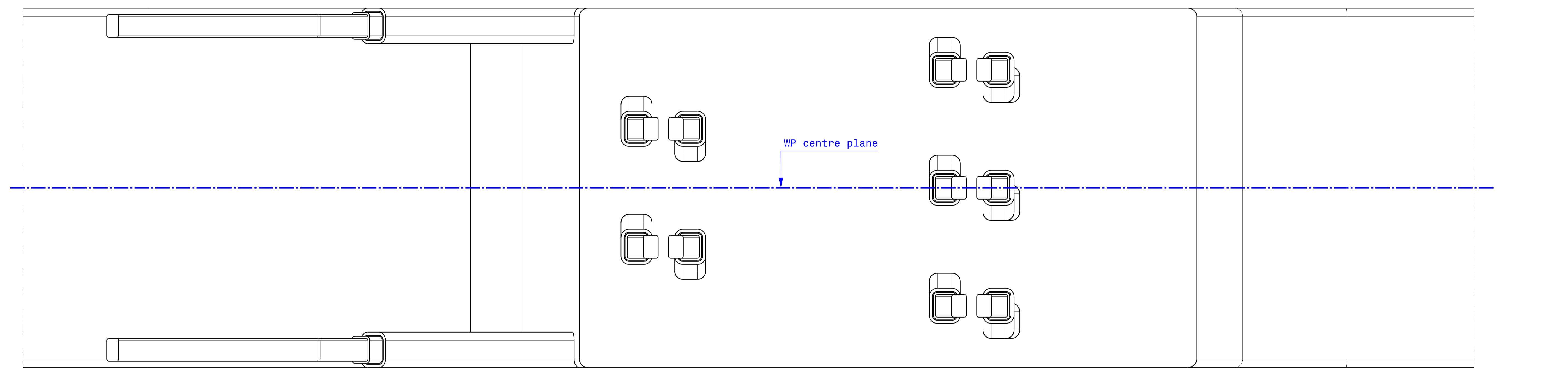
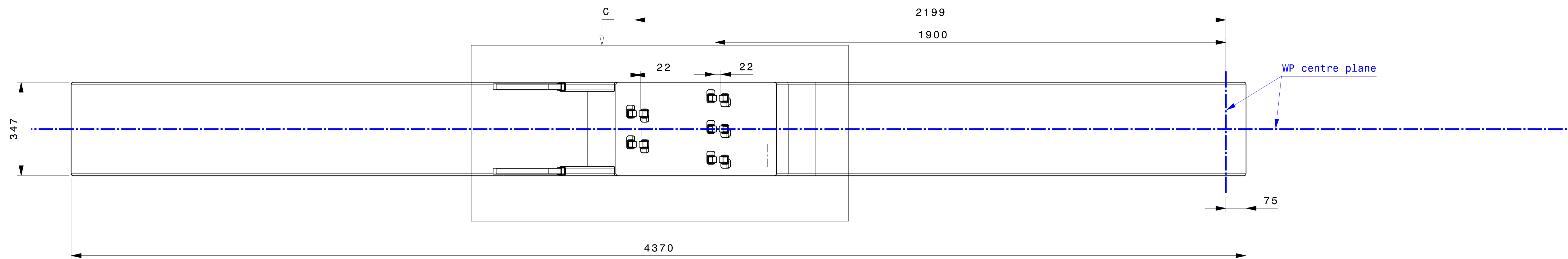


Section A-A

Detail D

| | | | | |
|--|---------------------------------------|------------------------------------|--|---------------------------------|
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | Ref to 3D CatProduct: 010202-203100_01 | |
| REV DATE 03-10-2011 | FIRST ISSUE DATE 20-01-2011 | REVIEWED BY |  Fusion <small>Italy-Frascati Research Centre</small> | CUSTOMER: Fusion-for-Energy |
| SCALE | DRAWN BY G. BROLATTI | CHECKED BY | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Section A-A | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS 3 LEVELS | CODE ENEA ID: DD-JT60TF-NCO | Drawing Number 503100 |
| | | | SHEET 02 <small>/03</small> | REVISION 01 |
| | | | MATURITY | |

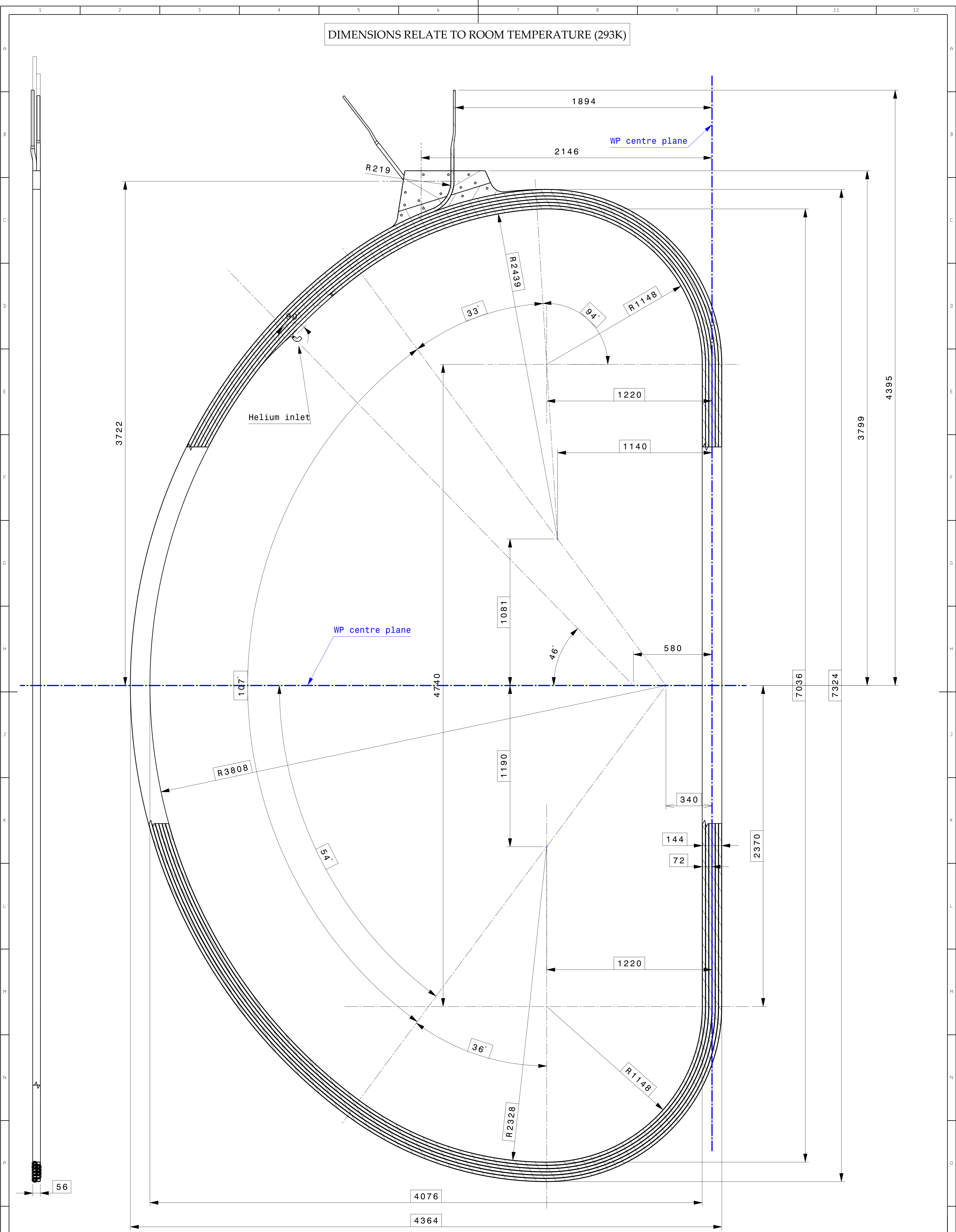
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Note:
 - Dimensions for reference only.
 - Actual geometry depends on chosen joint configuration.

| | | | | |
|--|--------------------------------------|------------------------------------|--|---|
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | Ref to 3D CatProduct: 010202-203100_01 | |
| REV DATE 03-10-2011 | CONTROLLED BY A. CUCCHIARO | REVIEWED BY | CUSTOMER: Fusion-for-Energy | |
| FIRST ISSUE DATE 20-01-2011 | SCALE | CHECKED BY | DRAWING TITLE JT60-SA: TF MAGNET <i>Toroidal Field Coil</i> <i>WP double pancake ends. View from top</i> | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | DRAWN BY G. BROLATTI | CODE ENEA ID: DD-JT60TF-NCO | |
| | WBS LEVELS 3 | 010202 | Drawing Number 503100 | SHEET REVISION MATURITY 03 01 |

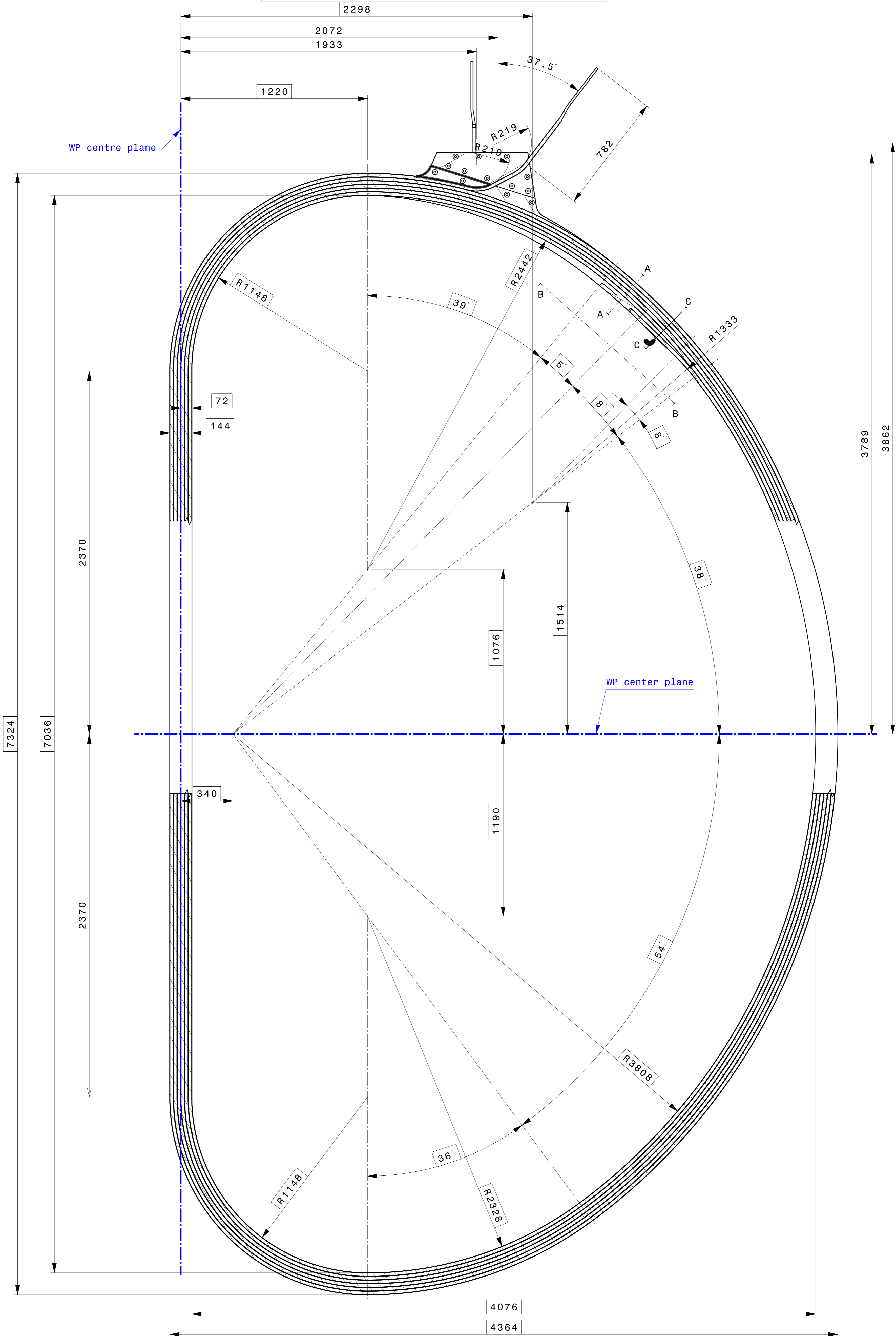
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Note:
 Dimensions for reference only.
 For final winding pack envelope refer
 to drawing 010202-503111. Dimensions
 are related to double pancake without
 0.5mm insulation tape.

| | | | |
|---|------------------------|---------------------------------------|--|
| DMS: | | Ref to 3D CatProduct:010202-203101_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE JT60-SA: TF MAGNET |
| FIRST ISSUE DATE 20-01-2011 | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| SCALE | | DRAWN BY G. BROLATTI | Toroidal Field Coil Double pancake 01. Front view |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS 3 LEVELS | Drawing Number 010202 |
| | | | 503101 |
| | | | SHEET 01 |
| | | | REVISION 01 |
| | | | MATURITY 01 |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



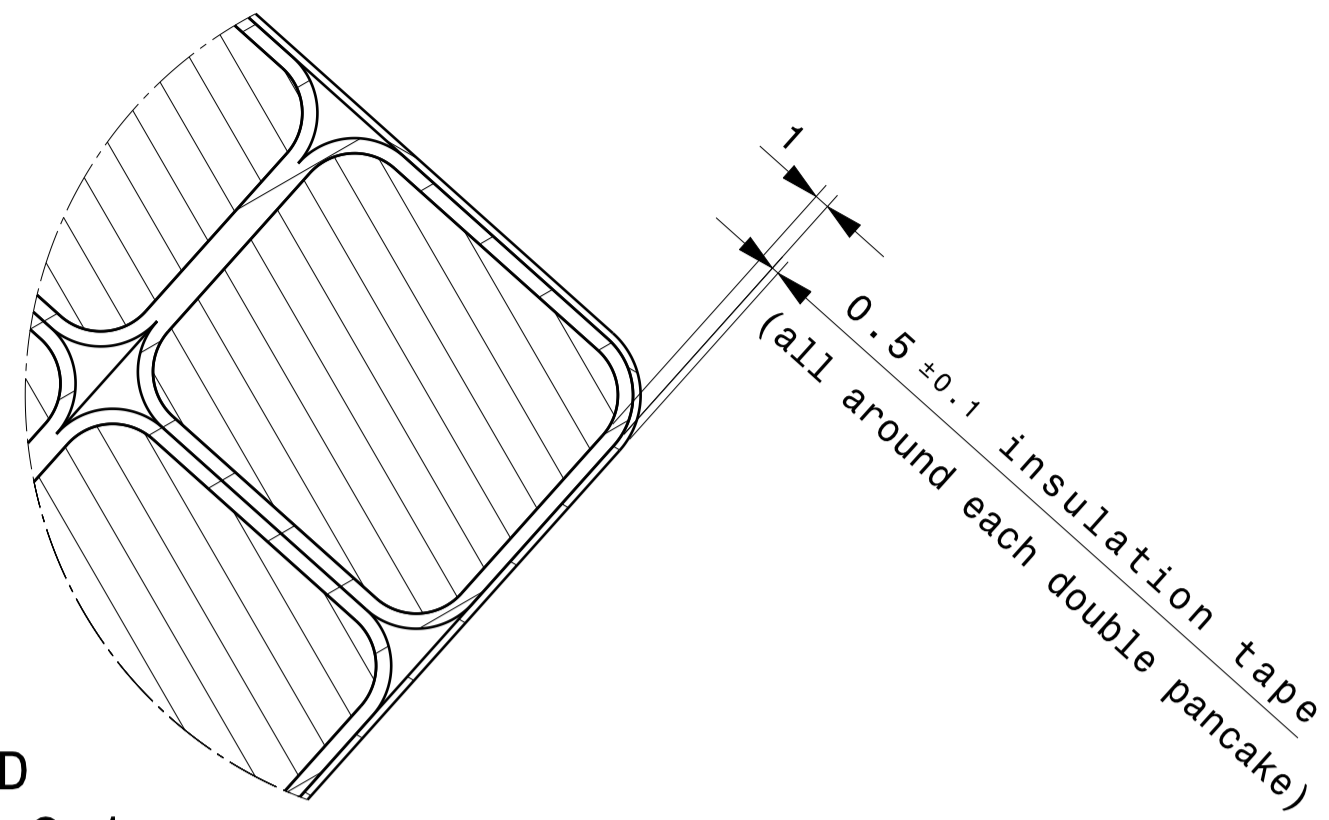
Note:

Dimensions for reference only.
For final winding pack envelope refer to drawing 010202-503111. Dimensions are related to doublepancake without 0.5mm insulation tape.

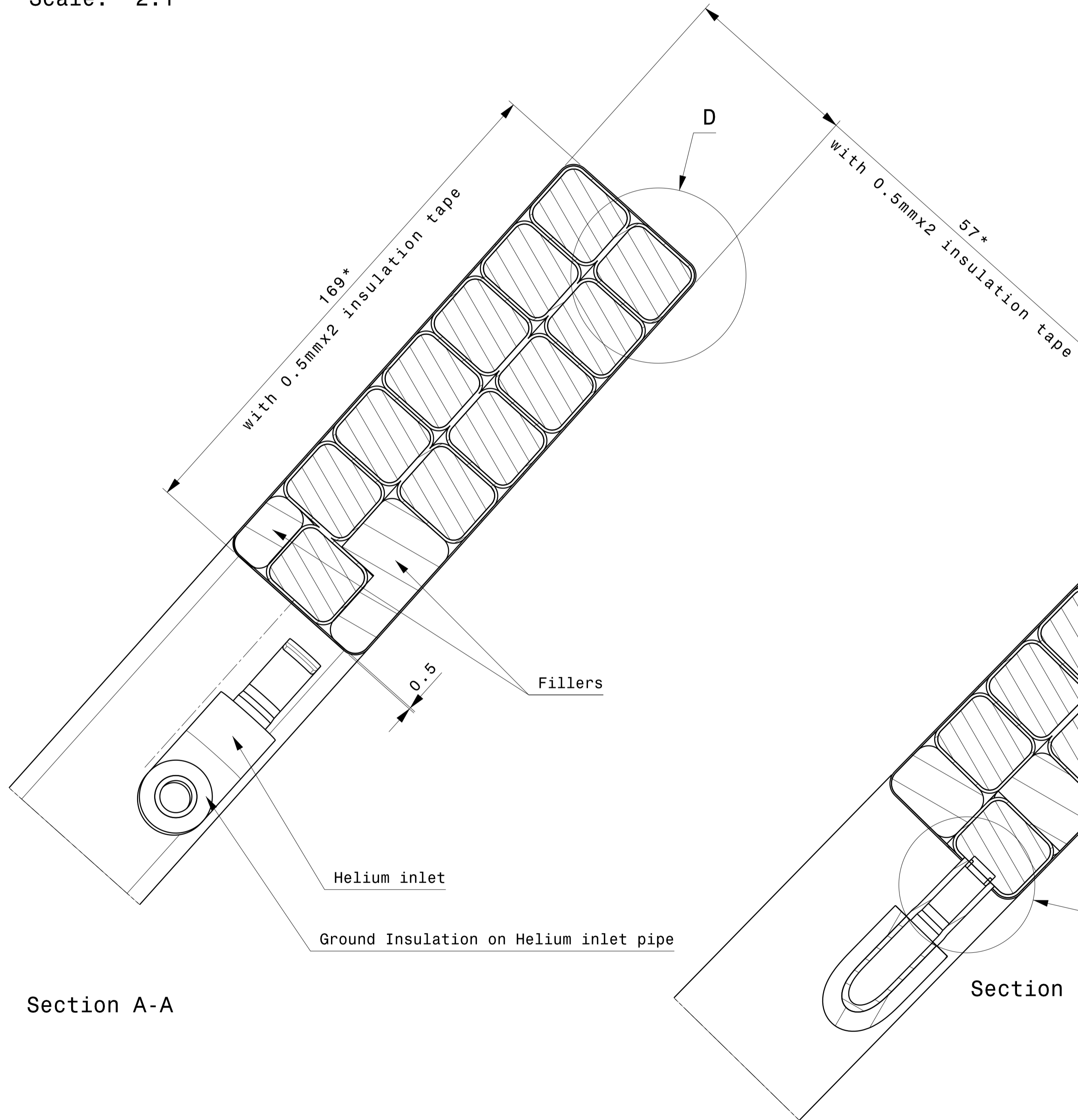
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|---|-----------------|--|---|
| DMS: | | Ref to 3D CatProduct: 010202-203101_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE JT60-SA: TF MAGNET |
| FIRST ISSUE DATE 20-01-2011 | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| SHEET SIZE A1 | | DRAWN BY G. BROLATTI | Toroidal Field Coil Double pancake 01. Rear view |
| FIRST ANGLE PROJECTION | WBS 3 LEVELS | 010202 | Drawing Number 503101 |
| | | | SHEET REVISION MATURITY 02 01 /03 |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

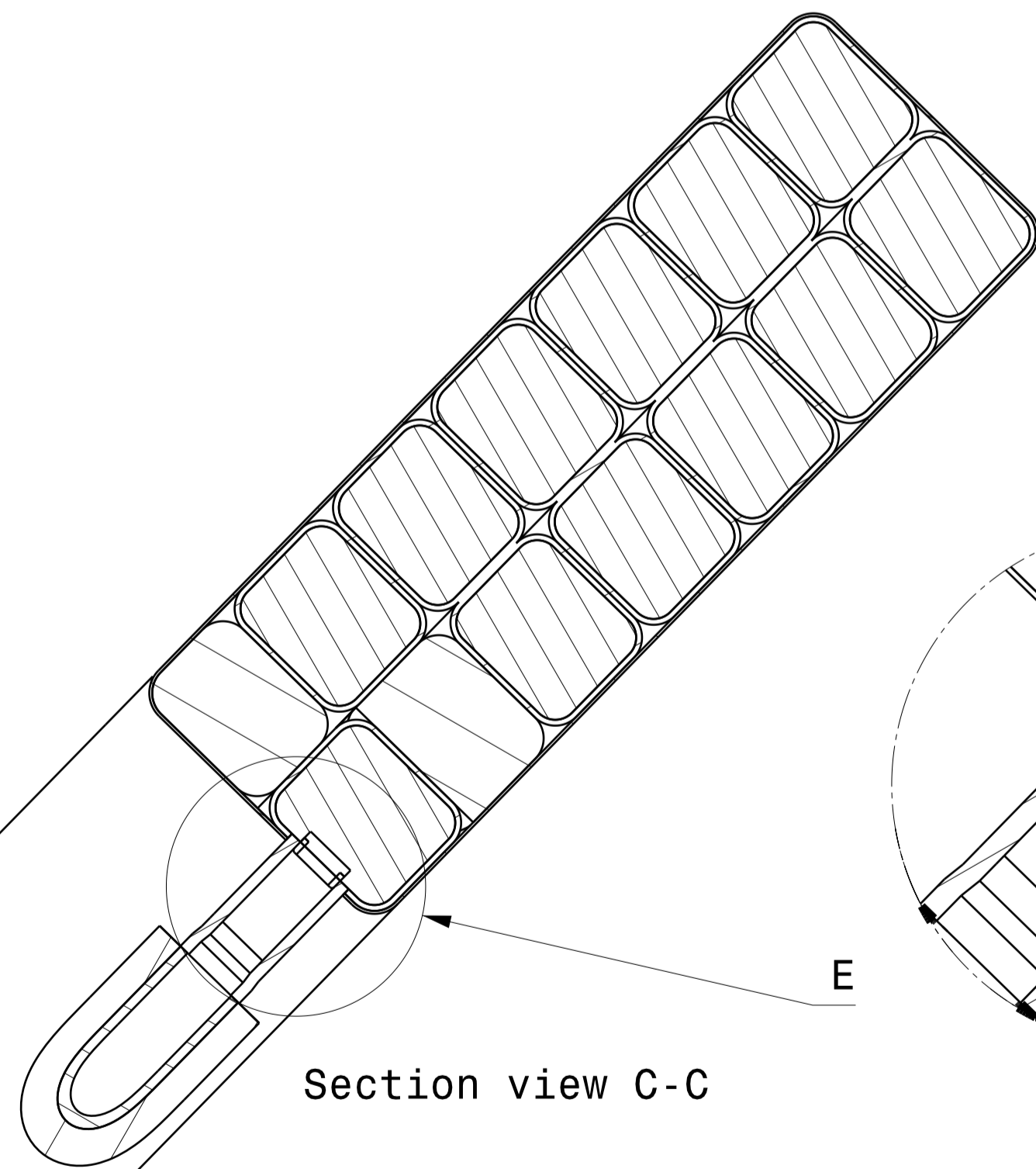
* NOTE:
Dimensions for reference only
refer to drawings 010202-503107 for additional information



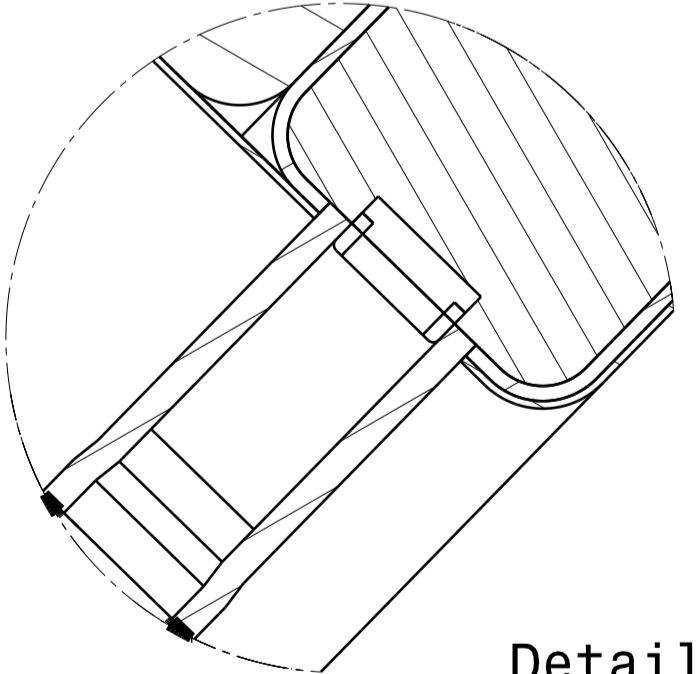
Detail D
Scale: 2:1



Section A-A



Section view C-C



Detail E

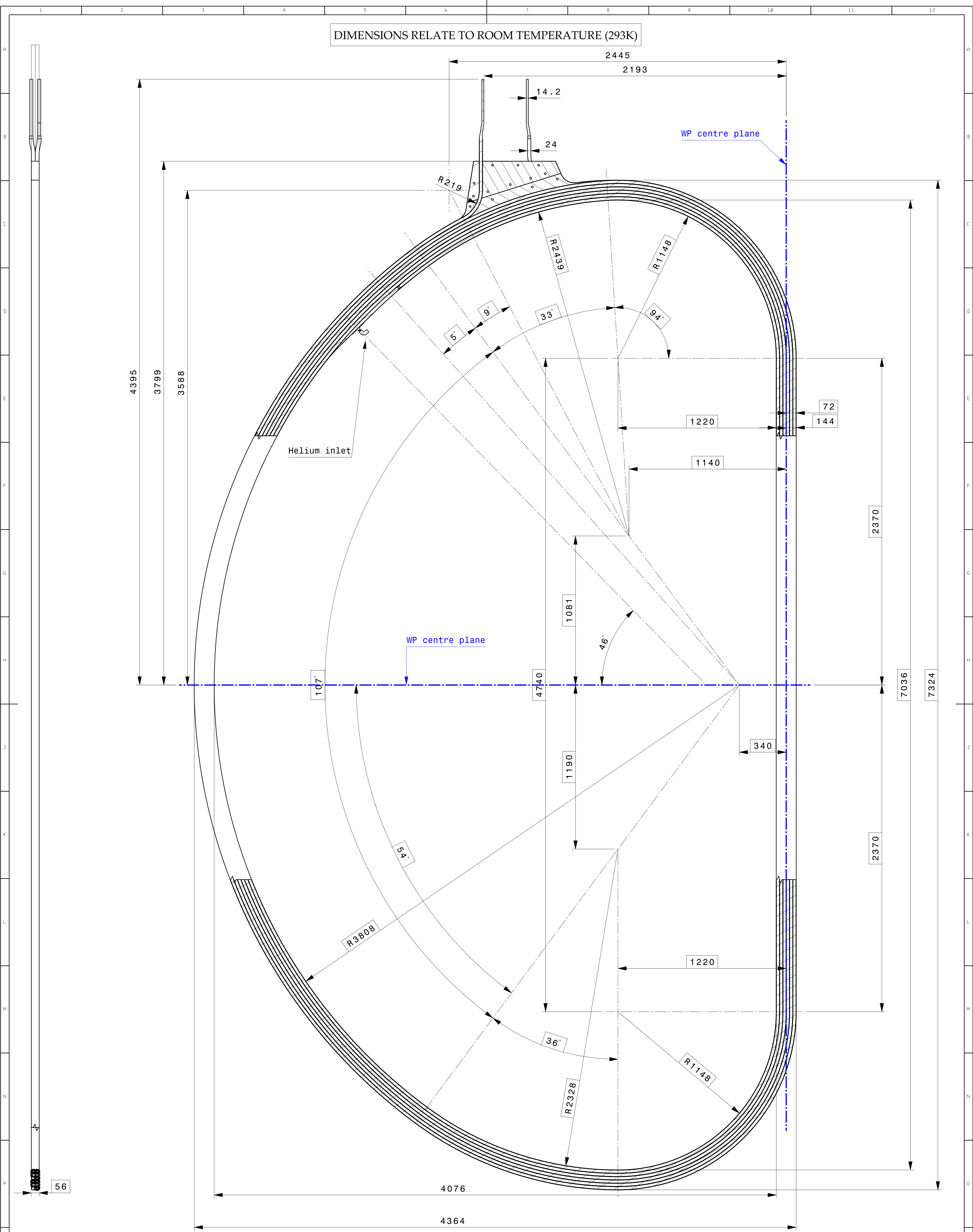
View B-B

Helium inlet

Joggle

| | | | |
|--|------------------------|---------------------------------------|--|
| DMS: | | Ref to 3D CatProduct:010202-203101_01 | |
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| | | REVIEWED BY | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Double pancake 01. Sections |
| | | CHECKED BY | |
| REV DATE 03-10-2011 | SCALE | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| FIRST ISSUE DATE 20-01-2011 | | DRAWN BY G. BROLATTI | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS LEVELS 3 | Drawing Number 010202 503101 |
| | | | SHEET REVISION MATURITY 03 01 |

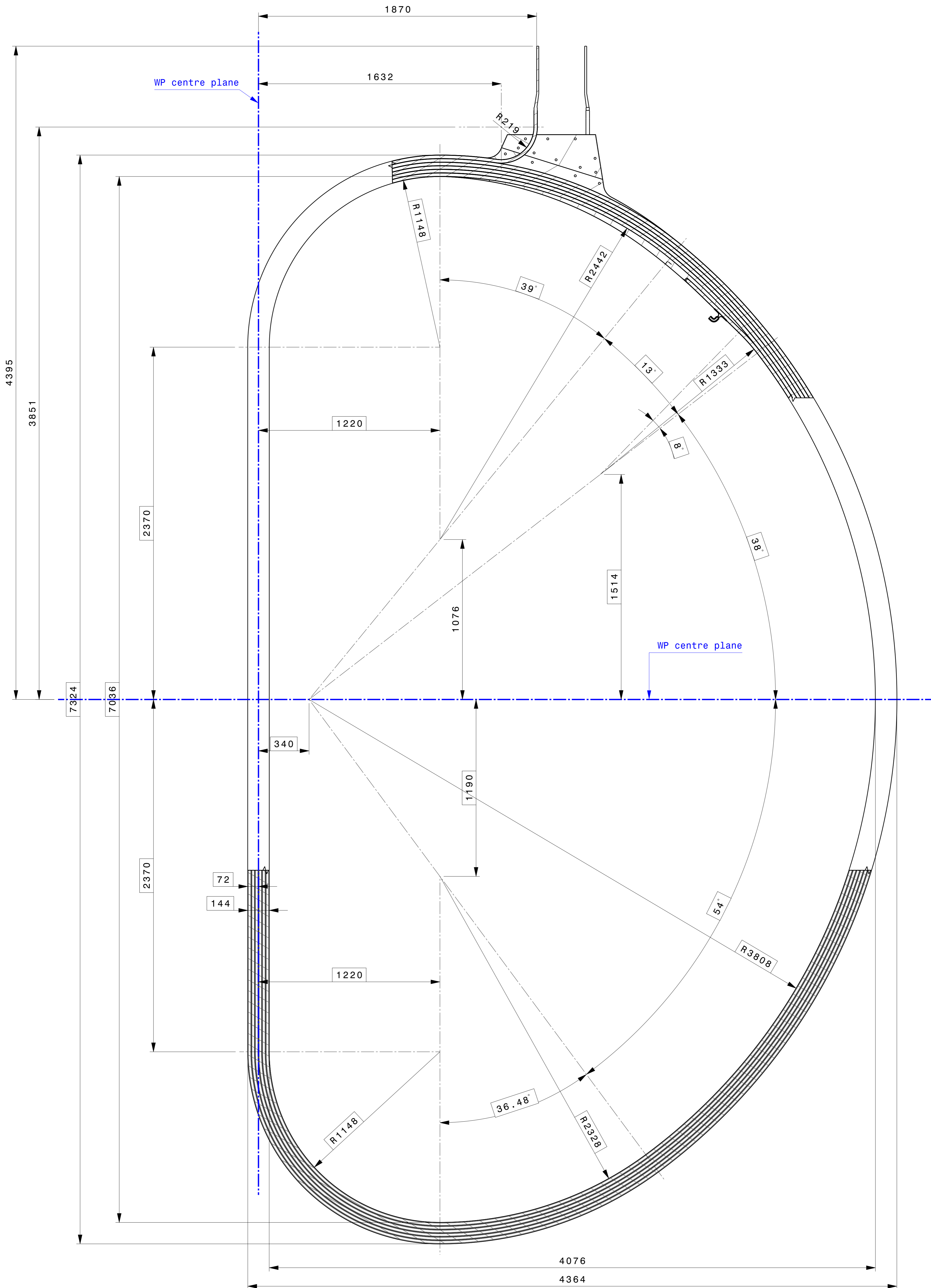
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Note:
 Dimensions for reference only.
 For final winding pack envelope refer
 to drawing 010202-503111. Dimensions
 are related to double pancake without
 0.5mm insulation tape.

| | | | |
|--|----------------------------|--|--|
| DMS: | | Ref to 3D CatProduct: 010202-203102_01 | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | CHECKED BY _____ | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Double pancake 02. Front view |
| FIRST ISSUE DATE 20-01-2011 | SCALE _____ | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS 3 LEVELS | SHEET 01 |
| Drawing Number 010202 | | Drawing Number 503102 | REVISION 01 |
| | | SHEET 01 | MATURITY 01 |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

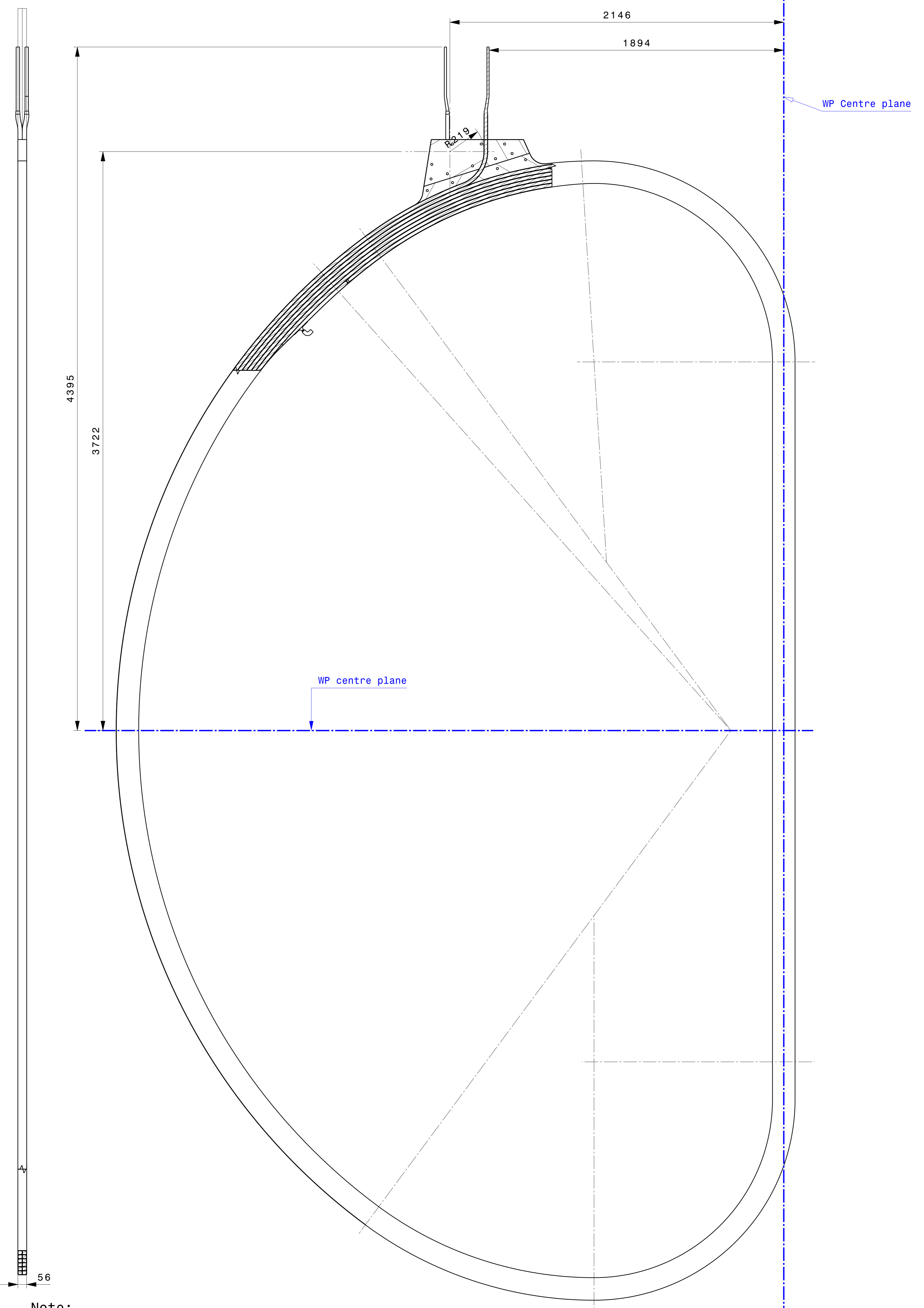


Note:

Dimensions for reference only.
 For final winding pack envelope refer to drawing 010202-503111. Dimensions are related to double pancake without 0.5mm insulation tape.

| | | | |
|---|-----------------|--|--------------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203102_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE JT60-SA: TF MAGNET |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | CODE ENEA ID: DD-JT60TF-NCO |
| SCALE | | CONTROLLED BY A. CUCCHIARO | Toroidal Field Coil |
| SHEET SIZE A1 | | DRAWN BY G. BROLATTI | Double pancake 02. Rear view |
| FIRST ANGLE PROJECTION | WBS 3 LEVELS | 010202 | Drawing Number 503102 |
| | | | SHEET REVISION MATURITY 02 /02 01 |

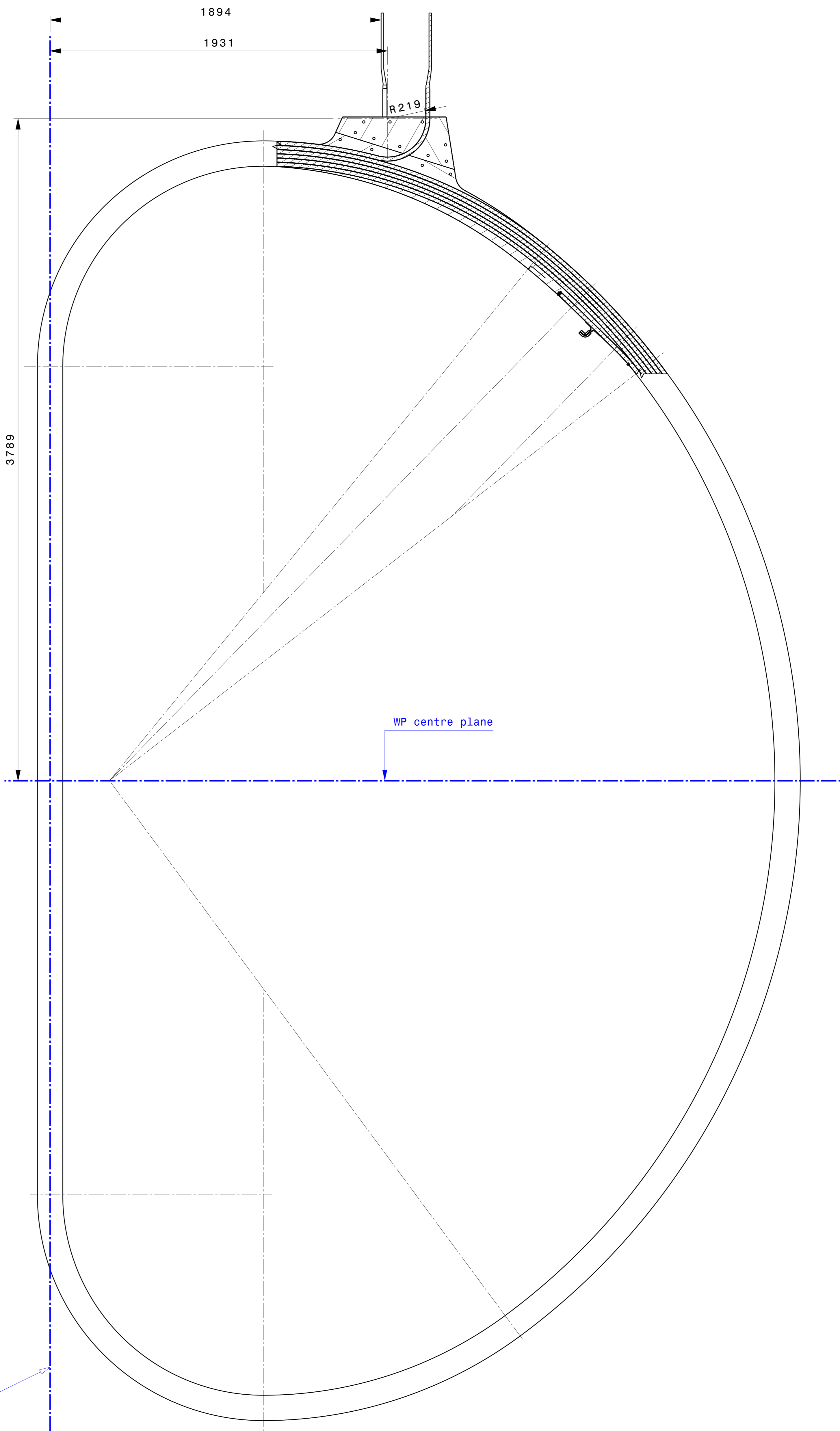
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Note:
 Double pancake "03"
 Winding & helium inlet similar to Double pancake "01"
 Conductor termination & filler layout only.
 Dimensions for reference only.
 For final winding pack envelope refer to drawing 010202-503111. Dimensions are related to double pancake without 0.5mm insulation tape.

| | | | | | |
|---|--------------------------------|--|--|---|--------------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203103_01 | | | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | ENEA Fusión Italy-Frascati Research Centre | | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | FIRST ISSUE DATE 20-01-2011 | SCALE | CONTROLLED BY A. CUCCHIARO | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Double pancake 03. Front view | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS 3 LEVELS | 010202 | Drawing Number 503103 | SHEET REVISION MATURITY 01 /02 01 |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

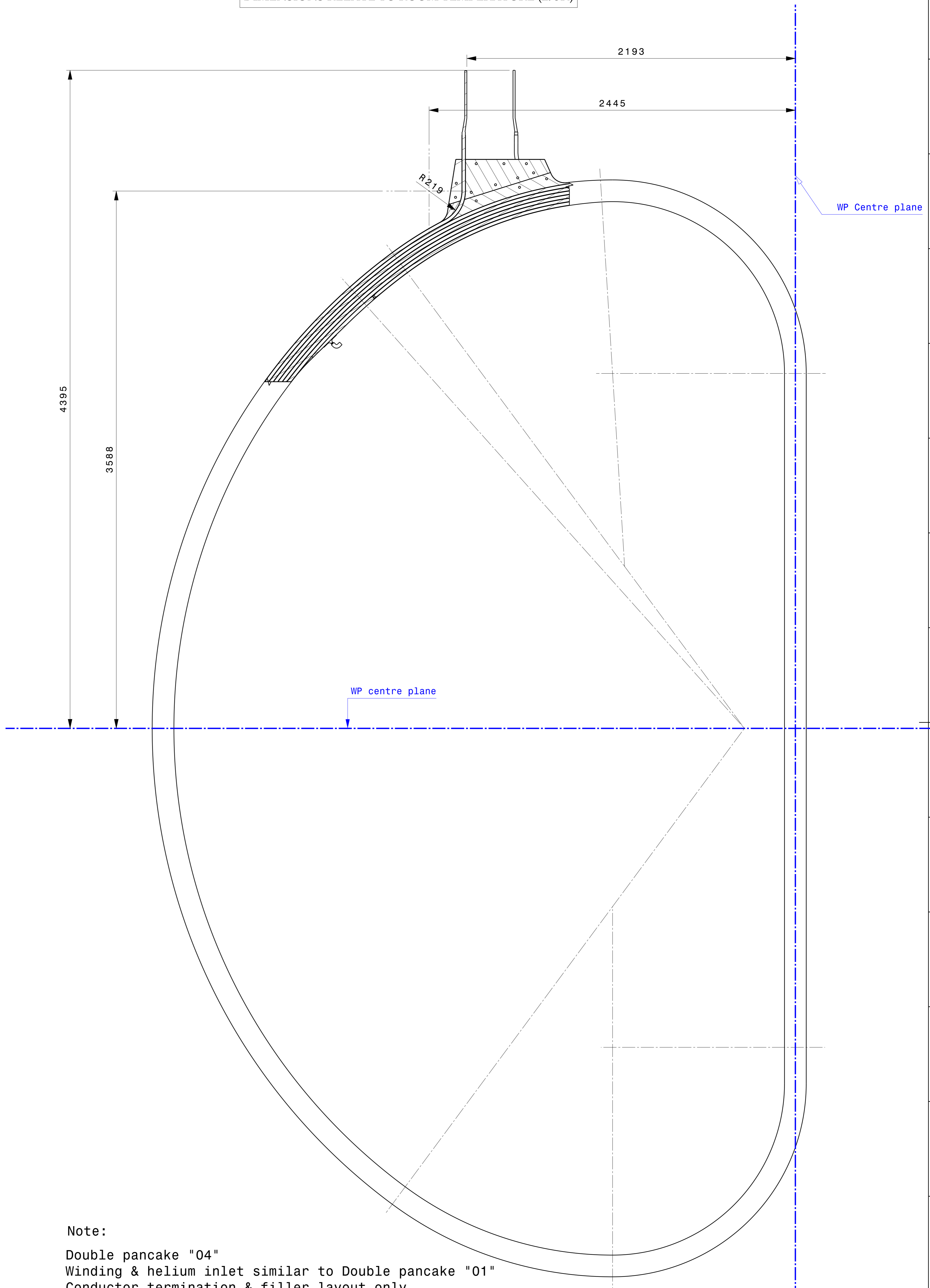


Note:

Double pancake "03"
 Winding & helium inlet similar to Double pancake "01"
 Conductor termination & filler layout only.
 Dimensions for reference only.
 For final winding pack envelope refer
 to drawing 010202-503111. Dimensions
 are related to double pancake without
 0.5mm insulation tape.

| | | | | | |
|---|------------------------|--|--|------------------------------|--------------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203103_01 | | | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | ENEA Fusión Italy-Frascati Research Centre | | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | SCALE | CHECKED BY | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil | | |
| FIRST ISSUE DATE 20-01-2011 | SCALE | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO | Double pancake 03. Rear view | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS 3 LEVELS | 010202 | Drawing Number 503103 | SHEET REVISION MATURITY 02 01 702 |


DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



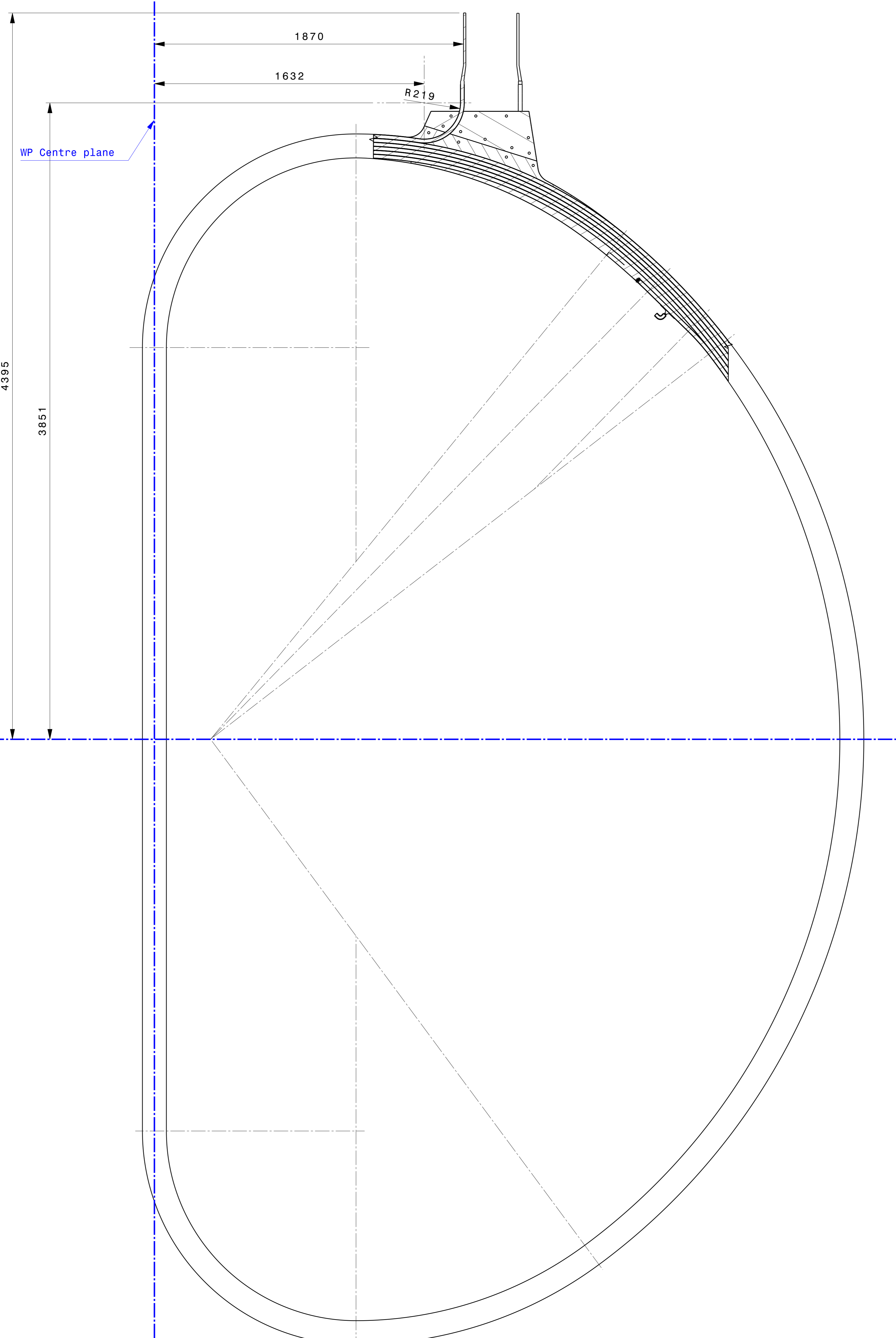
Note:

Double pancake "04"
 Winding & helium inlet similar to Double pancake "01"
 Conductor termination & filler layout only.

Dimensions for reference only.
 For final winding pack envelope refer
 to drawing 010202-503111. Dimensions
 are related to double pancake without
 0.5mm insulation tape.

| | | | |
|--|--------------------------------------|---|--|
| DMS: | | Ref to 3D CatProduct: 010202-203104_01 | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | APPROVED BY A. CUCCHIARO |  Fusión Italy-Frascati Research Centre | CUSTOMER: Fusion-for-Energy |
| | REVIEWED BY | | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil |
| REV DATE 03-10-2011 | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO | Double pancake 04. Front view |
| FIRST ISSUE DATE 20-01-2011 | SCALE | WBS 3 LEVELS | SHEET 01 |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | 010202 | REVISION 01 |
| | | Drawing Number 503104 | MATURITY 01 |


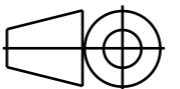
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



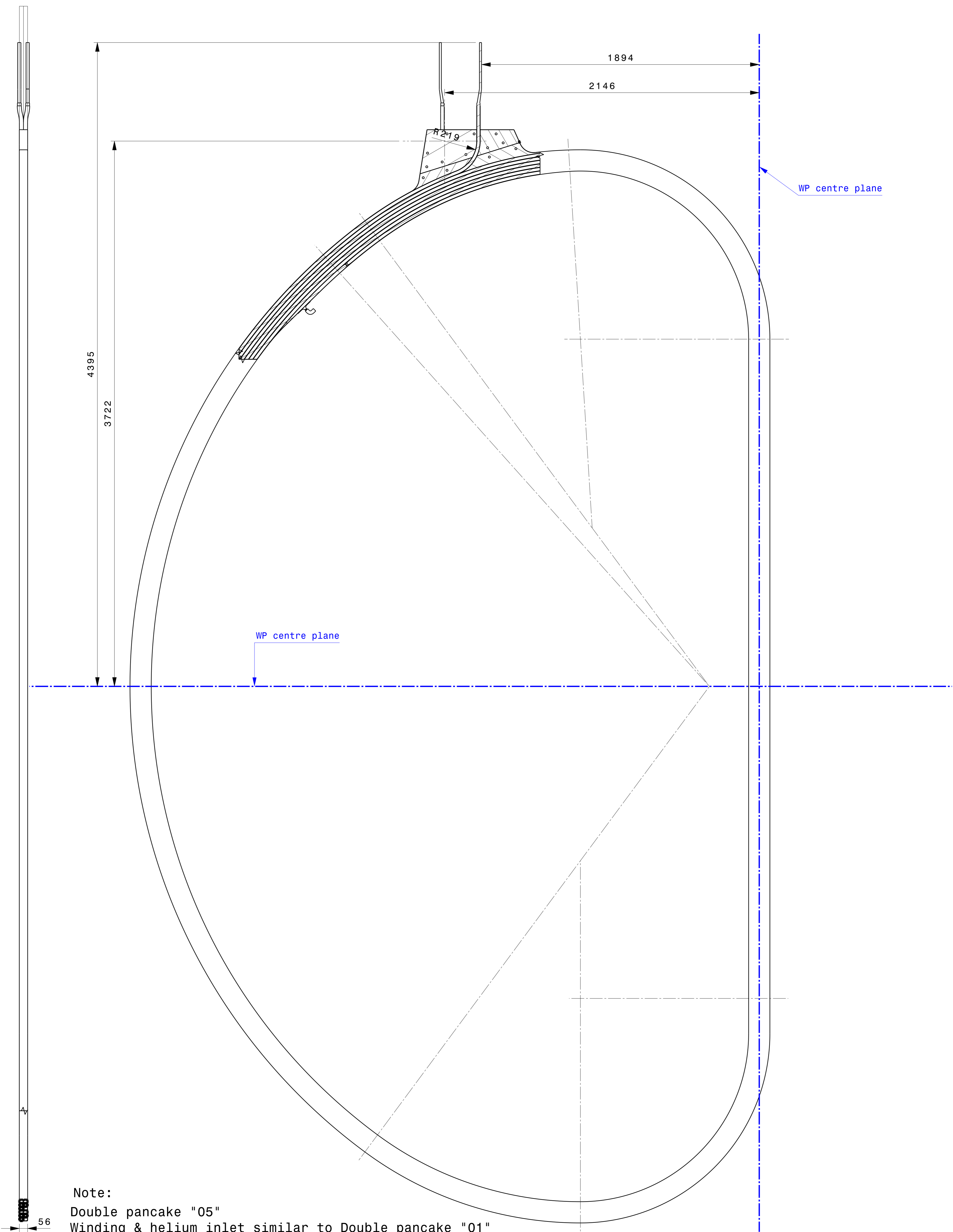
Note:

Double pancake "04"
Winding & helium inlet similar to Double pancake "01"
Conductor termination & filler layout only.

Dimensions for reference only.
For final winding pack envelope refer
to drawing 010202-503111. Dimensions
are related to double pancake without
0.5mm insulation tape.

| | | | | | |
|---|---|--|---|---|------------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203104_01 | | | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO |  Fusión Italy-Frascati Research Centre | | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | FIRST ISSUE DATE 20-01-2011 | SCALE | CONTROLLED BY A. CUCCHIARO | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Double pancake 04. Rear view | |
| DRAWN BY G. BROLATTI | | CODE ENEA ID: DD-JT60TF-NC0 | | | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION  | WBS 3 LEVELS | 010202 | Drawing Number 503104 | SHEET REVISION MATURITY 02 / 01 |

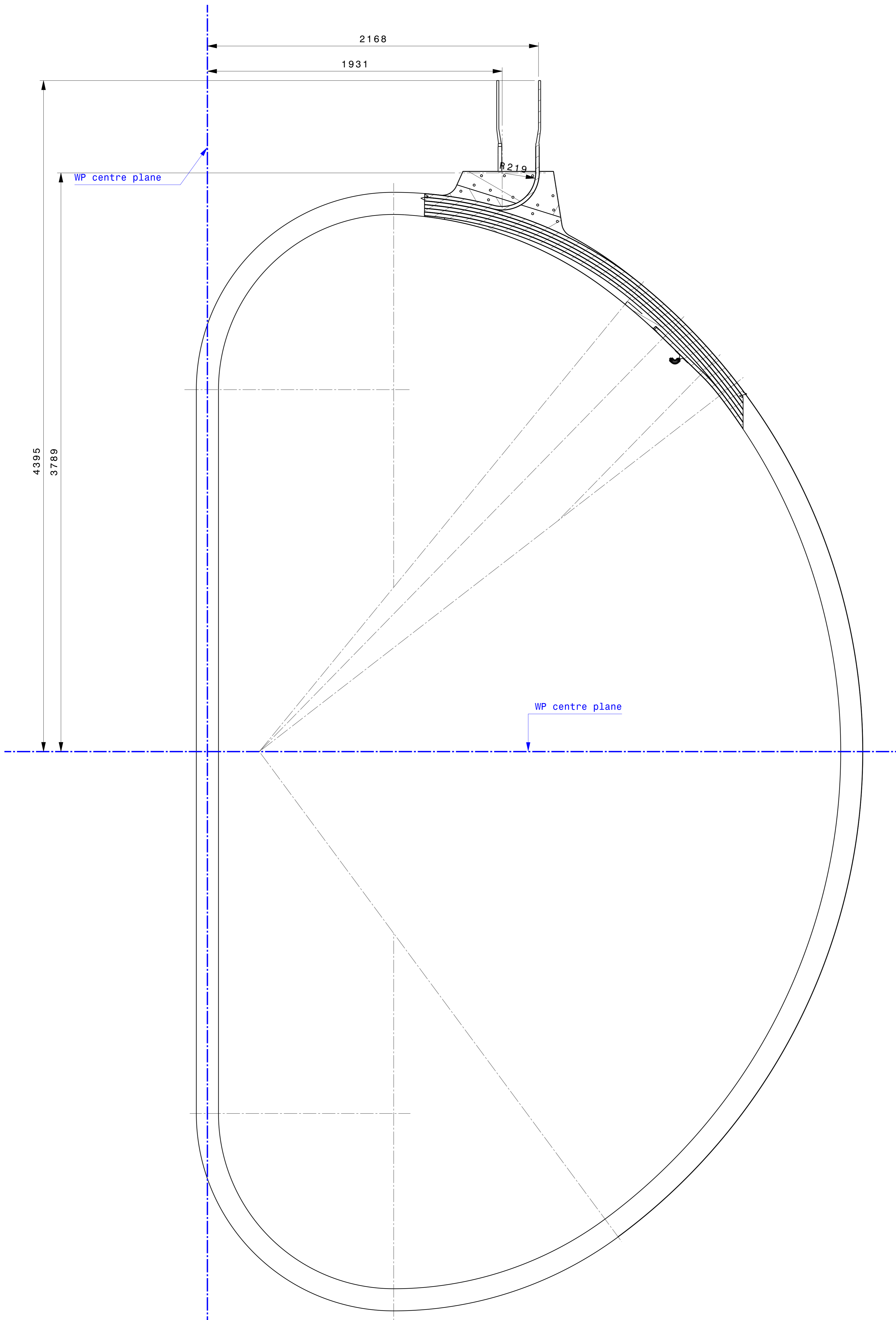
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Note:
 Double pancake "05"
 Winding & helium inlet similar to Double pancake "01"
 Conductor termination & filler layout only.
 Dimensions for reference only.
 For final winding pack envelope refer
 to drawing 010202-503111. Dimensions
 are related to double pancake without
 0.5mm insulation tape.


| | | | | | |
|---|--------------------------------|--|--|--|--------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203105_01 | | | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | ENEA Fusión Italy-Frascati Research Centre | | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | FIRST ISSUE DATE 20-01-2011 | SCALE | CONTROLLED BY A. CUCCHIARO | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil | |
| DRAWN BY G. BROLATTI | | CODE ENEA ID: DD-JT60TF-NCO | Double pancake 05. Front view | | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS 3 LEVELS | 010202 | Drawing Number 503105 | SHEET 01 |
| | | | REVISION 01 | MATURITY | |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

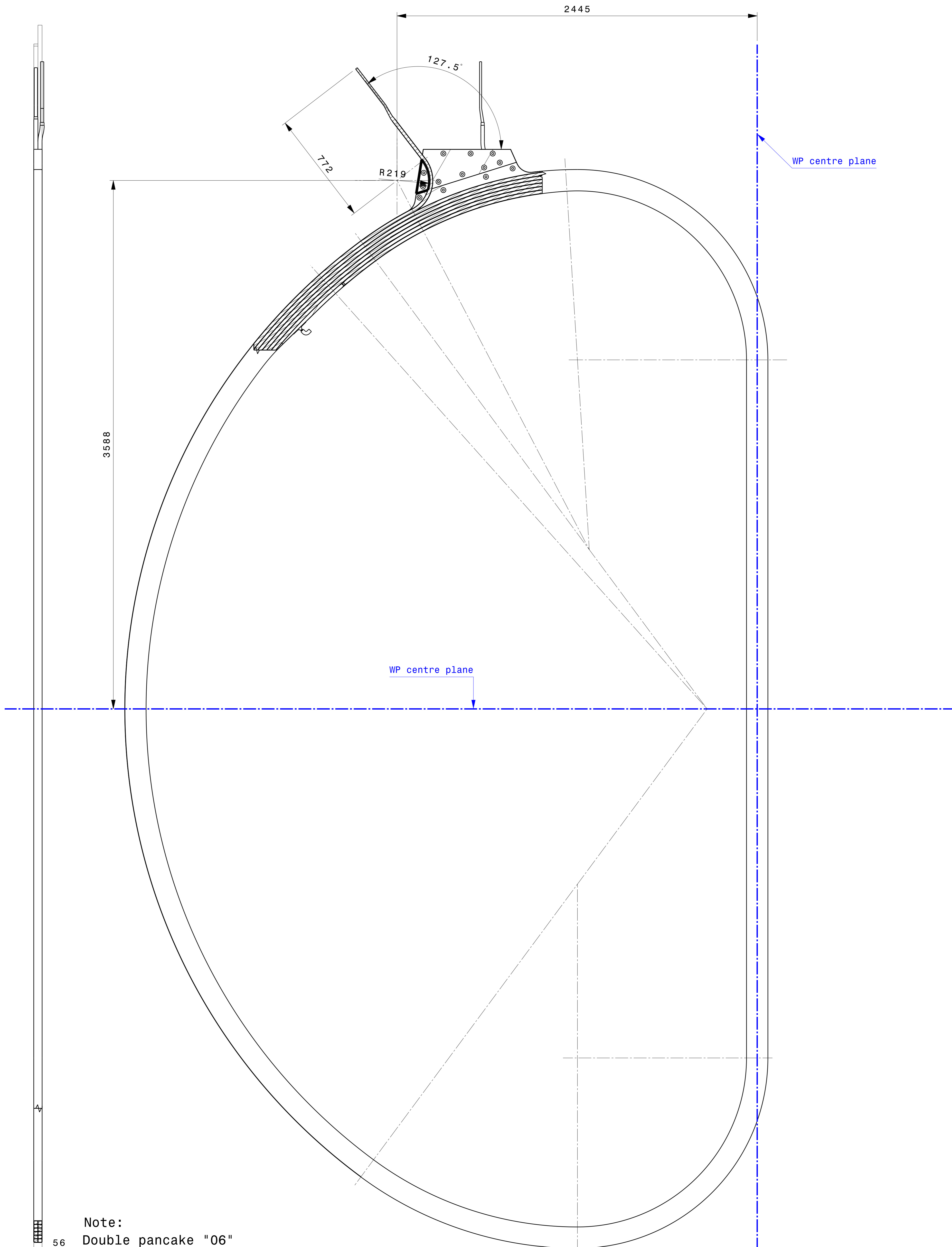


Note:

Double pancake "05"
 Winding & helium inlet similar to Double pancake "01"
 Conductor termination & filler layout only.
 Dimensions for reference only.
 For final winding pack envelope refer
 to drawing 010202-503111. Dimensions
 are related to double pancake without
 0.5mm insulation tape.

| | | | | | |
|---|------------------------|--|---|--------|--------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203105_01 | | | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO |  Fusión Italy-Frascati Research Centre | | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | SCALE | REVIEWED BY | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil | | |
| FIRST ISSUE DATE 20-01-2011 | SCALE | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO | | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | DRAWN BY G. BROLATTI | WBS 3 LEVELS | 010202 | Drawing Number 503105 |
| | | | | | SHEET 702 |
| | | | | | REVISION 02 |
| | | | | | MATURITY 01 |

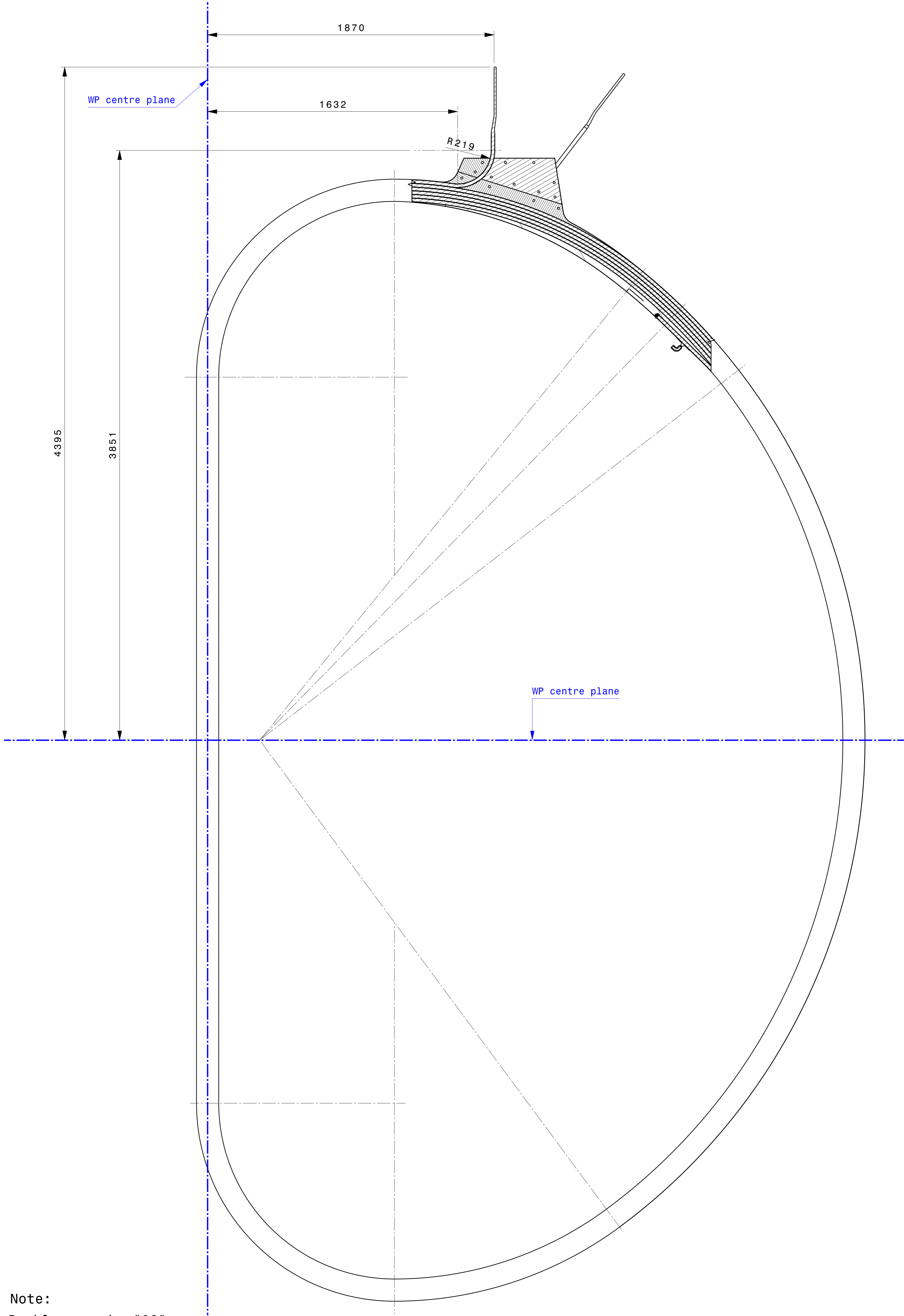
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Note:
 Double pancake "06"
 Winding & helium inlet similar to Double pancake "01"
 Conductor termination & filler layout only.
 Dimensions for reference only.
 For final winding pack envelope refer
 to drawing 010202-503111. Dimensions
 are related to double pancake without
 0.5mm insulation tape.

| | | | | | |
|---|--------------------------------|---------------------------------------|--|---|--------------------------------|
| DMS: | | Ref to 3D CatProduct:010202-203106_01 | | | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | ENEA Fusión Italy-Frascati Research Centre | | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | FIRST ISSUE DATE 20-01-2011 | SCALE | CONTROLLED BY A. CUCCHIARO | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil | |
| DRAWN BY G. BROLATTI | | CODE ENEA ID: DD-JT60TF-NCO | Double pancake 06. Front view | | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS 3 LEVELS | 010202 | Drawing Number 503106 | SHEET 01 |
| | | | | REVISION /02 | MATURITY 01 |


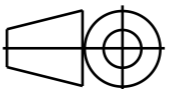
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



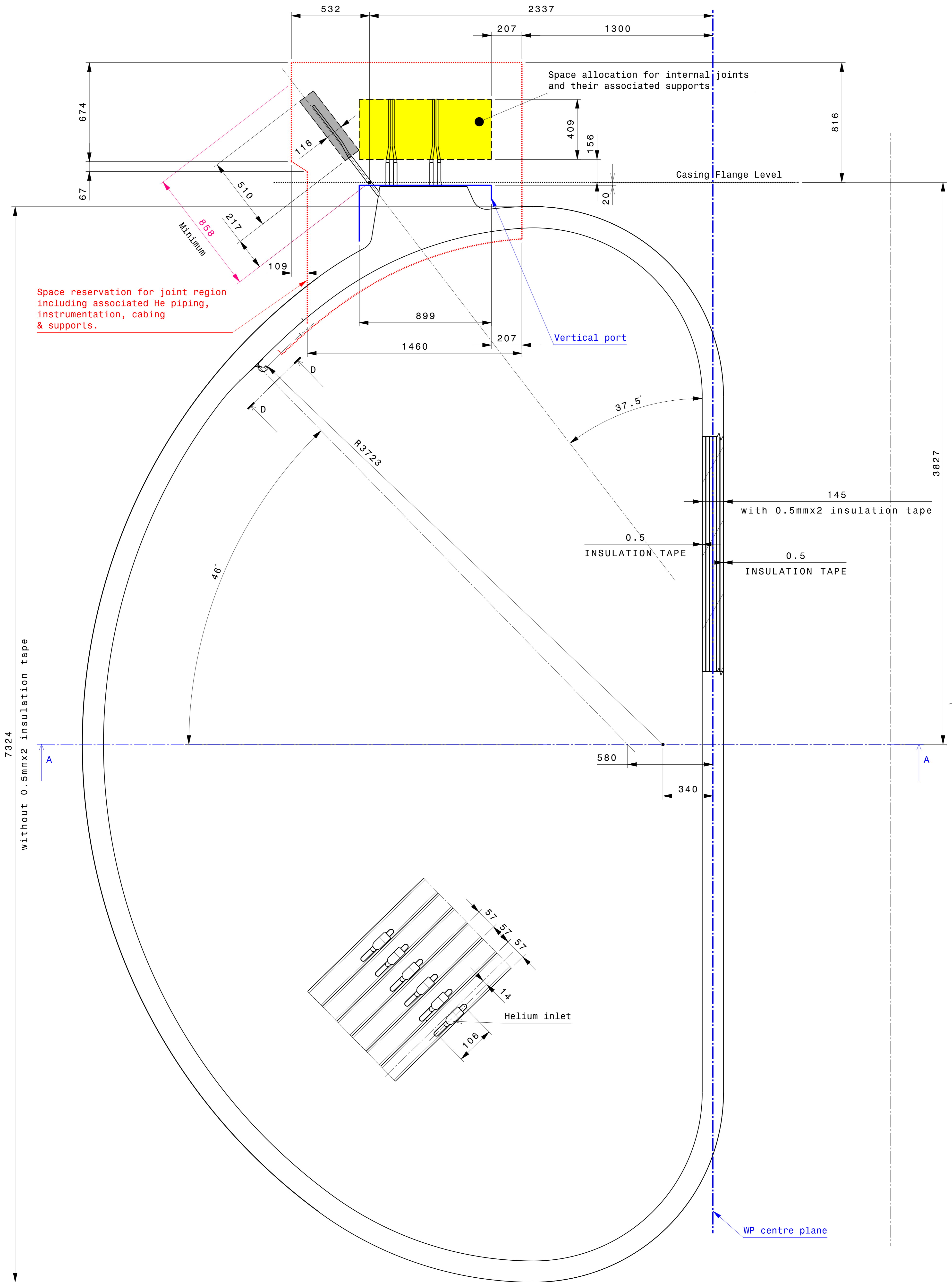
Note:

Double pancake "06"
Winding & helium inlet similar to Double pancake "01"
Conductor termination & filler layout only.

Dimensions for reference only.
For final winding pack envelope refer
to drawing 010202-503111. Dimensions
are related to double pancake without
0.5mm insulation tape.

| | | | | |
|---|---|--|---|--------------------------|
| DMS: | | Ref to 3D CatProduct:010202-203106_01 | | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | APPROVED BY A. CUCCHIARO |  Fusión <small>Italy-Frascati Research Centre</small> | CUSTOMER: Fusion-for-Energy | |
| | REVIEWED BY | | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil | |
| REV DATE 03-10-2011 | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO | | |
| FIRST ISSUE DATE 20-01-2011 | SCALE | DRAWN BY G. BROLATTI | DRAWING TITLE Double pancake 06. Rear view | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION  | WBS 3 LEVELS | 010202 | Drawing Number 503106 |
| | | | | SHEET 02 |
| | | | | REVISION 01 |
| | | | | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Space reservation for joint region including associated He piping, instrumentation, cabling & supports.

Space allocation for internal joints and their associated supports.

Casing Flange Level

Vertical port

145 with 0.5mmx2 insulation tape

0.5 INSULATION TAPE

0.5 INSULATION TAPE

7324 without 0.5mmx2 insulation tape

Helium inlet

WP centre plane

Note: Dimensions for reference only.

| | | | | | |
|--|-------------|--|--|-------------------|----------------|
| DMS: | | Ref to 3D CatProduct: 010202-203107_01 | | | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | APPROVED BY | Fusión Italy-Frascati Research Centre | | CUSTOMER: | |
| | REVIEWED BY | | | Fusion-for-Energy | |
| REV DATE | 03-10-2011 | CONTROLLED BY | DRAWING TITLE | | |
| FIRST ISSUE DATE | 20-01-2011 | SCALE | JT60-SA: TF MAGNET Toroidal Field Coil 2D Layout | | CODE ENEA ID: |
| SHEET SIZE | A1 | PROJECTION | WBS 3 LEVELS | 010202 | Drawing Number |
| | | | | 503107 | SHEET |
| | | | | 01 | REVISION |
| | | | | 01 | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

0.5 ±0.1 insulation tape
(all around each double pancake)

Detail E

E

WP centre plane

WP centre plane

145 ±3

144 ±3

24 ±0.1

Typical

0 ±0.6
28 ±0.1
Typical

DP06

DP05

DP04

DP03

DP02

DP01

Max 1

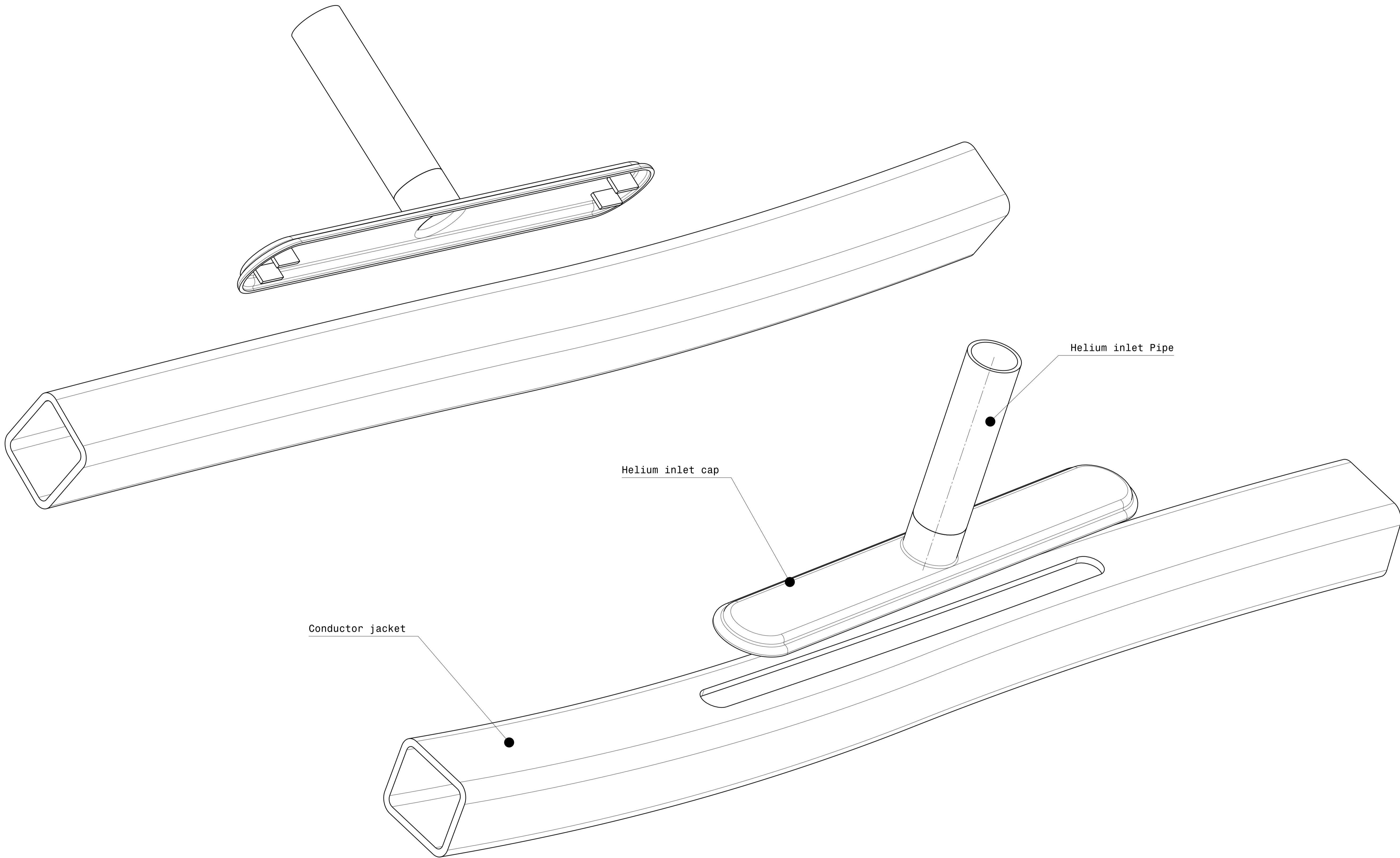
0.6




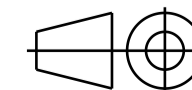
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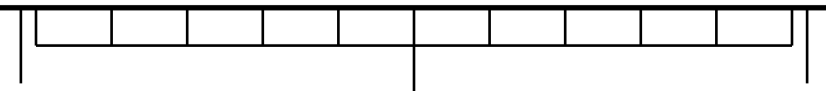
* with 0.5mmx2 insulation tape

| | | | | | |
|--|--|--|--|--|--|
| DMS: | | Ref to 3D CatProduct: 010202-203107_01 | | | |
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | | CUSTOMER: Fusion-for-Energy | |
| REV DATE 03-10-2011 | | REVIEWED BY | | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Section A-A | |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | | CODE ENEA ID: DD-JT60TF-NCO | |
| SCALE | | CONTROLLED BY A. CUCCHIARO | | SHEET 02 | |
| SHEET SIZE A1 | | DRAWN BY G. BROLATTI | | REVISION 01 | |
| FIRST ANGLE PROJECTION | | WBS LEVELS 010202 | | DRAWING NUMBER 503107 | |
| | | | | MATERIALITY | |

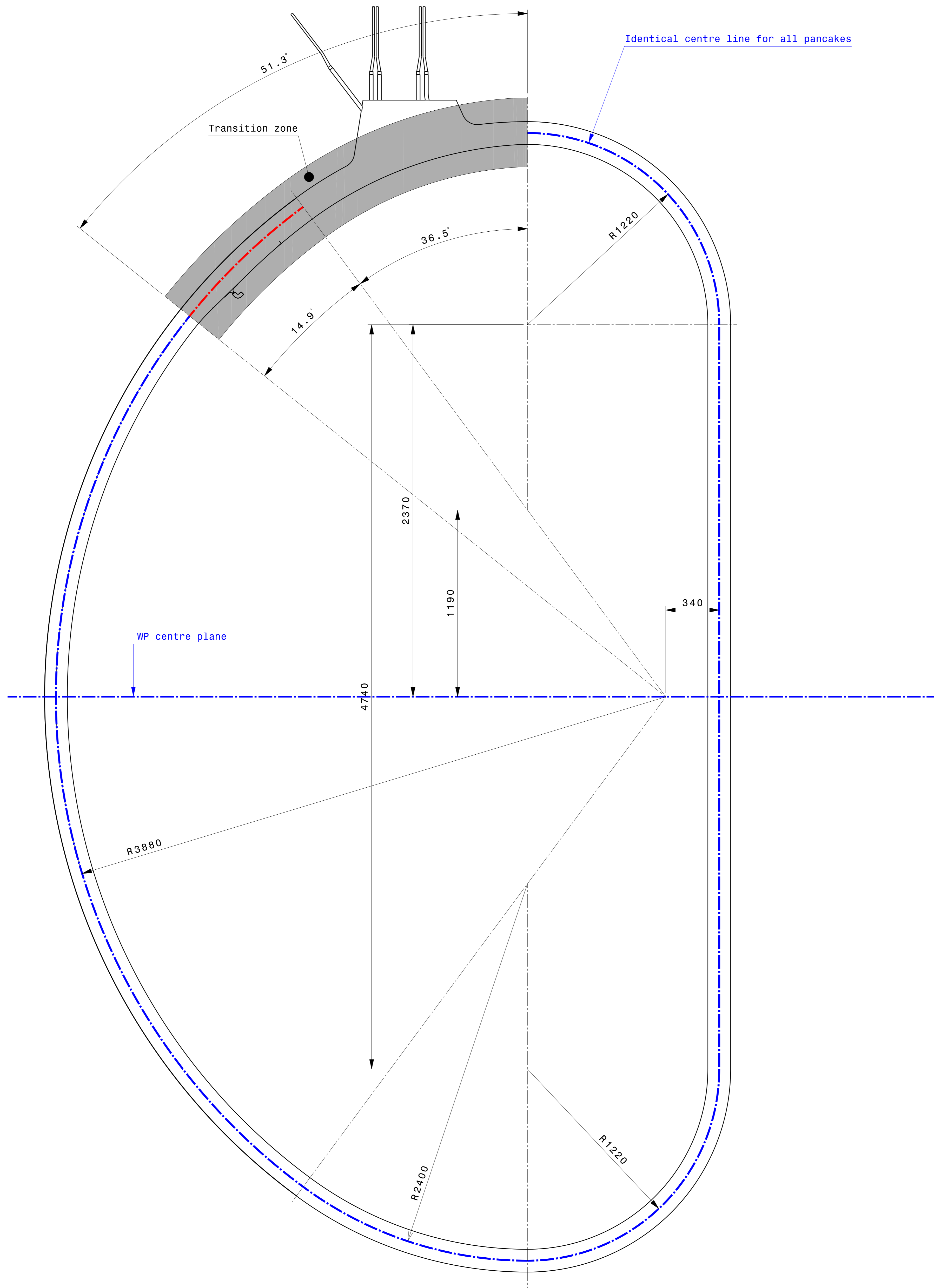
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)




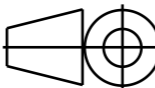
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|---|-----|---|---|------------|--|--------|-------|----|----------|----|----------|---|
| DMS: | | Ref to 3D CatProduct: | | | | | | | | | | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY |    | | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Draft for possible helium inlet | | | | | | | |
| | | REVIEWED BY | | | | | | | | | | |
| | | REV DATE | 20-01-2011 | CHECKED BY | | | | | | | | |
| SHEET SIZE | A-1 | SCALE | ... | | | | | | | | | |
| FIRST ANGLE PROJECTION | |  | WBS | 010202 | DRAWING NUMBER | 503108 | SHEET | 01 | REVISION | 00 | MATURITY | A |



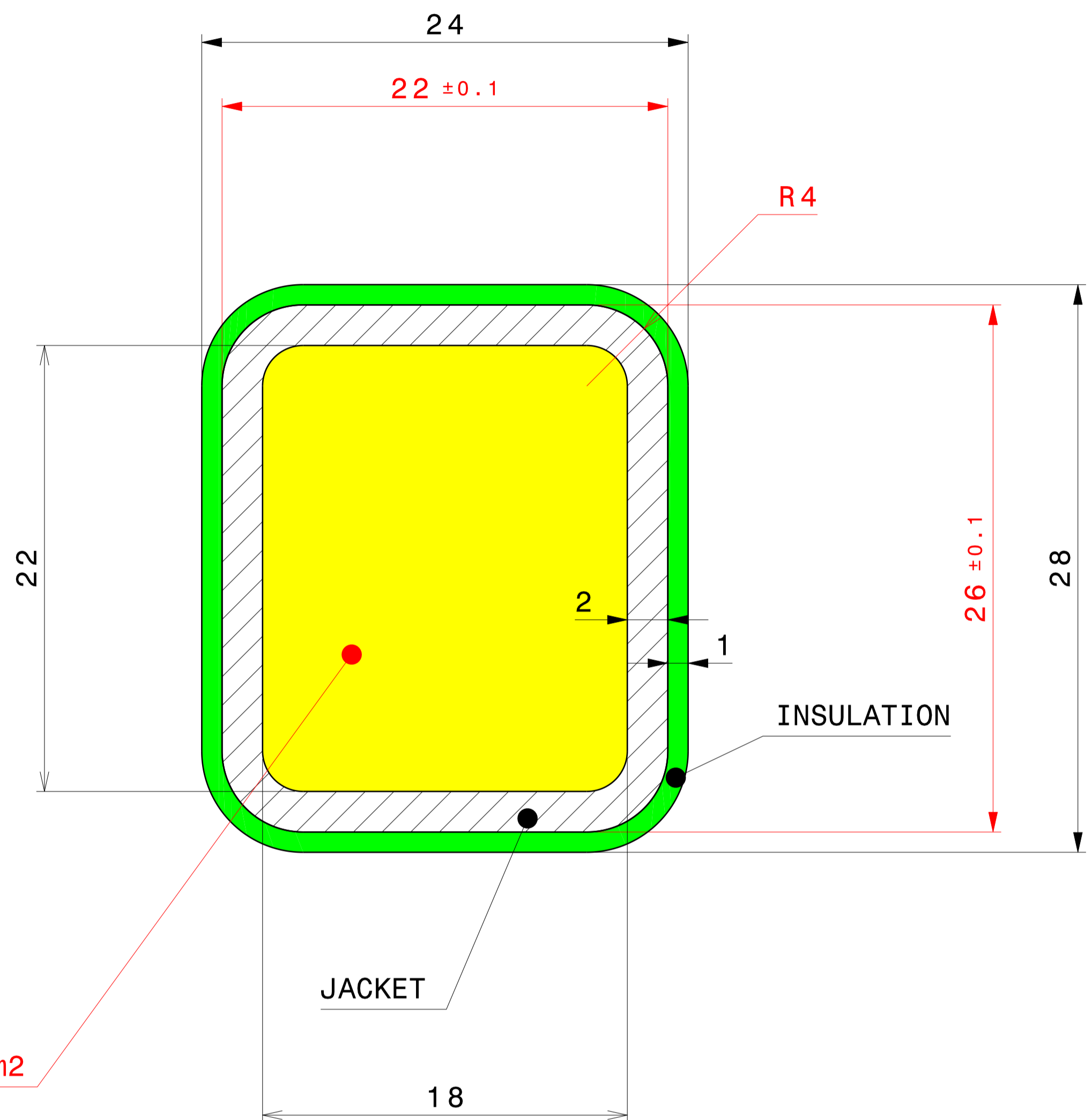
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)




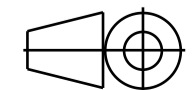
Note: Dimensions for reference only.

| | | | | | |
|---|---------------------------------------|--|--|---|-----------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203109_01 | | | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO |  Fusión <small>Italy-Frascati Research Centre</small> | CUSTOMER: Fusion-for-Energy | |
| REV DATE 03-10-2011 | FIRST ISSUE DATE 20-01-2011 | CHECKED BY _____ | | DRAWING TITLE JT60-SA: TF MAGNET Toroidal Field Coil Winding pack centre line | |
| CONTROLLED BY A. CUCCHIARO | SCALE _____ | DRAWN BY G. BROLATTI | CODE ENEA ID: DD-JT60TF-NCO | SHEET SIZE A1 | |
| FIRST ANGLE PROJECTION  | WBS 3 LEVELS | 010202 | Drawing Number 503109 | SHEET 01 | REVISION 01 |
| | | MATURITY /0... | | | |

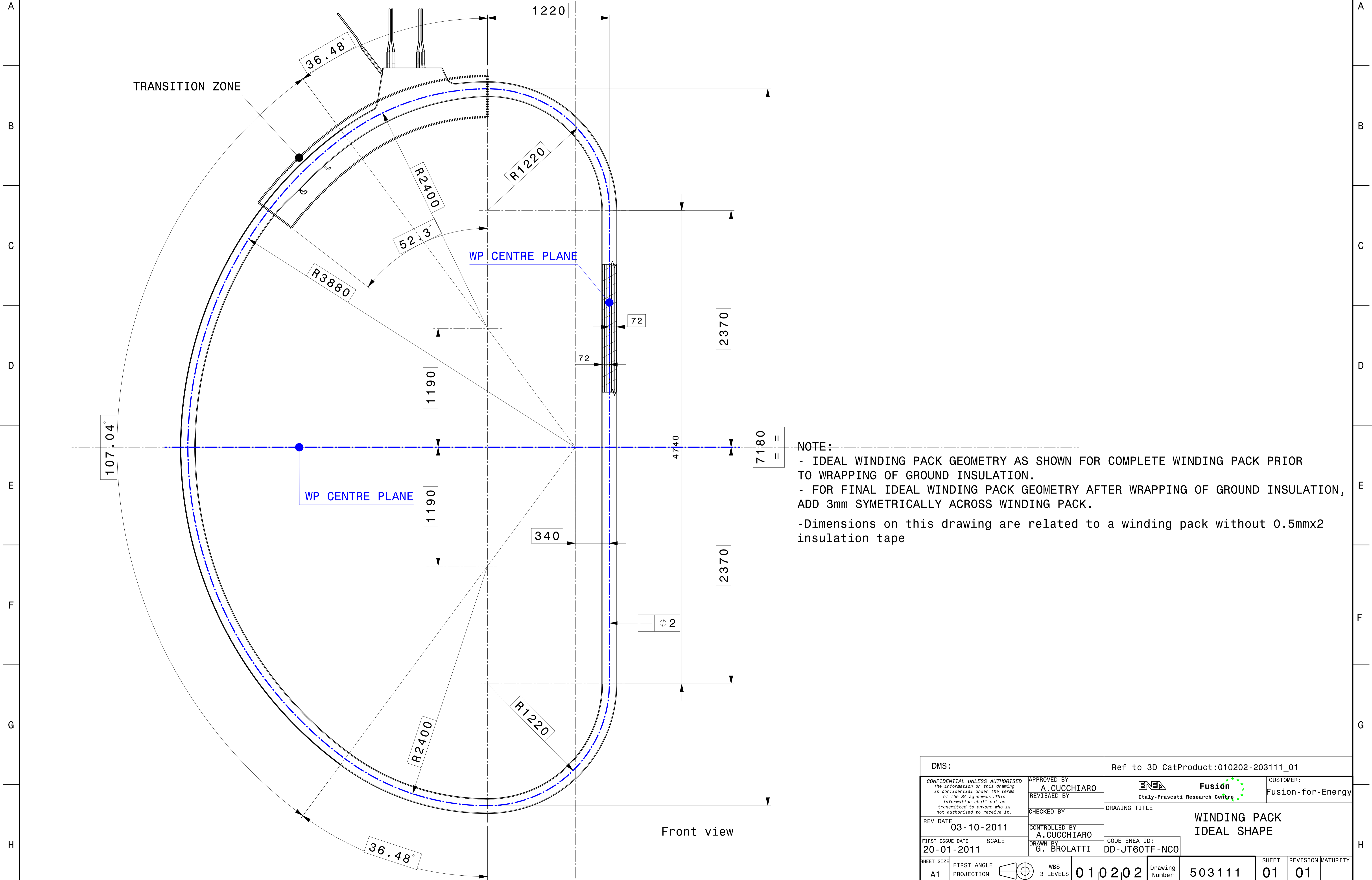
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



AREA for cable: 383.4mm²

| | | | | | | | | | | | | | | | |
|---|--|------------------|--|---|--|--|--|--|--|-----------------|--|----------------|--|----------------|--|
| DMS: | | | | Ref to 3D CatProduct: | | | | | | | | | | | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | | | APPROVED BY A. CUCCHIARO | |  Fusion <small>Italy-Frascati Research Centre</small> | | CUSTOMER: Fusion-for-Energy | | | | | | | |
| | | | | REVIEWED BY | | | | DRAWING TITLE JT60-SA: TF MAGNET <i>Toroidal Field Coil</i> | | | | | | | |
| REV DATE | | | | CHECKED BY | | CODE ENEA ID: <i>Insulated conductor cross section</i> | | | | | | | | | |
| FIRST ISSUE DATE 20-01-2011 | | SCALE | | CONTROLLED BY A. CUCCHIARO | | DD-JT60TF-NCO | | | | | | | | | |
| DRAWN BY G. BROLATTI | | SHEET SIZE A1 | | FIRST ANGLE PROJECTION  | | WBS LEVELS 3 LEVELS | | Drawing Number 010202 | | SHEET 503110 | | REVISION 01 | | MATURITY 00 | |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

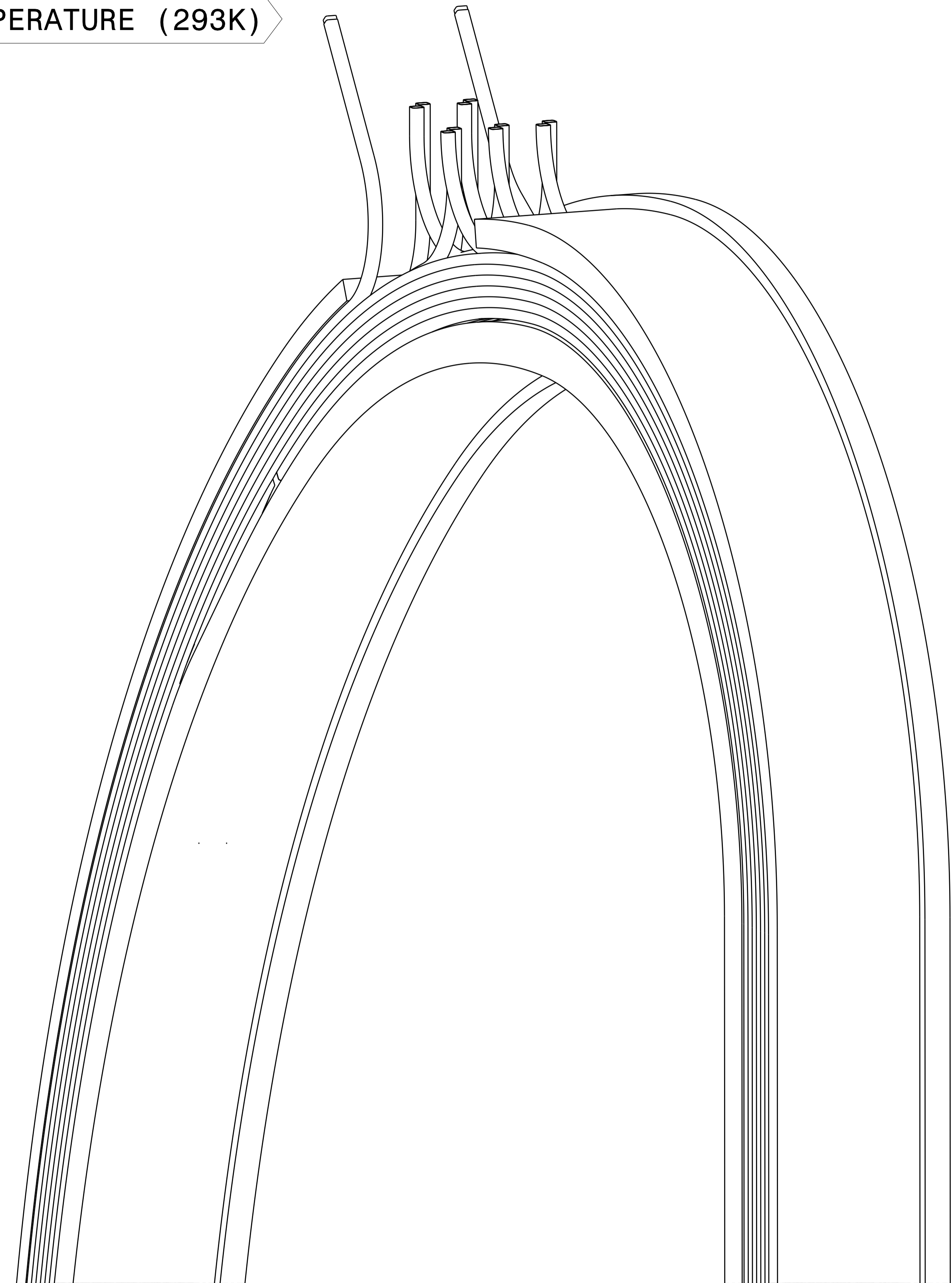
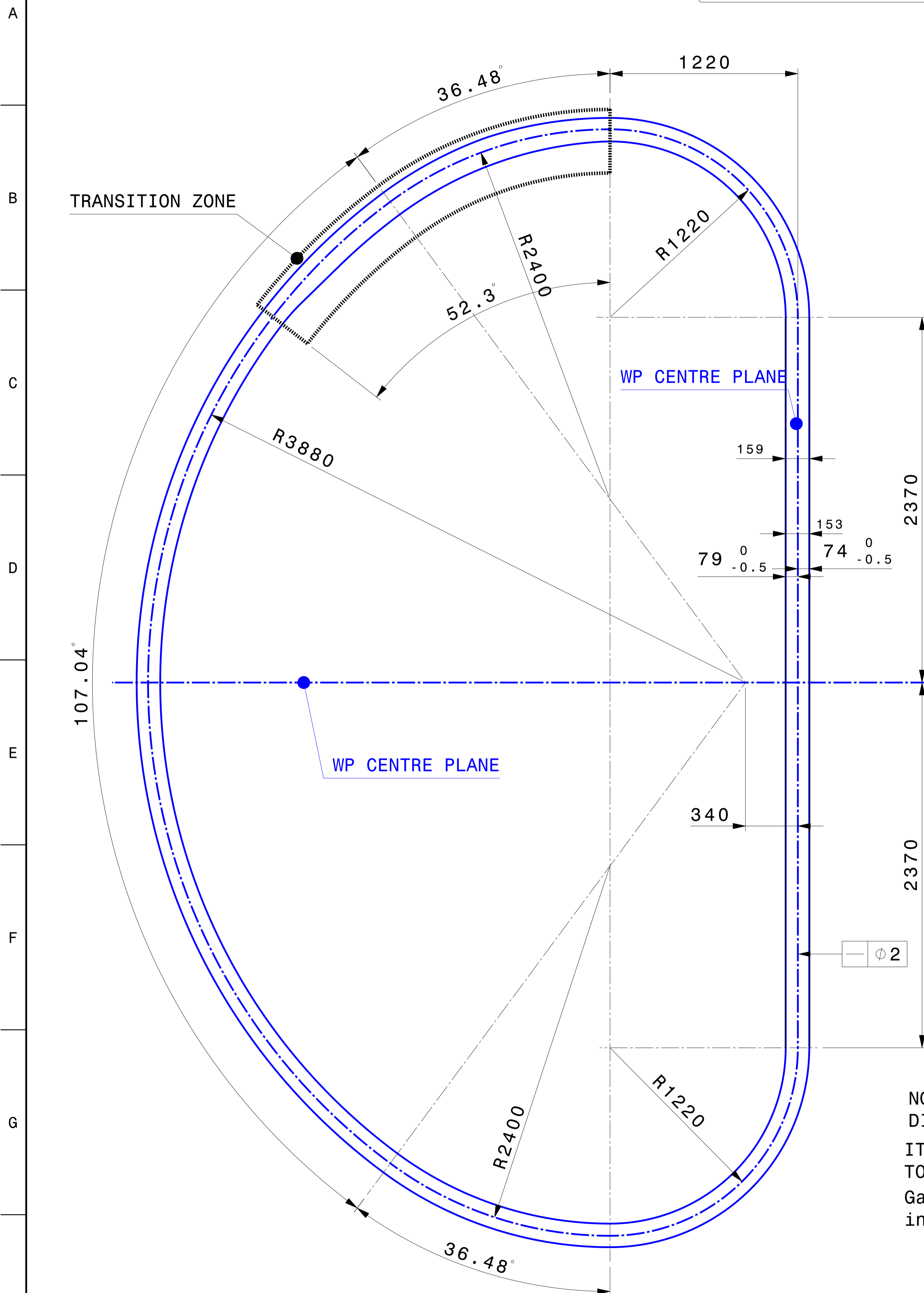


NOTE:
 - IDEAL WINDING PACK GEOMETRY AS SHOWN FOR COMPLETE WINDING PACK PRIOR TO WRAPPING OF GROUND INSULATION.
 - FOR FINAL IDEAL WINDING PACK GEOMETRY AFTER WRAPPING OF GROUND INSULATION, ADD 3mm SYMETRICALLY ACROSS WINDING PACK.
 -Dimensions on this drawing are related to a winding pack without 0.5mmx2 insulation tape

Front view

| | | | |
|---|------------------------|---------------------------------------|---|
| DMS: | | Ref to 3D CatProduct:010202-203111_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE WINDING PACK IDEAL SHAPE |
| FIRST ISSUE DATE 20-01-2011 | SCALE | CHECKED BY | CODE ENEA ID: DD-JT60TF-NCO |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | CONTROLLED BY A. CUCCHIARO | DRAWING NUMBER 503111 |
| | | DRAWN BY G. BROLATTI | SHEET REVISION MATURITY 01 01 01 |
| | | WBS LEVELS 3 LEVELS | |
| | | 010202 | |

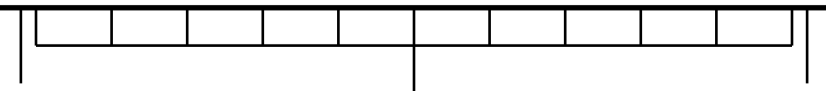
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



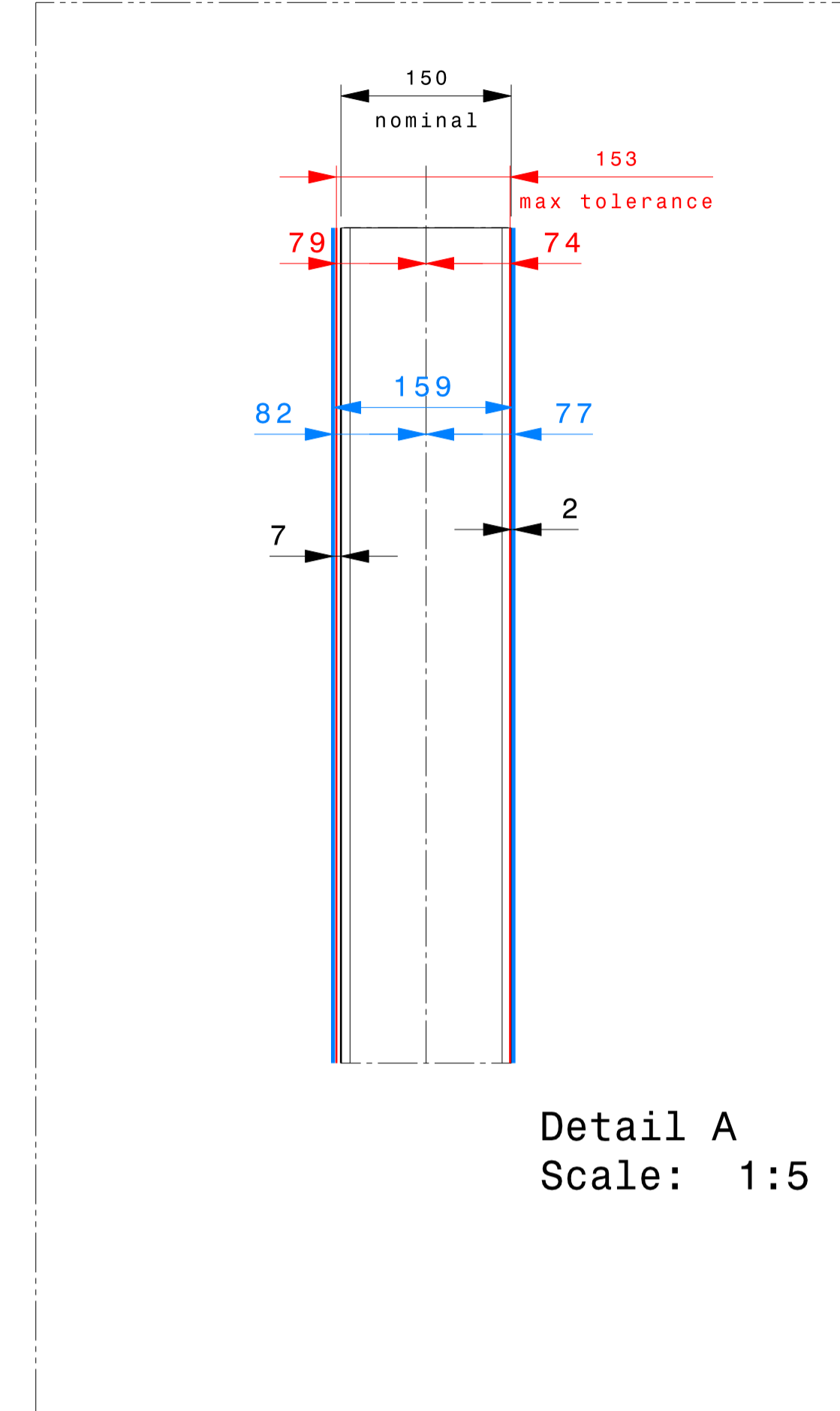
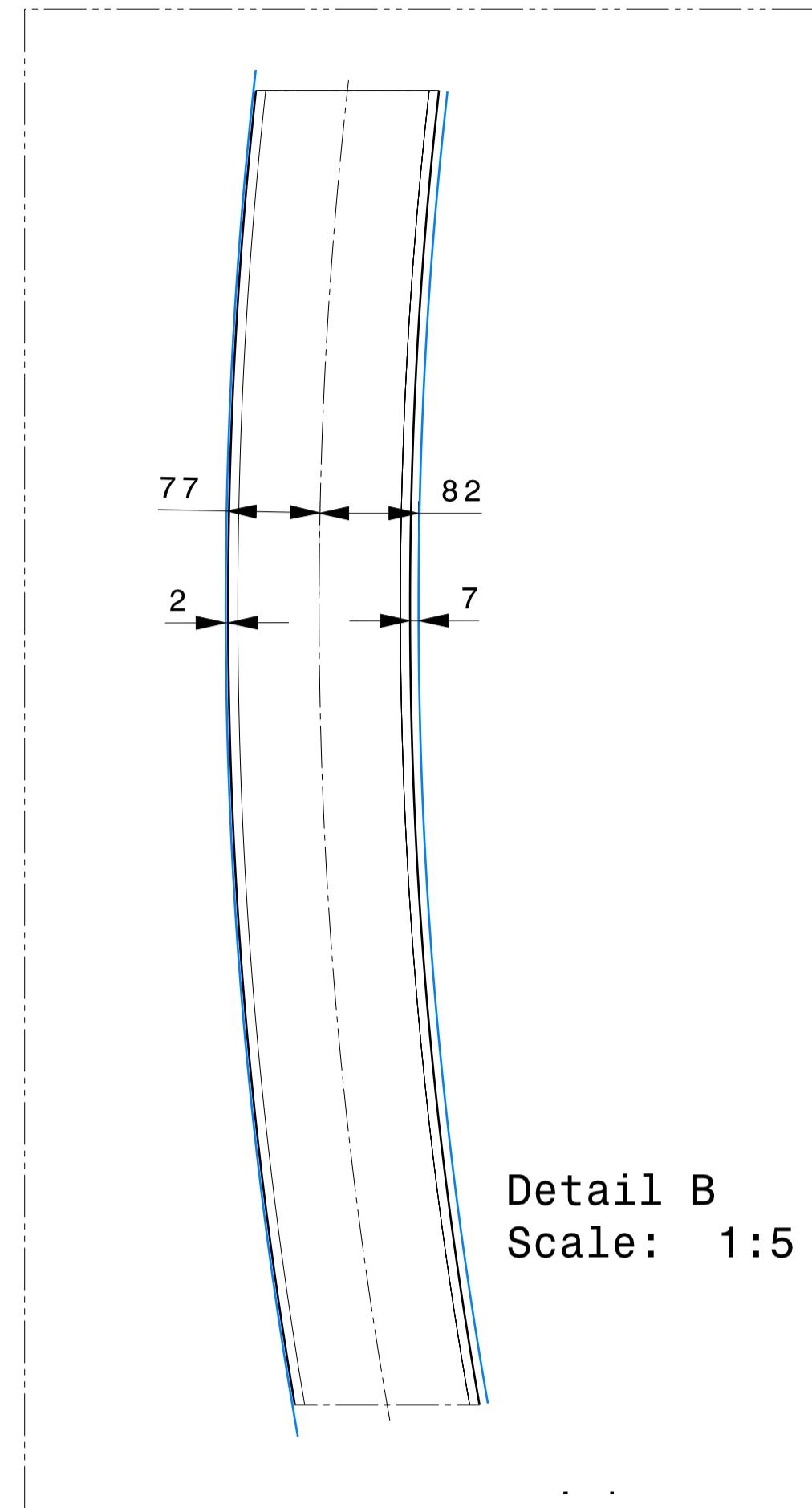
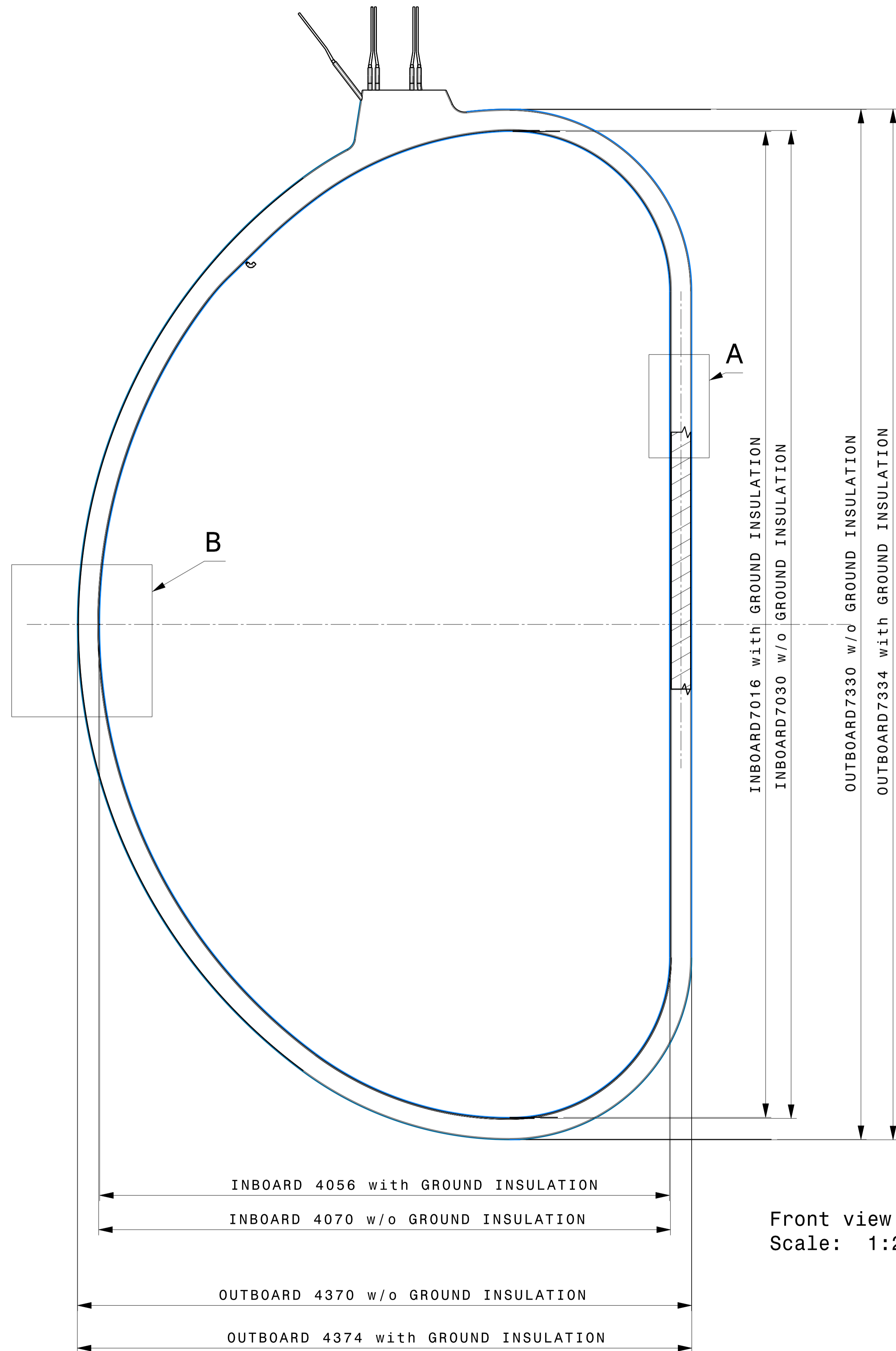
GAUGE SUGGESTION


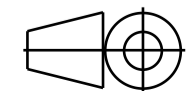
NOTE:
 DIMENSIONS SHOW MAXIMUM BOUNDS WITHIN WHICH WINDING PACK MUST FIT.
 IT IS SUGGESTED THAT A GAUGE BE MANUFACTURED MEETING THESE DIMENSIONS
 TO CONFIRM THE WINDING PACK GEOMETRY AS SHOWN
 Gauge for winding pack without 0.5mmx2
 insulation tape on double pancake

| | | | |
|--|-----------------|-------------------------------|---|
| DMS: | | Ref to 3D CatProduct: | |
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE WINDING PACK IDEAL SHAPE |
| FIRST ISSUE DATE 20-01-2011 | | CONTROLLED BY A. CUCCHIARO | |
| SHEET SIZE A1 | | DRAWN BY G. BROLATTI | CODE ENEA ID: DD-JT60TF-NCO |
| FIRST ANGLE PROJECTION | WBS 3 LEVELS | 010202 | Drawing Number 503111 |
| | | | SHEET 02 |
| | | | REVISION 01 |
| | | | MATURITY |

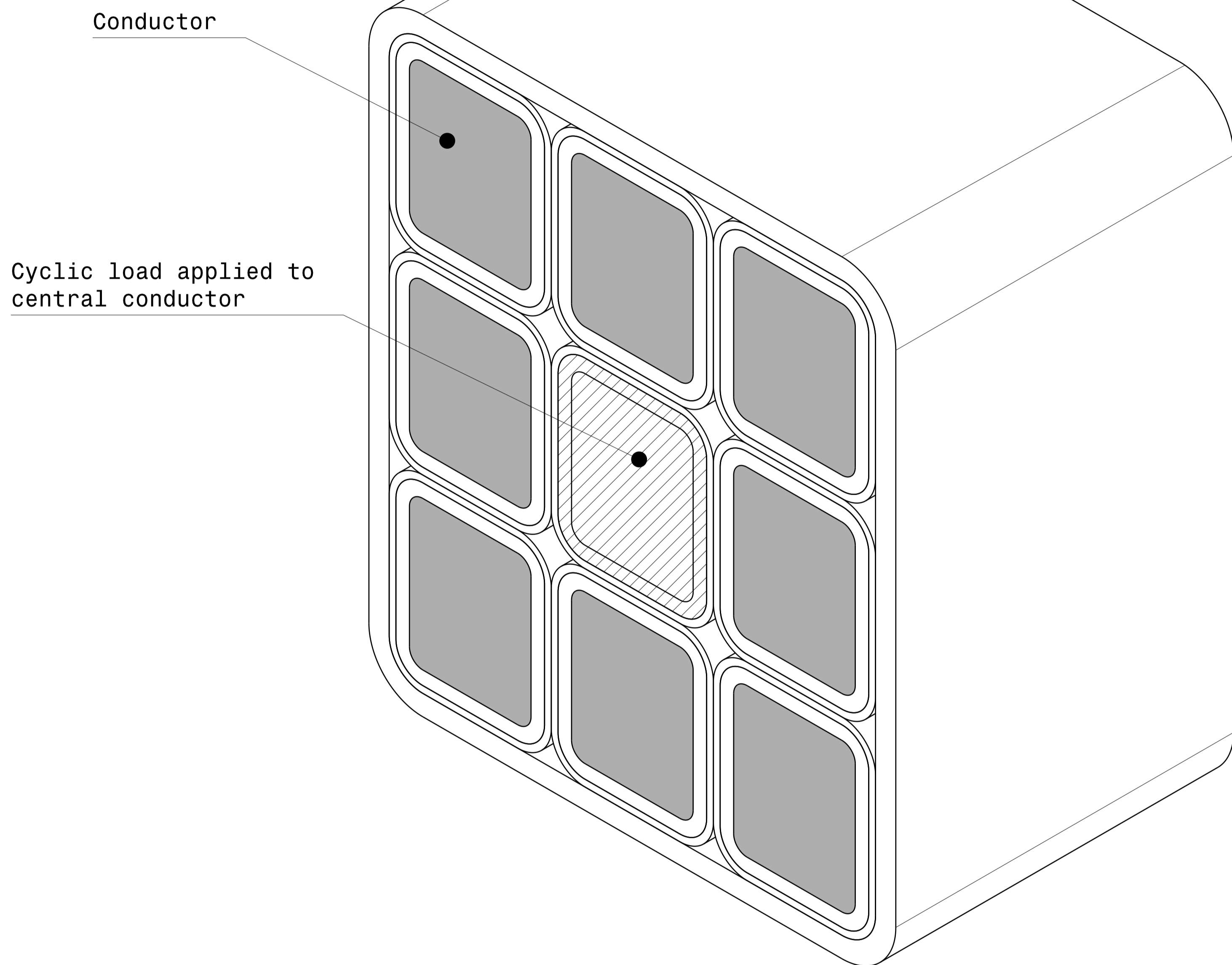


DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



| | | | |
|--|---|---|--|
| DMS: | | Ref to 3D CatProduct:010202-203111_01 | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | APPROVED BY A. CUCCHIARO |  Fusion Italy-Frascati Research Centre | CUSTOMER: Fusion-for-Energy |
| | REVIEWED BY | | DRAWING TITLE WINDING PACK TOLERANCE |
| REV DATE 03-10-2011 | CHECKED BY | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| FIRST ISSUE DATE 20-01-2011 | SCALE | DRAWN BY G. BROLATTI | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION  | WBS 3 LEVELS | 010202 |
| | | Drawing Number 503111 | SHEET 03 |
| | | REVISION 01 | MATURITY |

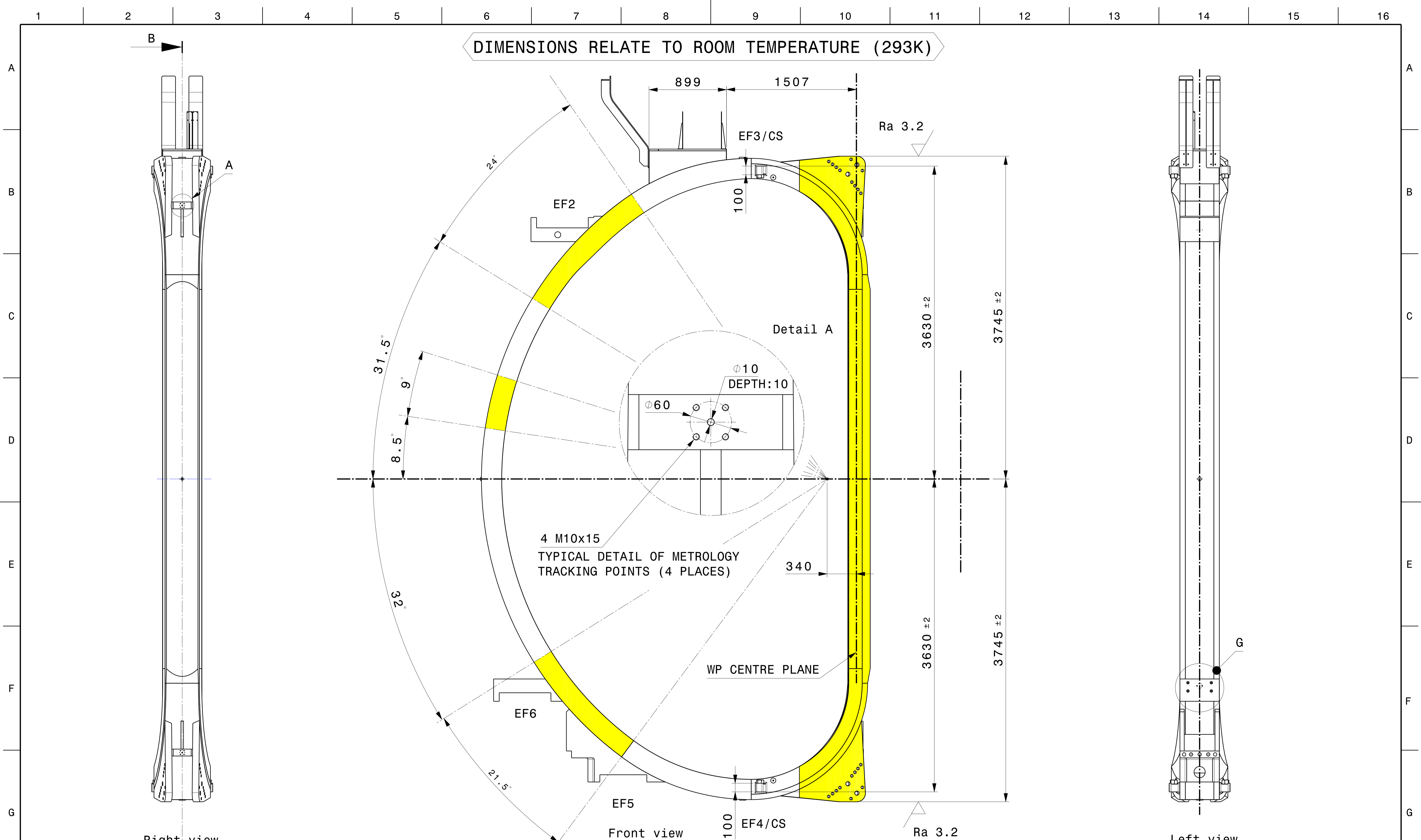
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



- Note:
- Central conductor shall be mechanically supported across plane of loading.
 - Conductors should be geometrically similar to actual conductor, but do not need to be actual conductor.

| | | | |
|---|------------------------|--------------------------------------|--|
| DMS: | | Ref to 3D CatProduct: | |
| <small>CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE | | REVIEWED BY | DRAWING TITLE WINDING PACK <i>3x3 layout for insulation testing</i> |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | |
| SCALE | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | DRAWN BY G. BROLATTI | WBS 010202 |
| | | | Drawing Number 503112 |
| | | | SHEET 01 |
| | | | REVISION 00 |
| | | | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

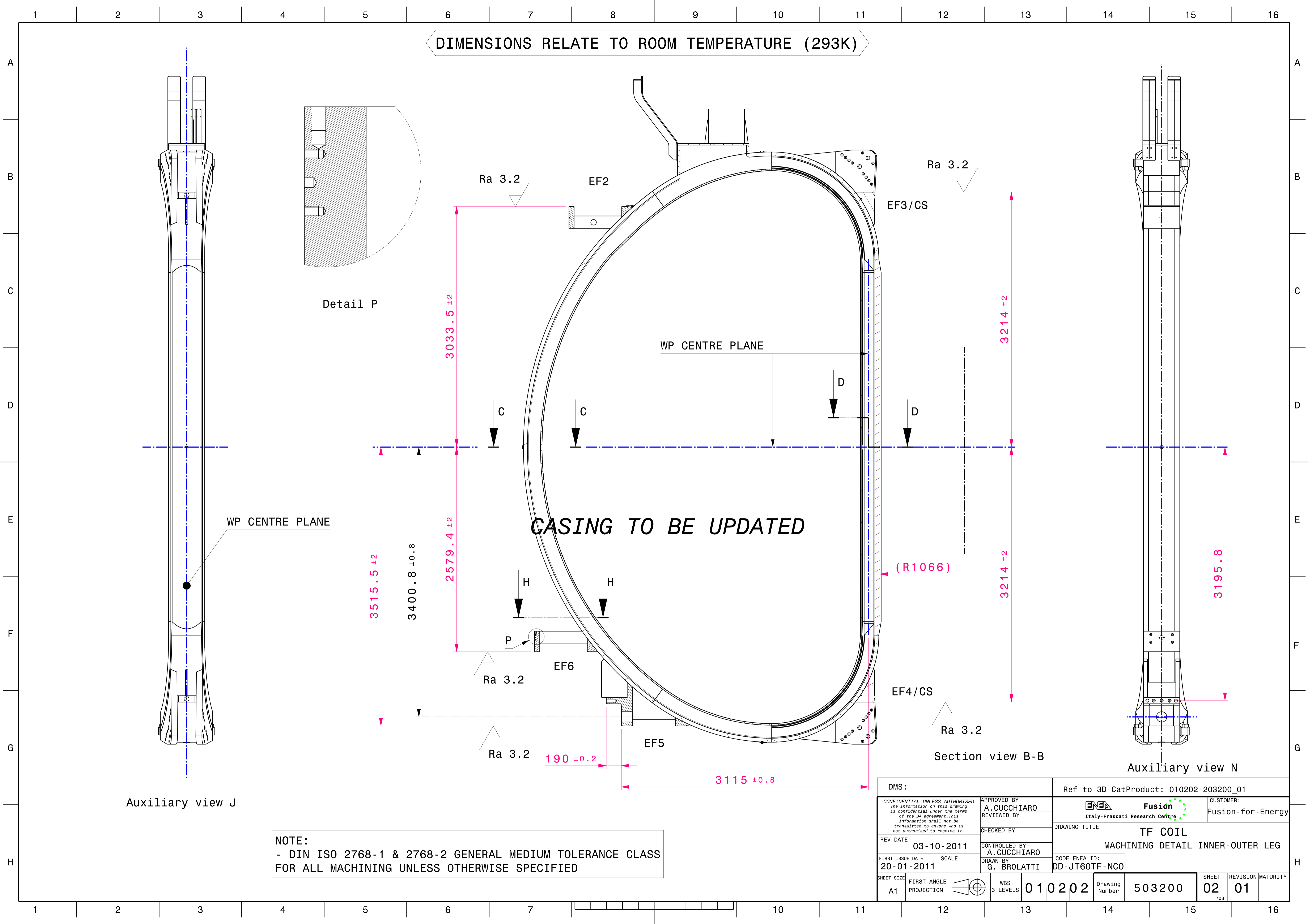


Final location & detail of metrology tracking points to be confirmed after consultation with JAEA

NOTE:
- DIN ISO 2768-1 & 2768-2 GENERAL MEDIUM TOLERANCE CLASS FOR ALL MACHINING UNLESS OTHERWISE SPECIFIED

| | | | |
|---|--|--|--|
| DMS: | | Ref to 3D CatProduct: 010202-203200_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE TF COIL MACHINING DETAIL INNER-OUTER LEG |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | |
| SCALE | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| DRAWN BY G. BROLATTI | | SHEET SIZE A1 | |
| FIRST ANGLE PROJECTION | | WBS LEVELS 3 LEVELS | Drawing Number 503200 |
| | | 010202 | SHEET 01 |
| | | | REVISION 01 |
| | | | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Auxiliary view J

NOTE:
 - DIN ISO 2768-1 & 2768-2 GENERAL MEDIUM TOLERANCE CLASS
 FOR ALL MACHINING UNLESS OTHERWISE SPECIFIED

Section view B-B

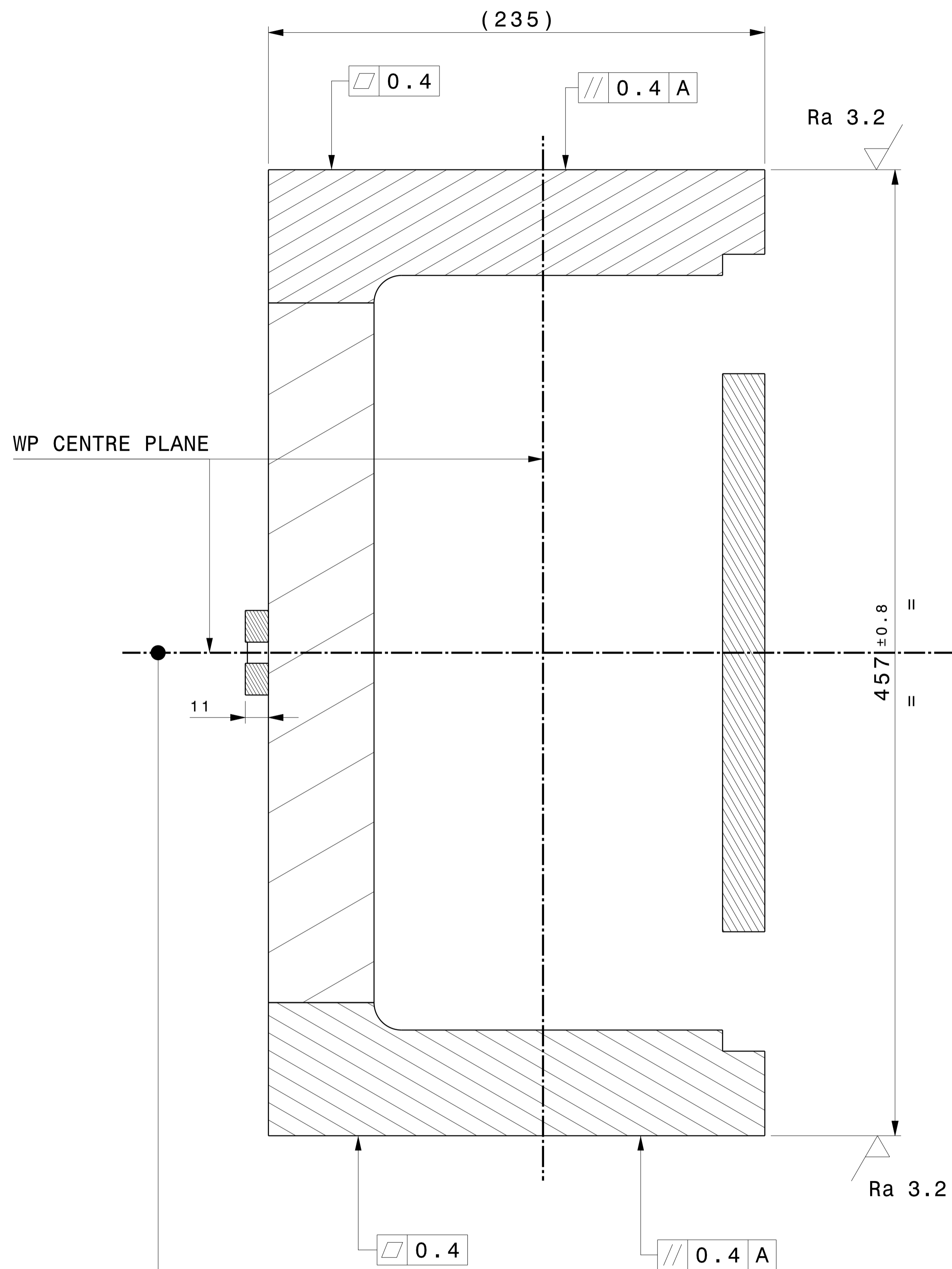
Auxiliary view N

| | | | |
|---|--|--|--|
| DMS: | | Ref to 3D CatProduct: 010202-203200_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE TF COIL MACHINING DETAIL INNER-OUTER LEG |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | |
| SCALE | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| DRAWN BY G. BROLATTI | | SHEET SIZE A1 | |
| FIRST ANGLE PROJECTION | | WBS LEVELS 3 | Drawing Number 010202 |
| SHEET NUMBER 01 | | SHEET REVISION MATURITY 02 01 | |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

ADDITIONAL MATERIAL FOR MACHINING

SEE DRAWING 010202-503201

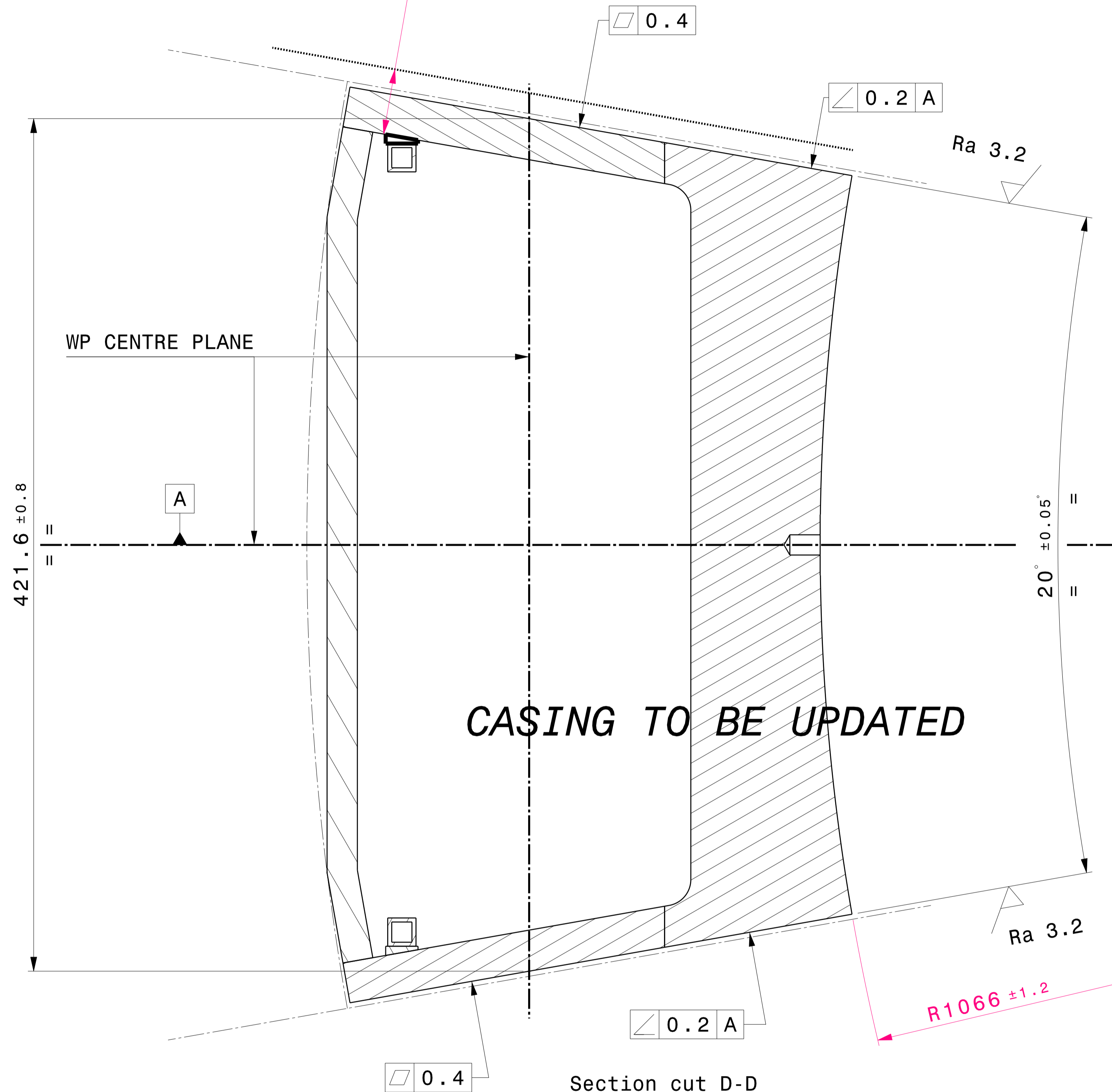


Section cut C-C

TYPICAL MACHINING SECTION CURVED LEG

CENTRE LINE OF TF WINDING PACK
AS MEASURED AFTER INSERTION

NOTE:
- DIN ISO 2768-1 & 2768-2 GENERAL MEDIUM TOLERANCE CLASS
FOR ALL MACHINING UNLESS OTHERWISE SPECIFIED
- WP CENTRE PLANE DEFINED BY MARKING POINTS ON WP SURFACE



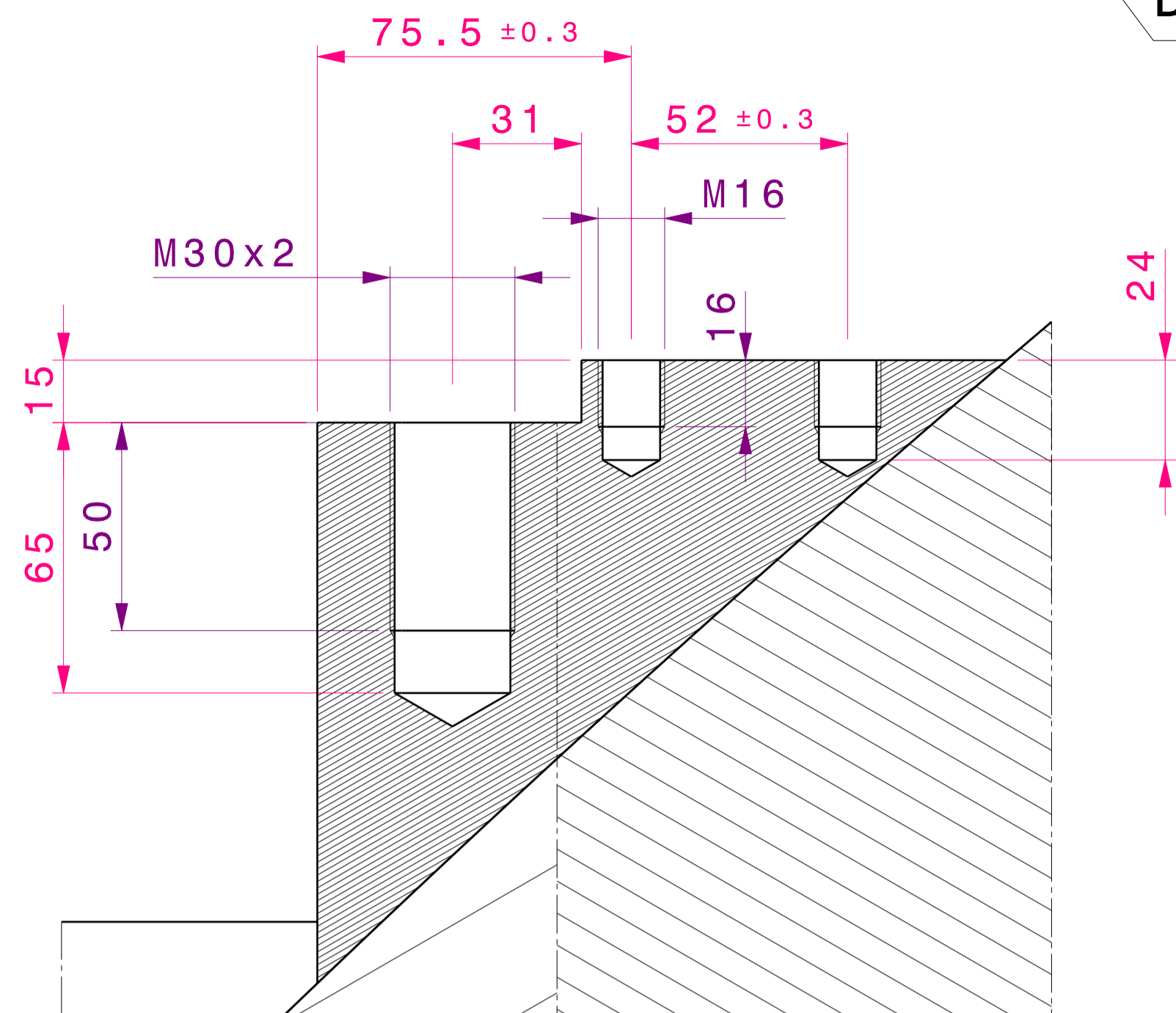
Section cut D-D

CASING TO BE UPDATED

TYPICAL MACHINING SECTION STRAIGHT LEG

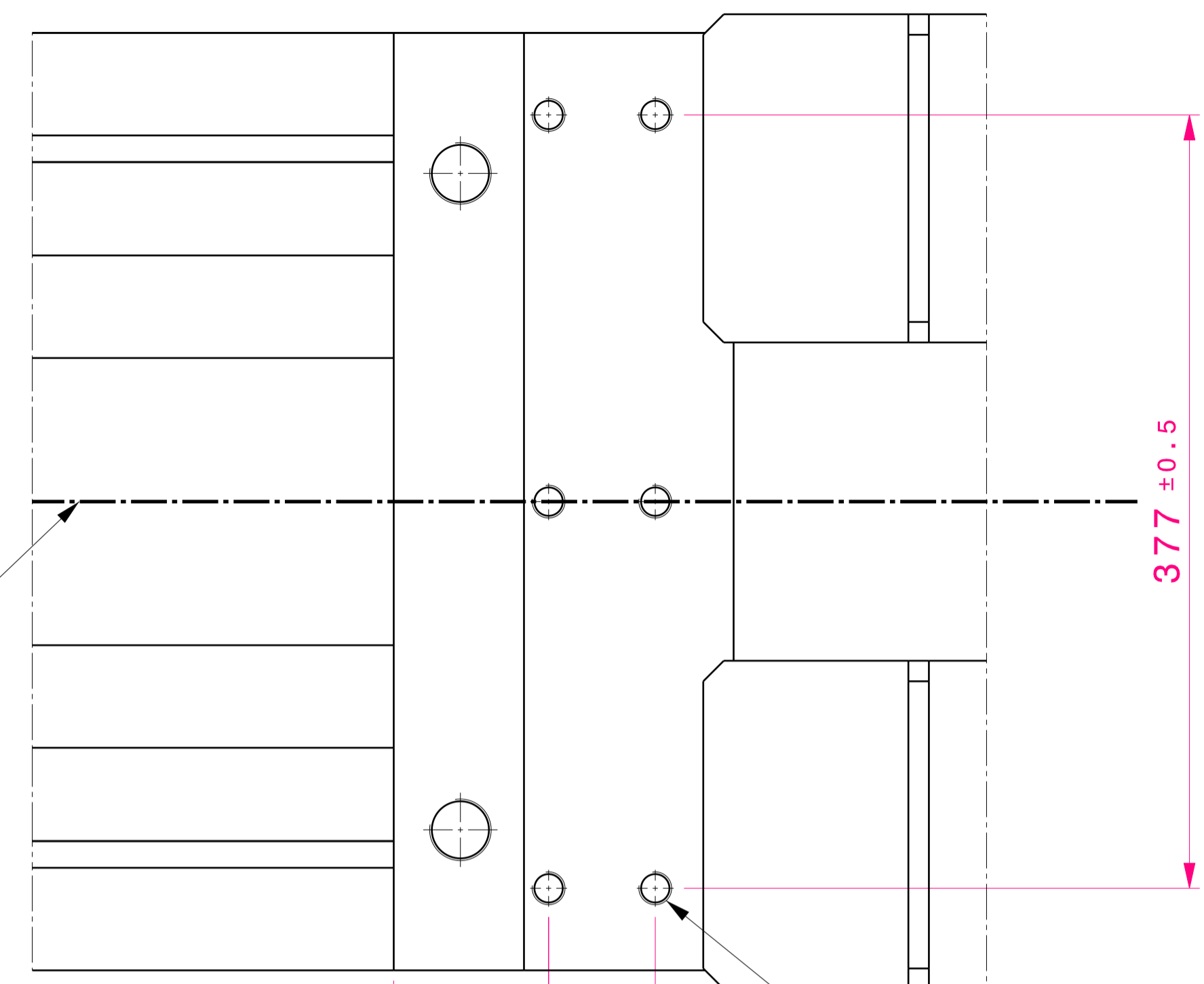
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|---|------------------------|--|----------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203200_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE TF COIL |
| FIRST ISSUE DATE 20-01-2011 | SCALE | CHECKED BY | MACHINING DETAIL INNER-OUTER LEG |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| WBS LEVELS 3 | 010202 | DRAWN BY G. BROLATTI | Drawing Number 503200 |
| | | | SHEET 03 |
| | | | REVISION 01 |
| | | | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Section view E-E

WP CENTRE PLANE



Detail F

6 M16x2

CASING TO BE UPDATED

75.5 ± 0.3 52 ± 0.3

665 ± 0.8

3078.4 ± 2

(1210)

TOP AND BOTTOM

1117 ± 1.2

EF2

F

EF3/CS

680.5

382.4

Ø50

R1066 ± 1.2

320 ± 0.5

599 ± 0.8

WP CENTRE PLANE

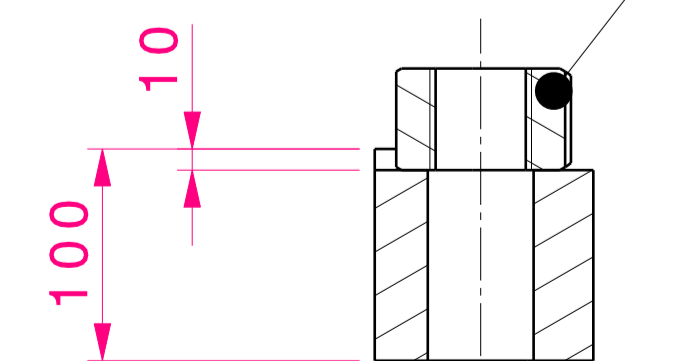
4 M30x2
THREAD DEPTH:50

Top view

EXTENDED NUT M48

(1228.2)
INFO ONLY

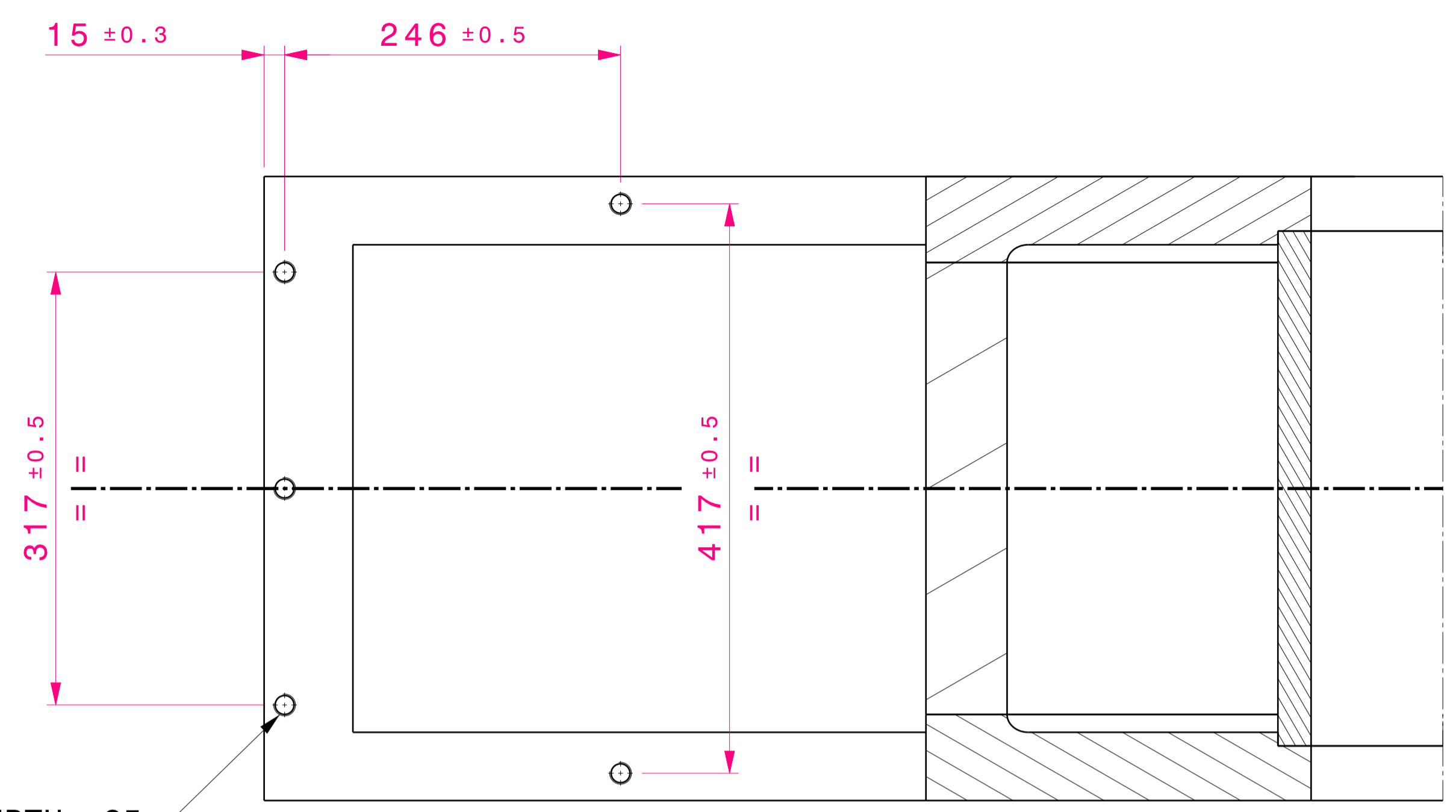
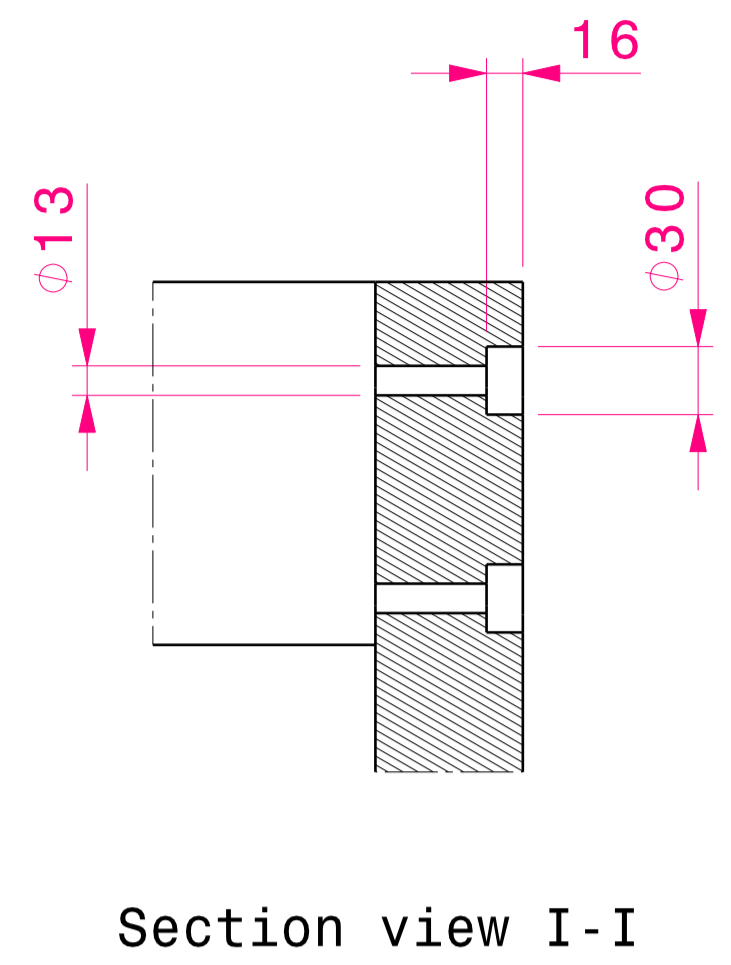
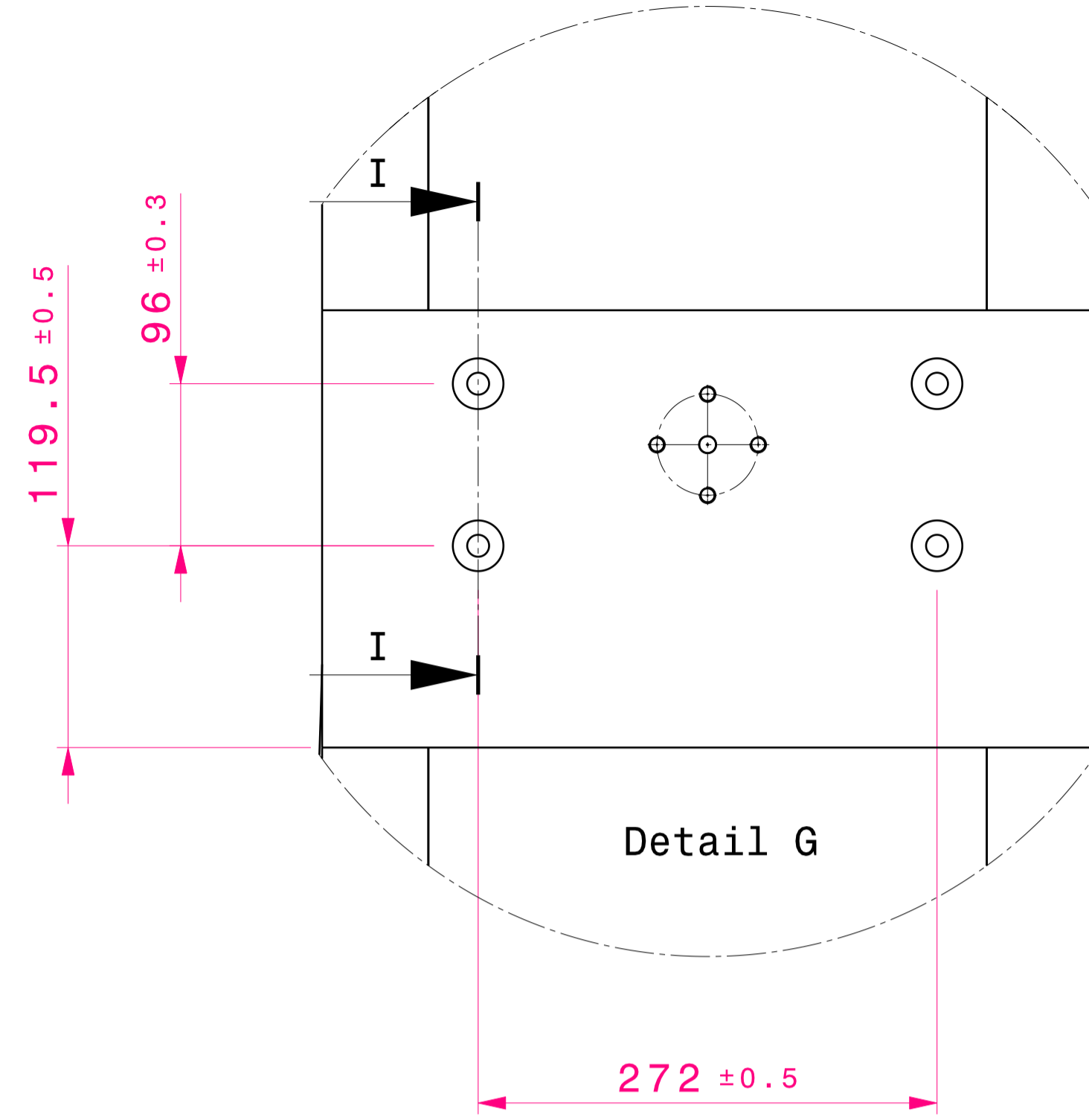
NOTE:
- DIN ISO 2768-1 & 2768-2 GENERAL MEDIUM TOLERANCE CLASS
FOR ALL MACHINING UNLESS OTHERWISE SPECIFIED



Section view 0-0

| | | | |
|---|-----------------|--|----------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203200_01 | |
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| REV DATE | | REVIEWED BY | DRAWING TITLE TF COIL |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | MACHINING DETAIL INNER-OUTER LEG |
| SCALE | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| SHEET SIZE A1 | | DRAWN BY G. BROLATTI | |
| FIRST ANGLE PROJECTION | WBS LEVELS 3 | 010202 | Drawing Number 503200 |
| | | | SHEET 04 |
| | | | REVISION 01 |
| | | | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

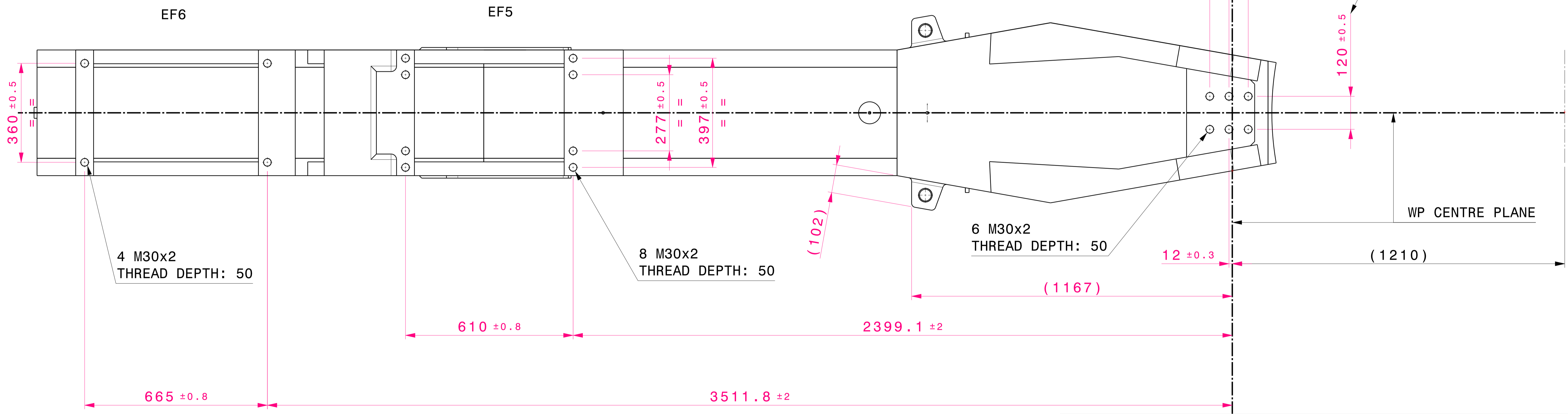


5 M16x2
THREAD DEPTH: 25

Section view H-H

CASING TO BE UPDATED

EF4/CS

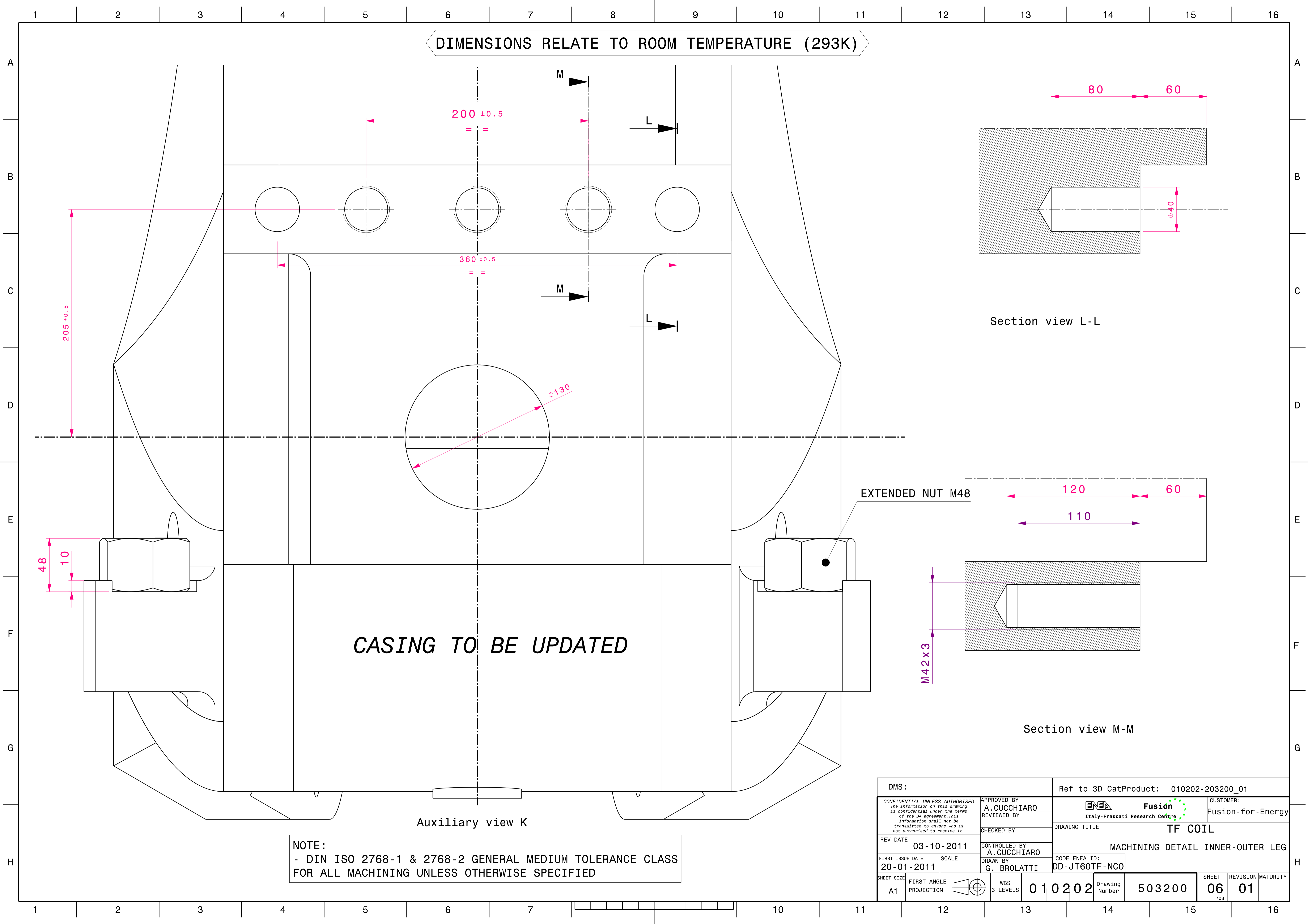


Bottom view

NOTE:
- DIN ISO 2768-1 & 2768-2 GENERAL MEDIUM TOLERANCE CLASS
FOR ALL MACHINING UNLESS OTHERWISE SPECIFIED

| | | | |
|---|------------------------|--|----------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203200_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE TF COIL |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | MACHINING DETAIL INNER-OUTER LEG |
| SCALE | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| DRAWN BY G. BROLATTI | | SHEET 05 | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS LEVELS 3 LEVELS | Drawing Number 503200 |
| | | 010202 | REVISION 01 |
| | | | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Section view L-L

Section view M-M

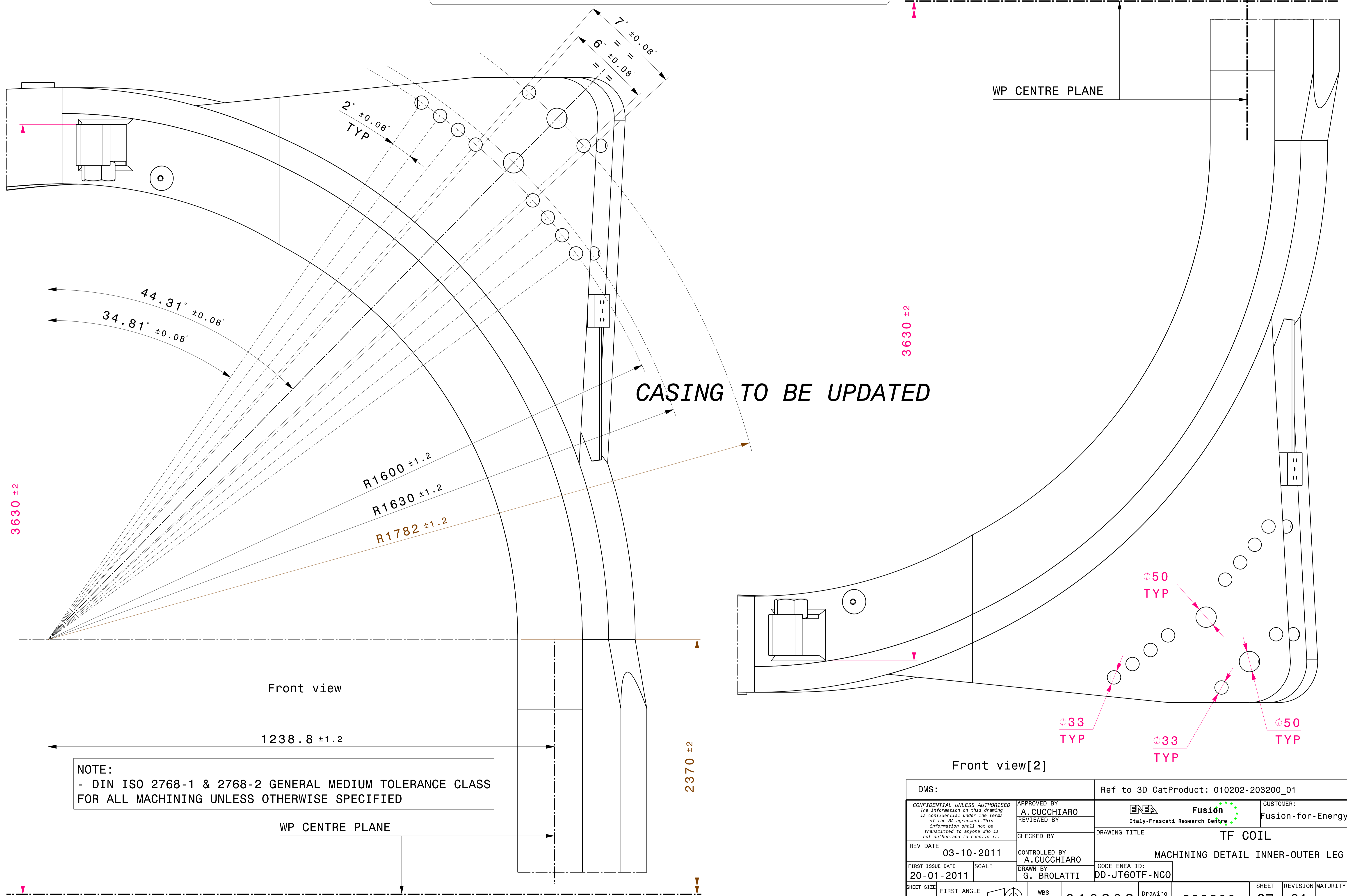
CASING TO BE UPDATED

Auxiliary view K

NOTE:
 - DIN ISO 2768-1 & 2768-2 GENERAL MEDIUM TOLERANCE CLASS
 FOR ALL MACHINING UNLESS OTHERWISE SPECIFIED

| | | | |
|---|-----------------|--|----------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203200_01 | |
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| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE TF COIL |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | MACHINING DETAIL INNER-OUTER LEG |
| SCALE | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| DRAWN BY G. BROLATTI | | SHEET SIZE A1 | |
| FIRST ANGLE PROJECTION | WBS LEVELS 3 | 010202 | Drawing Number 503200 |
| | | SHEET 06 | REVISION 01 |
| | | MATURITY | |

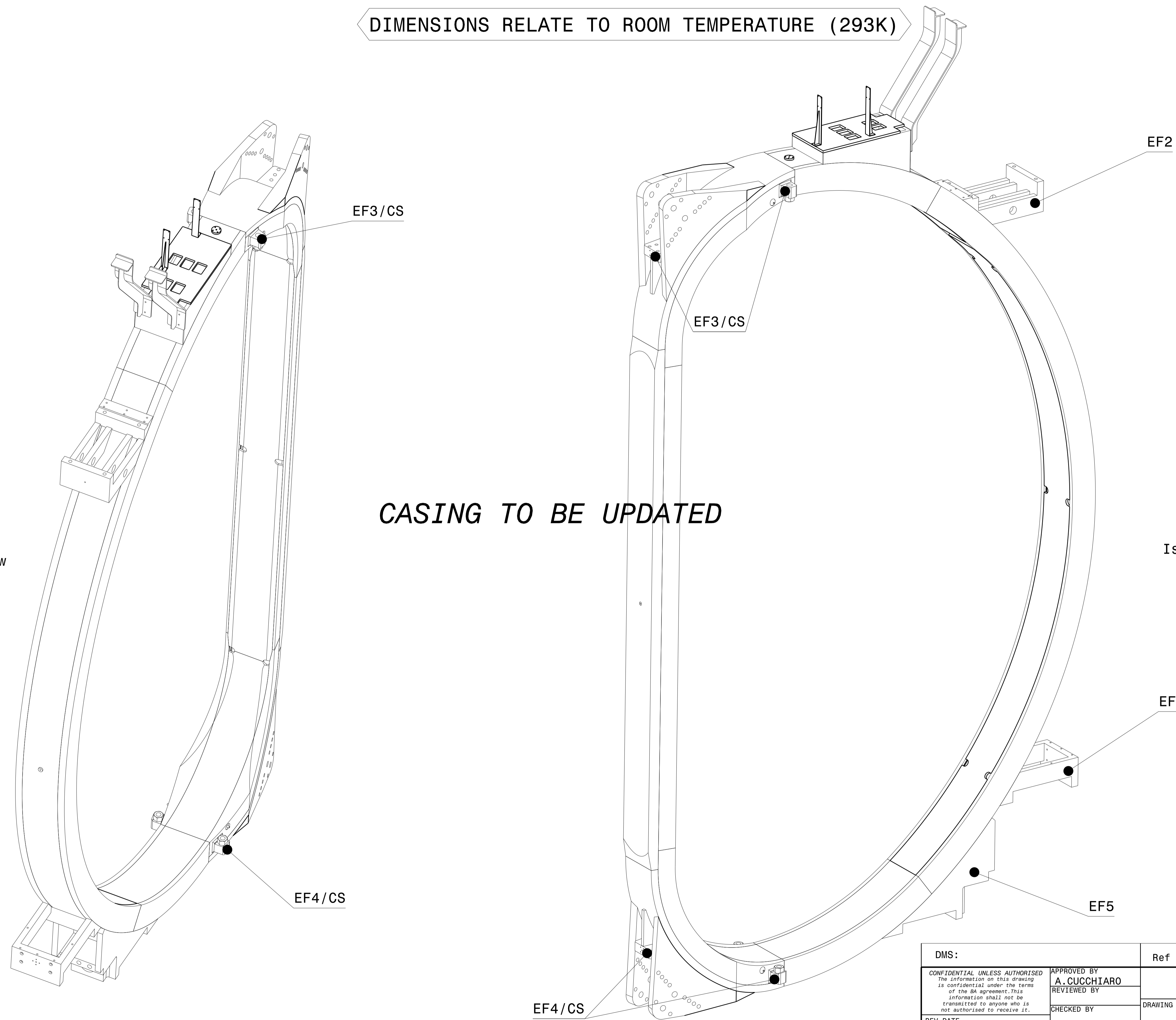
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



NOTE:
 - DIN ISO 2768-1 & 2768-2 GENERAL MEDIUM TOLERANCE CLASS
 FOR ALL MACHINING UNLESS OTHERWISE SPECIFIED

| | | | |
|---|------------------------|--|----------------------------------|
| DMS: | | Ref to 3D CatProduct: 010202-203200_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE TF COIL |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | MACHINING DETAIL INNER-OUTER LEG |
| SCALE | | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO |
| DRAWN BY G. BROLATTI | | SHEET 07 | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS LEVELS 3 | REVISION 01 |
| 010202 | | Drawing Number 503200 | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



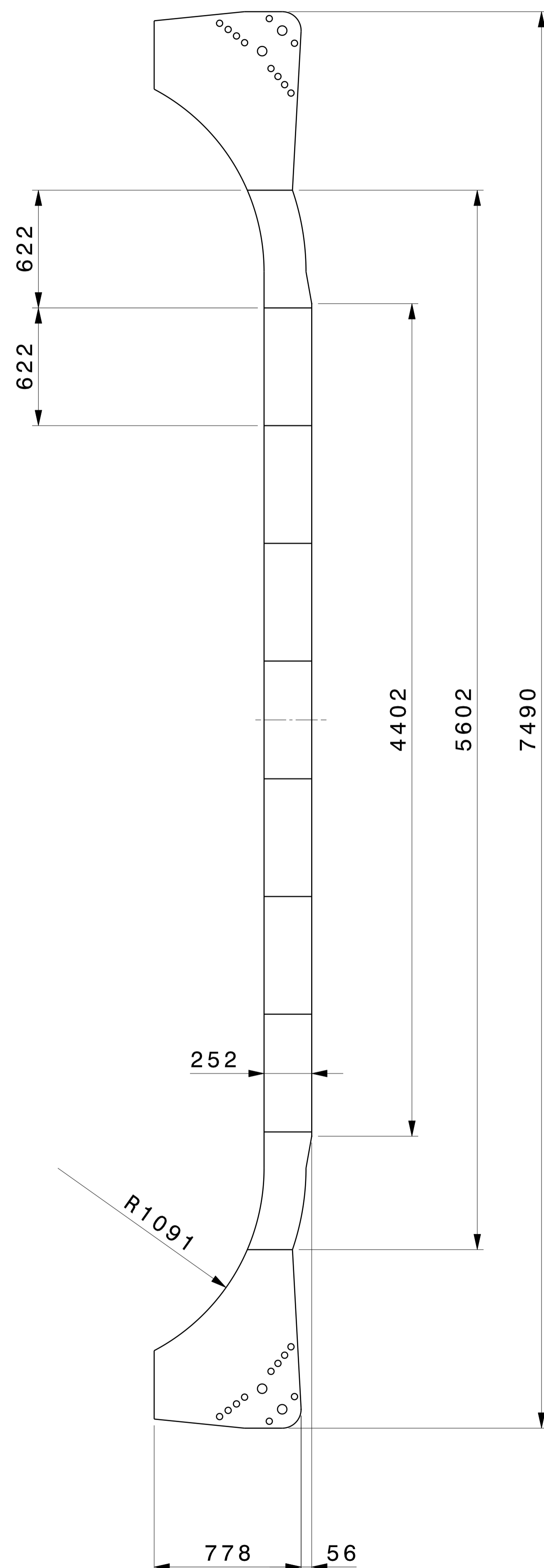
Isometric view

Isometric view

CASING TO BE UPDATED


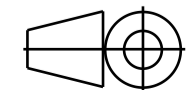
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| DMS: | | Ref to 3D CatProduct:010202-203200_01 | |
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE TF COIL |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | |
| SCALE | | CONTROLLED BY A. CUCCHIARO | MACHINING DETAIL INNER-OUTER LEG |
| DRAWN BY G. BROLATTI | | CODE ENEA ID: DD-JT60TF-NCO | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS LEVELS 3 | 010202 |
| Drawing Number 503200 | | SHEET 08 | REVISION 01 |
| | | MATURITY | |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

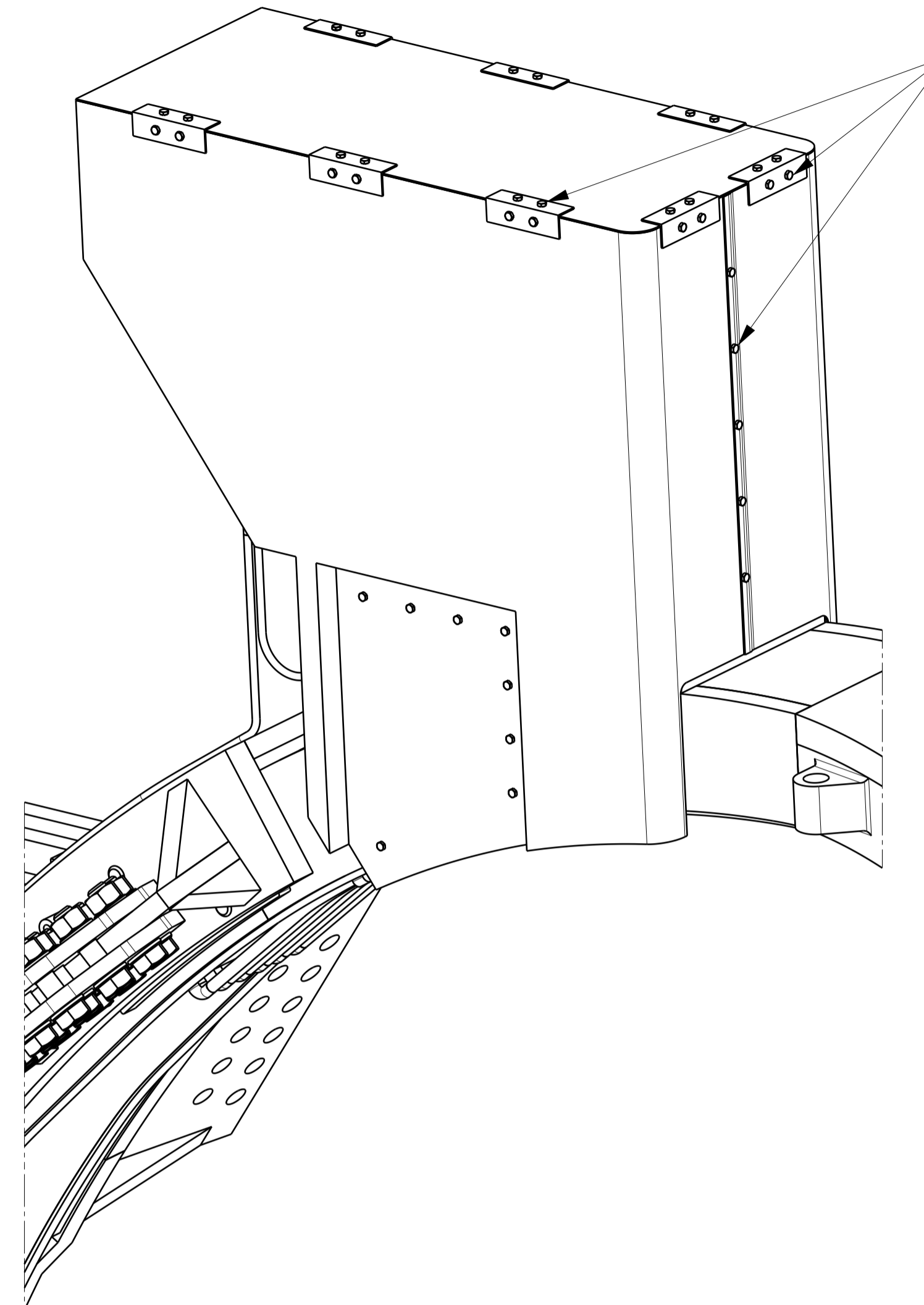


NOTE: FOR BOLT & PIN PATTERN REFER TO DRAWING NUMBER 010202-503200

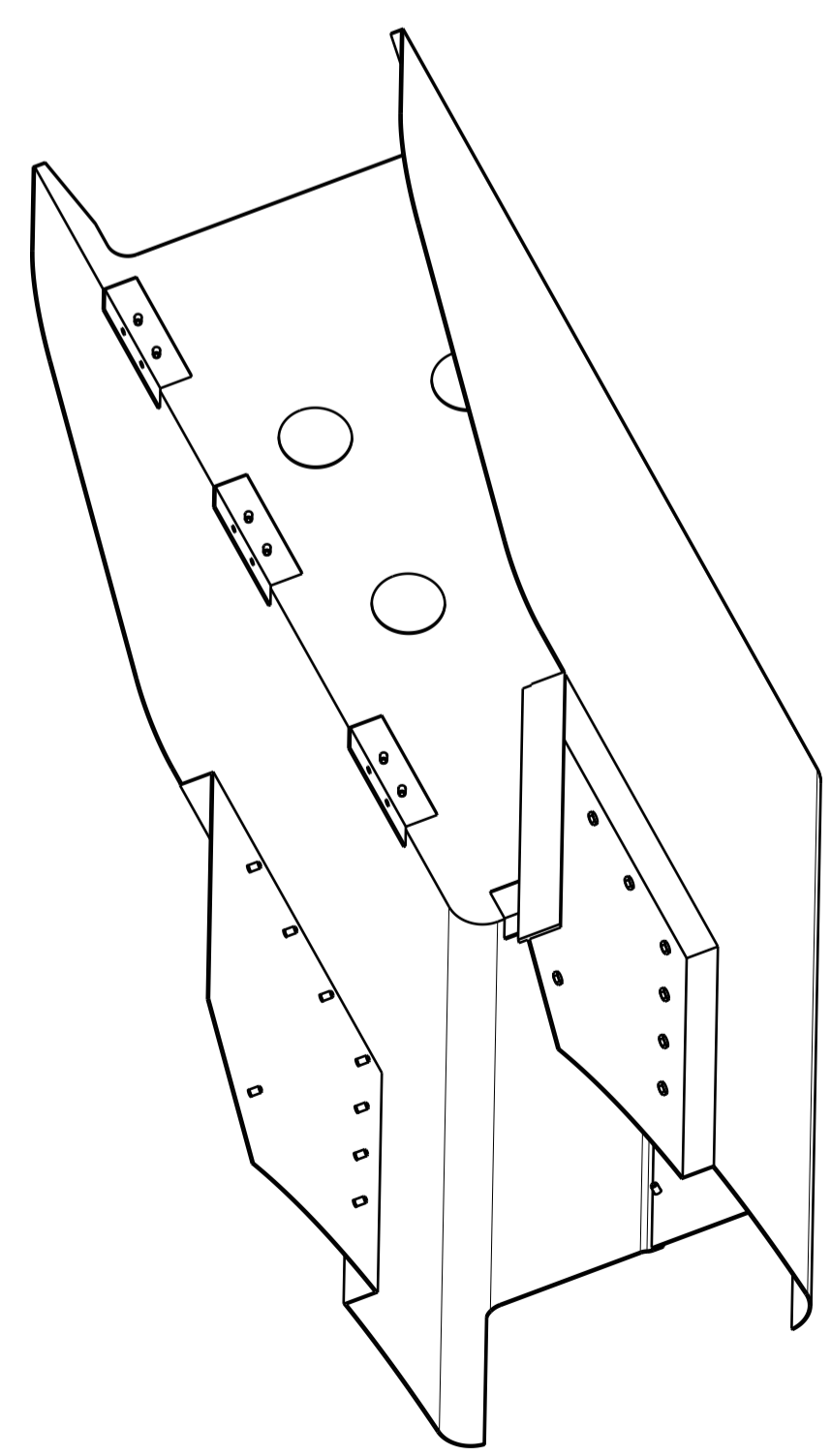
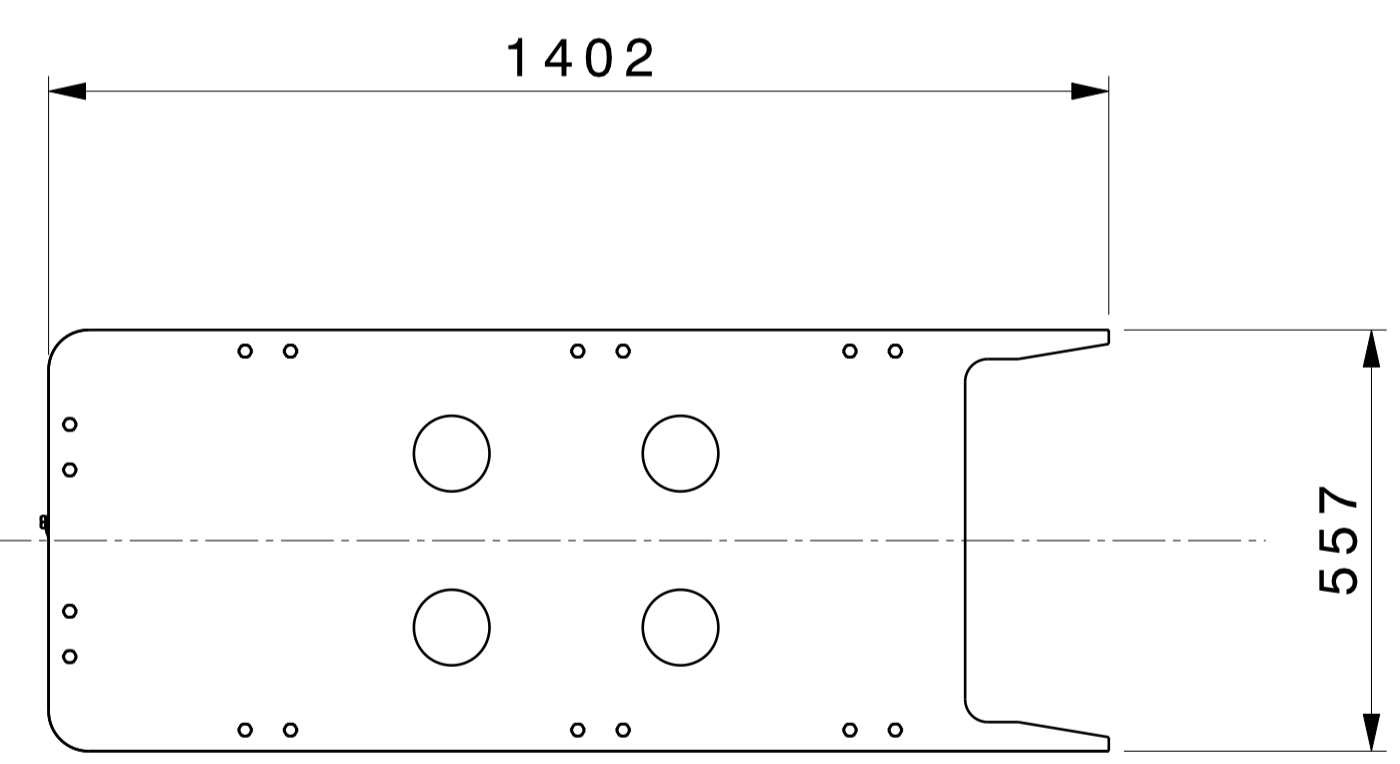
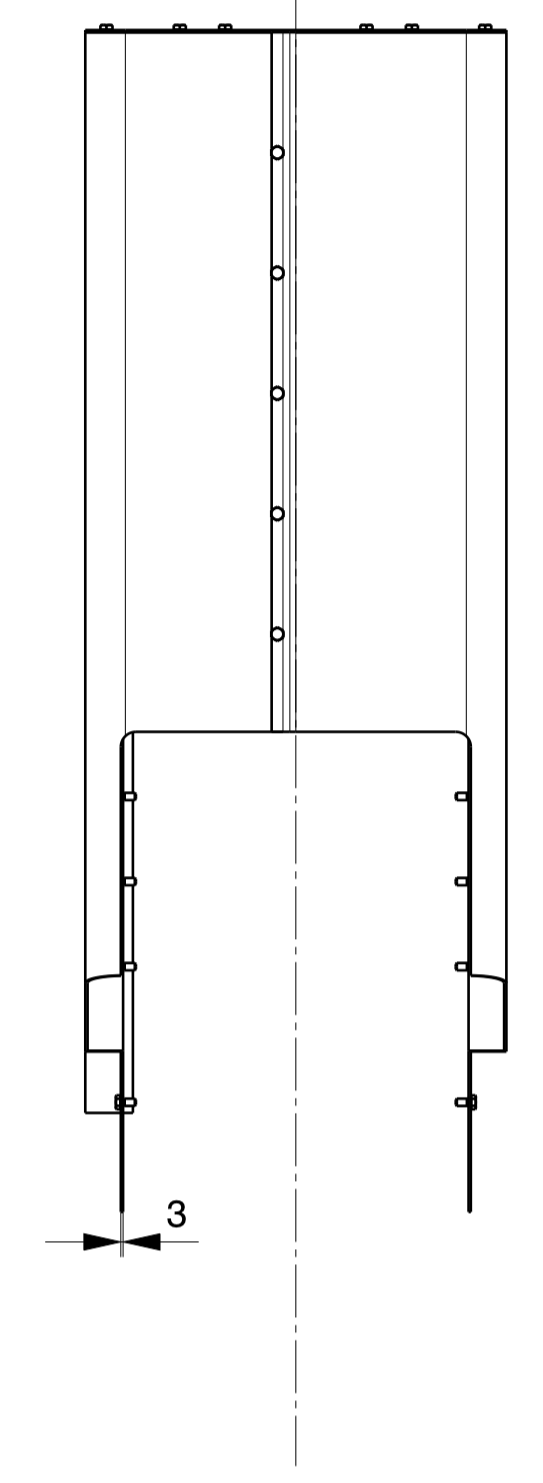
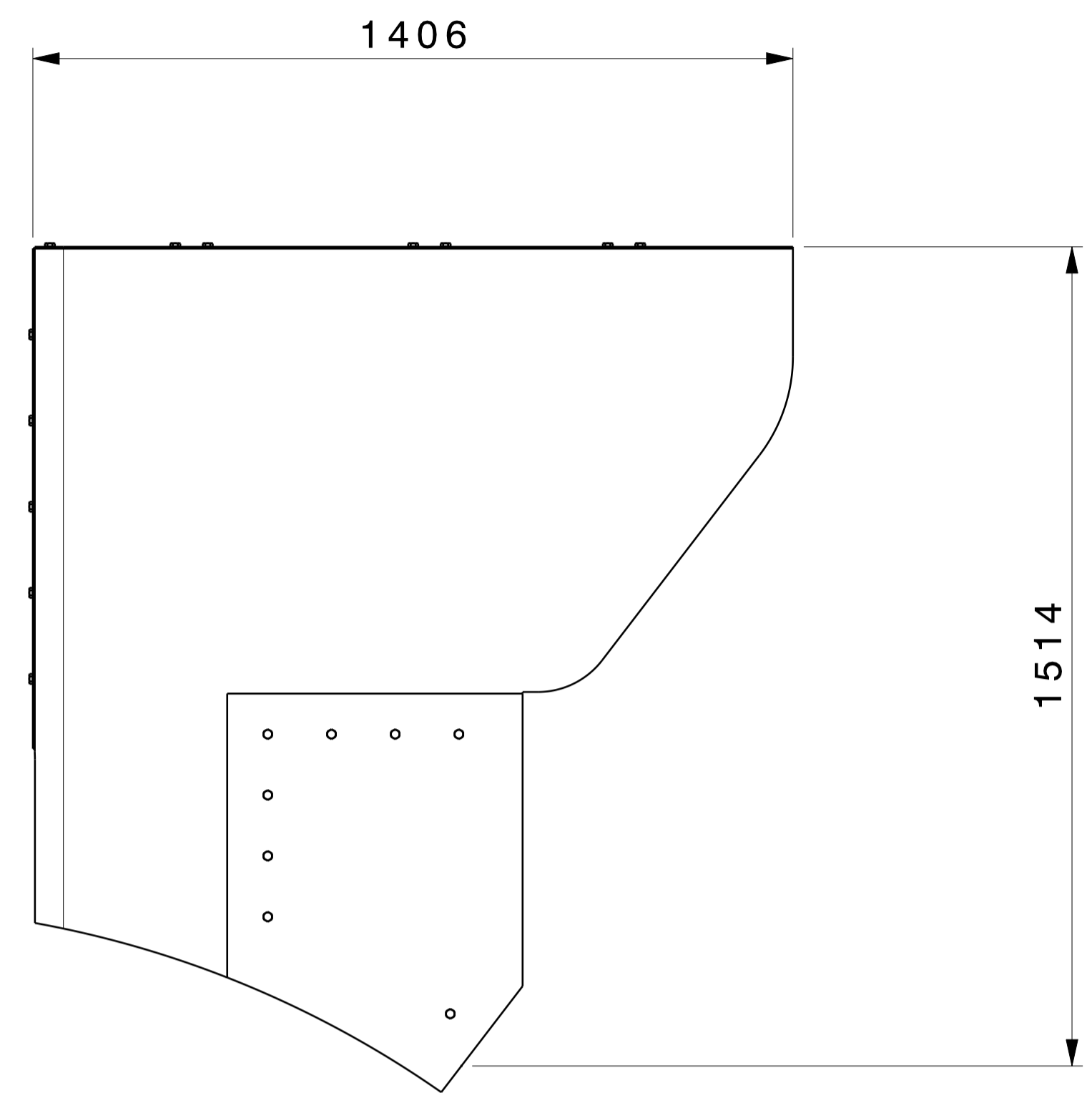
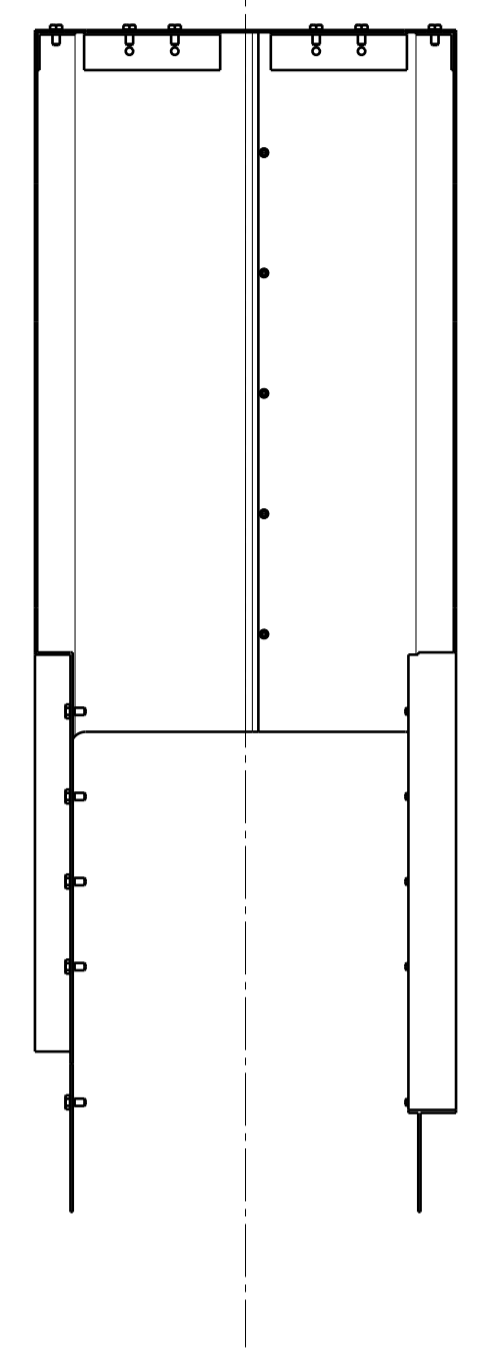
CASING TO BE UPDATED

| | | | | | |
|---|---|--|----------------------------|----------------|--------|
| DMS: | | Ref to 3D CatProduct:010202-103201_01 | | | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | APPROVED BY |  Fusion <small>Italy-Frascati Research Centre</small> | CUSTOMER: | | |
| | REVIEWED BY | | Fusion-for-Energy | | |
| | CHECKED BY | | DRAWING TITLE | | |
| REV DATE | 03-10-2011 | CONTROLLED BY | TF COIL | | |
| FIRST ISSUE DATE | 20-01-2011 | DRAWN BY | INTERCOIL INSULATION PLATE | | |
| SHEET SIZE | A1 | G. BROLATTI | CODE ENEA ID: | DD-JT60TF-NCO | |
| FIRST ANGLE PROJECTION |  | WBS LEVELS | 010202 | Drawing Number | 503201 |
| | | | | SHEET | 01 |
| | | | | REVISION | 01 |
| | | | | MATURITY | |


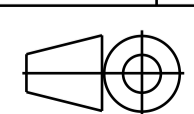
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



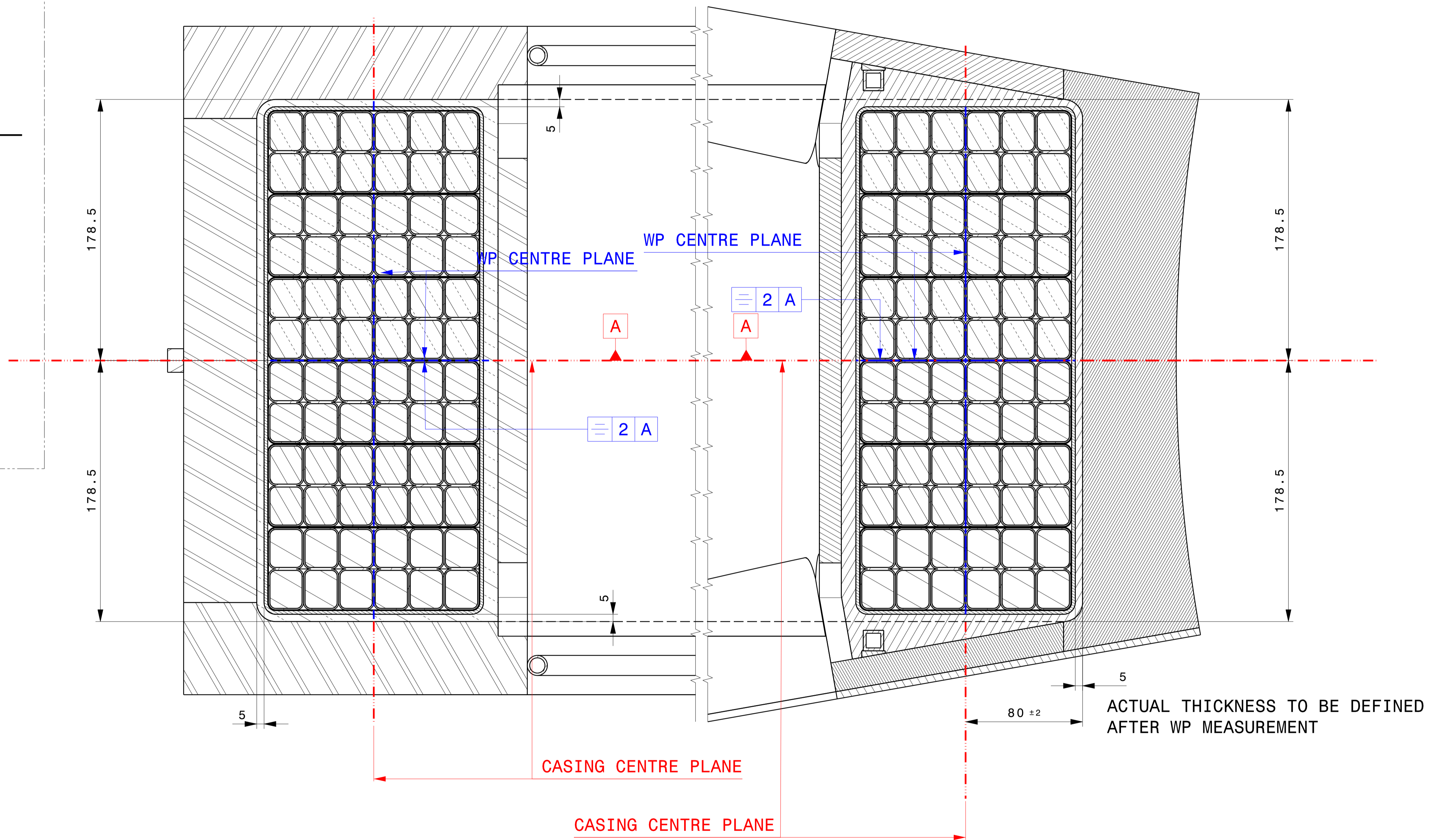
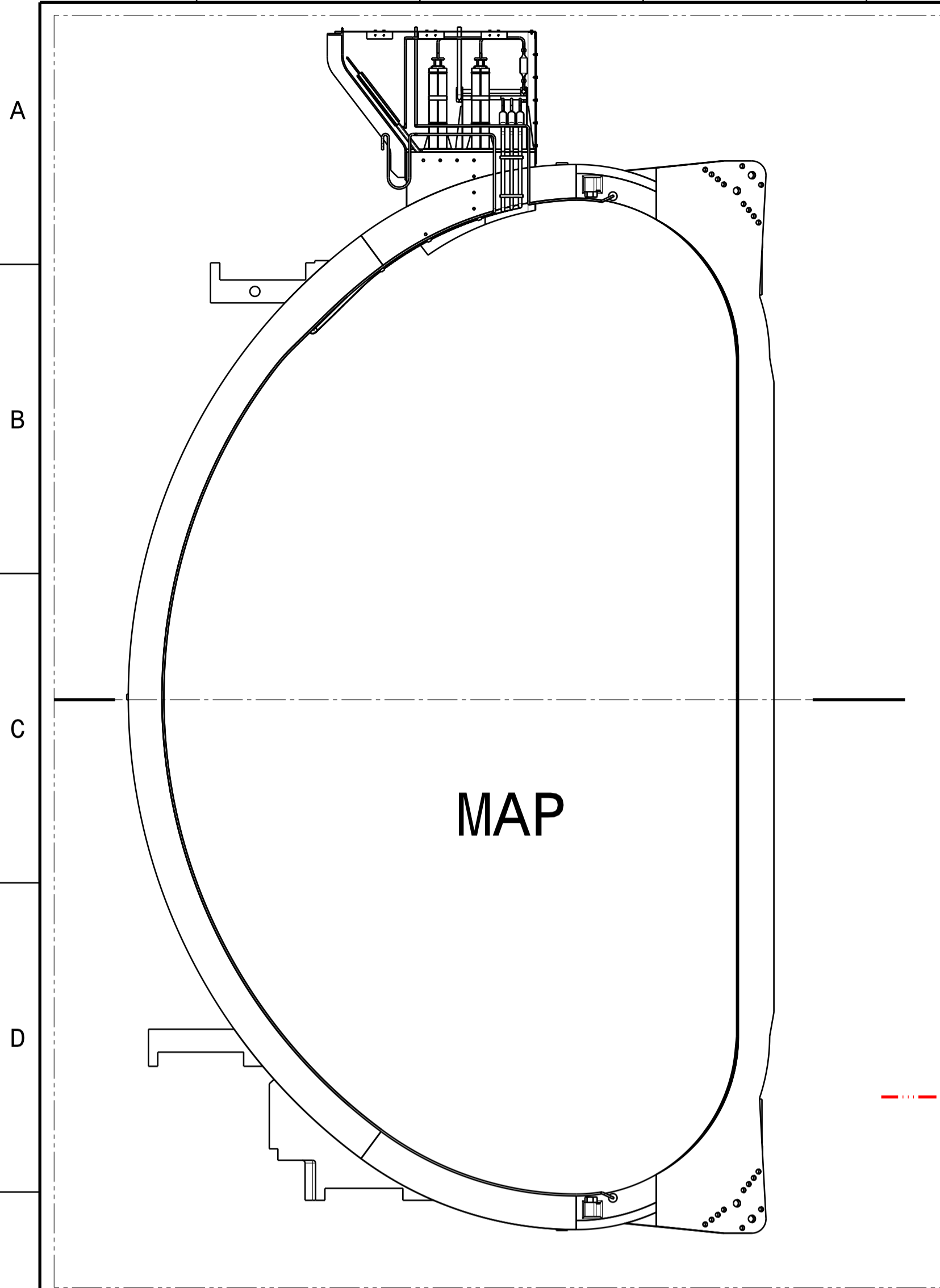
Bolted interface
60 M10 BOLTS REQUIRED



NOTE:
 - CONCEPTUAL DESIGN ONLY, FINAL DESIGN TO BE DEVELOPED BY CONTRACTOR
 - SUITABLE STIFFENERS WILL BE REQUIRED TO ENSURE STABILITY OF STRUCTURE DURING HANDLING AND TRANSPORT
 - BOLTED CONSTRUCTION TO ALLOW ASSEMBLY/DISASSEMBLY FOR SHIPMENT/INSTALLATION ON MACHINE

| | | | |
|---|---|--|---------------------------------------|
| DMS: | | Ref to 3D CatProduct:010202-203202_01 | |
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| | REVIEWED BY | | DRAWING TITLE TF COIL COVER |
| REV DATE 03-10-2011 | CONTROLLED BY A. CUCCHIARO | CODE ENEA ID: DD-JT60TF-NCO | |
| FIRST ISSUE DATE 20-01-2011 | SCALE | | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION  | WBS LEVELS 010202 | Drawing Number 503202 |
| | | SHEET 01 | REVISION 01 |
| | | MATURITY | |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



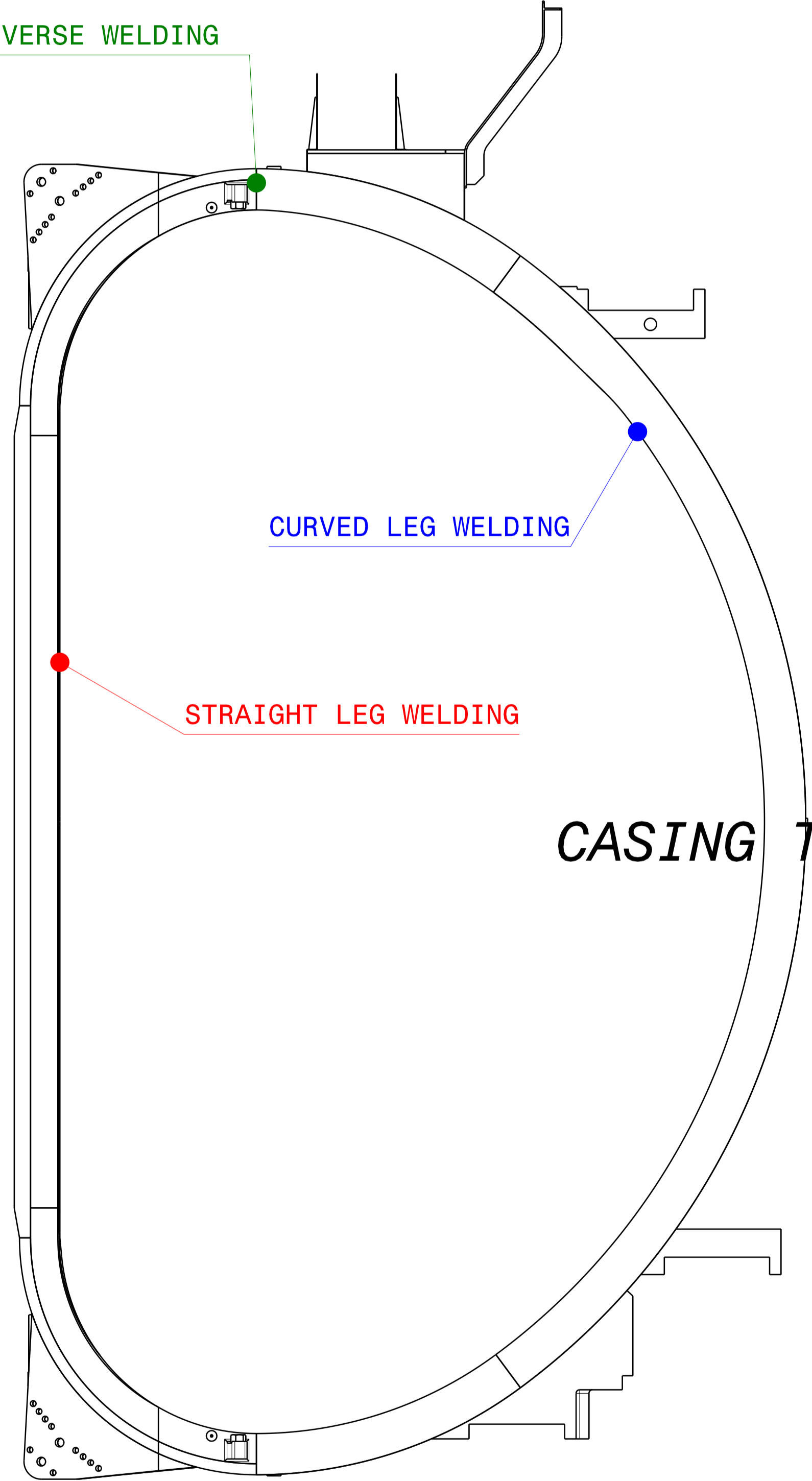
CASING TO BE UPDATED

NOTE:
 REFERENCE SURFACE B IS DEFINED AS THE TOP & BOTTOM OF THE STRAIGHT LEG ONLY.
 A PROJECTED REFERENCE IS REQUIRED TO DEFINE THIS SURFACE ALONG THE LENGTH OF THE STRAIGHT LEG.

| | | | |
|--|------------------------|---------------------------------------|--|
| DMS: | | Ref to 3D CatProduct:010202-203203_01 | |
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE WINDING PACK SPACER ALLOCATION BETWEEN CASING & WP |
| FIRST ISSUE DATE 20-01-2011 | | CONTROLLED BY A. CUCCHIARO | |
| SCALE | | DRAWN BY G. BROLATTI | CODE ENEA ID: DD-JT60TF-NCO |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS LEVELS 3 | 010202 |
| Drawing Number 503203 | | SHEET 01 | REVISION 01 |
| Maturity | | MATURITY | |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

TRANSVERSE WELDING



Front view

CASING TO BE UPDATED

NOTE:
 RESPONSABILITY OF THE CONTRACTOR INCLUDES
 - WELD DETAIL DESIGN
 - FINAL WELDING

JOINT VERTICAL PORT

CURVED LEG CLOSURE PLATE

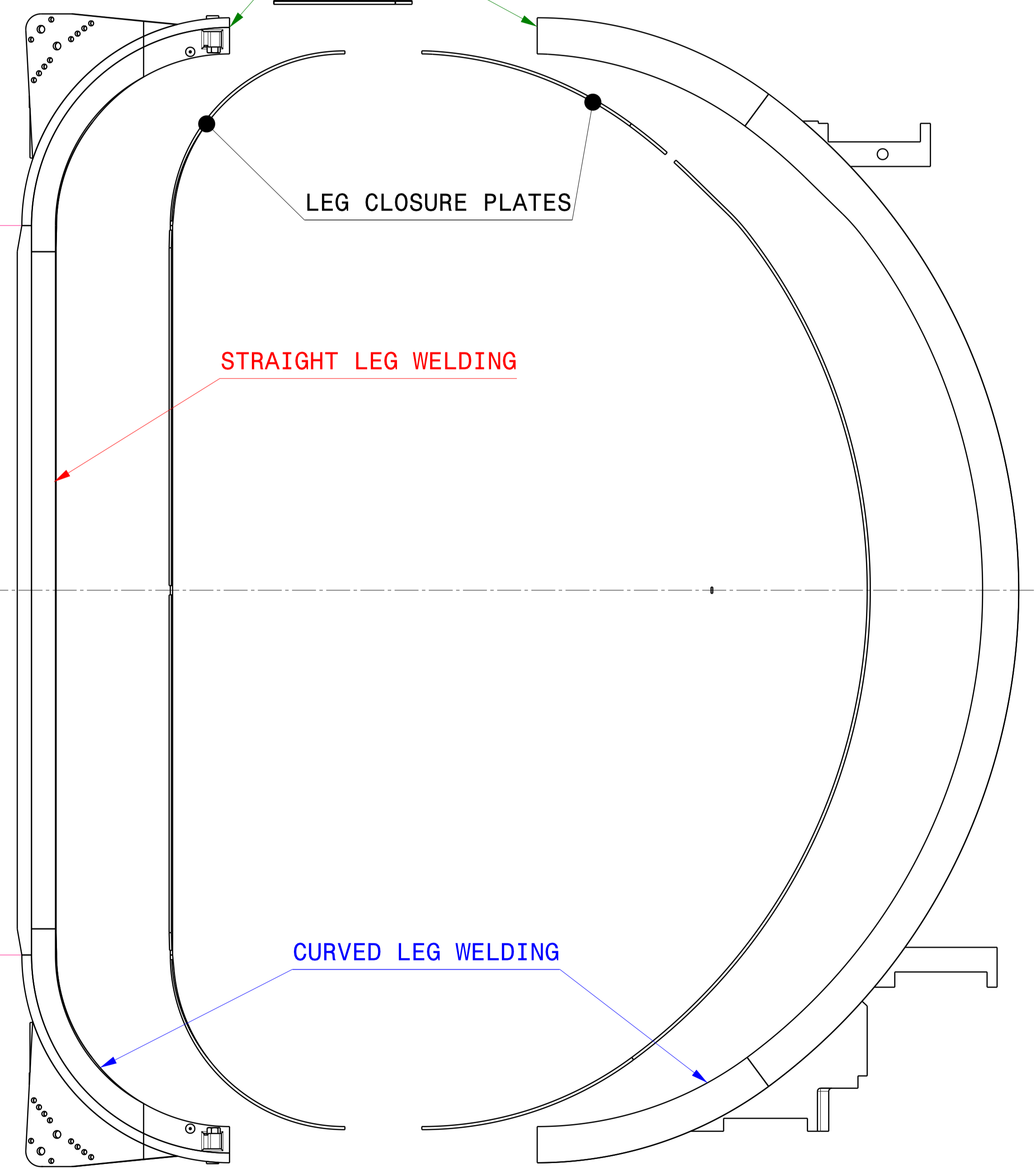
TRANSVERSE WELDS

LEG CLOSURE PLATES

STRAIGHT LEG WELDING

STRAIGHT LEG WELDING

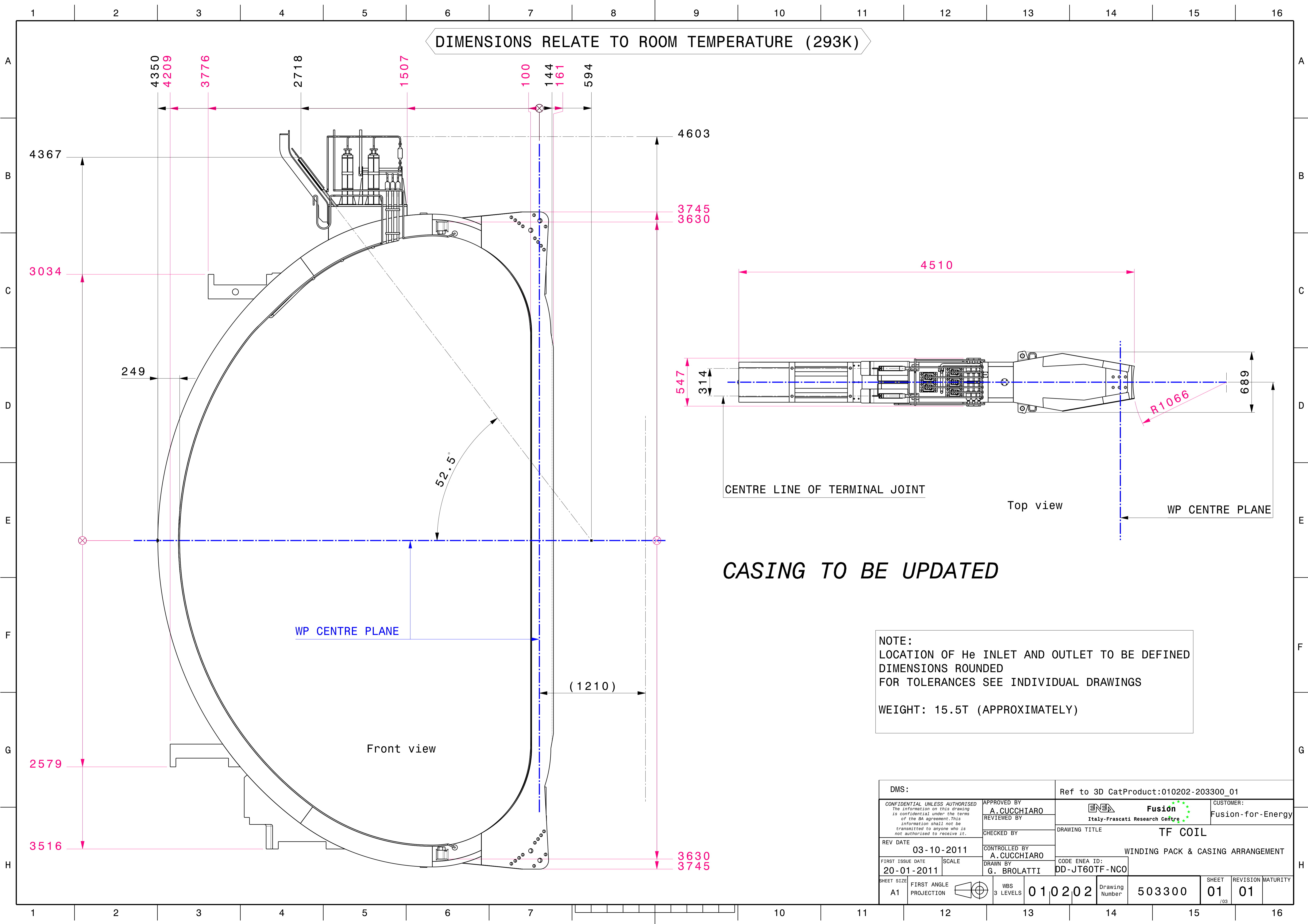
CURVED LEG WELDING



Front view


| | | | |
|--|------------------------|--|--|
| DMS: | | Ref to 3D CatProduct: 010202-203204_01 | |
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE CASING WELDING LAYOUT |
| FIRST ISSUE DATE 20-01-2011 | SCALE | CHECKED BY | CODE ENEA ID: DD-JT60TF-NCO |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | CONTROLLED BY A. CUCCHIARO | DRAWING NUMBER 503204 |
| WBS LEVELS 3 | 010202 | DRAWN BY G. BROLATTI | SHEET REVISION MATURITY 01 01 |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

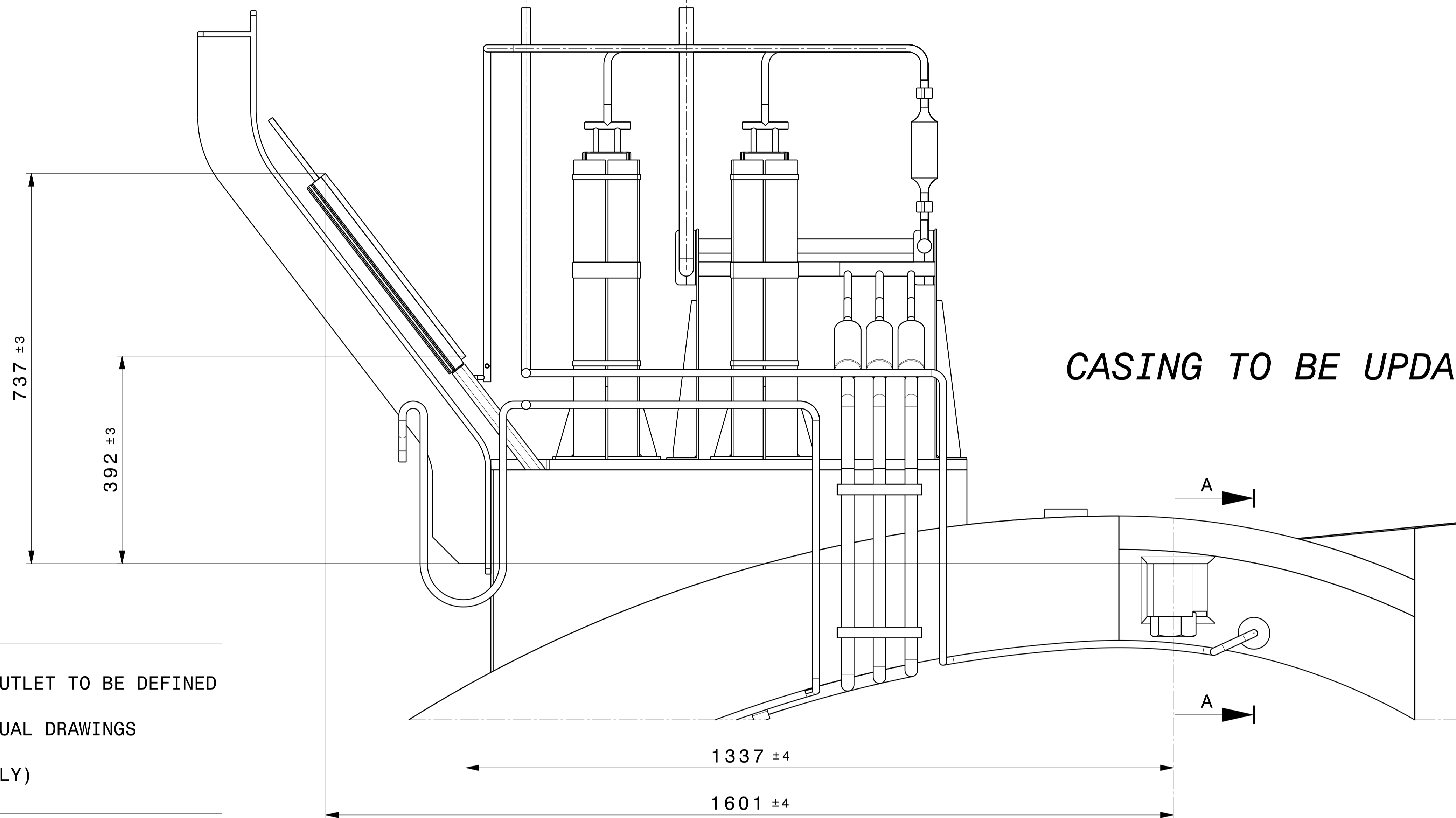


CASING TO BE UPDATED

NOTE:
LOCATION OF He INLET AND OUTLET TO BE DEFINED
DIMENSIONS ROUNDED
FOR TOLERANCES SEE INDIVIDUAL DRAWINGS
WEIGHT: 15.5T (APPROXIMATELY)

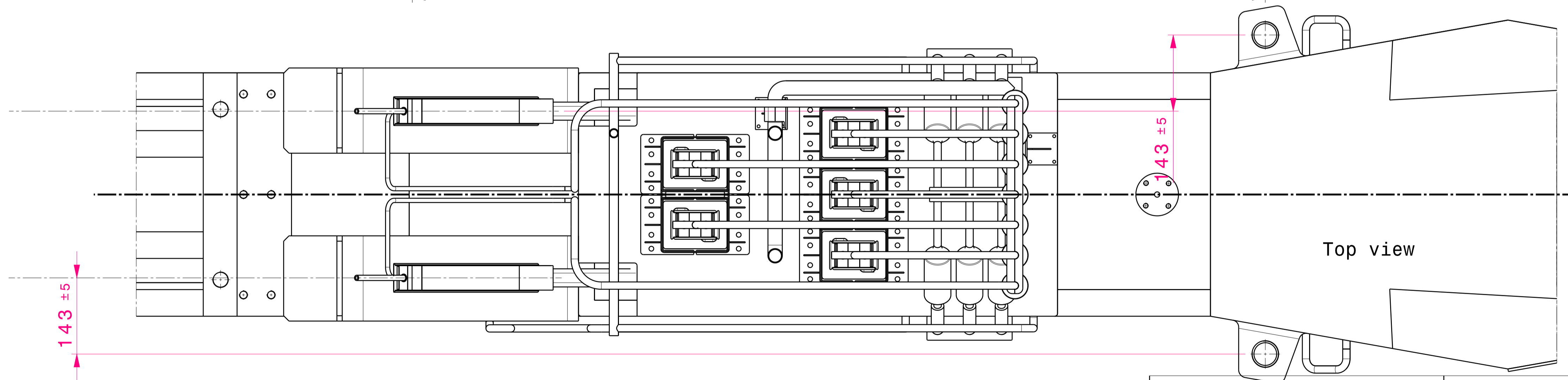
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|---|-------------------------------|---|--------------------------------|
| DMS: | | Ref to 3D CatProduct:010202-203300_01 | |
| CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it. | APPROVED BY A. CUCCHIARO |  Fusion Italy-Frascati Research Centre | CUSTOMER: Fusion-for-Energy |
| | REVIEWED BY | | DRAWING TITLE TF COIL |
| REV DATE 03-10-2011 | CONTROLLED BY A. CUCCHIARO | WINDING PACK & CASING ARRANGEMENT | |
| FIRST ISSUE DATE 20-01-2011 | DRAWN BY G. BROLATTI | CODE ENEA ID: DD-JT60TF-NCO | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS LEVELS 3 | 010202 |
| | | Drawing Number 503300 | SHEET 01 |
| | | | REVISION 01 |
| | | | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



CASING TO BE UPDATED

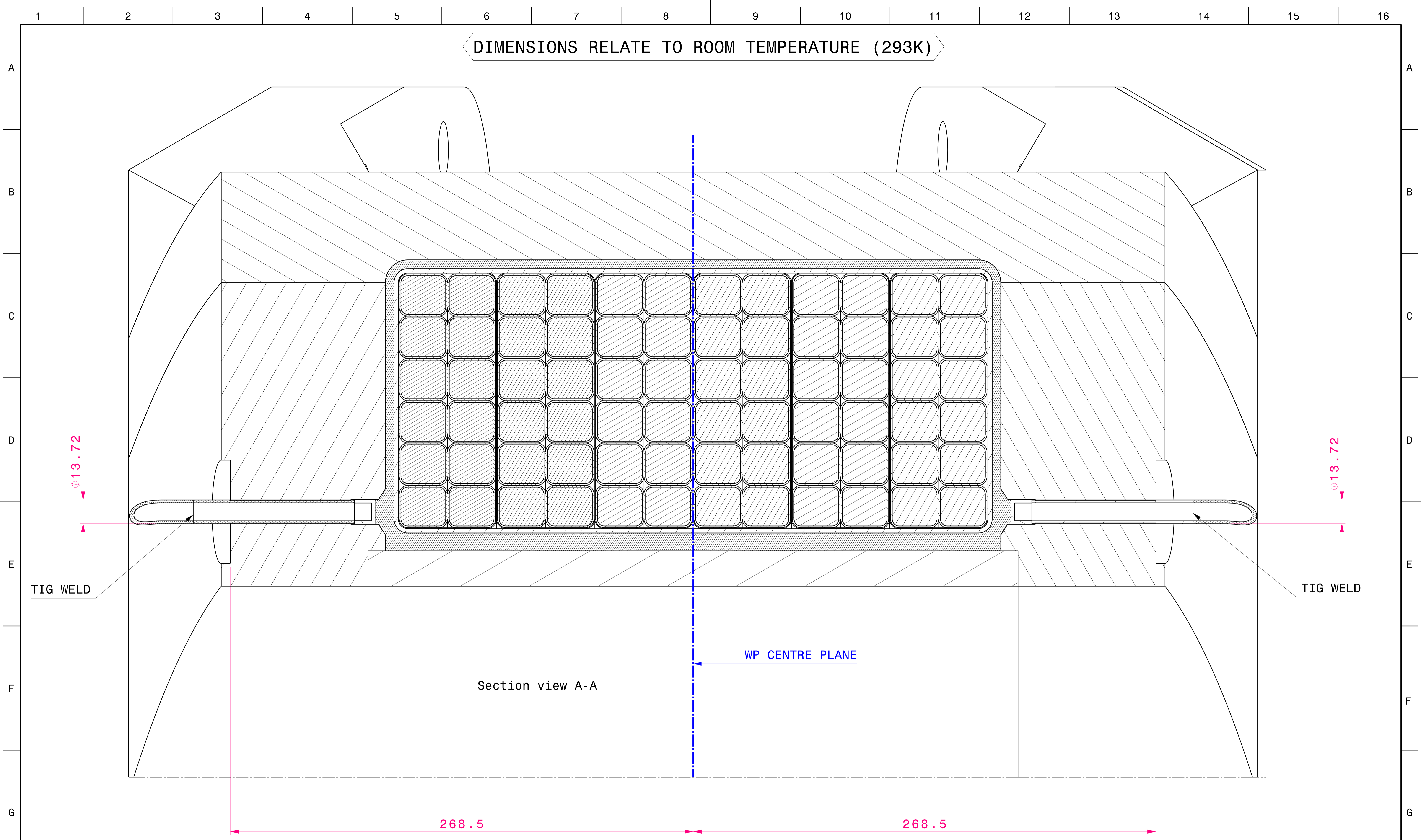
NOTE:
 LOCATION OF He INLET AND OUTLET TO BE DEFINED
 DIMENSIONS ROUNDED
 FOR TOLERANCES SEE INDIVIDUAL DRAWINGS
 WEIGHT: 15.5T (APPROXIMATELY)



Top view

| | | | | |
|--|--------------------------------------|--|---------------------------------|---------------------------------|
| DMS: | | Ref to 3D CatProduct:010202-203300_01 | | |
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| | REVIEWED BY | | DRAWING TITLE TF COIL | |
| REV DATE 03-10-2011 | CONTROLLED BY A. CUCCHIARO | WINDING PACK & CASING ARRANGEMENT | | |
| FIRST ISSUE DATE 20-01-2011 | DRAWN BY G. BROLATTI | CODE ENEA ID: DD-JT60TF-NCO | | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS LEVELS 3 | 010202 | Drawing Number 503300 |
| | | | SHEET 02 | REVISION 01 |
| | | | | MATURITY |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Section view A-A

WP CENTRE PLANE

TIG WELD

TIG WELD

268.5

268.5

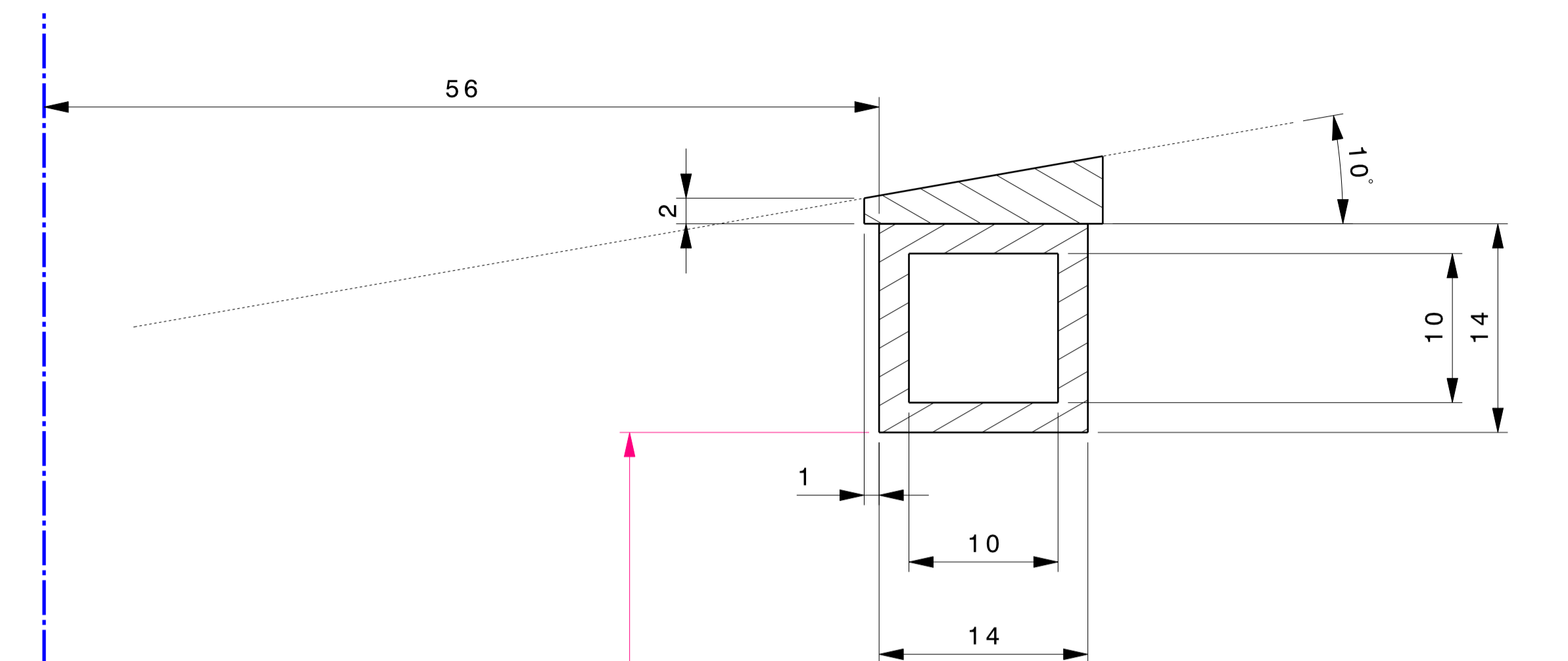
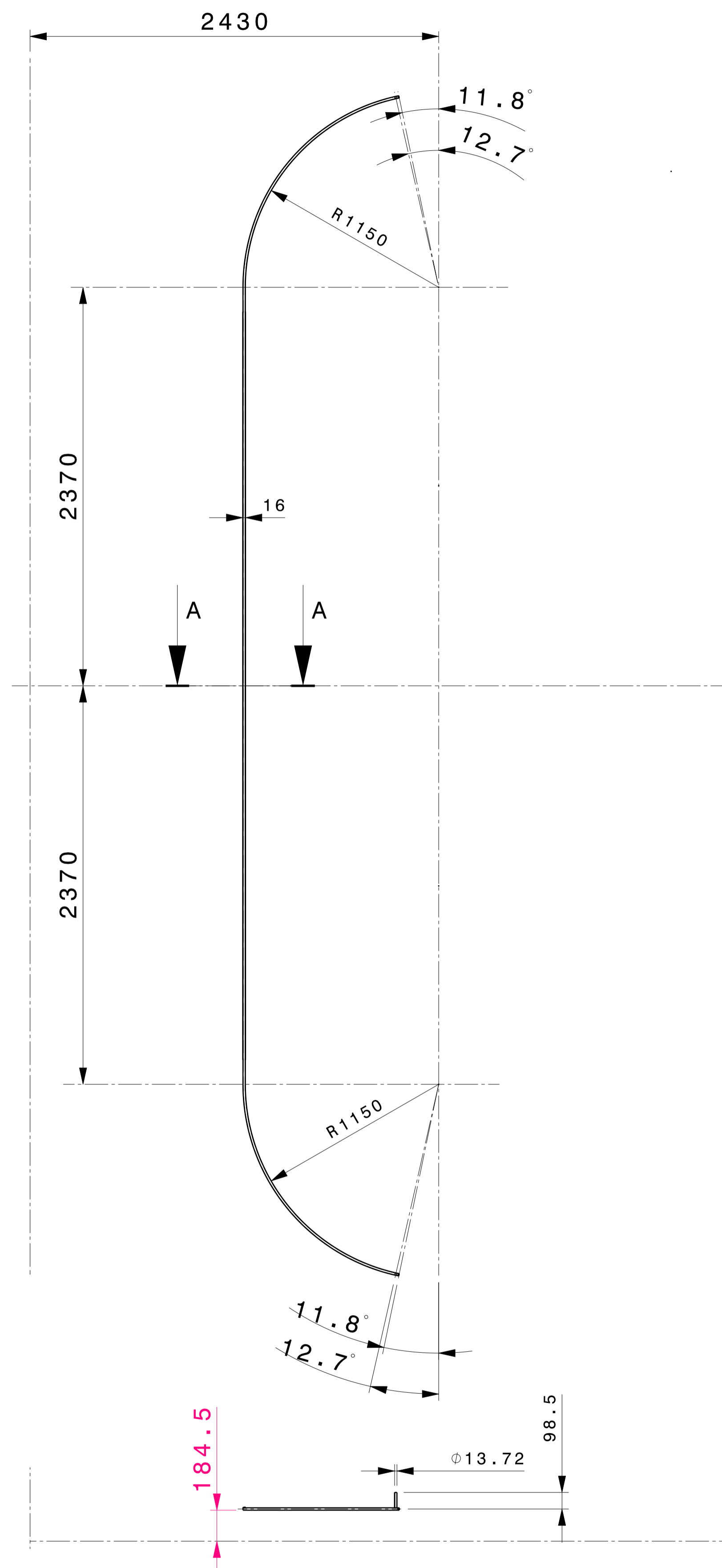
$\phi 13.72$

$\phi 13.72$

CASING TO BE UPDATED

| | | | |
|---|------------------------|---------------------------------------|-----------------------------------|
| DMS: | | Ref to 3D CatProduct:010202-203300_01 | |
| <small>CONFIDENTIAL UNLESS AUTHORISED The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE TF COIL |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | |
| SCALE | | CONTROLLED BY A. CUCCHIARO | WINDING PACK & CASING ARRANGEMENT |
| DRAWN BY G. BROLATTI | | CODE ENEA ID: DD-JT60TF-NCO | |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS LEVELS 010202 | Drawing Number 503300 |
| | | SHEET 03 | REVISION 01 |
| | | MATURITY | |


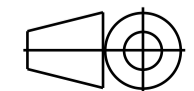
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



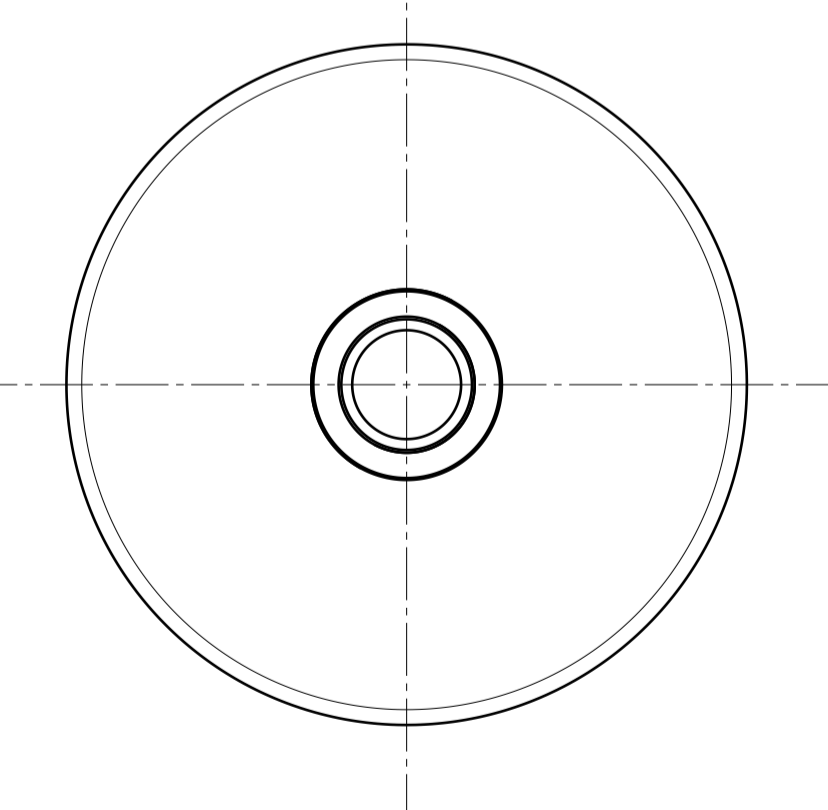
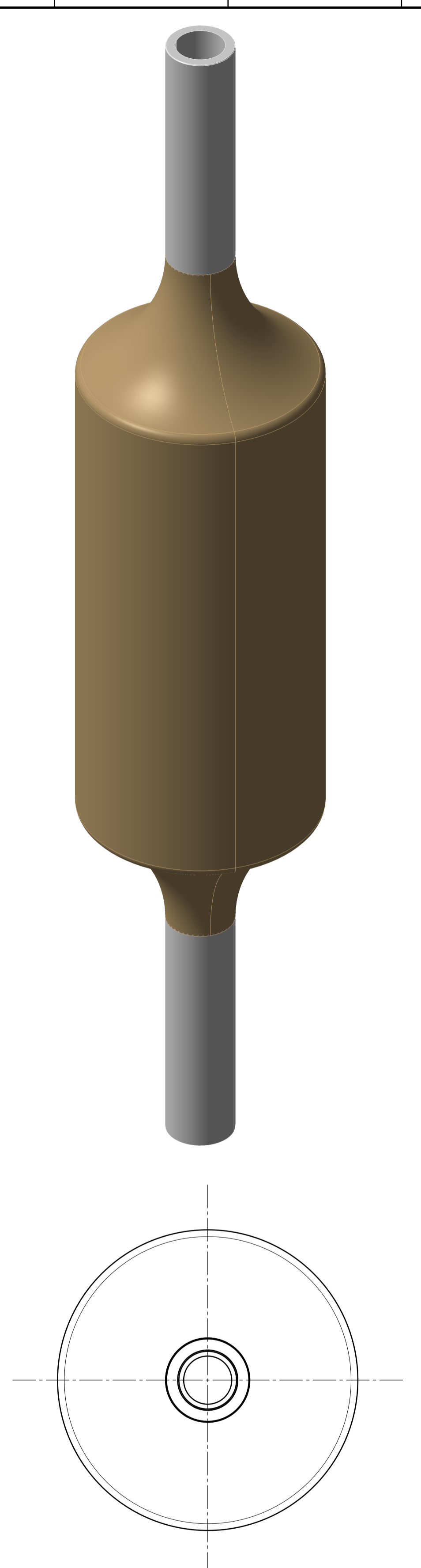
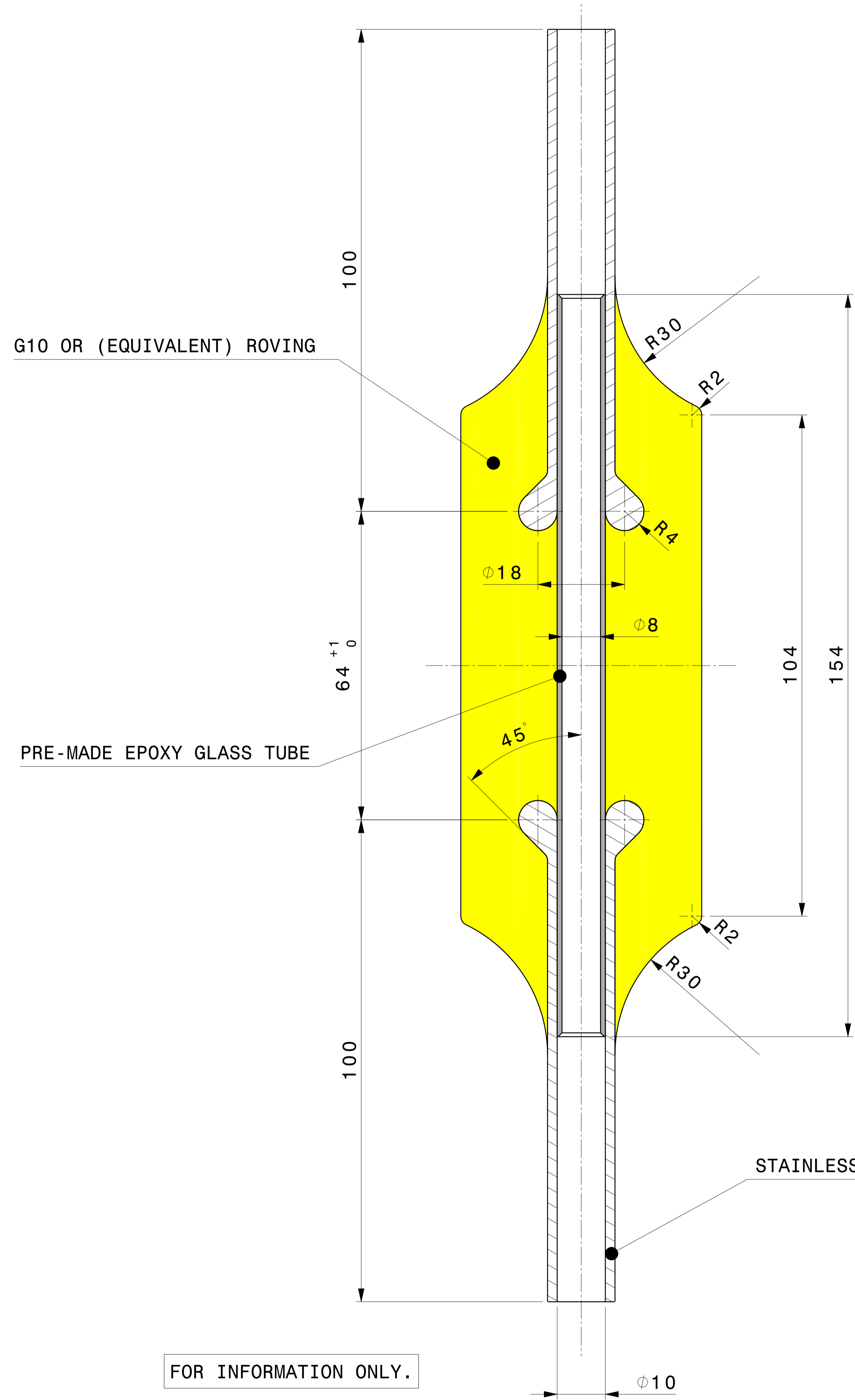
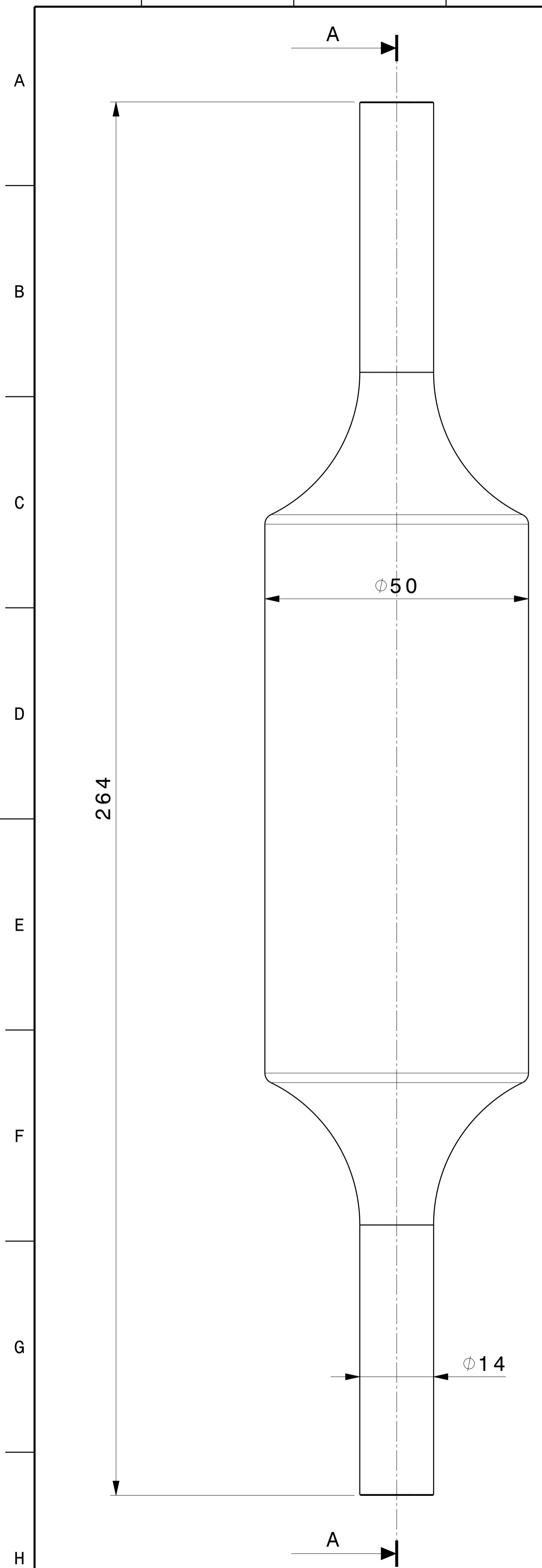
Section cut A-A

WP CENTRE PLANE

**PIPE TO BE MODIFIED-SEE
DRAWING 010301-503006**

| | | | | | | | | |
|---|---|---|--------------------------------|----------------|--------|-------|----------|----------|
| DMS: | | Ref to 3D CatProduct:010202-203301_01 | | | | | | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | APPROVED BY |  Fusion <small>Italy-Frascati Research Centre</small> | CUSTOMER: | | | | | |
| | REVIEWED BY | | Fusion-for-Energy | | | | | |
| | CHECKED BY | | DRAWING TITLE | | | | | |
| REV DATE | 03-10-2011 | CONTROLLED BY | CASING INNER HELIUM COOLING | | | | | |
| FIRST ISSUE DATE | 20-01-2011 | DRAWN BY | CODE ENEA ID: | | | | | |
| | | G. BROLATTI | DD-JT60TF-NCO | | | | | |
| SHEET SIZE | FIRST ANGLE PROJECTION | WBS LEVELS | 010202 | Drawing Number | 503301 | SHEET | REVISION | MATURITY |
| A1 |  | 3 | | | | 01 | 01 | |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



G10 OR (EQUIVALENT) ROVING

PRE-MADE EPOXY GLASS TUBE

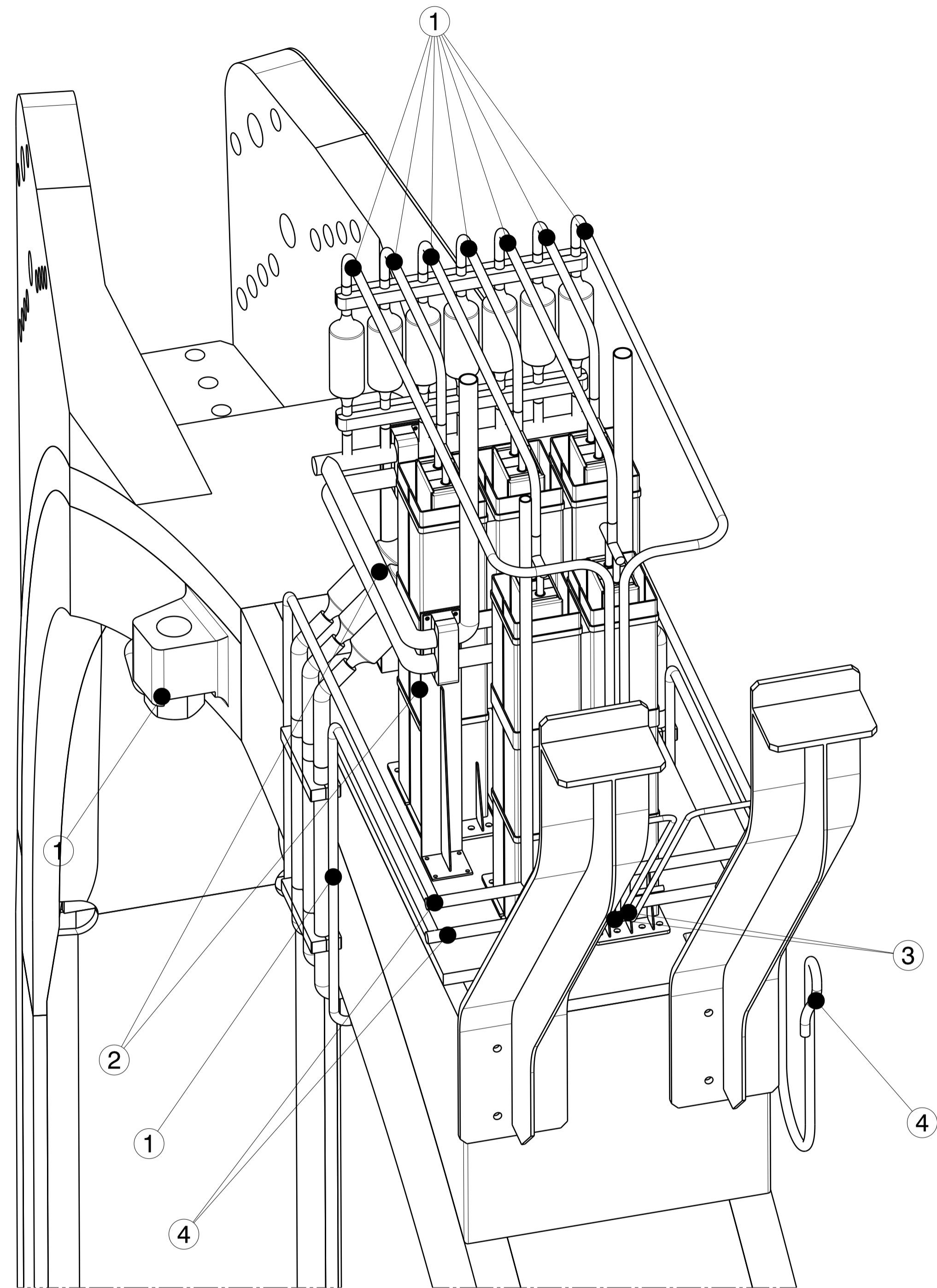
STAINLESS STEEL TUBE

FOR INFORMATION ONLY.

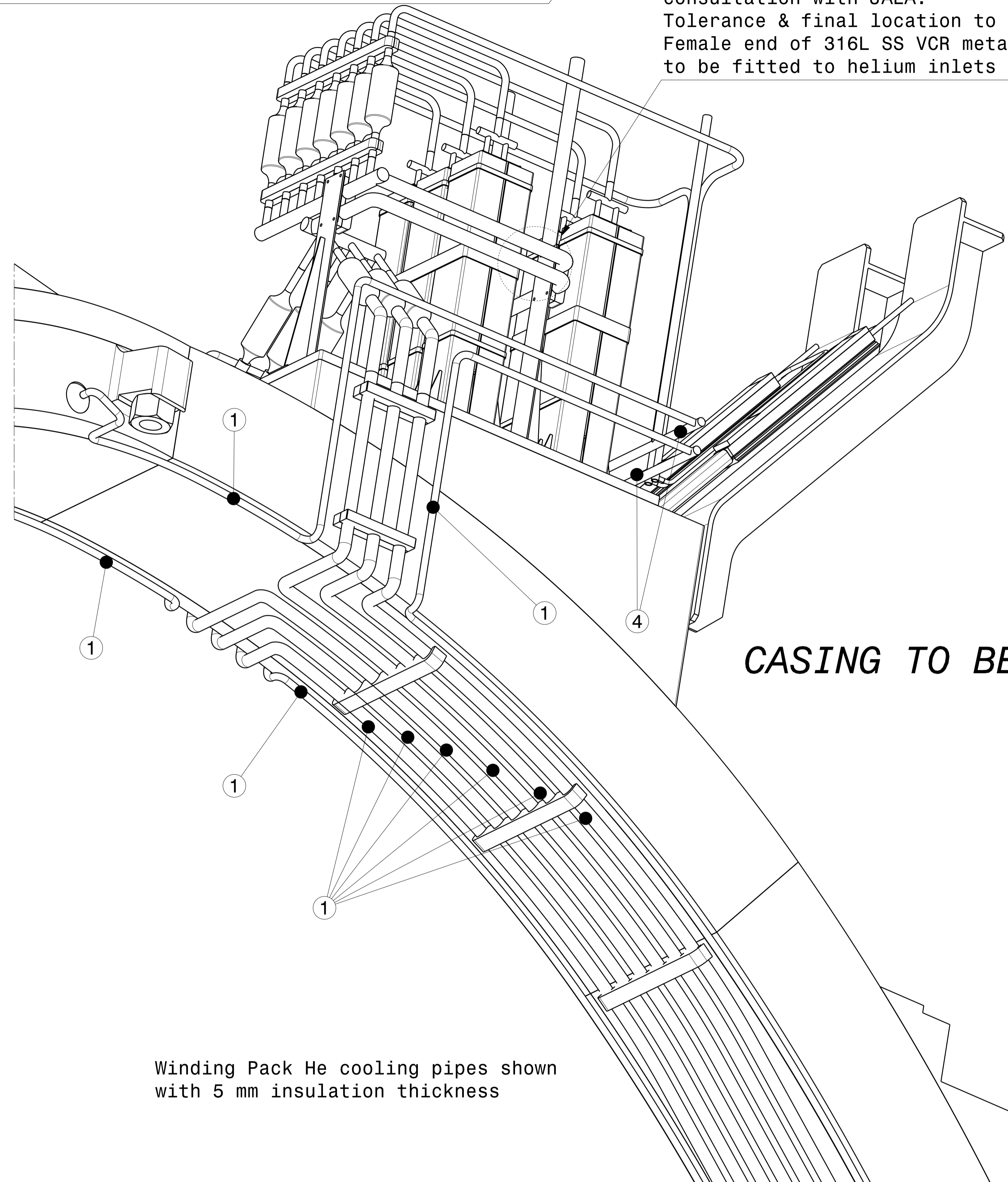
| | | | |
|--|------------------------|---------------------------------------|--|
| DMS: | | Ref to 3D CatProduct:010202-203302_01 | |
| CONFIDENTIAL UNLESS AUTHORISED <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | | APPROVED BY A. CUCCHIARO | CUSTOMER: Fusion-for-Energy |
| REV DATE 03-10-2011 | | REVIEWED BY | DRAWING TITLE WINDING PACK INSULATION BREAK |
| FIRST ISSUE DATE 20-01-2011 | | CHECKED BY | CODE ENEA ID: DD-JT60TF-NCO |
| SCALE | | CONTROLLED BY A. CUCCHIARO | SHEET 01 |
| DRAWN BY G. BROLATTI | | REVISION 01 | MATURITY |
| SHEET SIZE A1 | FIRST ANGLE PROJECTION | WBS 3 LEVELS | 010202 |
| Drawing Number 503302 | | SHEET REVISION MATURITY 01 01 | |

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

Final location of inlet & outlet to be defined after consultation with JAEA.
 Tolerance & final location to be +/-5mm
 Female end of 316L SS VCR metal gasket face seal to be fitted to helium inlets and outlets



Isometric view




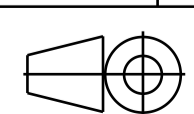
Winding Pack He cooling pipes shown with 5 mm insulation thickness

Isometric view

CASING TO BE UPDATED

Note: Pipe length given for reference.
 Final lengths to be delivered during detail design.

| Item Nr | Description | Length |
|---------|--|--------|
| 4 | ISO Pipe $\phi 17.2-14$ (3/8") | 2.5 m |
| 3 | ISO Pipe $\phi 8-6$ | 1.9 m |
| 2 | ISO Pipe $\phi 26.9-23.7$ (3/4") | 2.5 m |
| 1 | ANSI/AMSE Pipe $\phi 13.72 - 10.42$ (1/4") | 48 m |

| | | | |
|---|---|--|------------------------|
| DMS: | | Ref to 3D CatProduct:010202-203303_01 | |
| <small>CONFIDENTIAL UNLESS AUTHORISED</small> <small>The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.</small> | APPROVED BY |  Fusion <small>Italy-Frascati Research Centre</small> | CUSTOMER: |
| | REVIEWED BY | | Fusion-for-Energy |
| | CHECKED BY | | DRAWING TITLE |
| REV DATE | 03-10-2011 | CONTROLLED BY | TF COIL HELIUM COOLING |
| FIRST ISSUE DATE | 20-01-2011 | DRAWN BY | CODE ENEA ID: |
| | | G. BROLATTI | DD-JT60TF-NCO |
| SHEET SIZE | FIRST ANGLE PROJECTION | WBS LEVELS | 010202 |
| A1 |  | 3 LEVELS | Drawing Number |
| | | | 503303 |
| | | SHEET | REVISION |
| | | 01 | 01 |
| | | MATURITY | A |