



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



Ministero dello Sviluppo Economico

RICERCA DI SISTEMA ELETTRICO

Disegni costruttivi della cassa di contenimento della bobina di JT-60SA

Antonio Cucchiaro, Paolo Rossi, Giorgio Brolatti



DISEGNI COSTRUTTIVI DELLA CASSA DI CONTENIMENTO DELLA BOBINA DI JT-60SA

Antonio Cucchiaro, Paolo Rossi, Giorgio 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"

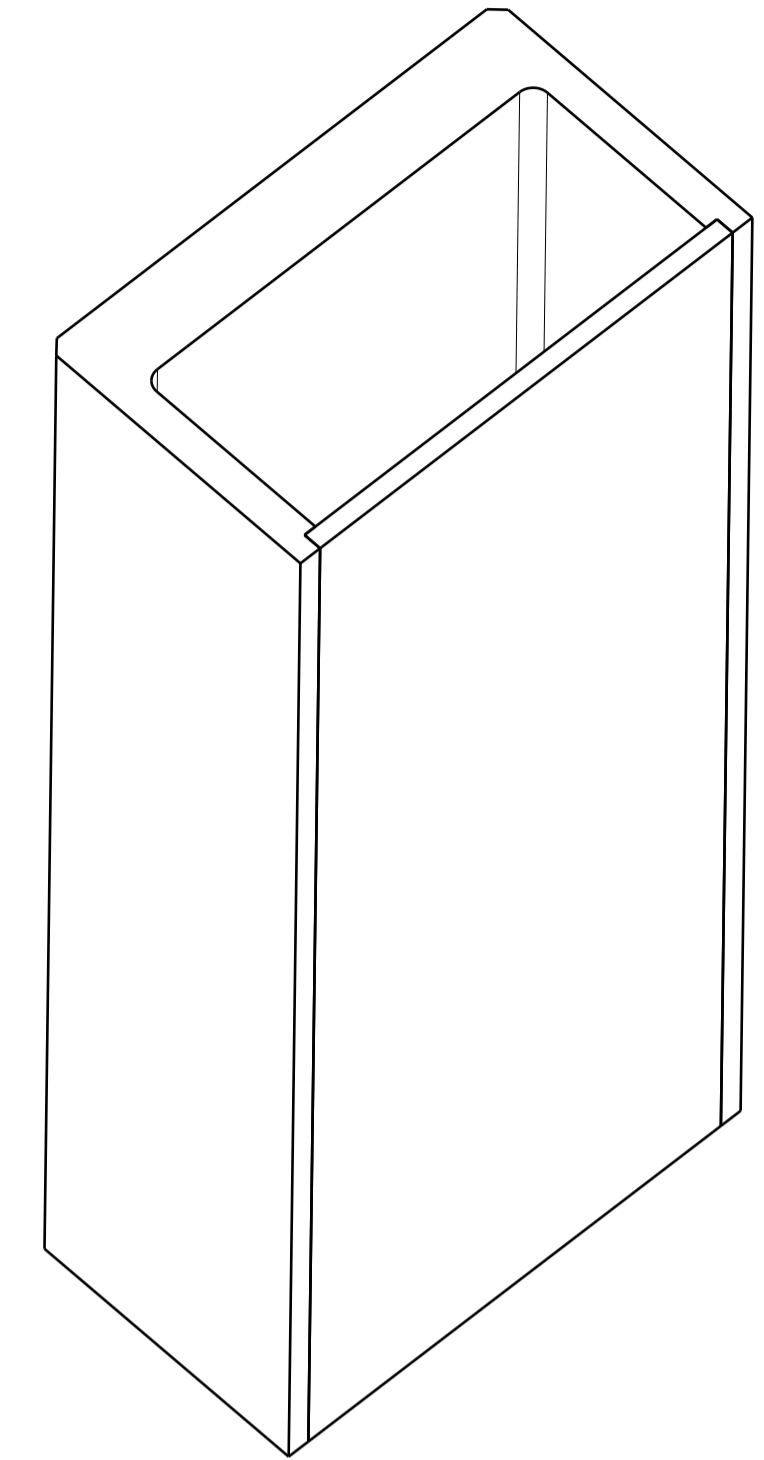
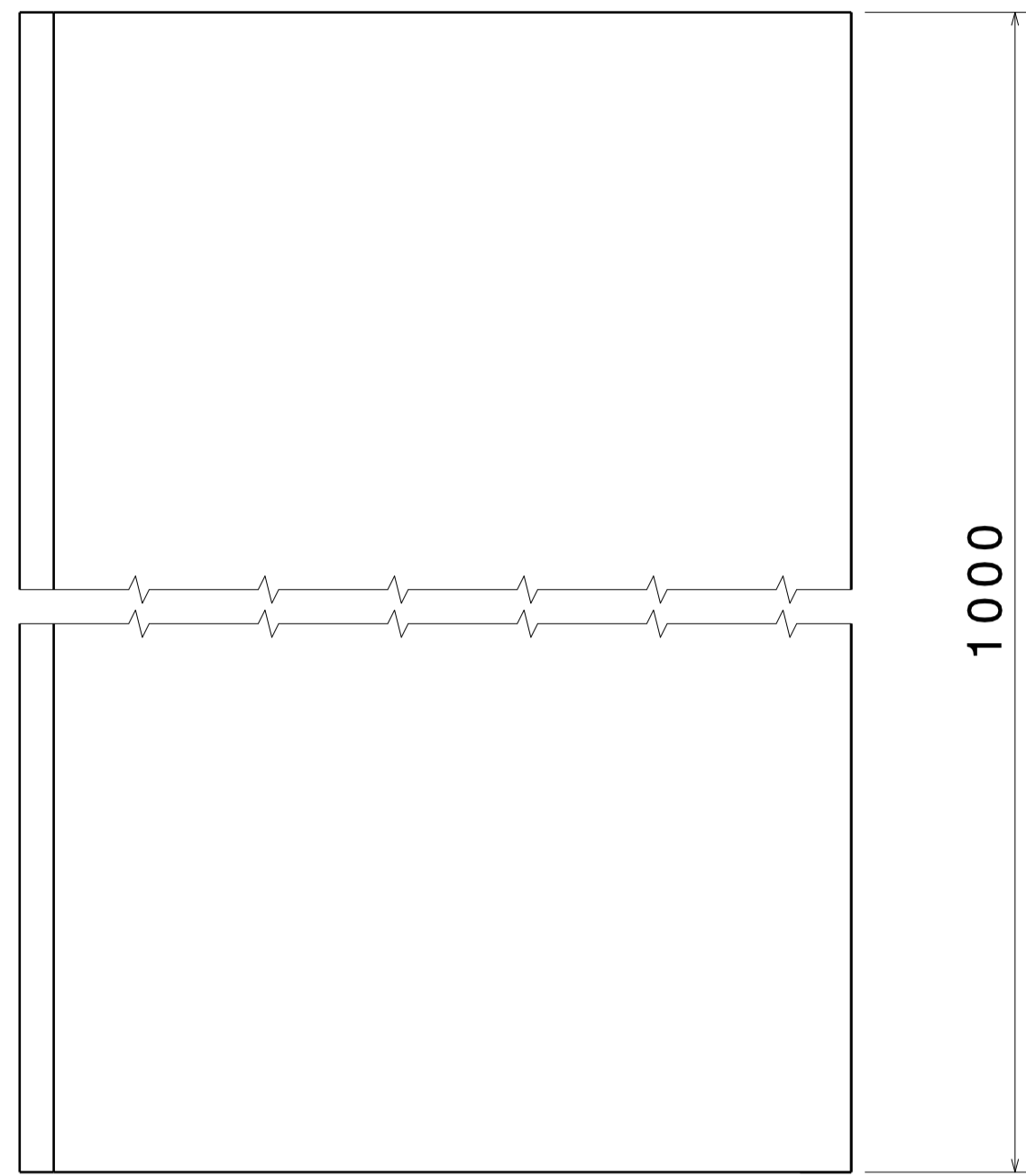
Responsabile Progetto: Aldo Pizzuto, ENEA

DISEGNI COSTRUTTIVI DELLA CASSA DI CONTENIMENTO DELLA BOBINA DI JT-60SA

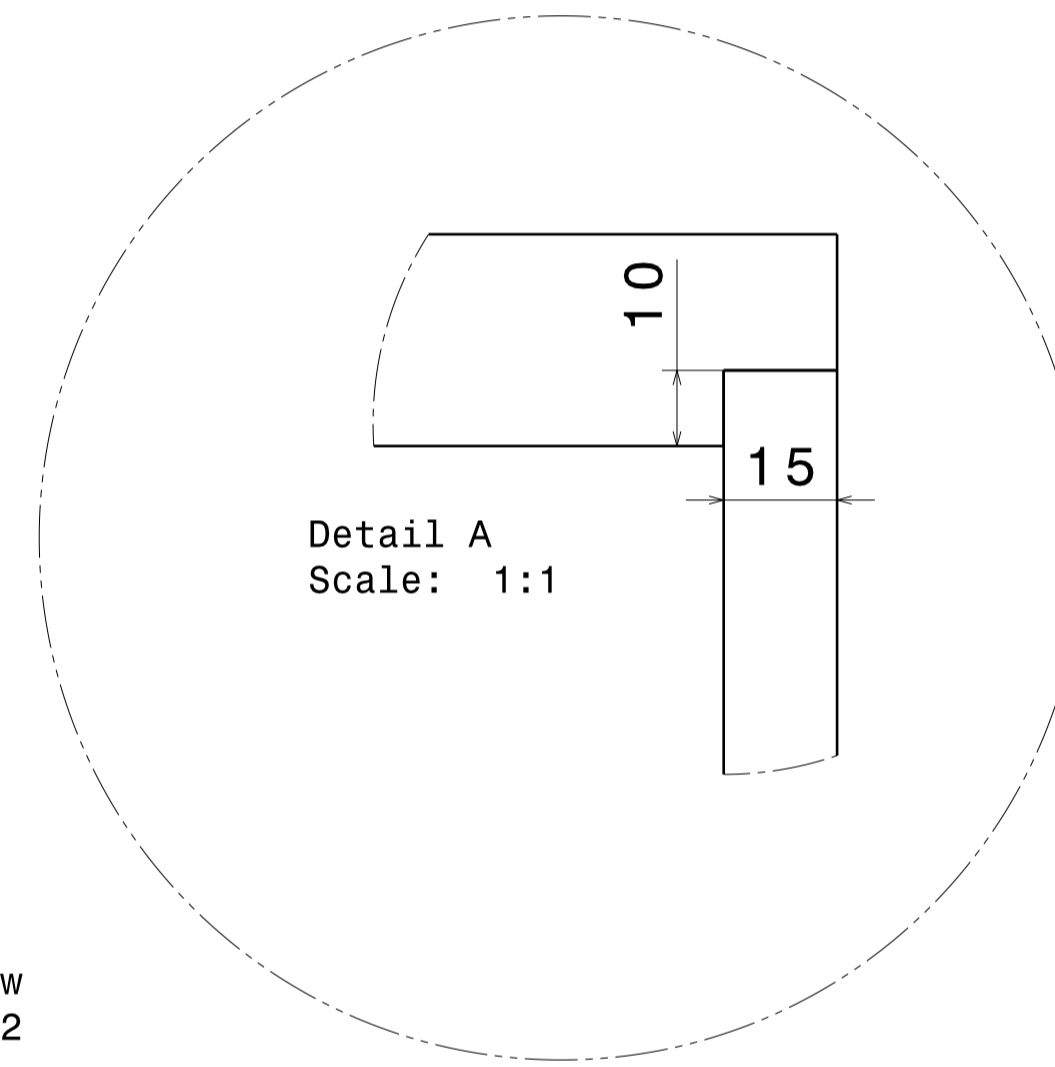
Rev. 0 30/09/2011

		Antonio Cucchiaro		
0	03/09/2011	Giorgio Brolatti		Antonio Cucchiaro
		Paolo Rossi		
Rev.	Date	Author	Reviewer	Approver

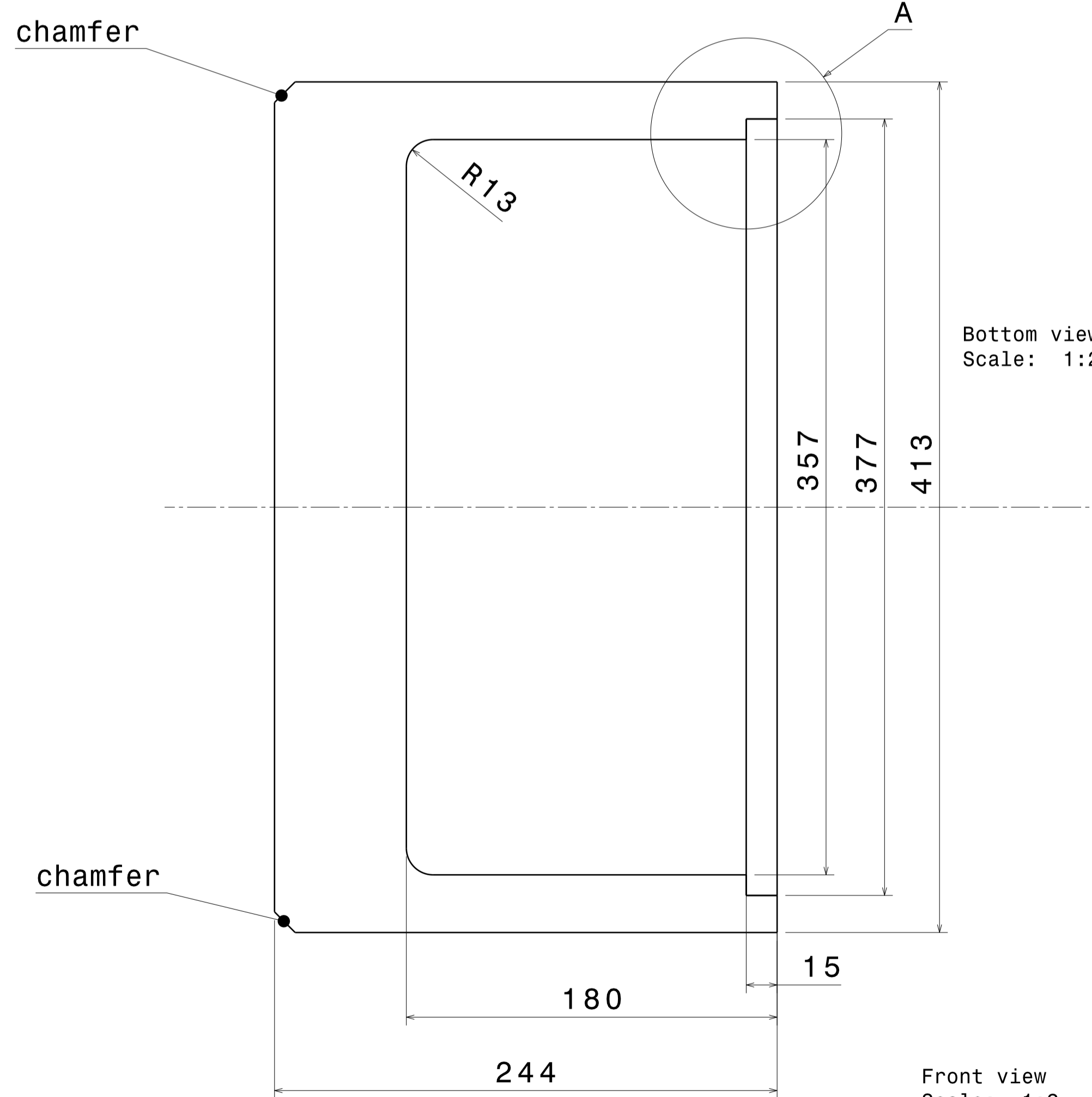
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Isometric view



Detail A
Scale: 1:1


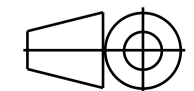


Bottom view
Scale: 1:2

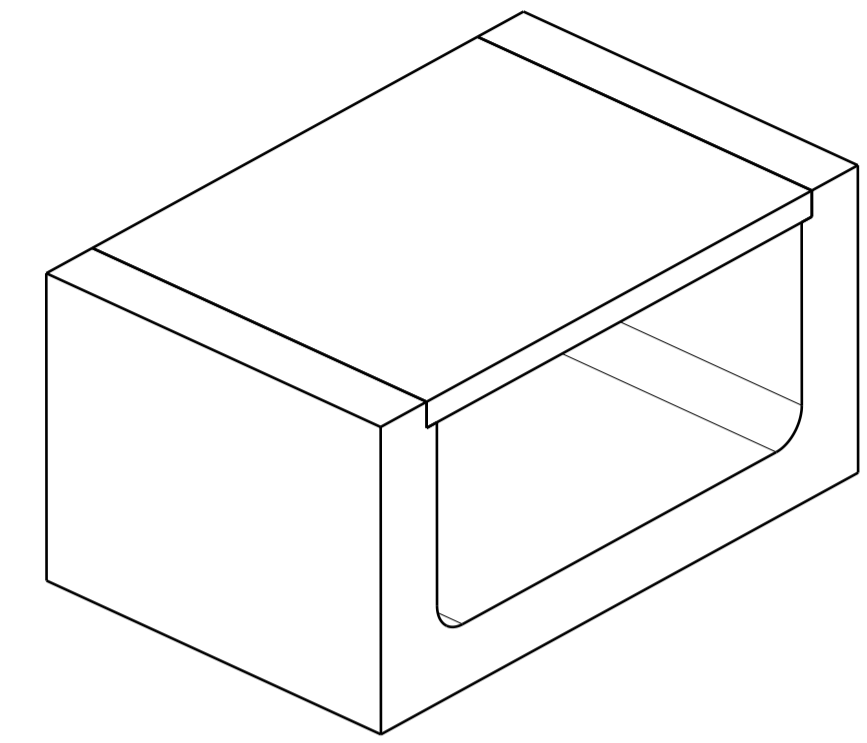
Front view
Scale: 1:2

NOTE:

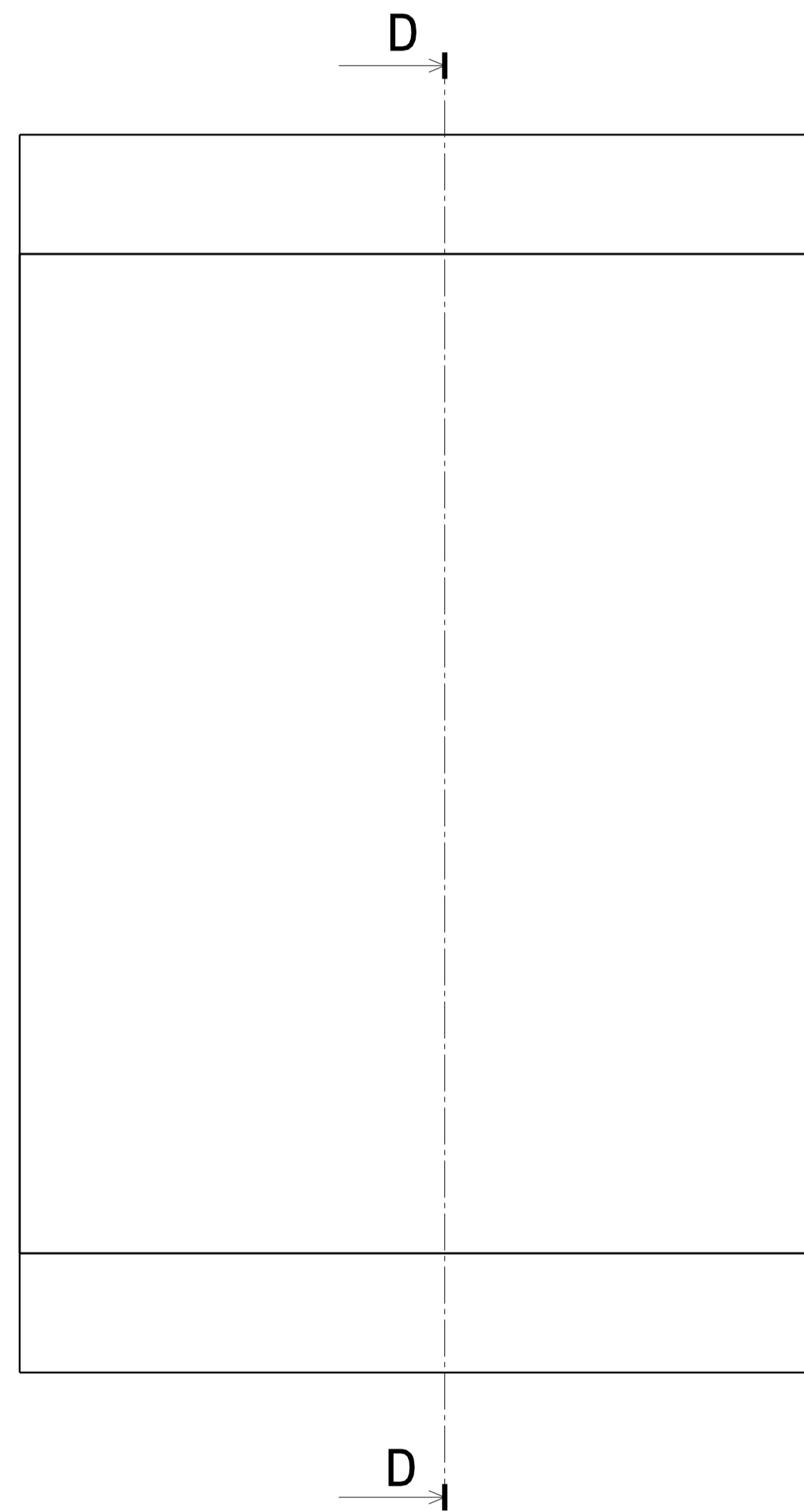
the design of the bevel will be provided later by ENEA
(Il disegno del cianfrino sarà fornito successivamente dall'ENEA)

FOR TENDER				Ref to 3D CatProduct: 010301 203007			
<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	
REV DATE		CHECKED BY		DRAWING TITLE			
FIRST ISSUE DATE 27/07/2011		CONTROLLED BY A. CUCCHIARO		MOCK UP: STRAIGHT BEAM 1 METRE LONG OF THE CASING (LONGITUDINAL WELDING)			
SCALE NTS		DRAWN BY G. BROLATTI		CODE ENEA ID: DD-JT60TF-NCO			
SHEET SIZE A1	FIRST ANGLE PROJECTION 	WBS LEVELS 3	010301	Drawing Number 503007	SHEET 01	REVISION 00	MATURITY 01

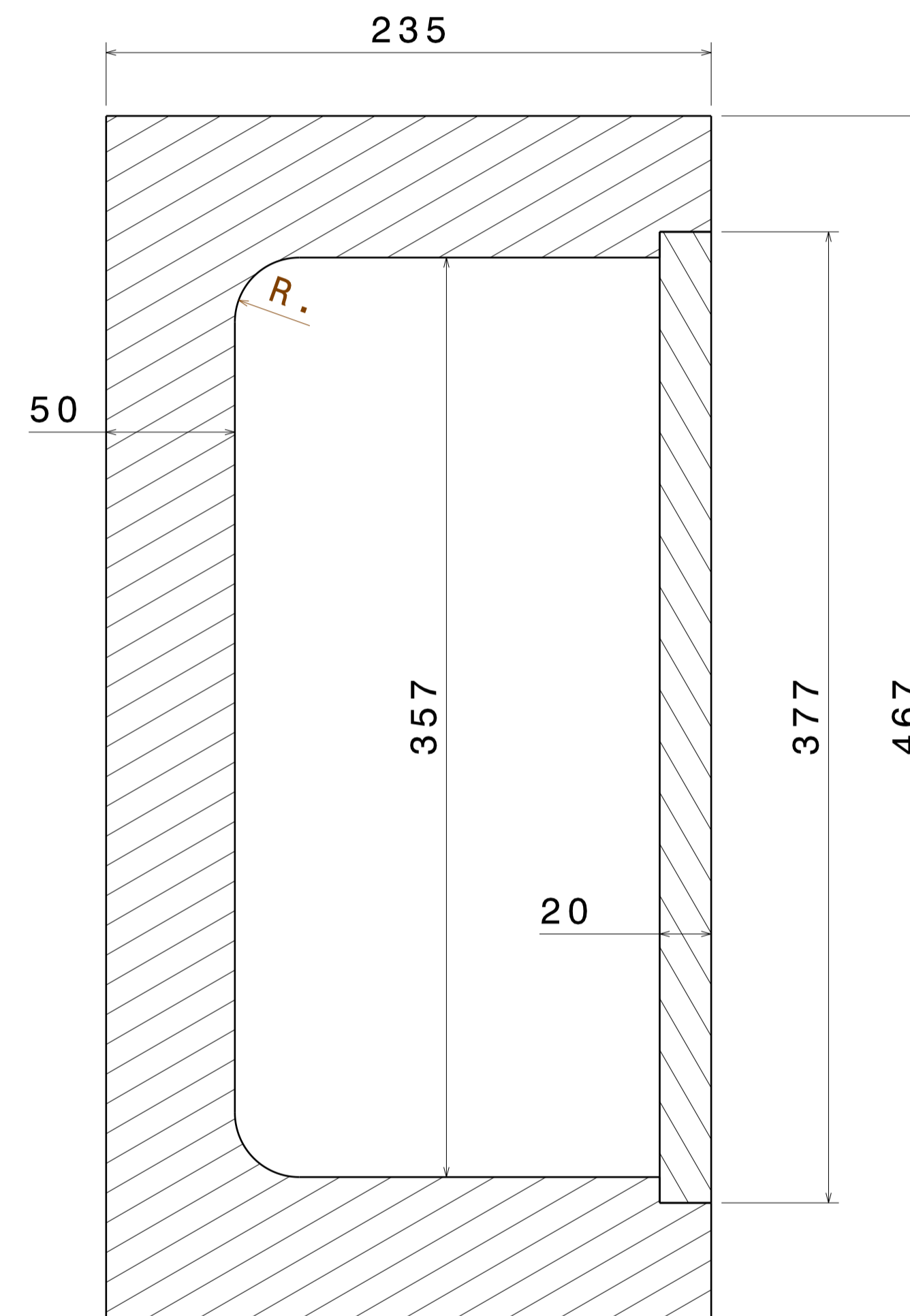
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Isometric view
Scale: 1:5



Auxiliary view C
Scale: 1:2

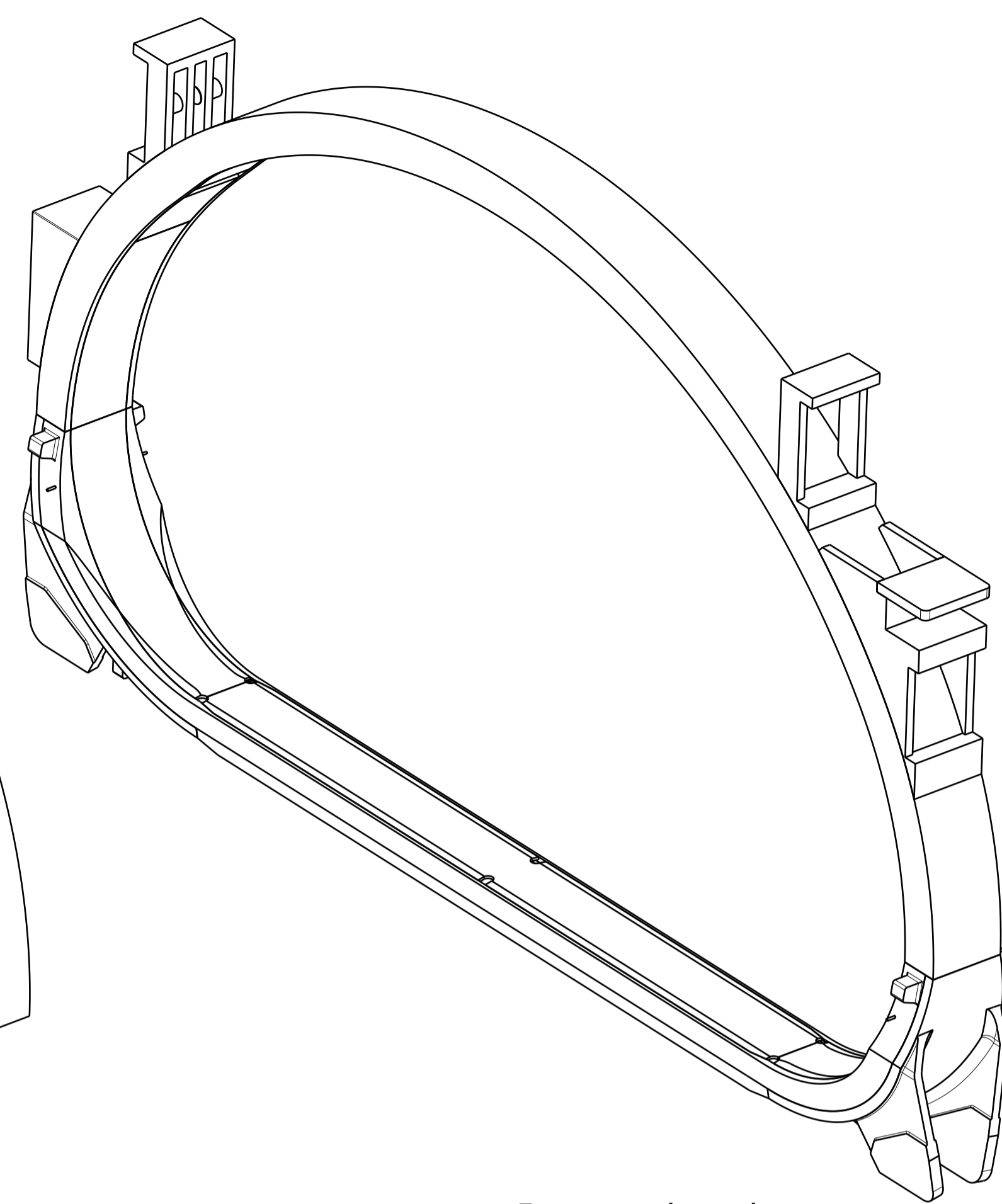
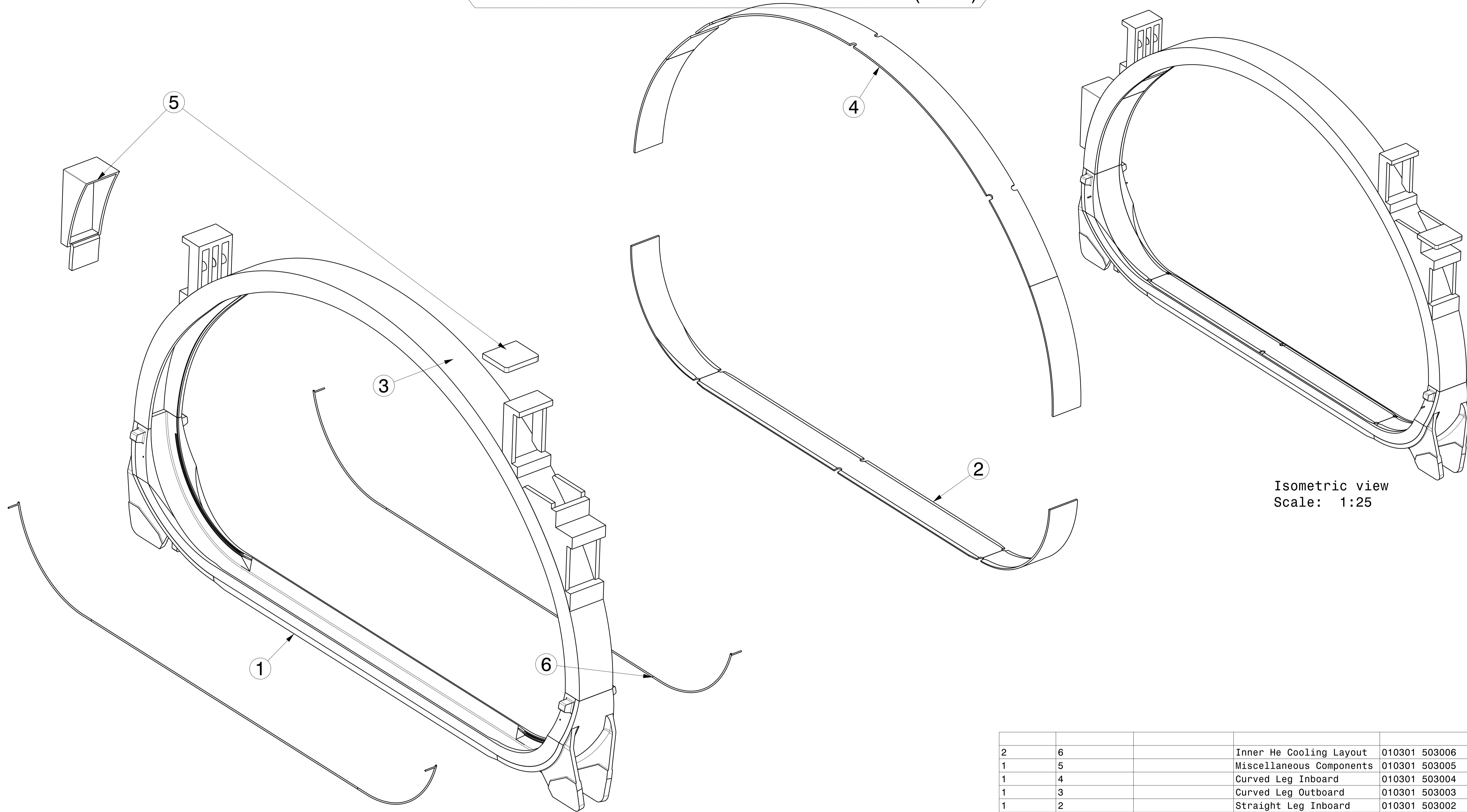


Section view D-D
Scale: 1:2

NOTE:
the design of the bevel will be provided later by ENEA
(Il disegno del cianfrino sarà fornito successivamente dall'ENEA)

FOR TENDER				ref. to 3D CatProduct: 010301-203008			
<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	
REV DATE 10/11/2011		CHECKED BY		DRAWING TITLE			
FIRST ISSUE DATE 27/07/2011		SCALE NTS		CONTROLLED BY A. CUCCHIARO		MOCK UP: STRAIGHT SAMPLE 30 CENTIMETRE LONG OF THE CASING	
DRAWN BY G. BROLATTI		CODE ENEA ID: DD-JT60TF-NCO		SHEET 01		REVISION 01	
SHEET SIZE A1		FIRST ANGLE PROJECTION		WBS LEVELS 010301		Drawing Number 503008	
				SHEET 01		REVISION 01	

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)


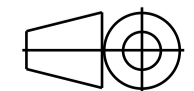


Isometric view
Scale: 1:25

Exploded Isometric view
Scale: 1:20

Note:
-Item 1,3 and 4 must be manufactured with reference to item 2

Quantity	Balloon No.	Component Number	Component Description	Drawing Number
2	6		Inner He Cooling Layout	010301 503006
1	5		Miscellaneous Components	010301 503005
1	4		Curved Leg Inboard	010301 503004
1	3		Curved Leg Outboard	010301 503003
1	2		Straight Leg Inboard	010301 503002
1	1		Straight Leg Outboard	010301 503001

FOR TENDER		ref. to 3D CatProduct: 010301-203000		
<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	 Fusion Italy-Frascati Research Centre	CUSTOMER: Fusion-for-Energy
REV DATE	SCALE	REVIEWED BY		DRAWING TITLE
10-11-2011	NTS	A. CUCCHIARO	Casing Components Toroidal Field Coil	
FIRST ISSUE DATE	SCALE	CONTROLLED BY		CODE ENEA ID:
10-11-2011	NTS	A. CUCCHIARO	DD-JT60TF-NCO	
SHEET SIZE	FIRST ANGLE PROJECTION	WBS LEVELS	010301	Drawing Number
A1		3		503000
				SHEET REVISION MATURITY
				01 00

ITEM No	DRAWING No	DESCRIPTION	NO OFF	NO ORDERED	MATERIAL	SUPPLIER	DATE ORDERED	DATE DELIVERED	REMARKS
1	010301-503001	STRAIGHT LEG OUTBOARD							
2	010301-503002	STRAIGHT LEG INBOARD							
3	010301-503003	CURVED LEG OUTBOARD							
4	010301-503004	CURVED LEG INBOARD							
5	010301-503005	MISCELLANEUS COMPONENTS							
6	010301-503006	INNER He COOLING LAYOUT							
7	010301-503007	MOCK-UP STRAIGHT BEAM 1m LONG							
8	010301-503008	MOCK-UP STRAIGHT SAMPLE 30cm LONG							
9									
10									
11									
12									
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18									
19									
20									
21									
22									
23									
24									

ENEA **Fusion**
Italy-Frascati Research Centre

00	ISSUE
10-11-11	DATE
A	MATURITY
TITLE:-	
DRN	GBROL
CHKD	
APPD	

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 TENDER

* 010301	503000
SHEET NO. 1	OF 1 SHEETS

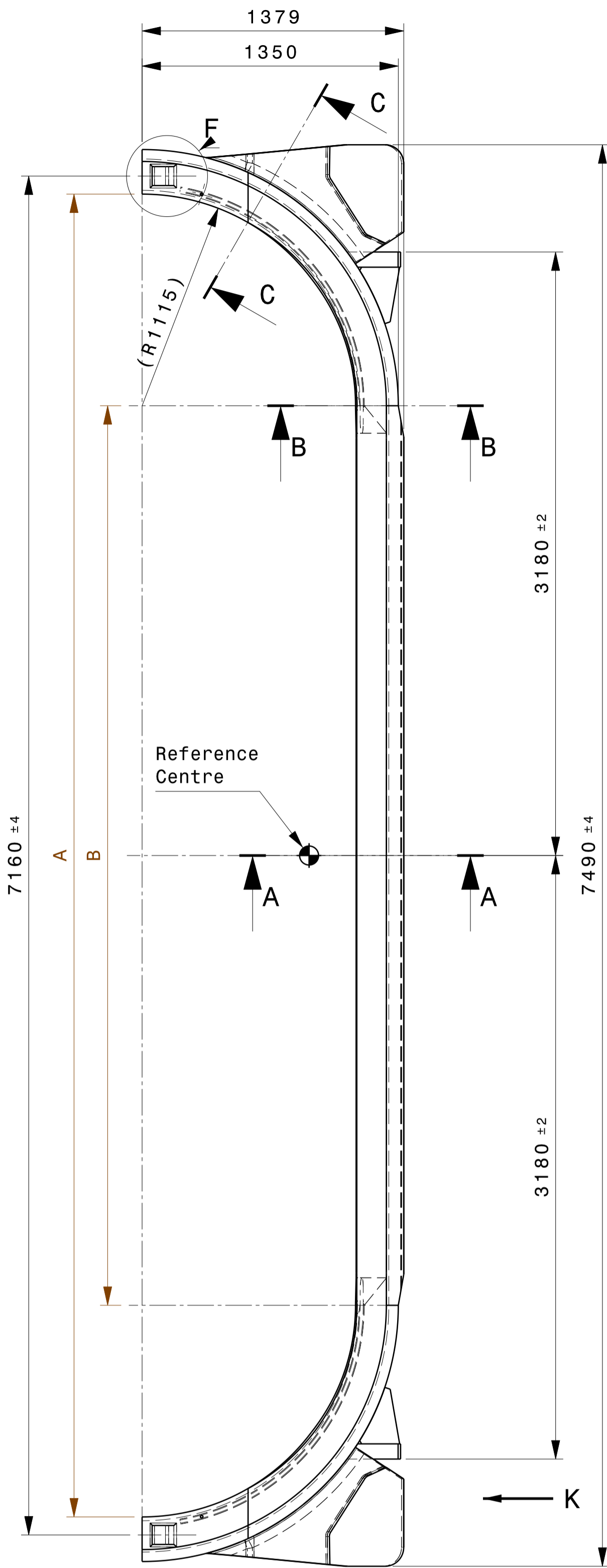
PLANNING NOTES

Item list

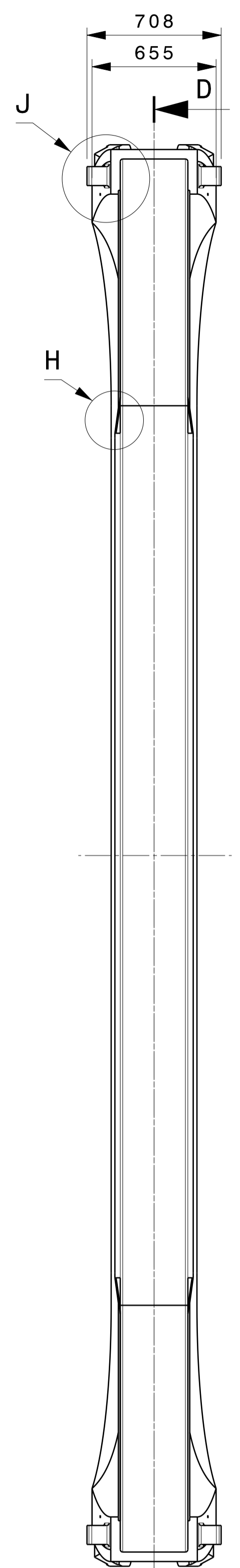
**JT60-SA CASING COMPONENTS
TOROIDAL FIELD COIL**

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

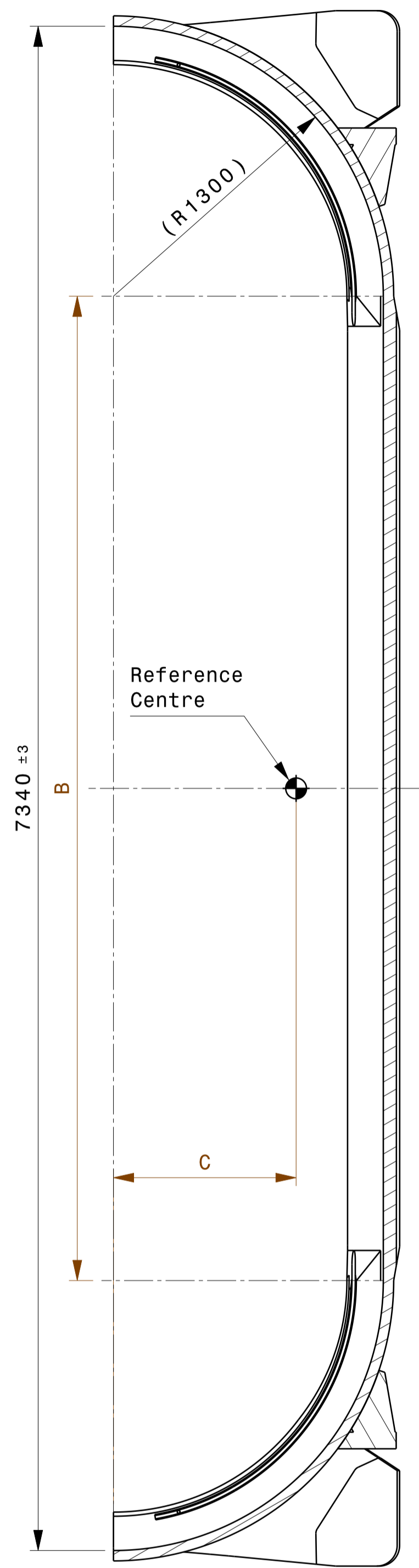
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



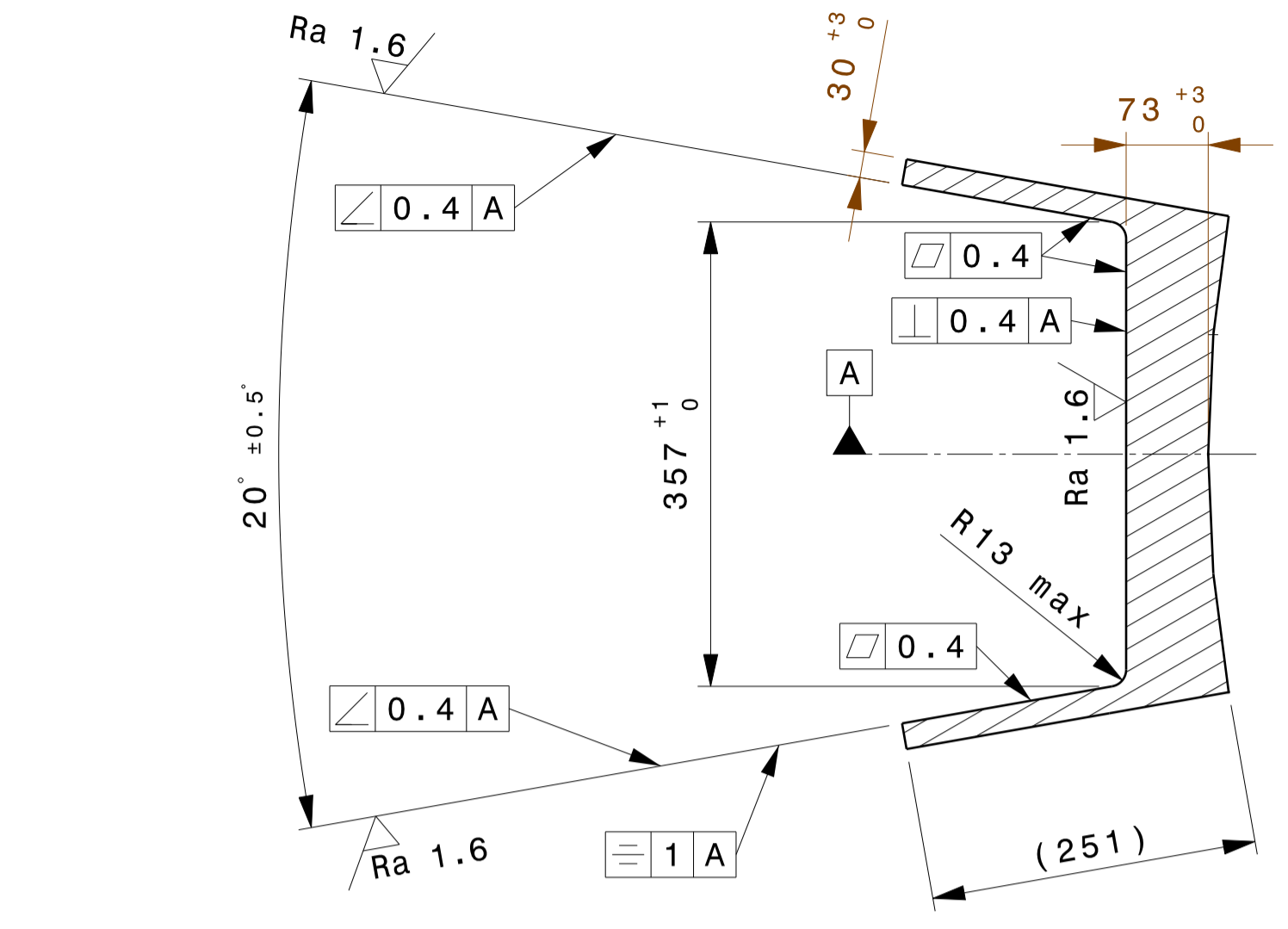
Front view
Scale: 1:20



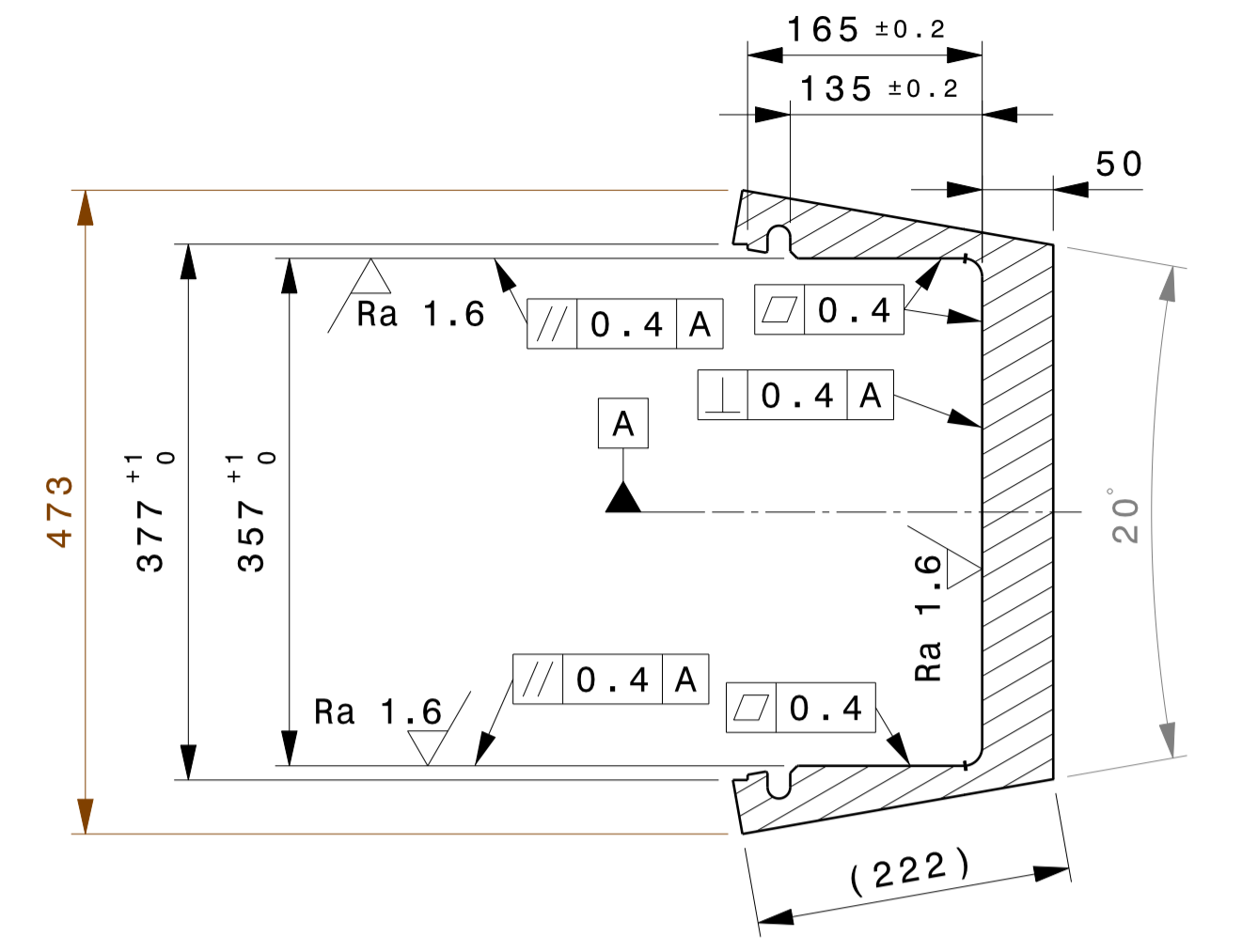
Left view
Scale: 1:20



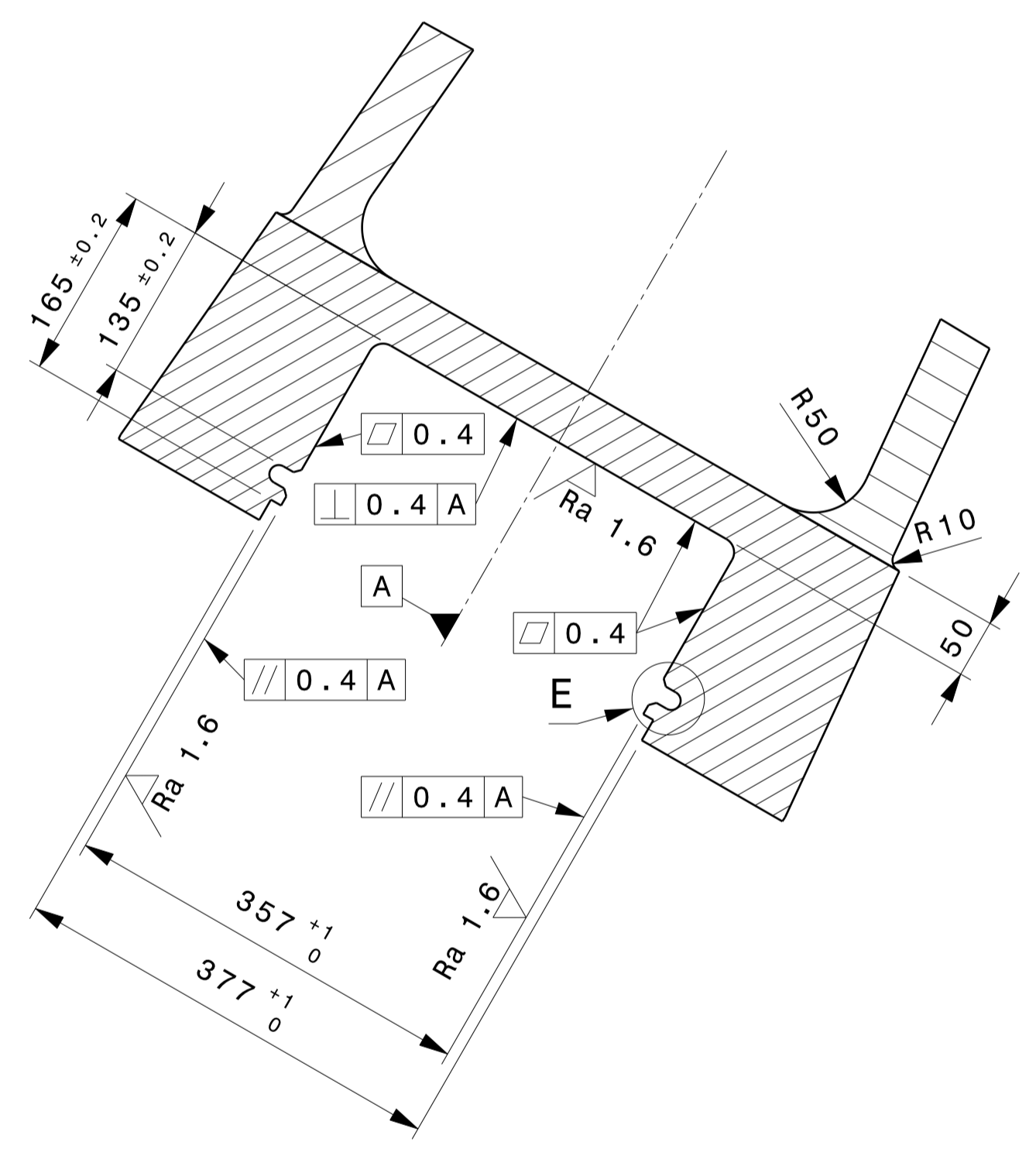
Section D-D
Scale: 1:20



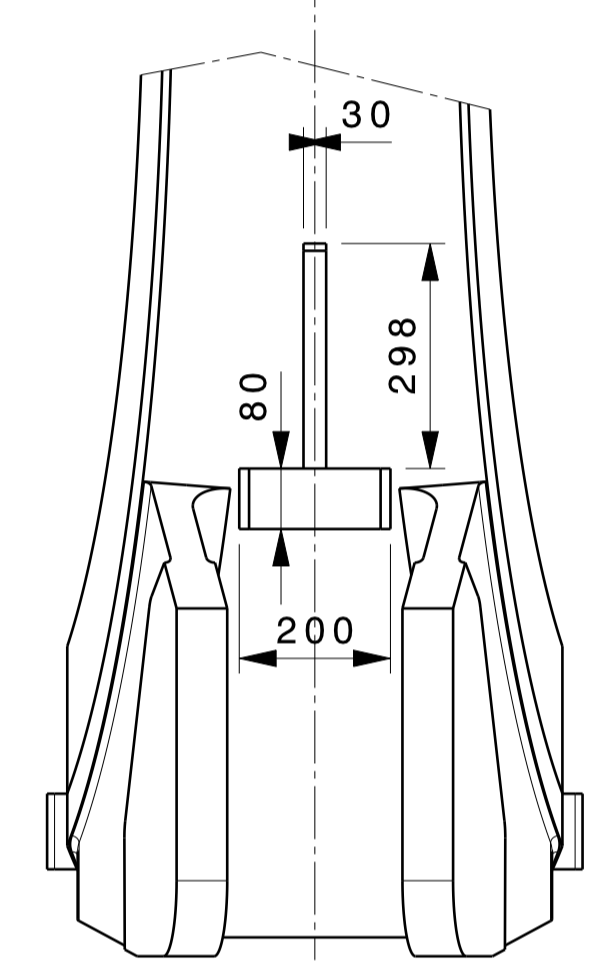
Section A-A
Scale: 1:5



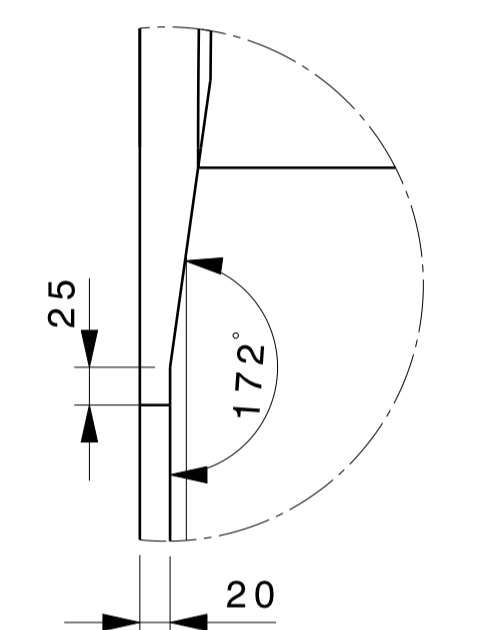
Section B-B
Scale: 1:5



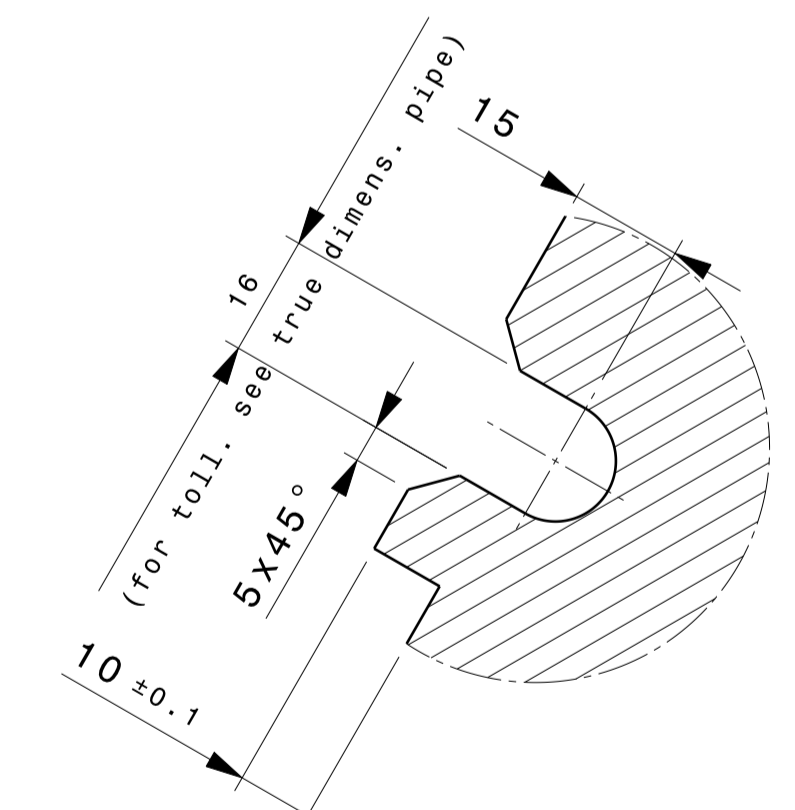
Section C-C
Scale: 1:5



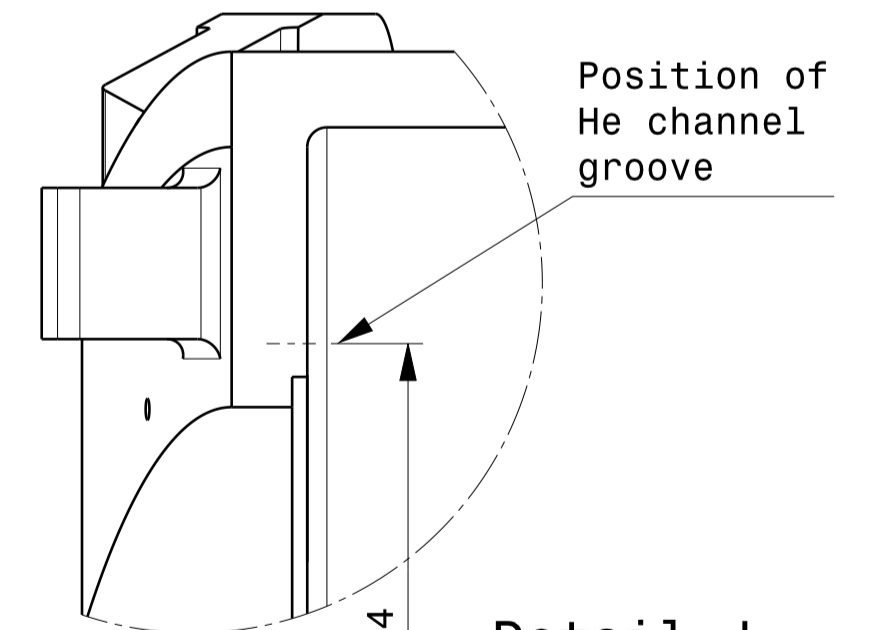
View K
Scale: 1:10



Detail H
Scale: 1:5



Detail E
Scale: 1:1

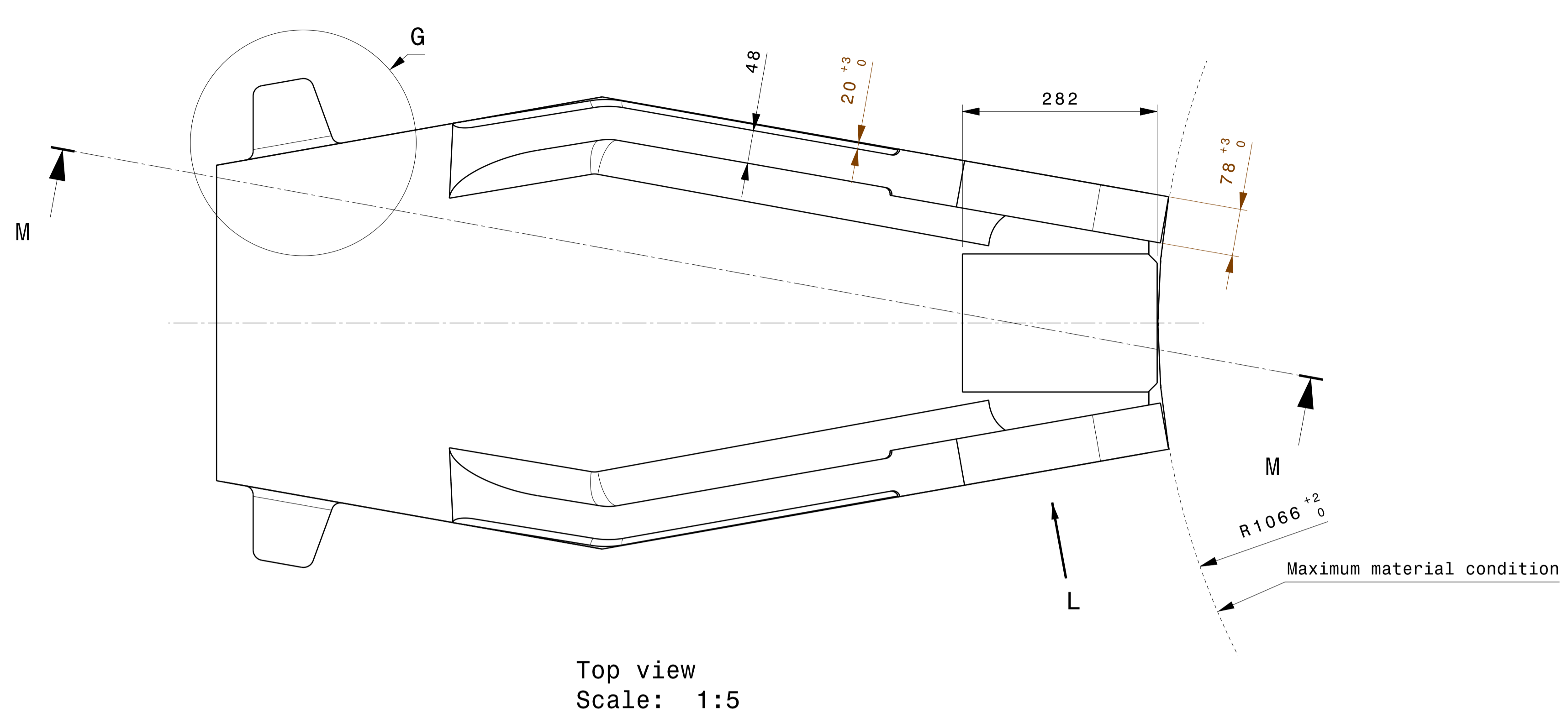


Detail J
Scale: 1:5

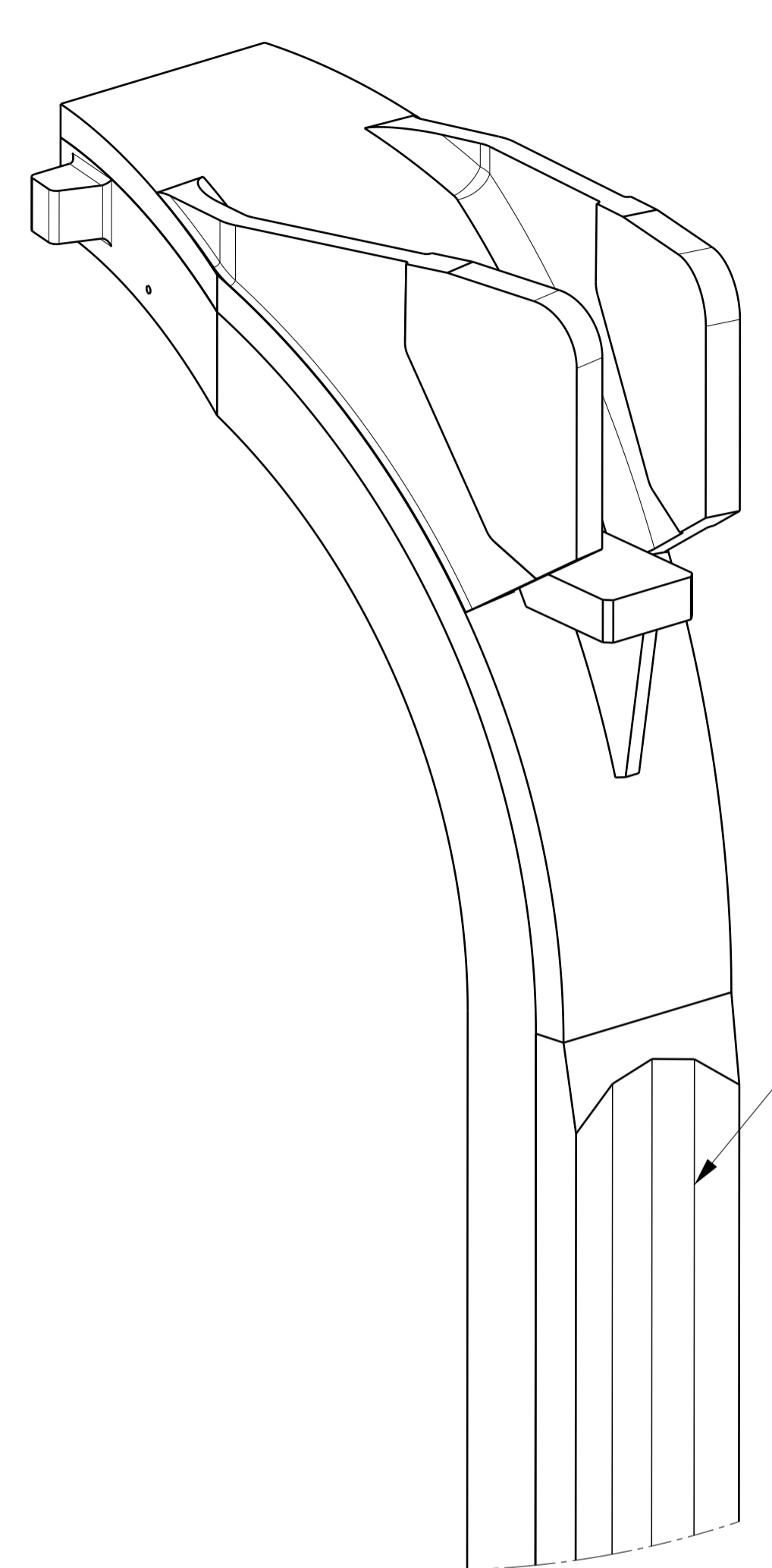
Note:
-DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
-For dimensions A, B and C see drawing 010301 503002

FOR TENDER				ref. to 3D CatProduct: 010301-203001			
<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		Fusion Italy-Frascati Research Centre	
				REVIEWED BY		CUSTOMER: Fusion-for-Energy	
				CHECKED BY		DRAWING TITLE Straight Leg Outboard Toroidal Field Coil	
REV DATE				CONTROLLED BY A. CUCCHIARO		CODE ENEA ID: DD-JT60TF-NCO	
FIRST ISSUE DATE 10-11-2011		SCALE NTS		DRAWN BY G. BROLATTI			
SHEET SIZE A1		FIRST ANGLE PROJECTION		WBS LEVELS 3 LEVELS		SHEET REVISION MATURITY 01 00	
				010301		Drawing Number 503001	

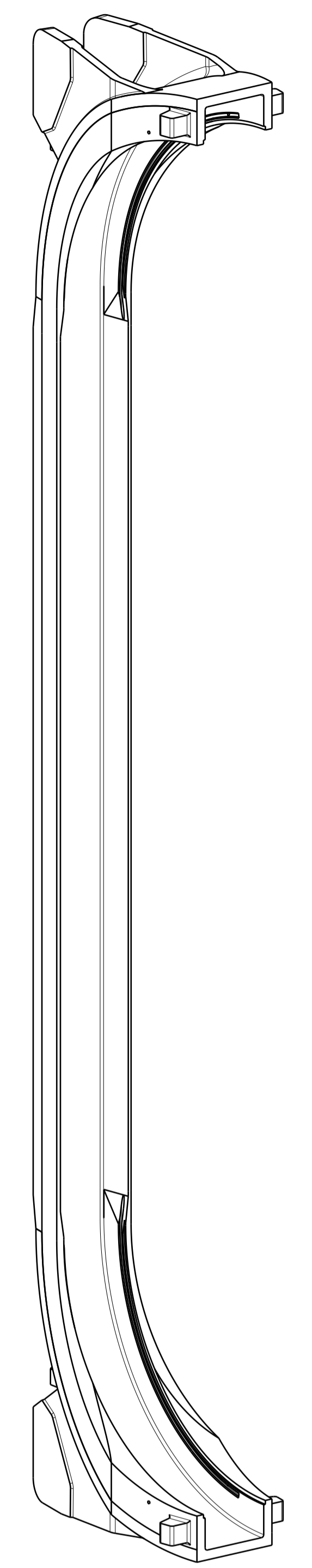
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



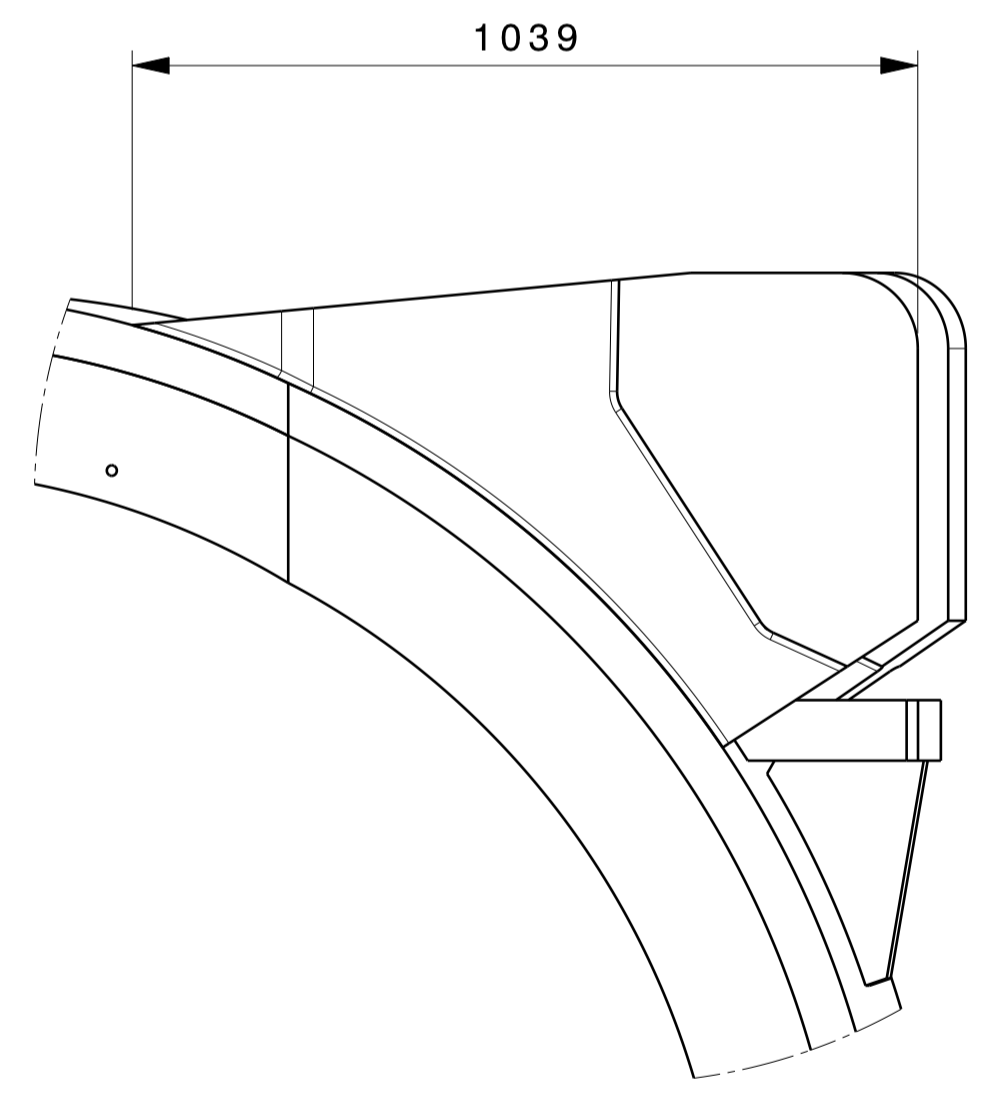
Top view
Scale: 1:5



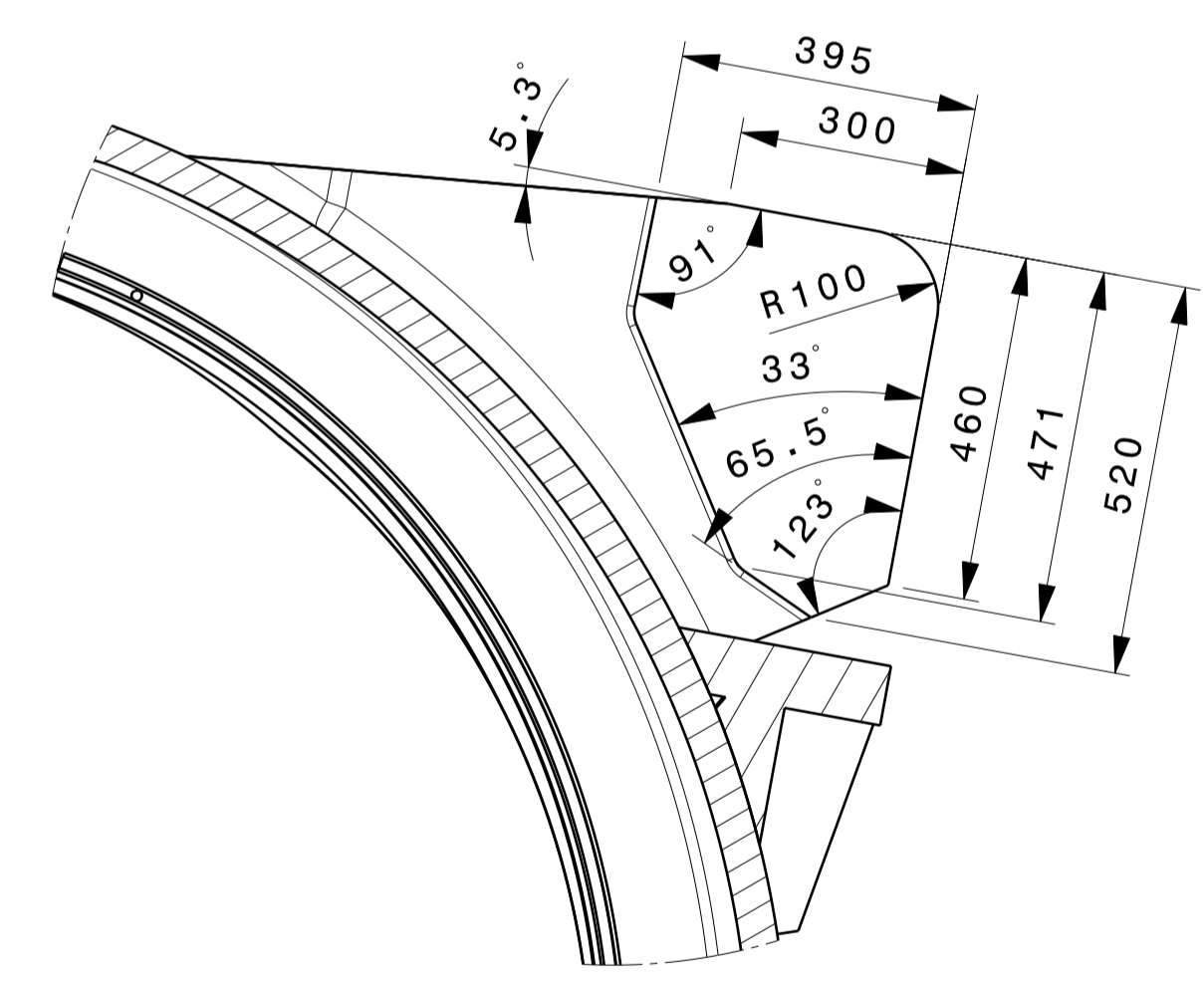
4 equally spaced 5 degrees facets



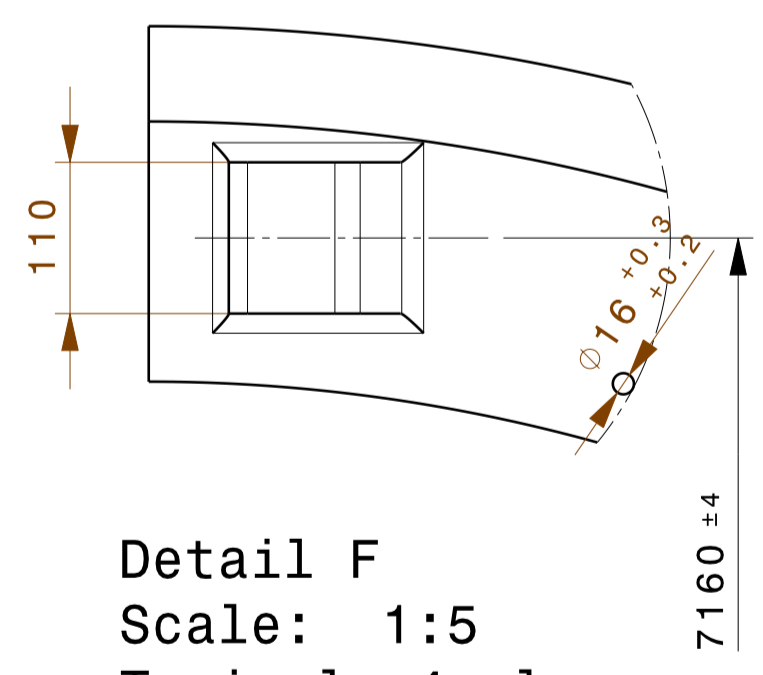
Isometric View



View L
SCALE: 1:10
Typical, 4 places

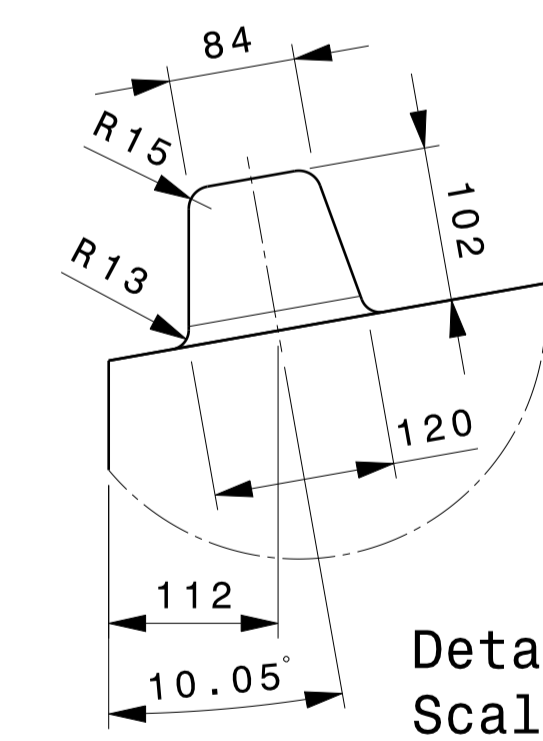


Section M-M
SCALE: 1:10
Typical, 4 places



Detail F
Scale: 1:5
Typical, 4 places

Isometric view

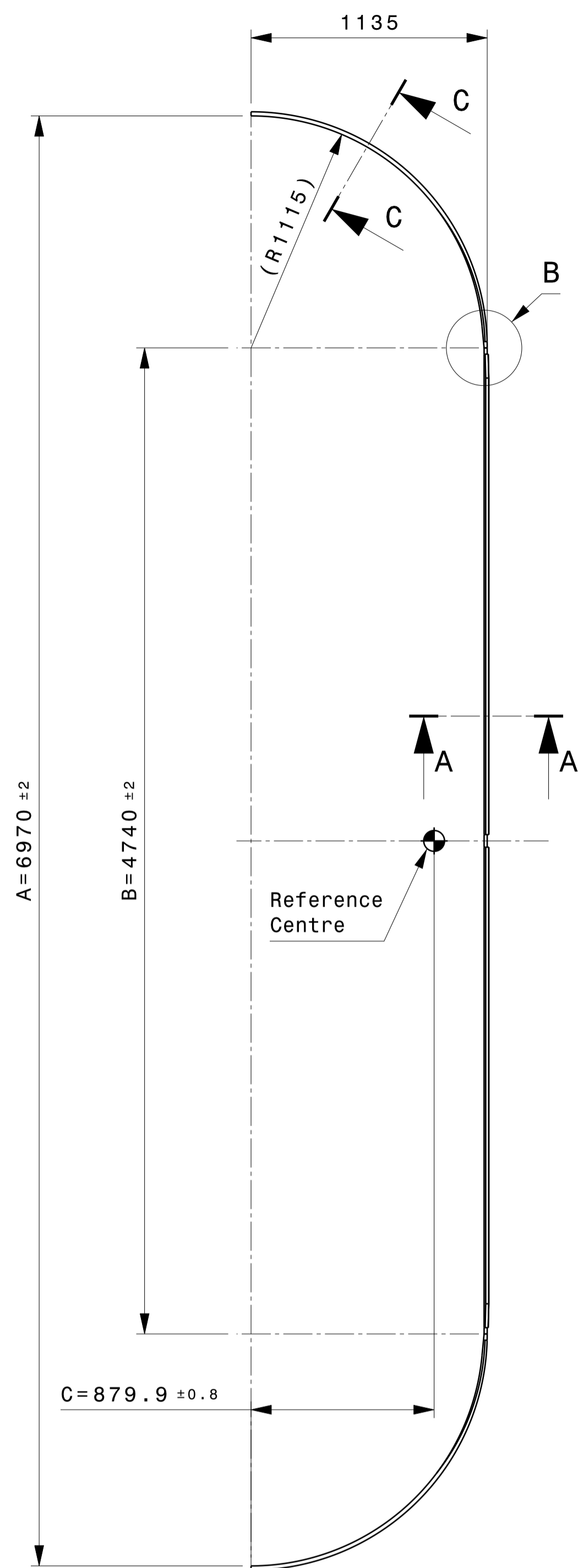


Detail G
Scale: 1:5
Typical, 4 places

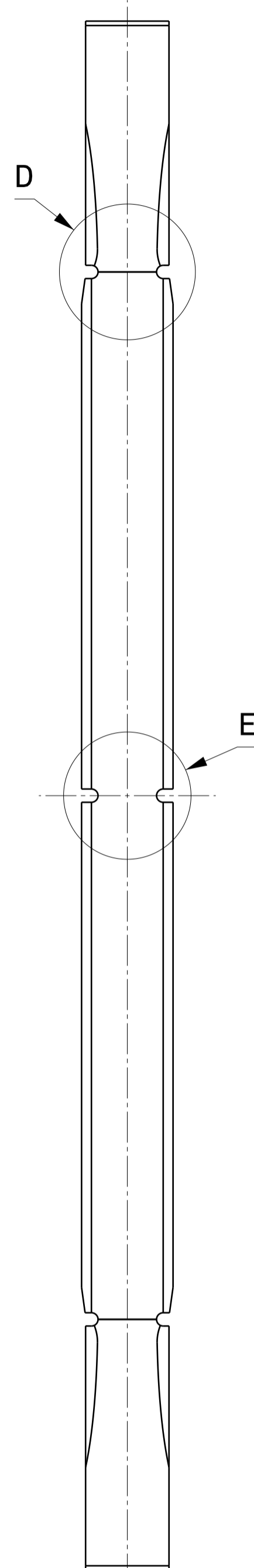
Note:
-DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
-For dimensions A, B and C see drawing 010301 503002
-For dimension D see drawing 010301 503006

FOR TENDER				ref. to 3D CatProduct: 010301-203001			
<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	
REV DATE		CHECKED BY		DRAWING TITLE Straight Leg Outboard Toroidal Field Coil			
FIRST ISSUE DATE 10-11-2011		SCALE NTS		CONTROLLED BY A. CUCCHIARO		CODE ENEA ID: DD-JT60TF-NCO	
DRAWN BY G. BROLATTI		SHEET SIZE A1		FIRST ANGLE PROJECTION		SHEET REVISION MATURITY 02 /02 00	
WBS LEVELS 3 LEVELS		010301		Drawing Number 503001			

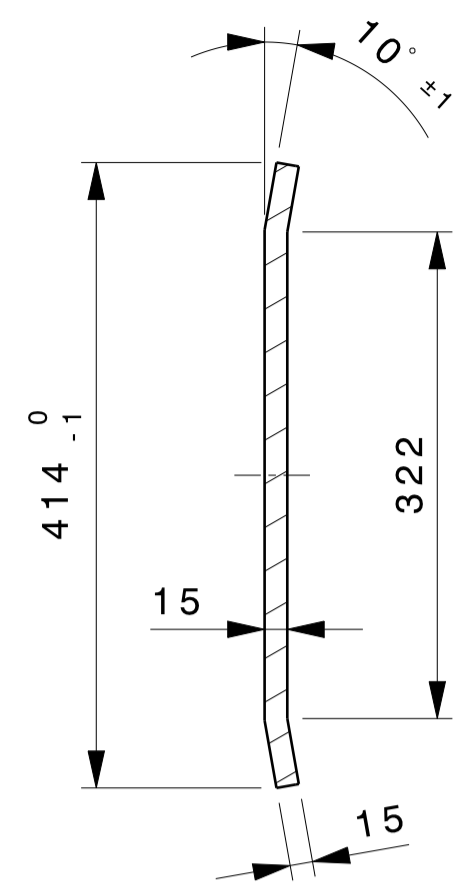
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



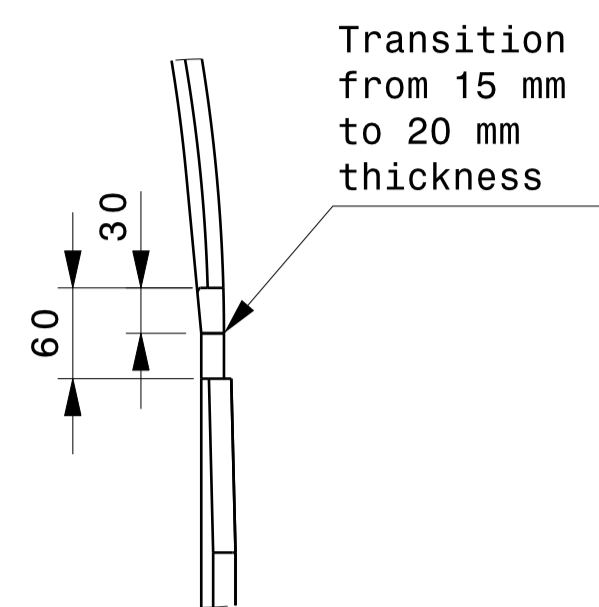
Front view
Scale: 1:20



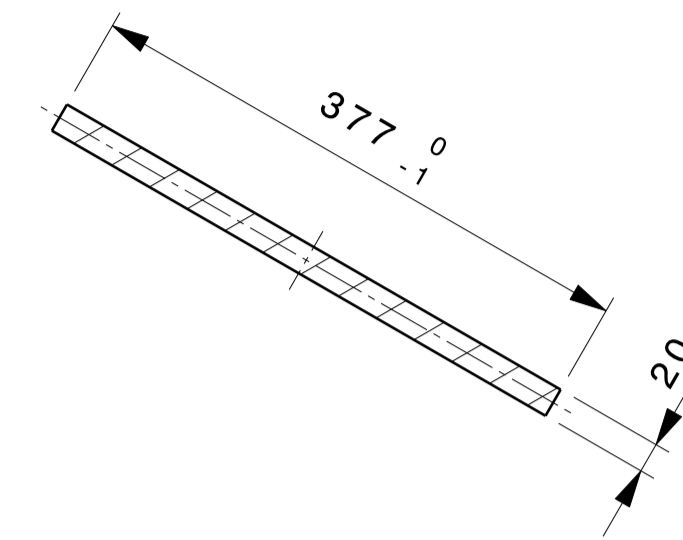
Left view
Scale: 1:20



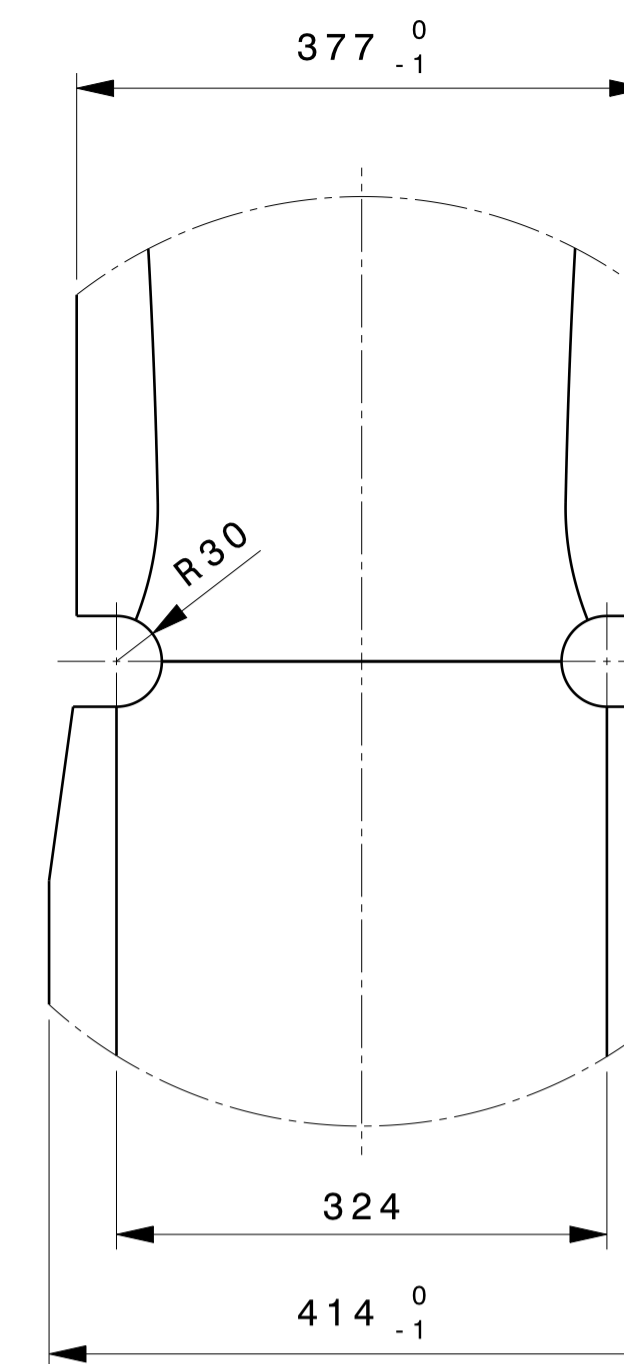
Section A-A
Scale: 1:5



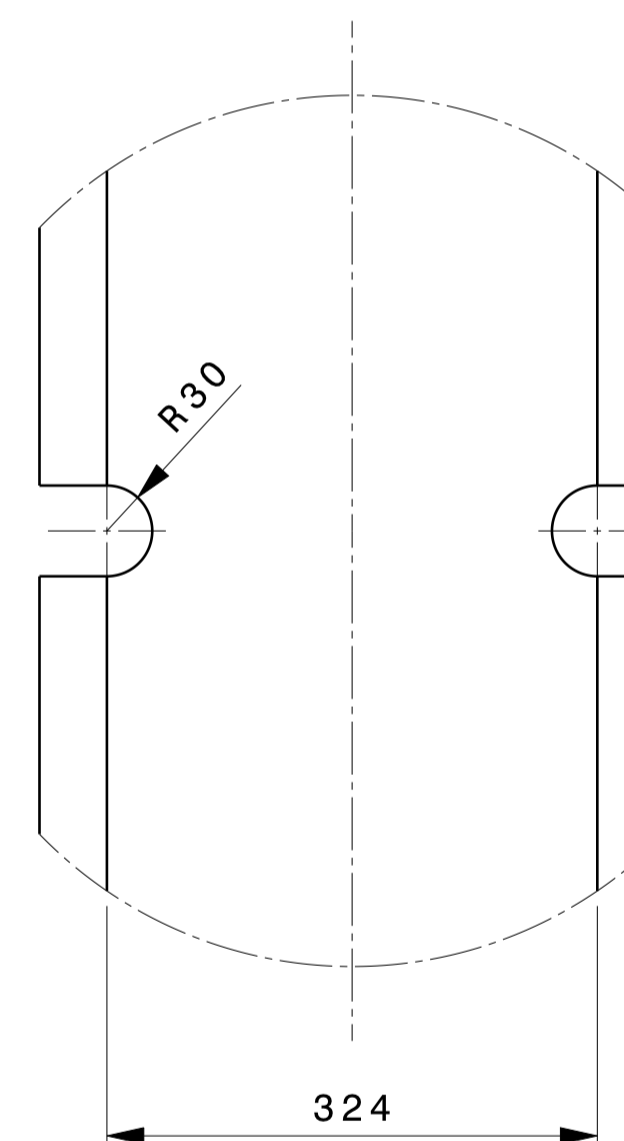
Detail B
Scale: 1:5



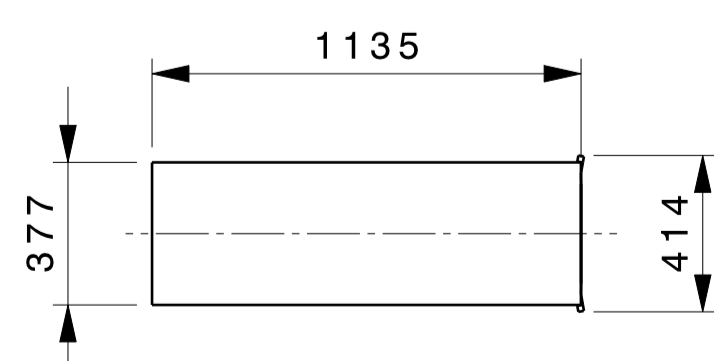
Section C-C
Scale: 1:5



Detail D
Scale: 1:5



Detail E
Scale: 1:5

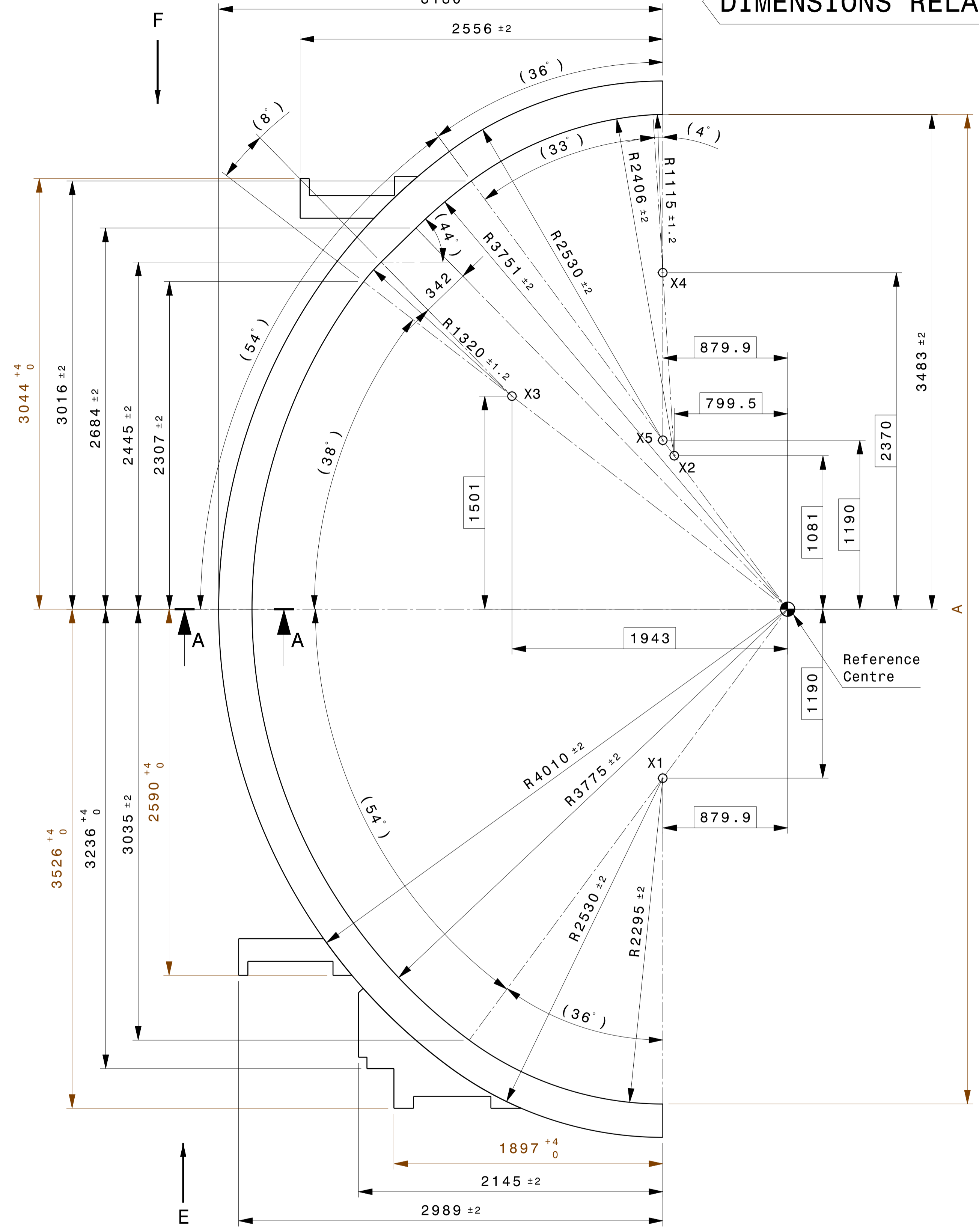


Top view
Scale: 1:20

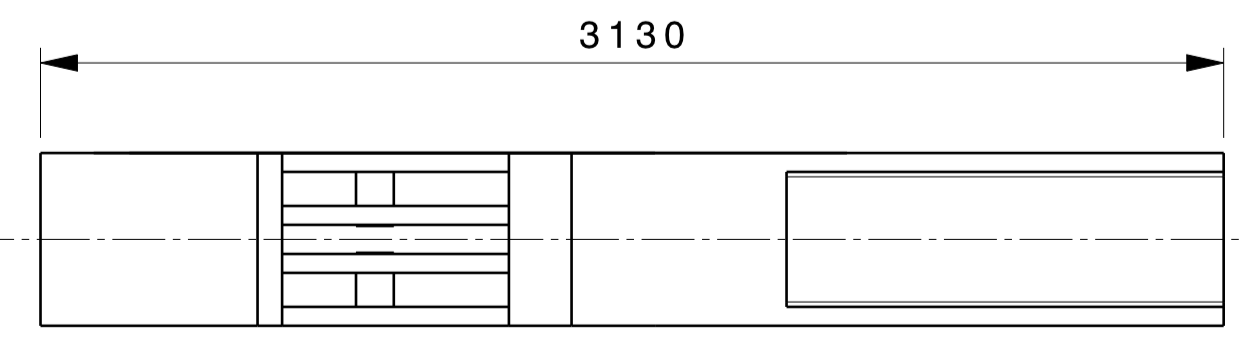
Note:
 -DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
 -A is required for machining of mating parts see drawing 010301 503001, 010301 503003, 010301 503004
 -B is required for machining of mating part see drawing 010301 503001
 -C is required for machining of mating parts see drawing 010301 503001, 010301 503003, 010301 503004

FOR TENDER				ref. to 3D CatProduct: 010301-203002			
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		ENEA Fusion <small>Italy-Frascati Research Centre</small>		CUSTOMER: Fusion-for-Energy	
REV DATE		CHECKED BY		DRAWING TITLE Straight leg inboard Toroidal Field Coil			
FIRST ISSUE DATE 10-11-2011		SCALE NTS		CONTROLLED BY A.CUCCHIARO		CODE ENEA ID: DD-JT60TF-NCO	
SHEET SIZE A1		FIRST ANGLE PROJECTION		WBS LEVELS 3 LEVELS		DRAWING NUMBER 010301	
				SHEET 503002		REVISION 01	
				MATERIALITY		00	

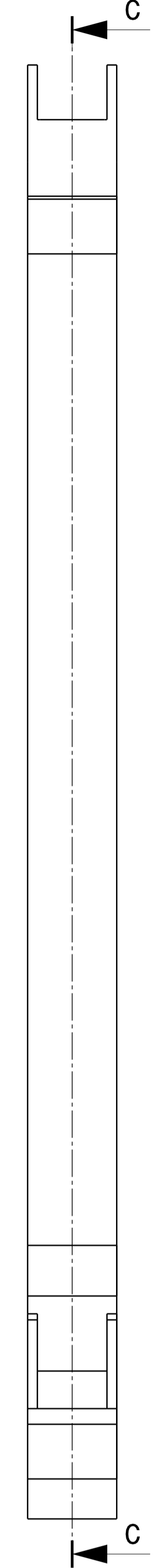
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



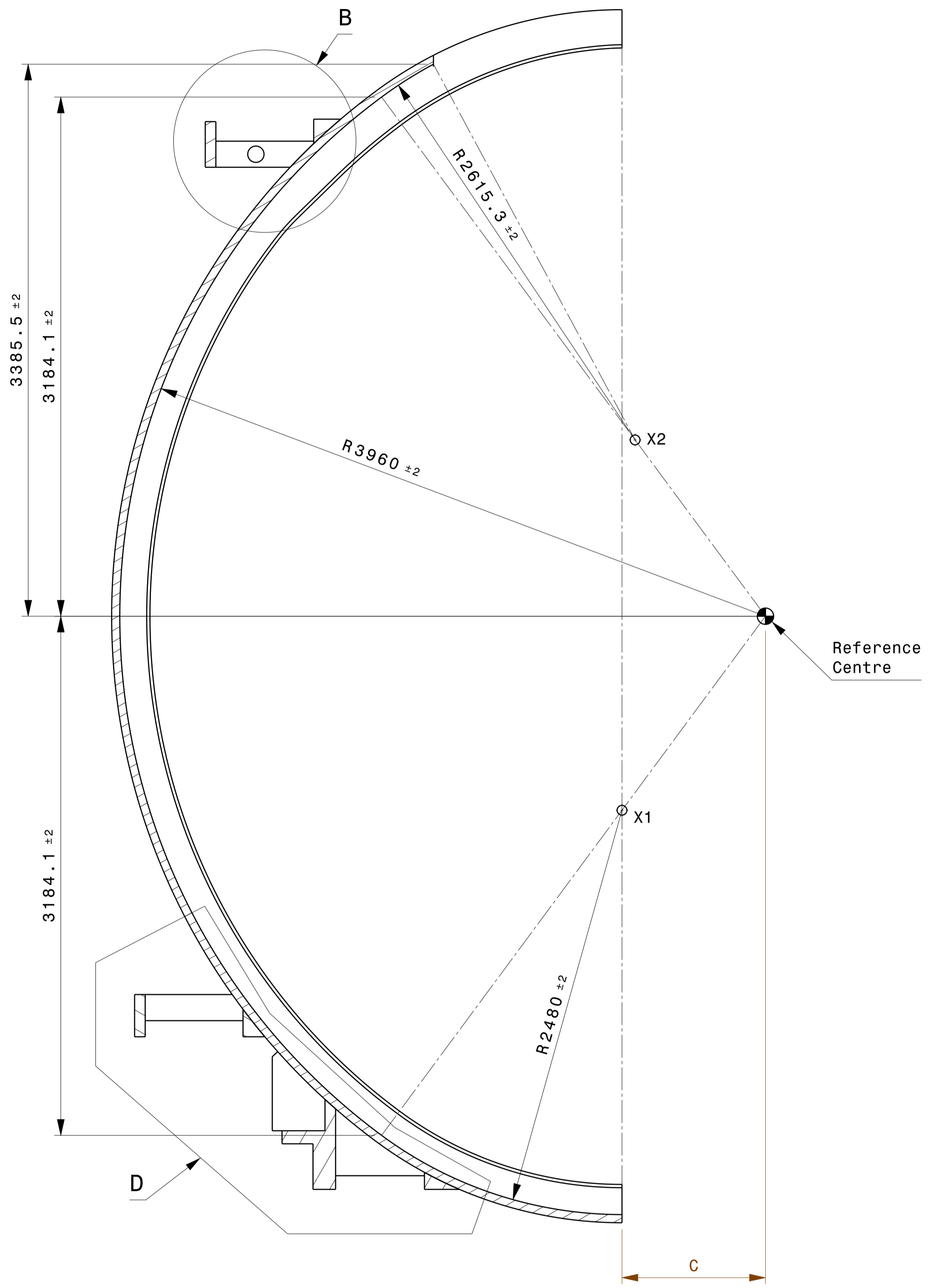
Front view
Scale: 1:20



Top view
Scale: 1:20



Left view
Scale: 1:20

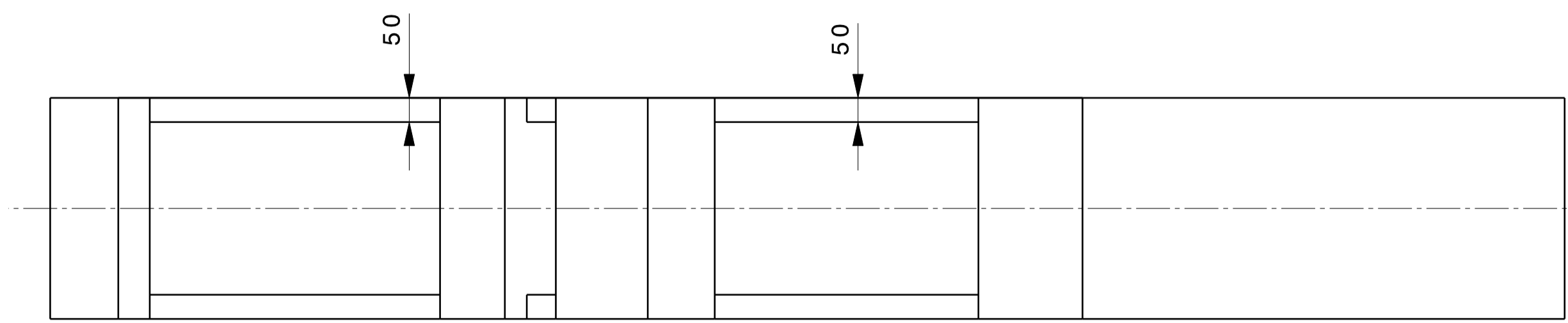


Section C-C
Scale: 1:20

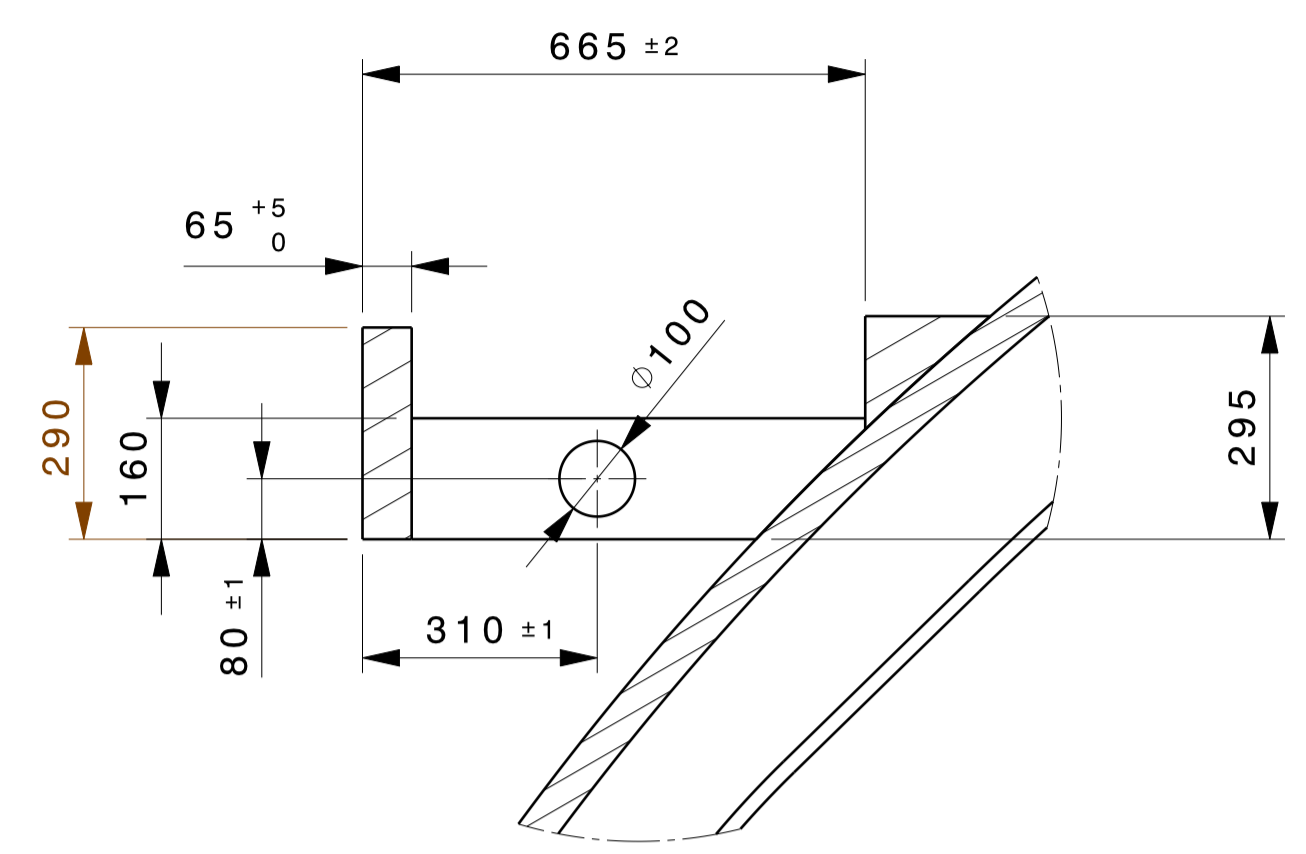
Note:
 -DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
 -For dimension A see drawing 010301 503002
 -For dimension C see drawing 010301 503002
 -X1, X2, X3, X4, X5 are the centre points of the radii
 -For machining of all inner surfaces radii must blend
 -ISSUED FOR TENDER ONLY

FOR TENDER		ref. to 3D CatProduct: 010301-203003	
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 Curved Leg Outboard Toroidal Field Coil
REV DATE	CONTROLLED BY A.CUCCHIARO	CODE ENEA ID: DD-JT60TF-NCO	
FIRST ISSUE DATE 10-11-2011	SCALE NTS	DRAWN BY G. BROLATTI	
SHEET SIZE A1	FIRST ANGLE PROJECTION	WBS LEVELS 3 LEVELS	010301
		Drawing Number 503003	SHEET 01
			REVISION 00
			MATURITY /03

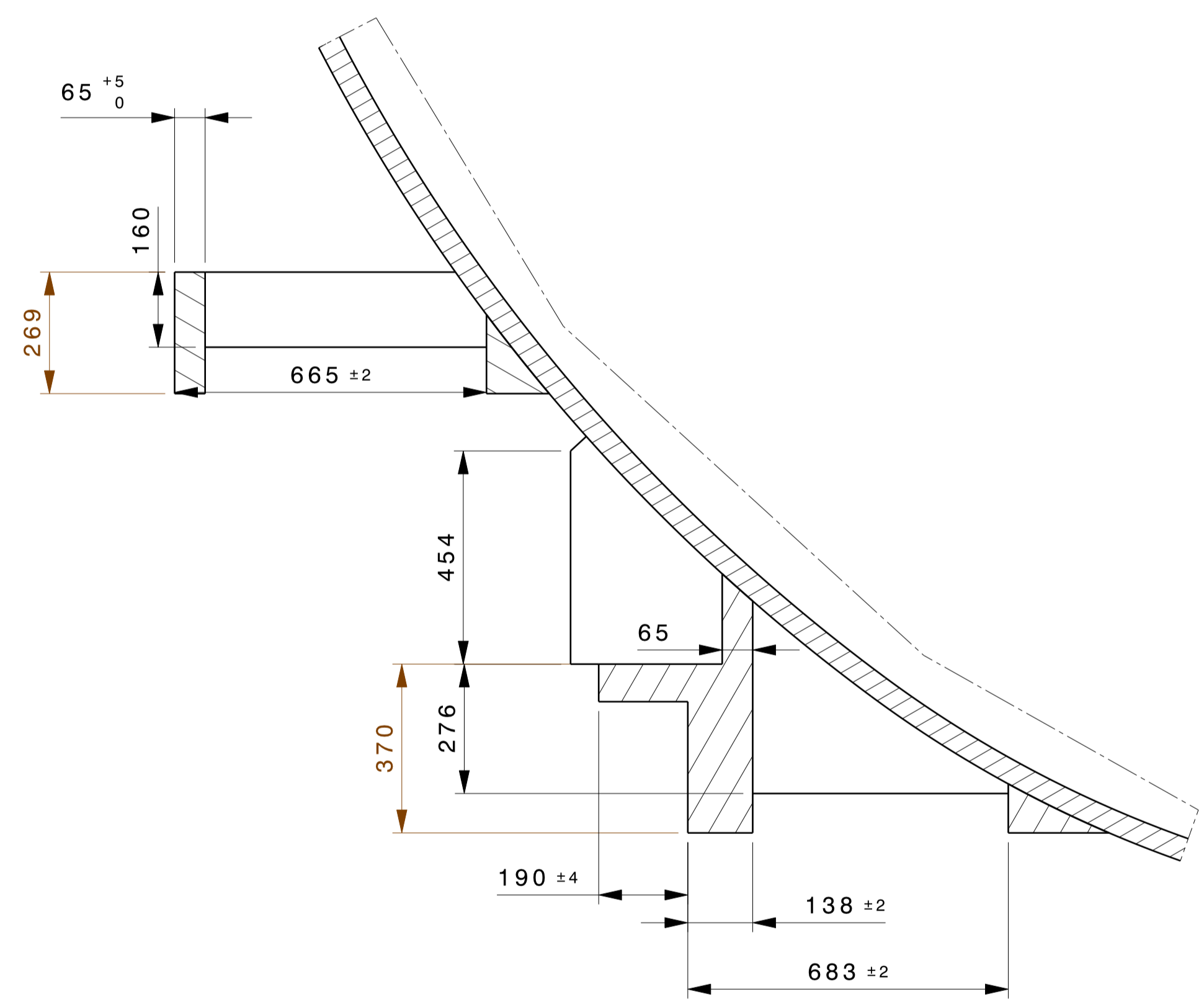
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



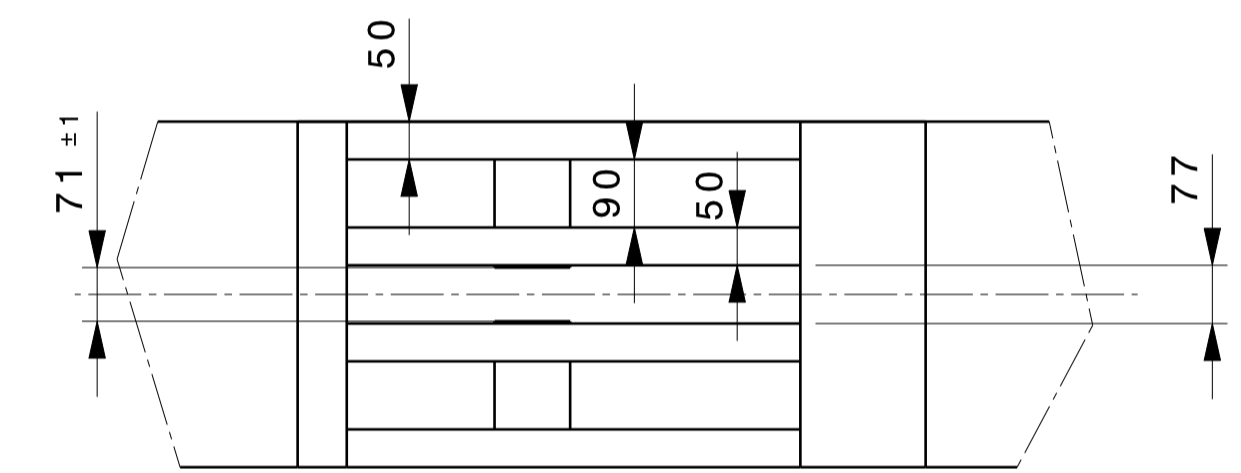
View E
Scale: 1:10



Detail B
Scale: 1:10



Detail D
Scale: 1:10

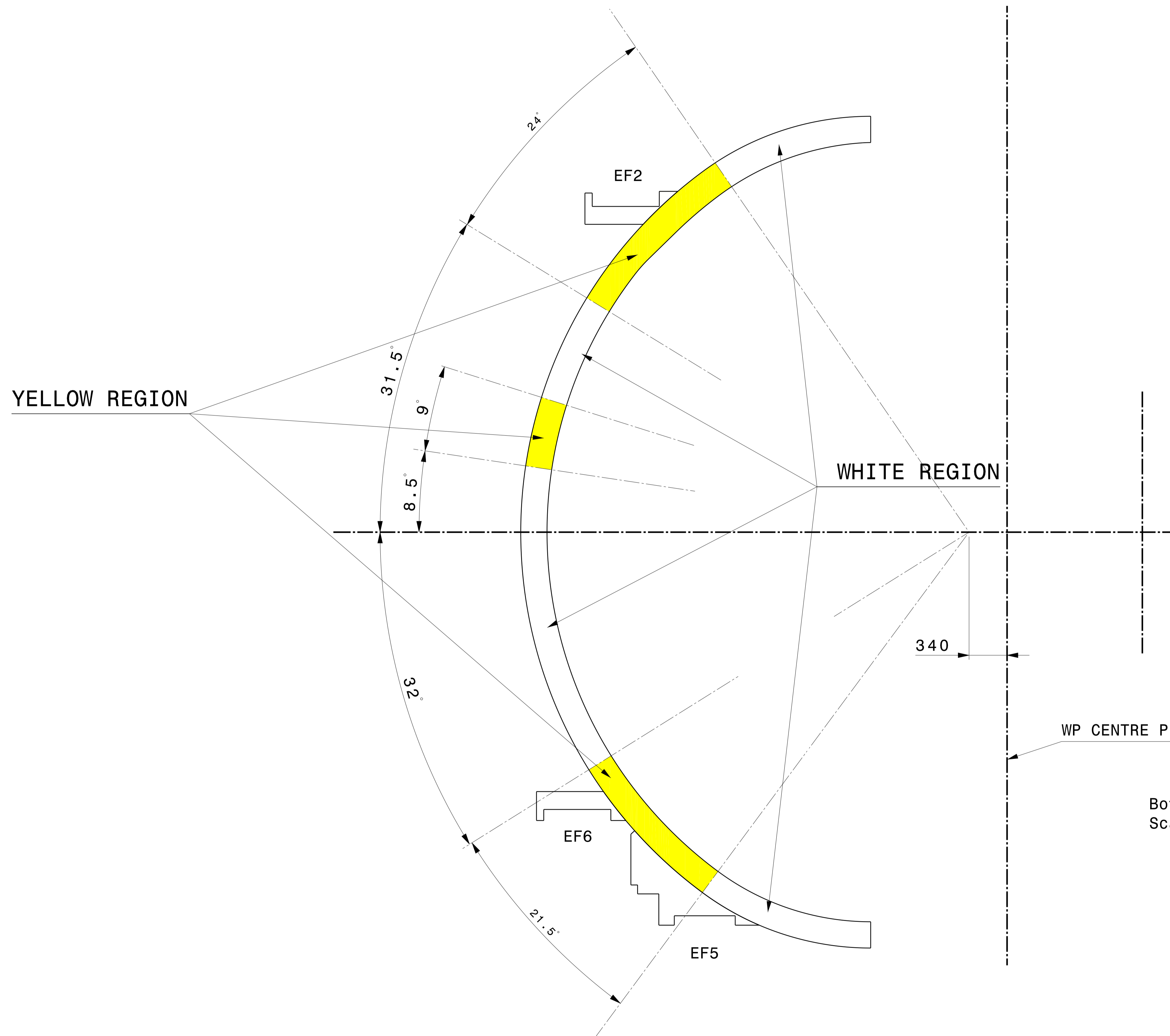


View F
Scale: 1:10

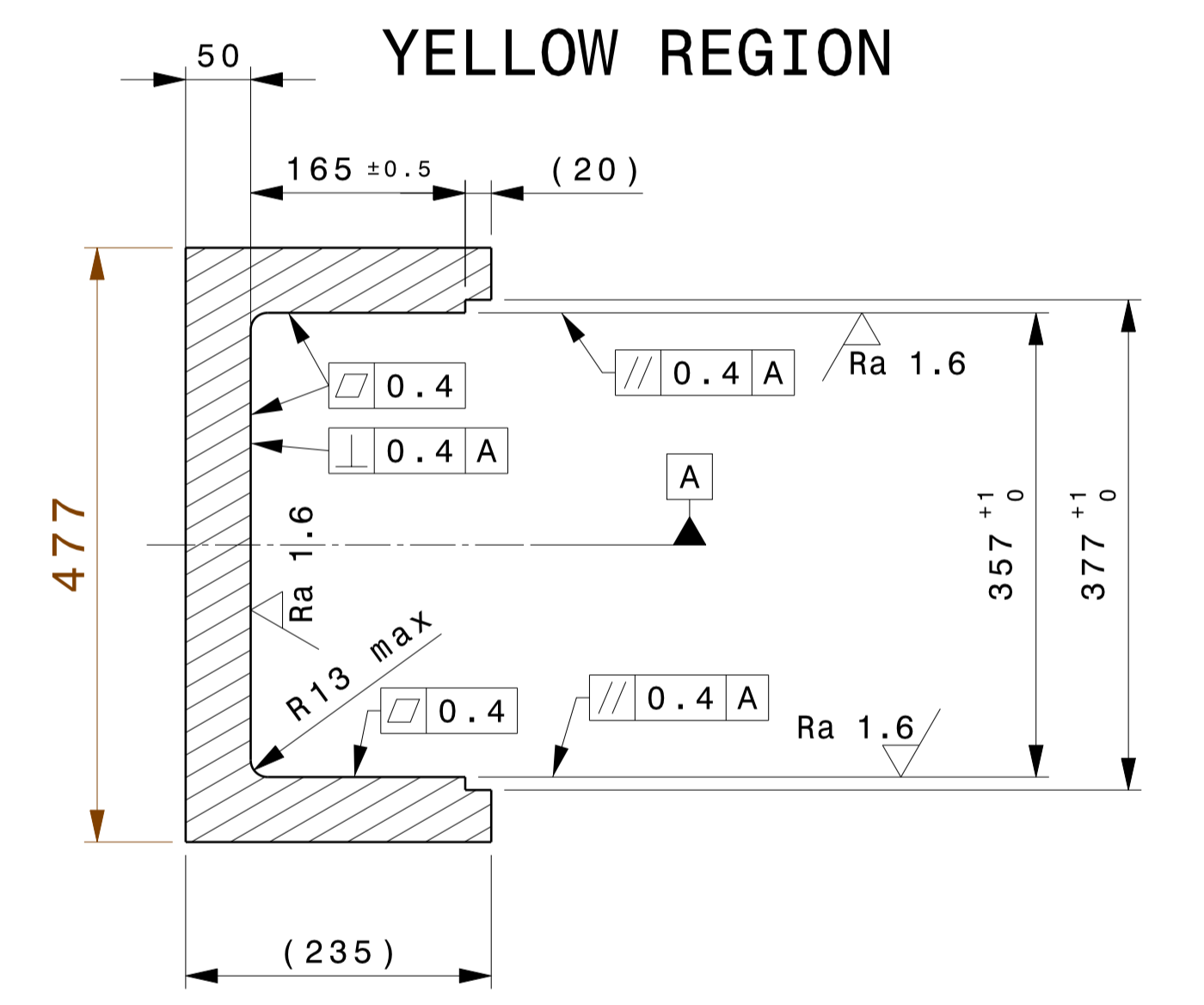
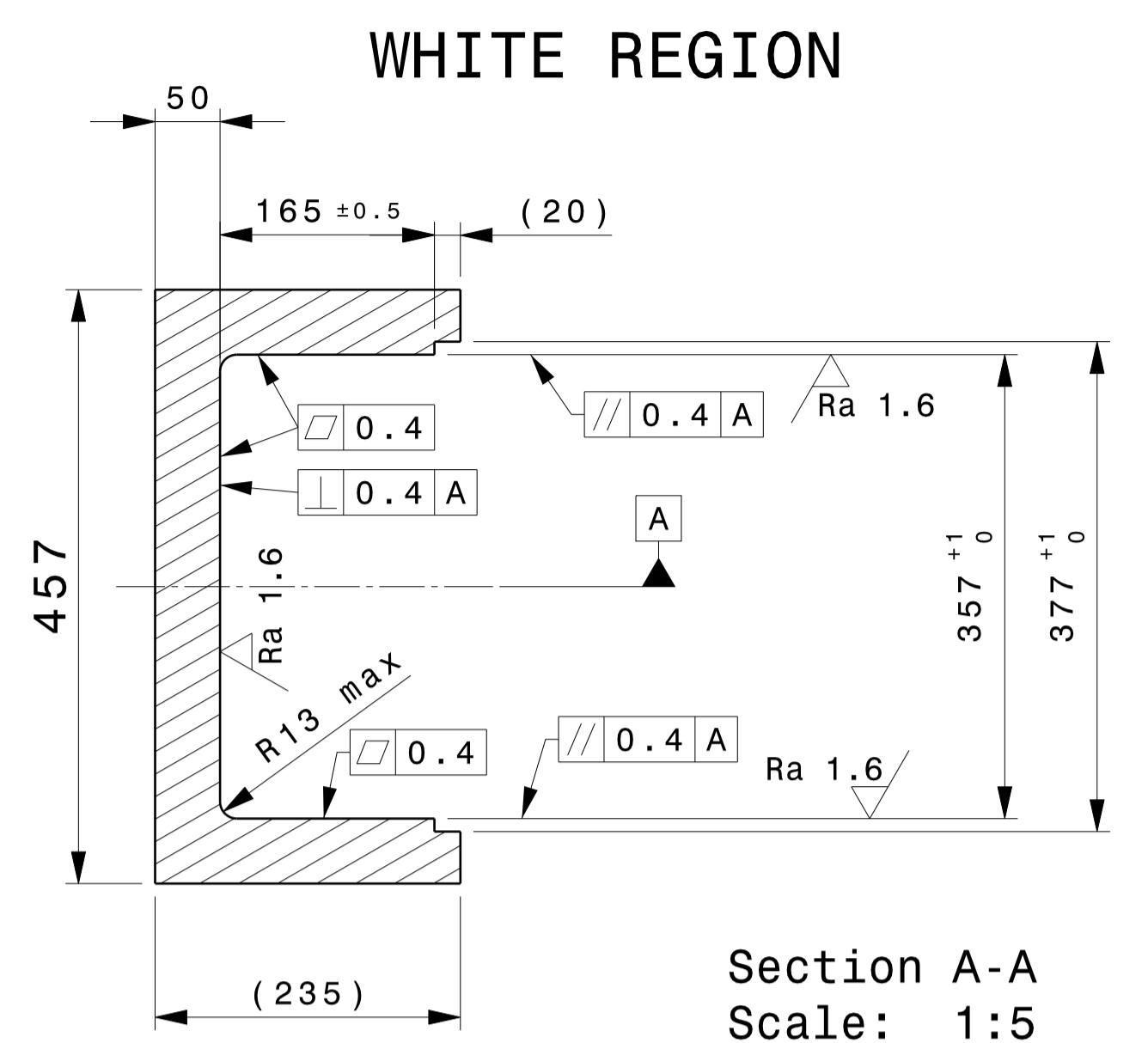
Note:
 -DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
 -For dimension A see drawing 010301 503002
 -For dimension C see drawing 010301 503002
 -X1, X2, X3, X4, X5 are the centre points of the radii
 -For machining of all inner surfaces radii must blend

FOR TENDER				ref. to 3D CatProduct: 010301-203003			
<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 Curved Leg Outboard Toroidal Field Coil	
REV DATE		CHECKED BY		CONTROLLED BY A.CUCCHIARO		CODE ENEA ID: DD-JT60TF-NCO	
FIRST ISSUE DATE 10-11-2011		SCALE		DRAWN BY G. BROLATTI			
SHEET SIZE A1		FIRST ANGLE PROJECTION 		WBS LEVELS 010301		Drawing Number 503003	
				SHEET 02		REVISION 00	
						MATURITY	

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Front view
Scale: 1:20

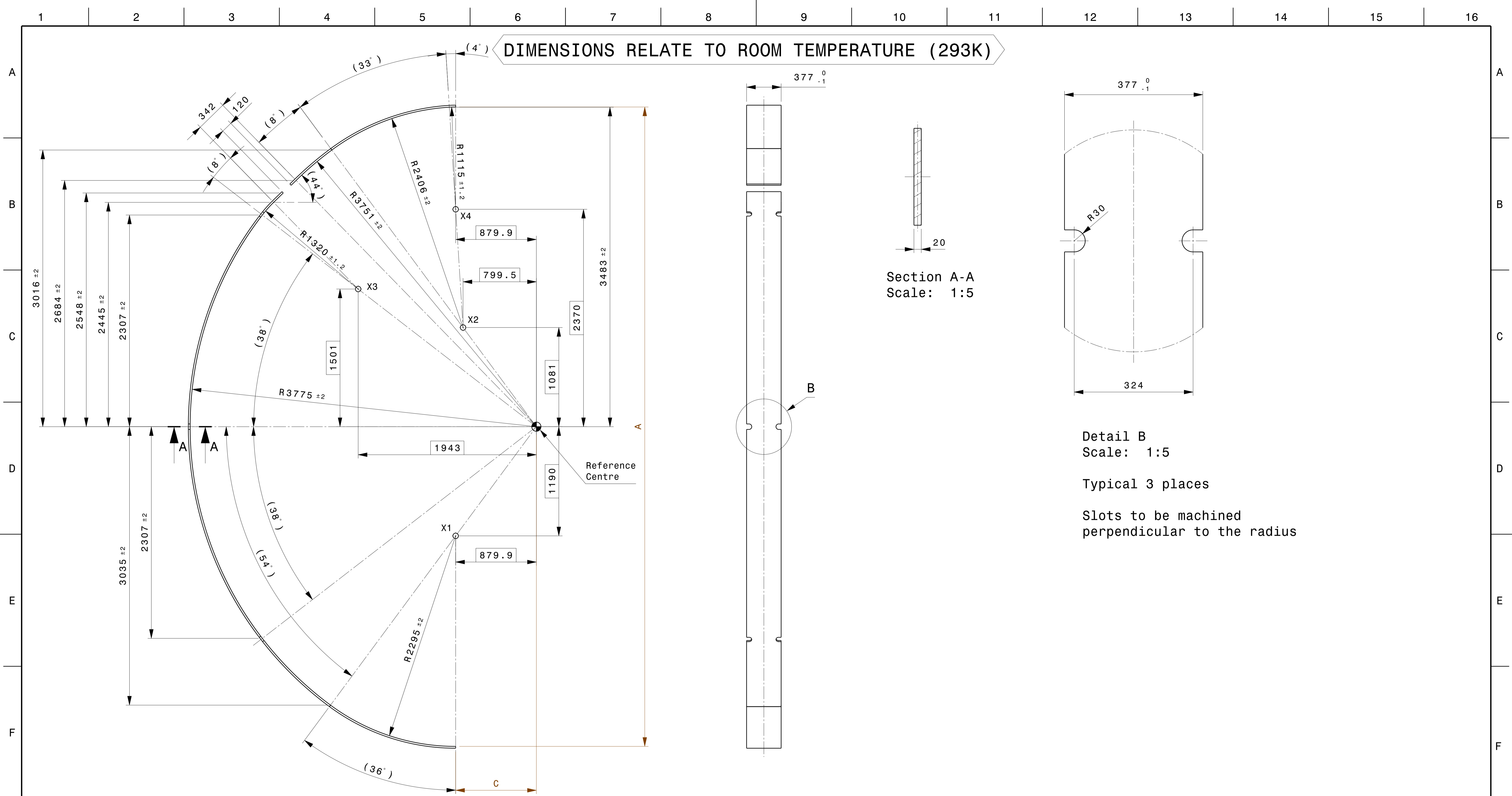


Bottom view
Scale: 1:20

NOTE:
The yellow zones are copied
by drawing 010202-503200
sheet1

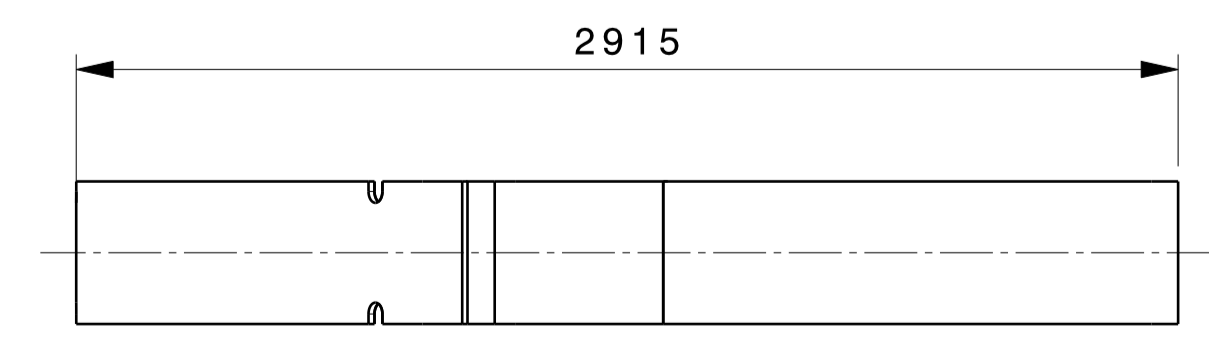
FOR TENDER				ref. to 3D CatProduct: 010301-203003																	
<small>CONFIDENTIAL UNLESS AUTHORISED</small> The information on this drawing is confidential under the terms of the BA agreement. This information shall not be transmitted to anyone who is not authorised to receive it.				APPROVED BY A. CUCCHIARO		Fusion Italy-Frascati Research Centre		CUSTOMER: Fusion-for-Energy													
				REVIEWED BY				DRAWING TITLE Curved Leg Outboard Toroidal Field Coil													
REV DATE		CONTROLLED BY A. CUCCHIARO		CODE ENEA ID: DD-JT60TF-NCO																	
FIRST ISSUE DATE 10-11-2011		SCALE NTS		DRAWN BY G. BROLATTI		SHEET SIZE A1		FIRST ANGLE PROJECTION		WBS LEVELS 3 LEVELS		010301		Drawing Number 503003		SHEET 03		REVISION 00		MATURITY	

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Front view
Scale: 1:20

Left view
Scale: 1:20



Top view
Scale: 1:20

Note:
 -DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
 -For dimension A see drawing 010301 503002
 -For dimension C see drawing 010301 503002
 -X1, X2, X3, X4 are the centre points of the radii
 -For machining of all inner surfaces radii must blend

Section A-A
Scale: 1:5

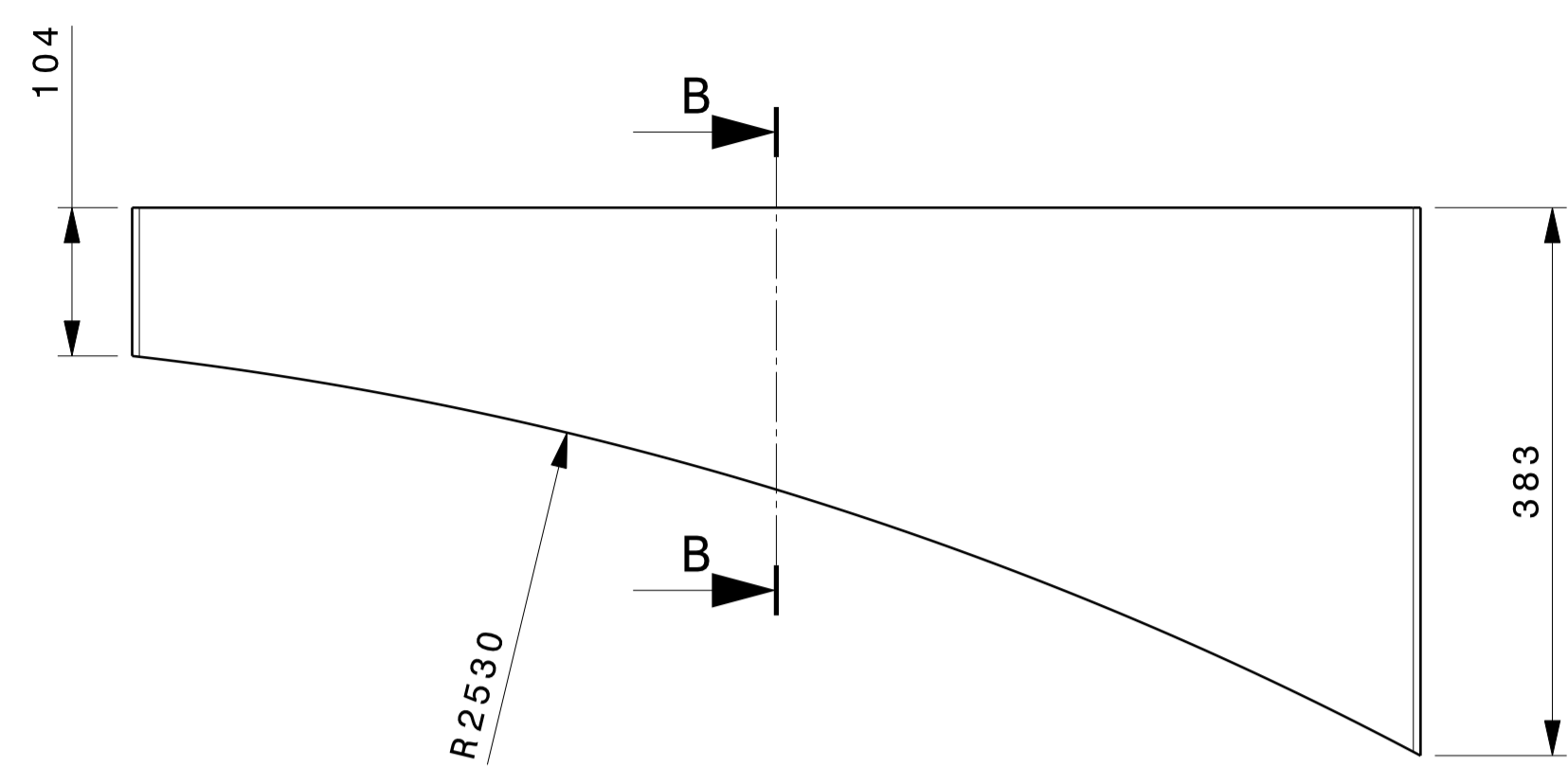
Detail B
Scale: 1:5

Typical 3 places

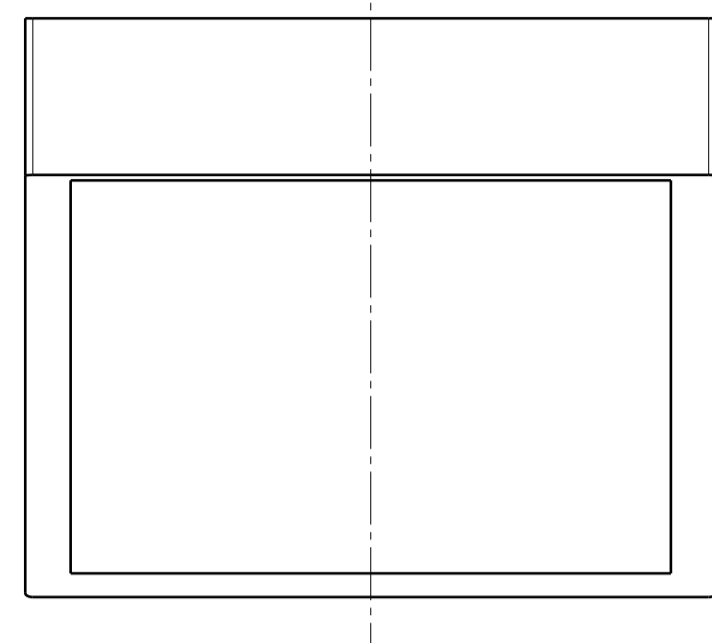
Slots to be machined perpendicular to the radius

FOR TENDER				ref. to 3D CatProduct: 010301-203004			
<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	
REV DATE		CHECKED BY		DRAWING TITLE Curved Leg Inboard Toroidal Field Coil			
FIRST ISSUE DATE 10-11-2011		SCALE NTS		CONTROLLED BY A. CUCCHIARO		CODE ENEA ID: DD-JT60TF-NCO	
DRAWN BY G. BROLATTI		SHEET SIZE A1		FIRST ANGLE PROJECTION		SHEET REVISION MATURITY 01 00	
WBS LEVELS 3		010301		Drawing Number 503004		01 00	

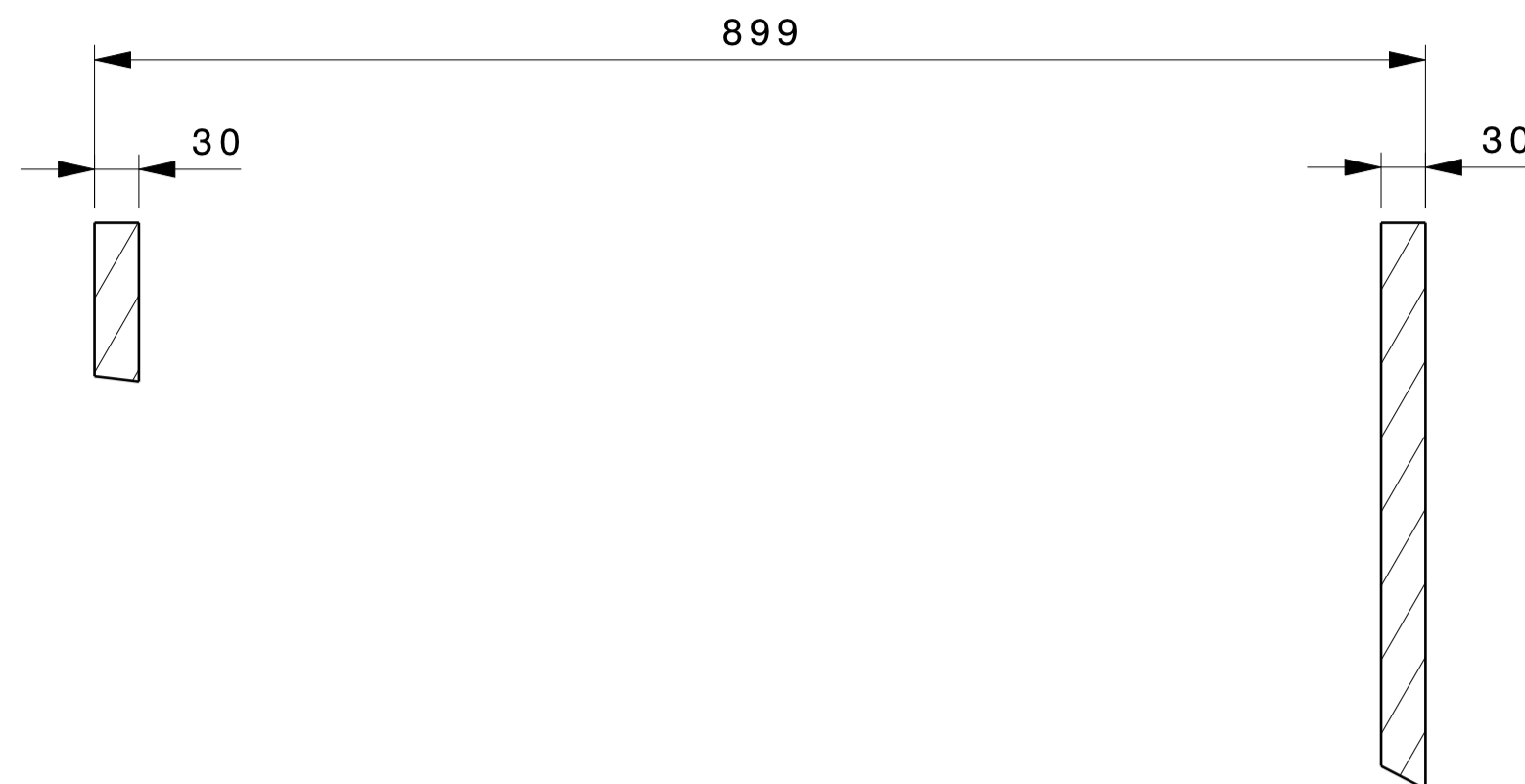
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



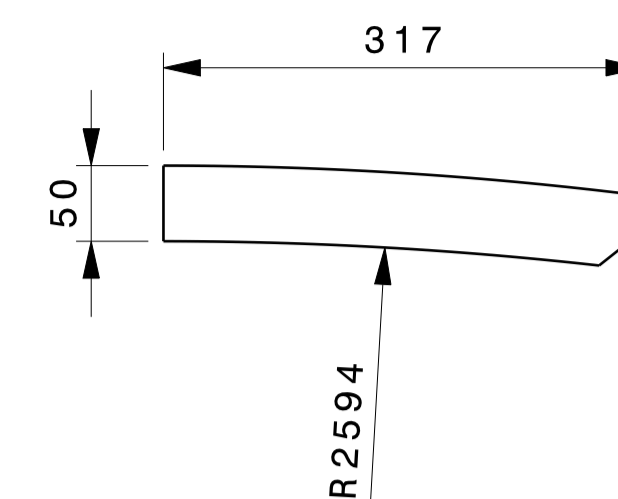
Front view terminal plates
Scale: 1:5



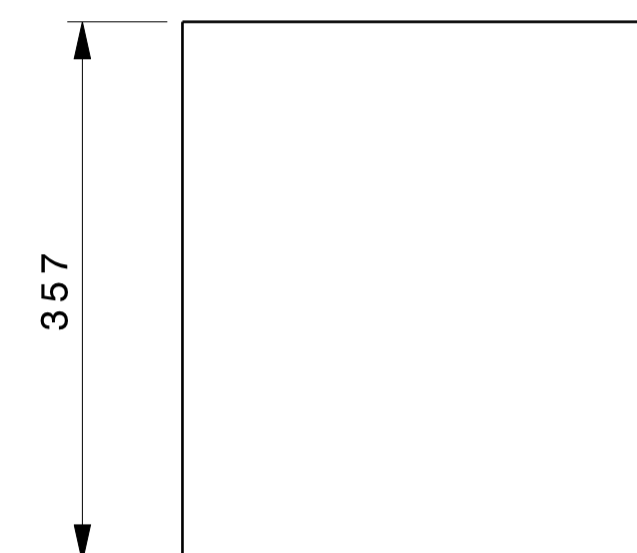
Left view terminal plates
Scale: 1:5



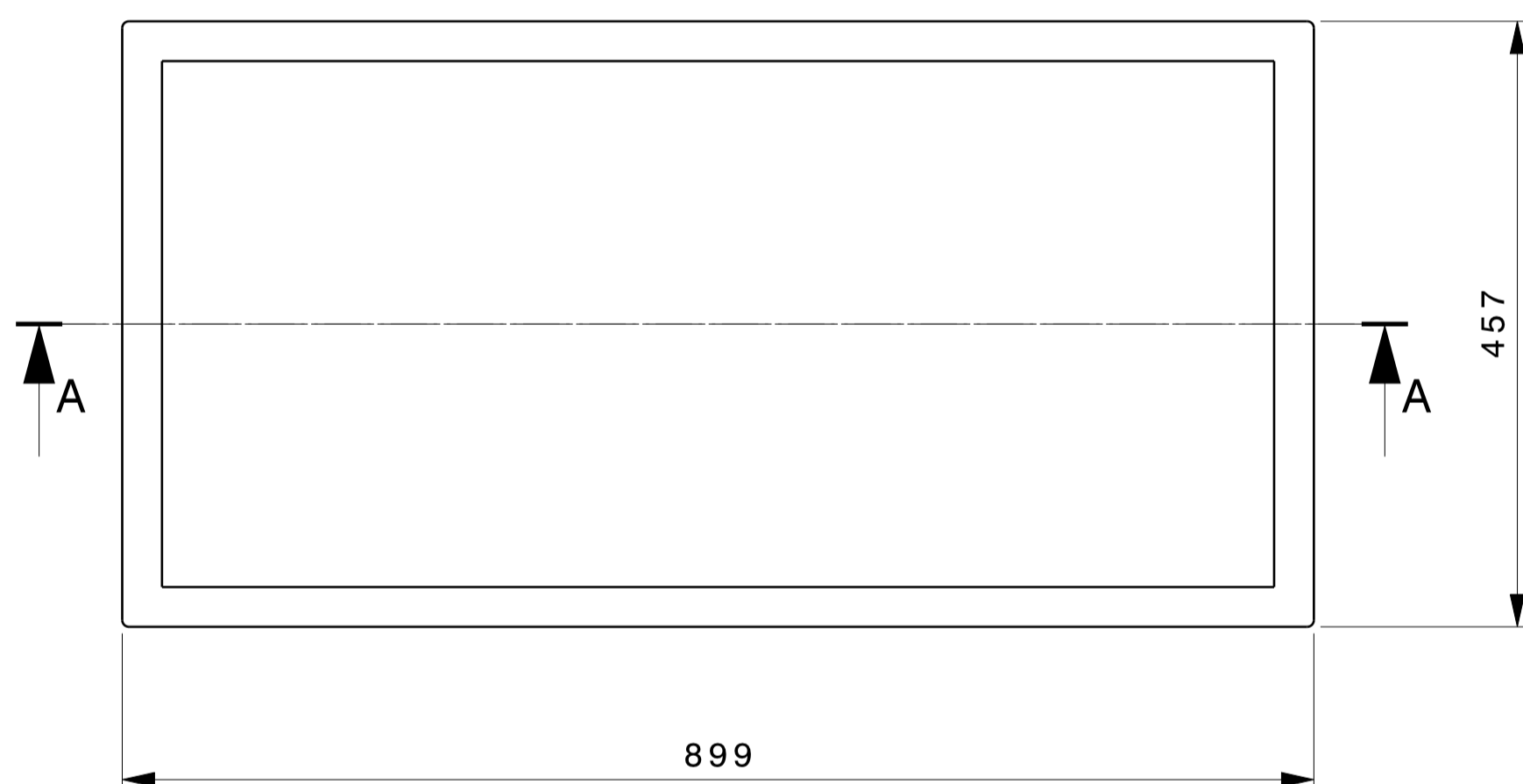
Section A-A
Scale: 1:5



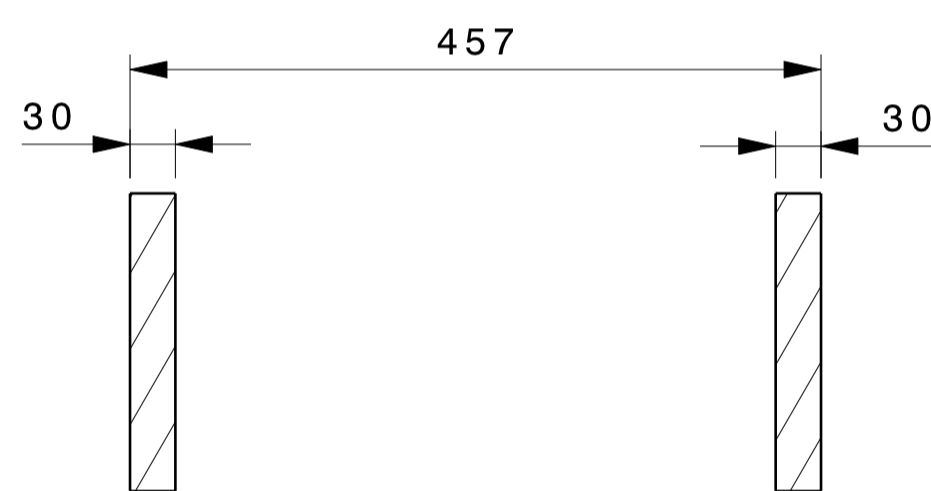
Front view closure plate
Scale: 1:5



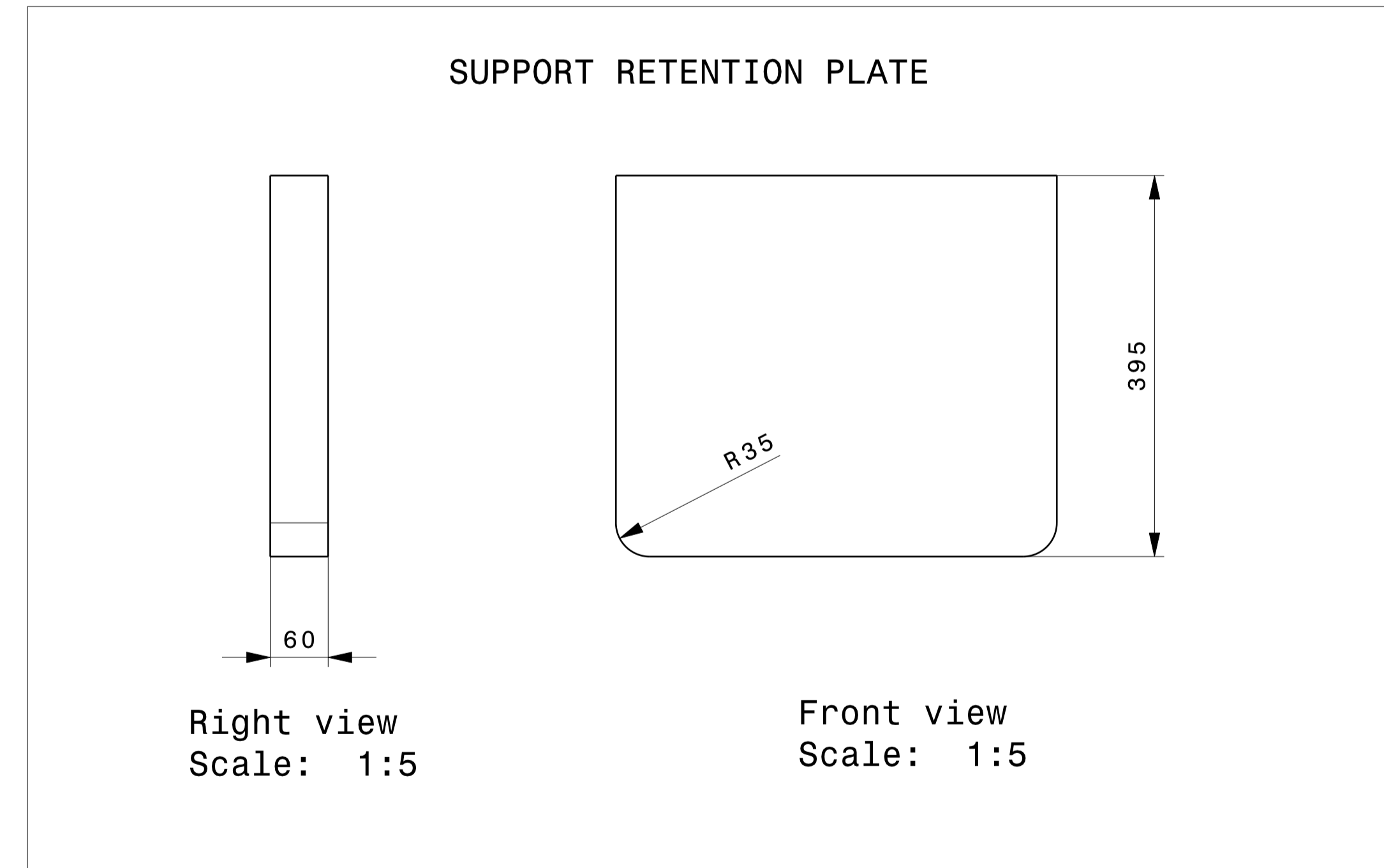
Top view closure plate
Scale: 1:5



Top view terminal plates
Scale: 1:5



Section B-B
Scale: 1:5



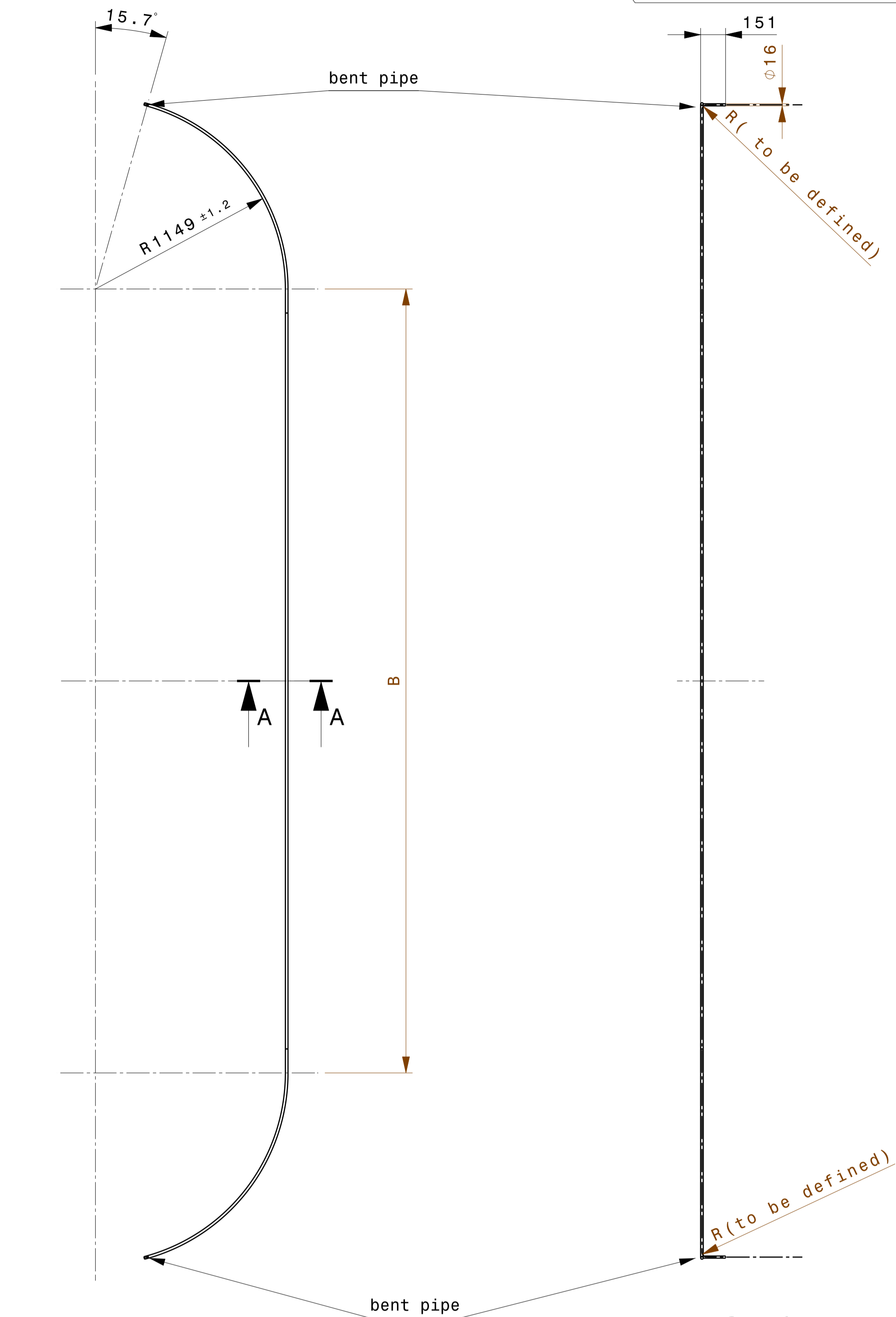
Right view
Scale: 1:5

Front view
Scale: 1:5

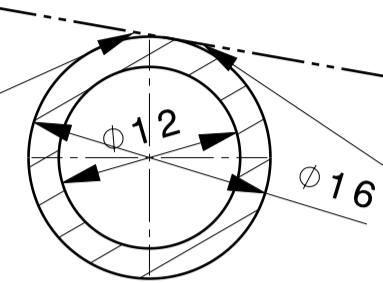
Note:
-DIN ISO 2768-1 & 2768-2 general medium tolerance class
for all machining unless otherwise specified
-Welded structure, all welds to be full penetration

FOR TENDER				ref. to 3D CatProduct: 010301-203005			
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REV DATE		CHECKED BY		DRAWING TITLE Miscellaneous Components Toroidal Field Coil			
FIRST ISSUE DATE 10-11-2011		SCALE NTS		CONTROLLED BY A.CUCCHIARO		CODE ENEA ID: DD-JT60TF-NCO	
DRAWN BY G. BROLATTI		SHEET SIZE A1		FIRST ANGLE PROJECTION		SHEET REVISION MATURITY 01 00	
WBS LEVELS 3		010301		Drawing Number 503005		01 00	

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Welded in accordance to ASME code




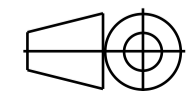
Section A-A
Scale: 2:1

Welded in accordance to ASME code

Front view
Scale: 1:20

Left view
Scale: 1:20

Note:
-DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
-For dimension B see drawing 010301 503002

FOR TENDER				ref. to 3D CatProduct: 010301-203006			
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		 Fusion <small>Italy-Frascati Research Centre</small>		CUSTOMER: Fusion-for-Energy	
REV DATE		CHECKED BY		DRAWING TITLE Inner He Cooling Layout Toroidal Field Coil			
FIRST ISSUE DATE 10-11-2011		SCALE NTS		CONTROLLED BY A.CUCCHIARO		CODE ENEA ID: DD-JT60TF-NCO	
DRAWN BY G. BROLATTI		SHEET SIZE A1		FIRST ANGLE PROJECTION 		WBS LEVELS 3 LEVELS	
010301		Drawing Number 503006		SHEET 01		REVISION 00	
				MATERIALITY			