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

Report RdS/2011/376

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

Antonio Cucchiaro, Paolo Rossi, Giorgio Brolatti (ENEA)

Novembre 2011

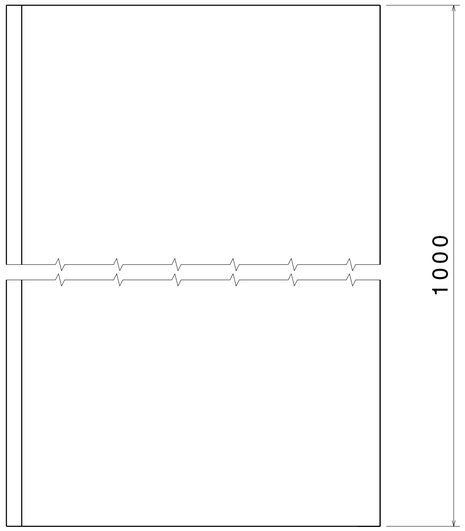
Report Ricerca di Sistema Elettrico
Accordo di Programma Ministero dello Sviluppo Economico – ENEA
Area: Governo, gestione e sviluppo del sistema elettrico nazionale
Progetto: Fusione nucleare: Attività di fisica e tecnologia della fusione complementari ad ITER, denominate "Broader Approach"
Responsabile Progetto: Aldo Pizzuto, ENEA

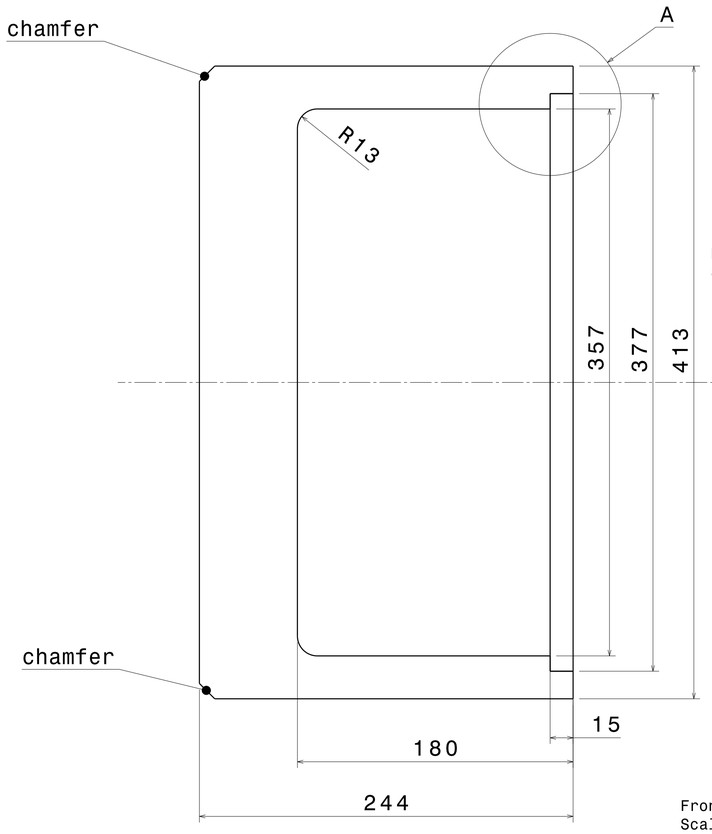
DISEGNI COSTRUTTIVI DELLA CASSA DI CONTENIMENTO DELLA BOBINA DI JT-60SA

Rev. 0 30/09/2011

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

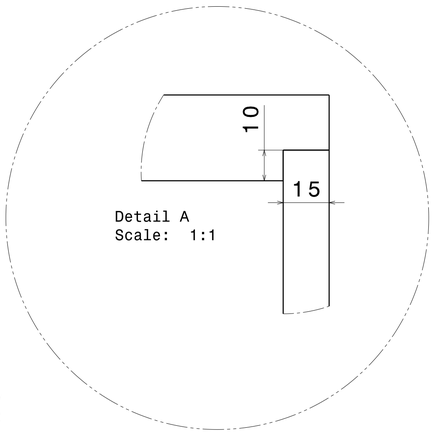
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



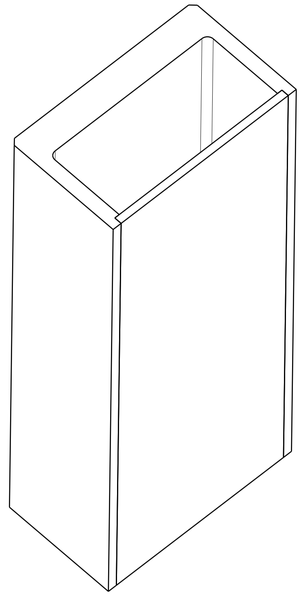


Bottom view
Scale: 1:2

Front view
Scale: 1:2



Detail A
Scale: 1:1



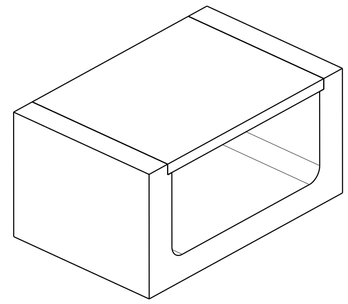
Isometric view

NOTE:

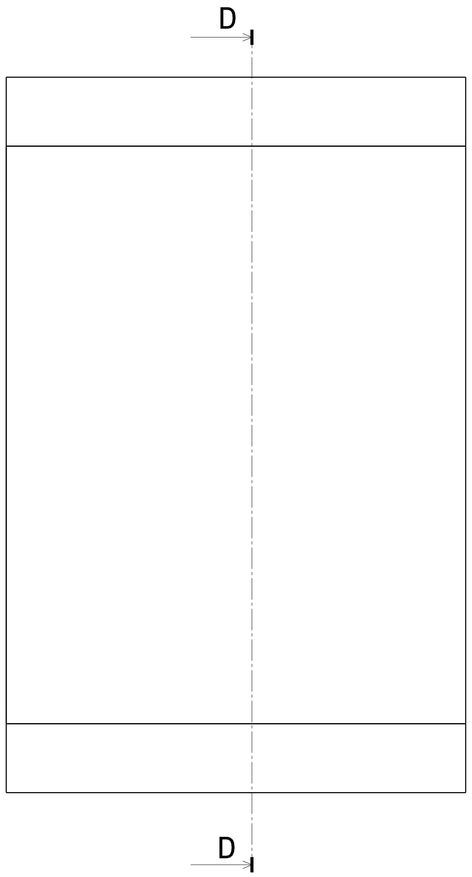
the design of the bevel will be provided later by ENEA
(Il disegno del cianfrino sarà fornito successivamente dall'ENEA)

FOR TENDER			Ref to 3D CatProduct: 010301 203007
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 REVIEWED BY CHECKED BY CONTROLLED BY A.CUCCHIARO DRAWN BY G. BROLATTI	ENEA Fusion Italy-Frascati Research Centre	CUSTOMER: Fusion-for-Energy
REV DATE		DRAWING TITLE: MOCK UP: STRAIGHT BEAM 1 METRE LONG OF THE CASING (LONGITUDINAL WELDING)	
FIRST ISSUE DATE 27/07/2011	SCALE NTS	CODE ENEA ID: DD-JT60TF-NC0	
SHEET SIZE A1	FIRST ANGLE PROJECTION	WBS 3 LEVELS 01 03 01	Drawing Number 503007
SHEET 01 /01	REVISION 00	MATURITY	

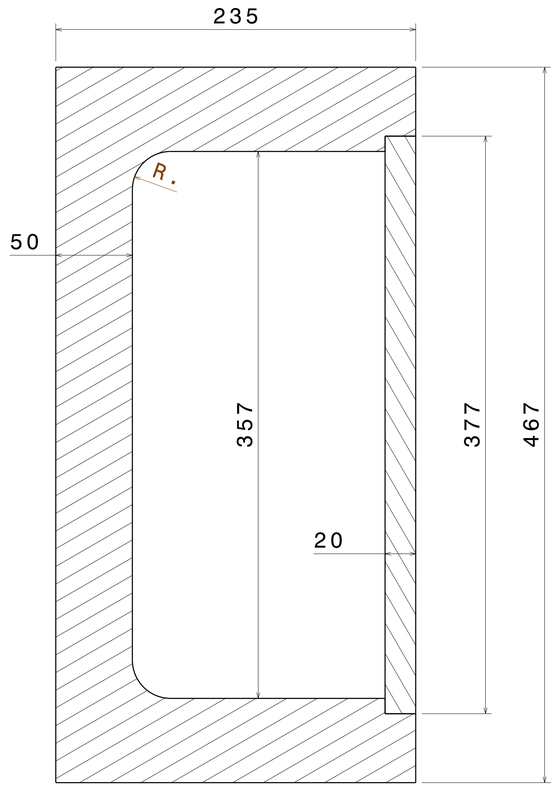
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



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)

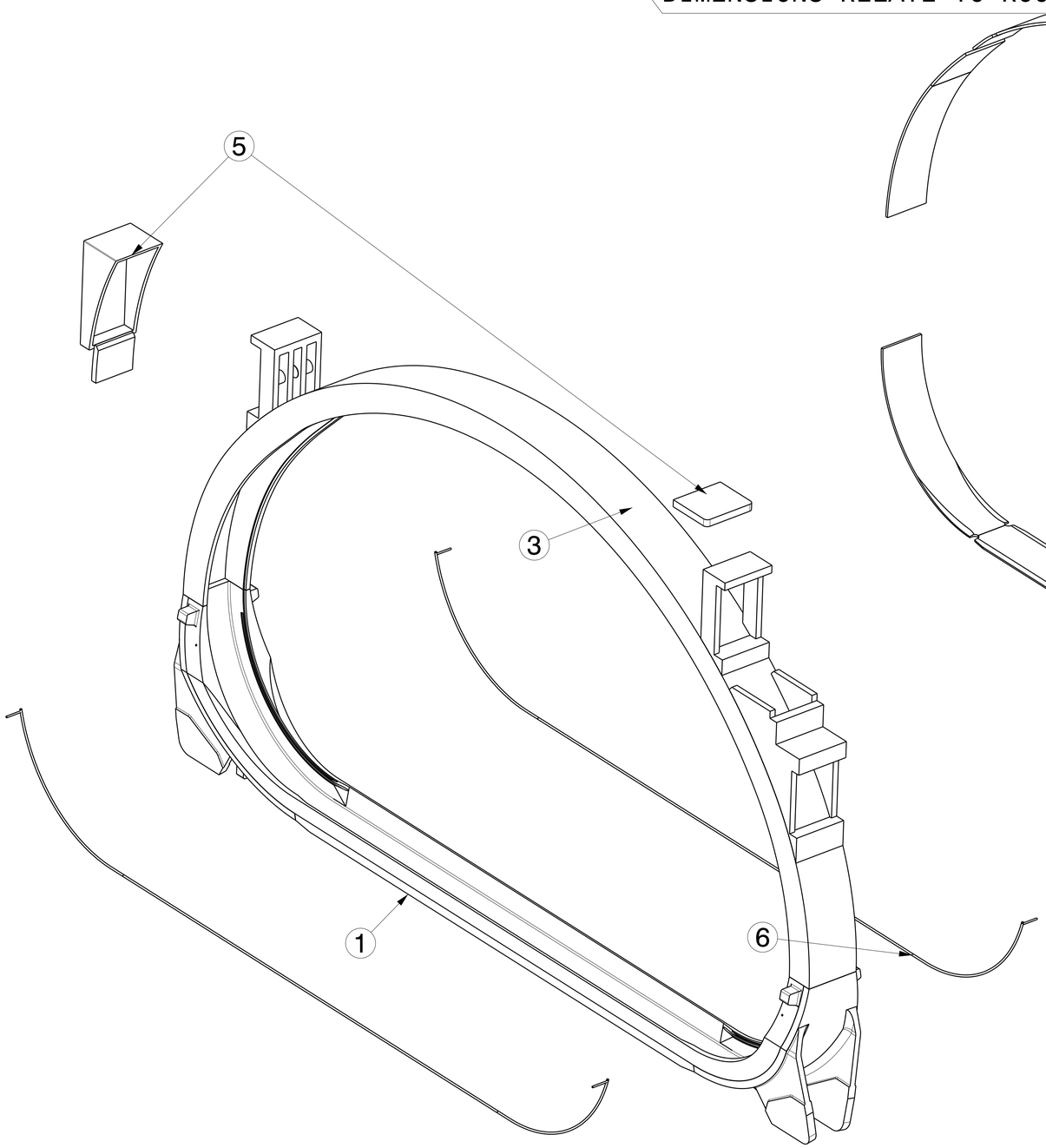
FOR TENDER

ref. to 3D CatProduct: 010301-203008

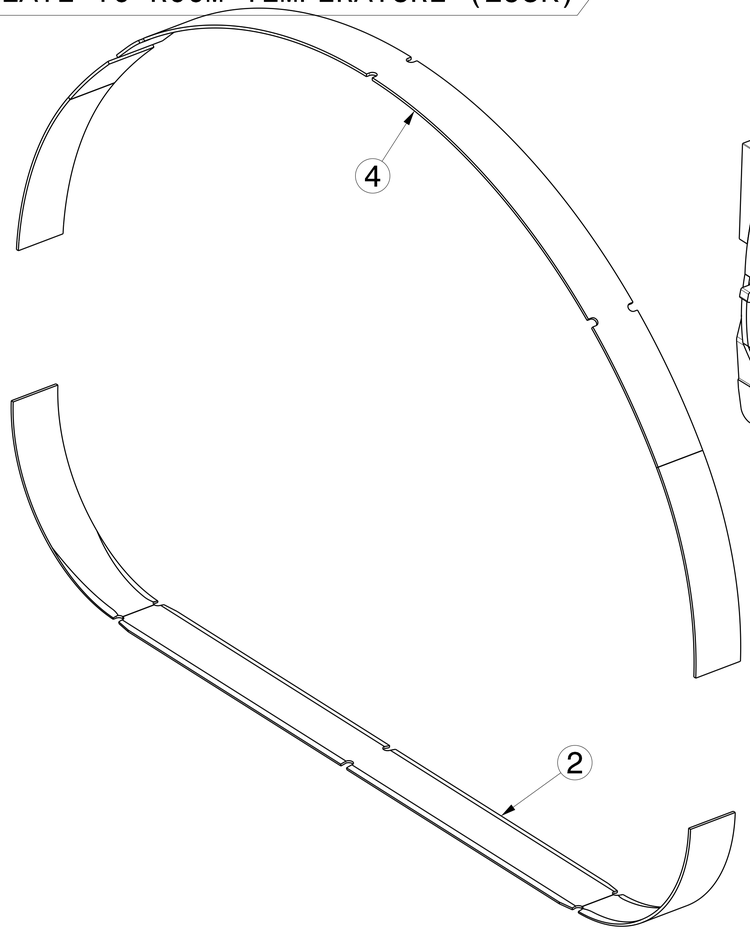
APPROVED BY	A.CUCCHIARO
REVIEWED BY	
CHECKED BY	
CONTROLLED BY	A.CUCCHIARO
DRAWN BY	G. BROLATTI
REV DATE	10/11/2011
FIRST ISSUE DATE	27/07/2011
SCALE	NTS
CUSTOMER:	Fusion-for-Energy
DRAWING TITLE	MOCK UP: STRAIGHT SAMPLE 30 CENTIMETRE LONG OF THE CASING
CODE ENEA ID:	DD-JT60TF-NCO
SHEET SIZE	A1
	FIRST ANGLE PROJECTION
WBS 3 LEVELS	01 03 01
Drawing Number	503008
SHEET	01 /01
REVISION	01
MATURITY	

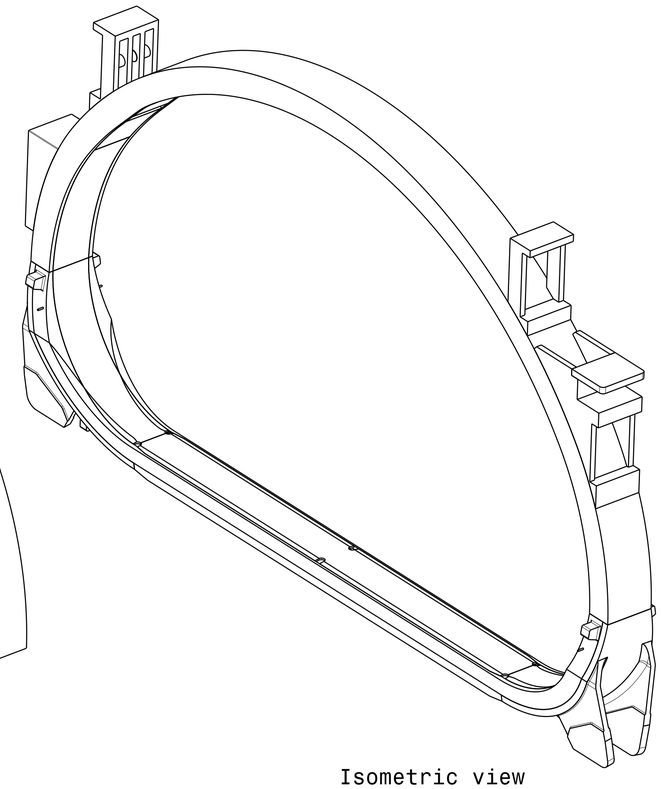
ENEA Fusion
Italy-Frascati Research Centre

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Exploded Isometric view
Scale: 1:20





Isometric view
Scale: 1:25

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
Quantity	Balloon No.	Component Number	Component Description	Drawing Number

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

FOR TENDER

ref. to 3D CatProduct: 010301-203000

APPROVED BY: A.CUCCHIARO
REVIEWED BY:
CHECKED BY:
CONTROLLED BY: A.CUCCHIARO
DRAWN BY: G.BROLATTI

REV DATE:
FIRST ISSUE DATE: 10-11-2011
SCALE: NTS

ENEA Fusion
Italy-Frascati Research Centre

CUSTOMER: Fusion-for-Energy

DRAWING TITLE
Casing Components
Toroidal Field Coil

CODE ENEA ID: DD-JT60TF-NCO

SHEET SIZE: A1
FIRST ANGLE PROJECTION
WBS 3 LEVELS: 0 1 0 3 0 1
Drawing Number: 503000
SHEET: 01 /01
REVISION: 00
MATURITY:

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									
13									
14									
15									
16									
17									
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

CONTRACTOR:
ITEM LIST FOR TENDER
* 010301 503000
SHEET NO. 1 OF 1 SHEETS

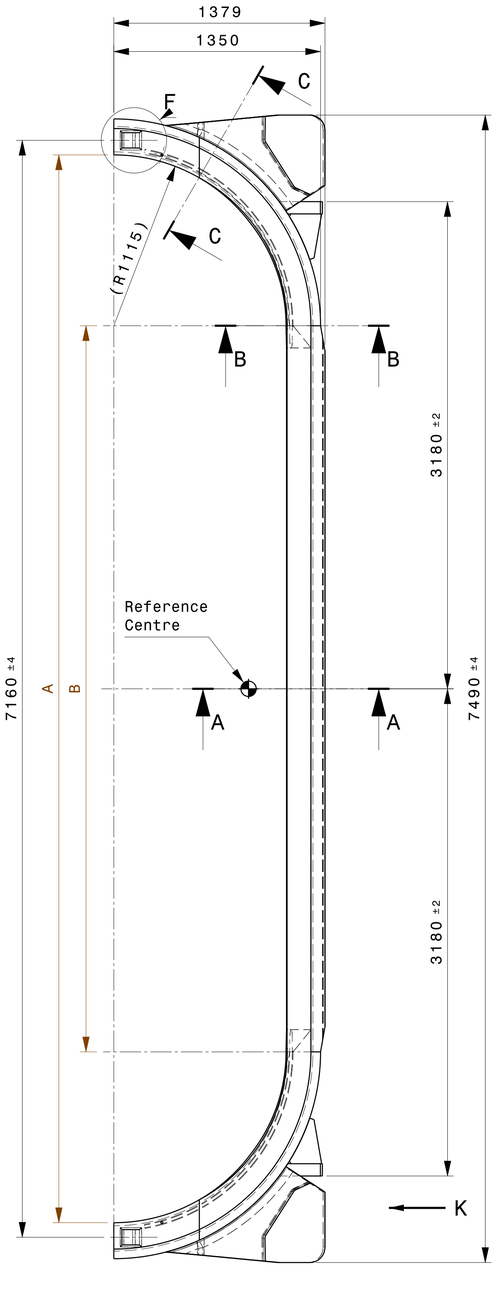
PLANNING NOTES

Item list

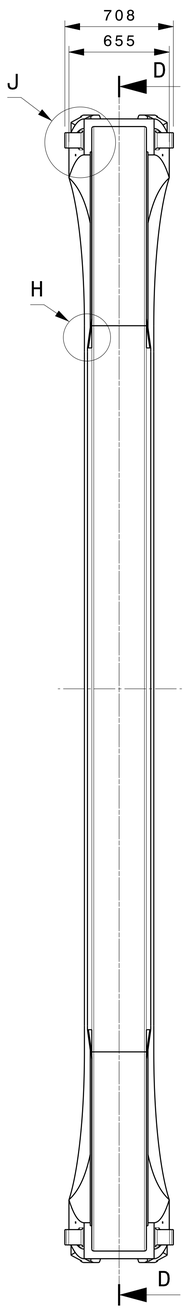
JT60-SA CASING COMPONENTS
TOROIDAL FIELD COIL

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

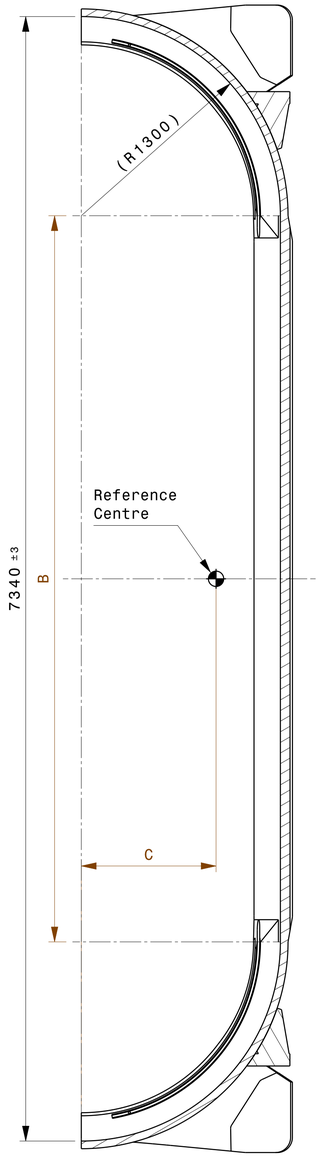
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



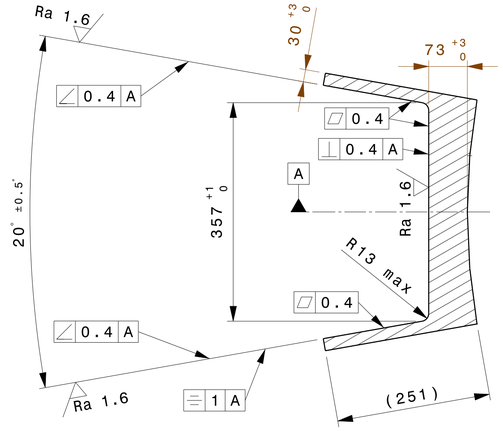
Front view
Scale: 1:20



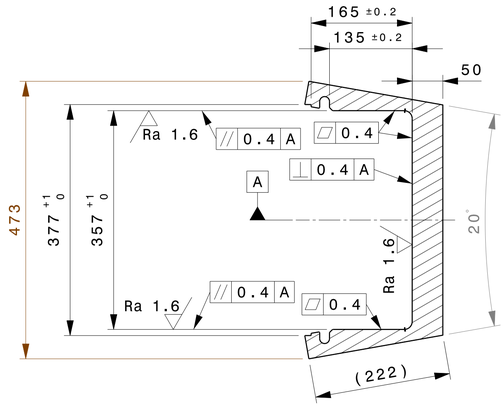
Left view
Scale: 1:20



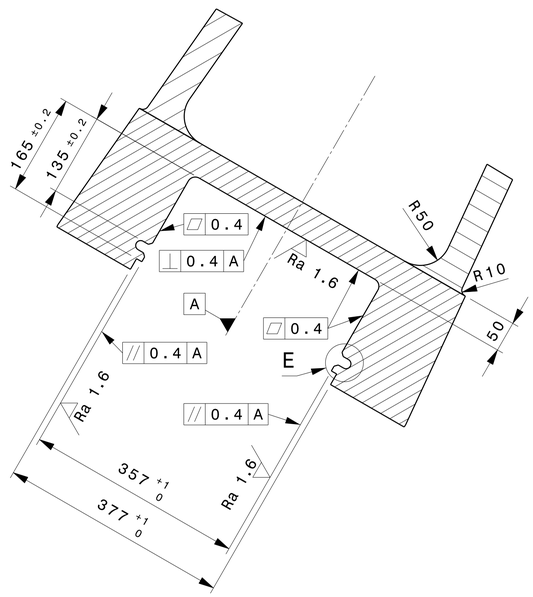
Section D-D
Scale: 1:20



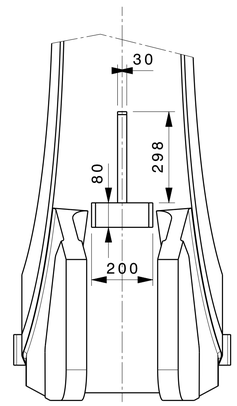
Section A-A
Scale: 1:5



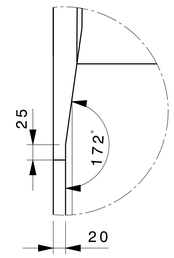
Section B-B
Scale: 1:5



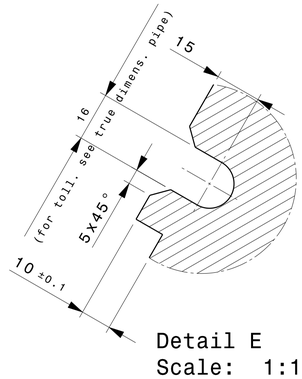
Section C-C
Scale: 1:5



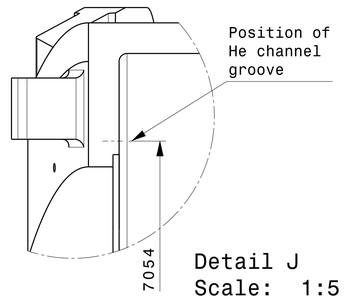
View K
Scale: 1:10



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

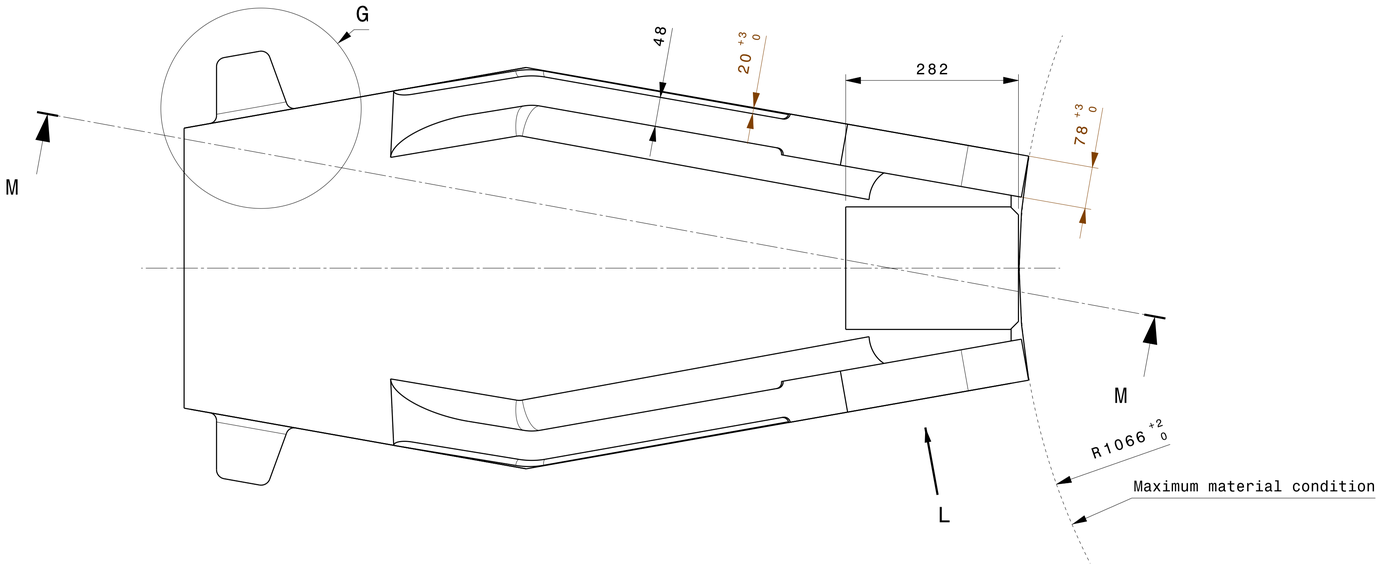
APPROVED BY	A.CUCCHIARO
REVIEWED BY	
CHECKED BY	
CONTROLLED BY	A.CUCCHIARO
DRAWN BY	G. BROLATTI
REV DATE	
FIRST ISSUE DATE	10-11-2011
SCALE	NTS
CUSTOMER:	Fusion-for-Energy
CODE ENEA ID:	DD-JT60TF-NCO

ENEA Fusion
Italy-Frascati Research Centre

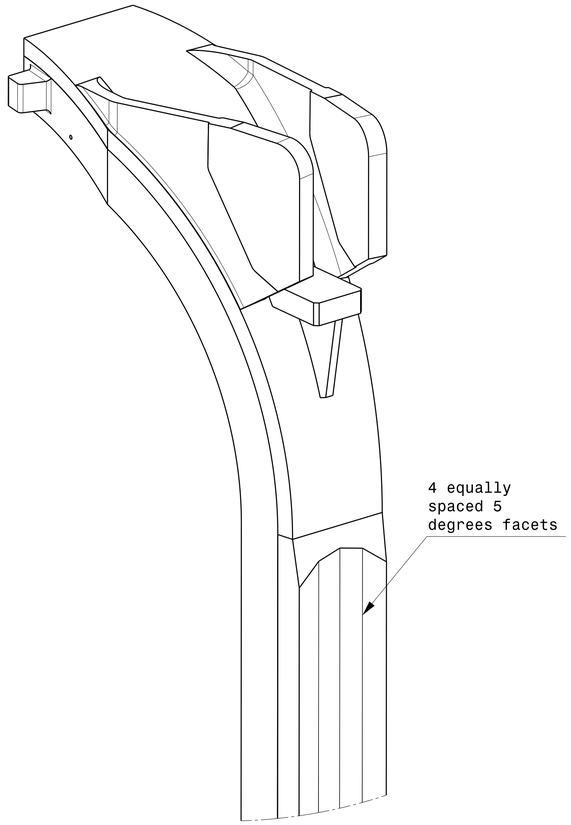
DRAWING TITLE
Straight Leg Outboard Toroidal Field Coil

SHEET SIZE	FIRST ANGLE PROJECTION	WBS 3 LEVELS	Drawing Number	SHEET	REVISION	MATURITY
A1		0 1 0 3 0 1	5 0 3 0 0 1	01 /02	00	

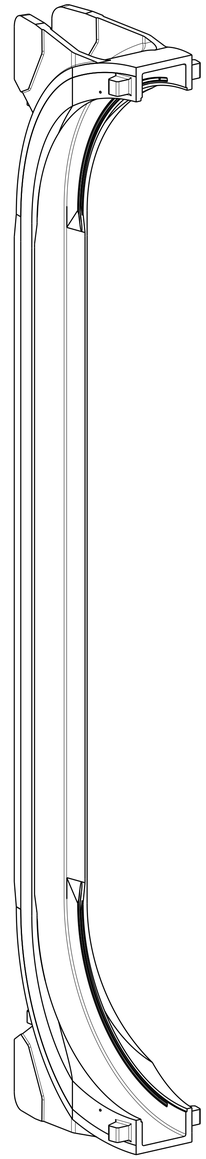
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



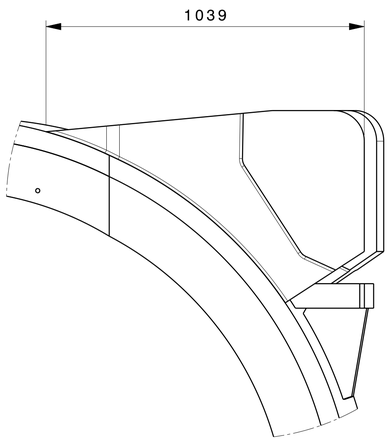
Top view
Scale: 1:5



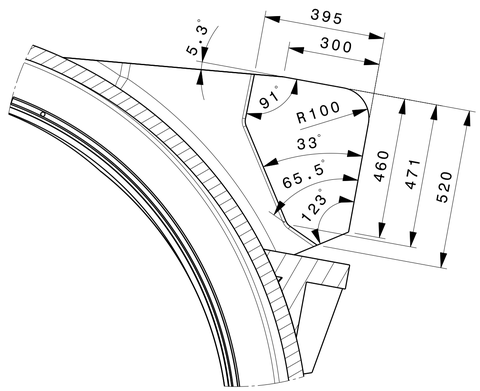
Isometric view



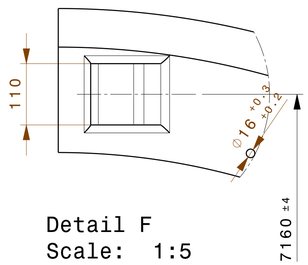
Isometric View



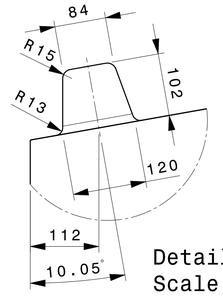
View L
SCALE: 1:10
Typical, 4 places



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



Detail F
Scale: 1:5
Typical, 4 places

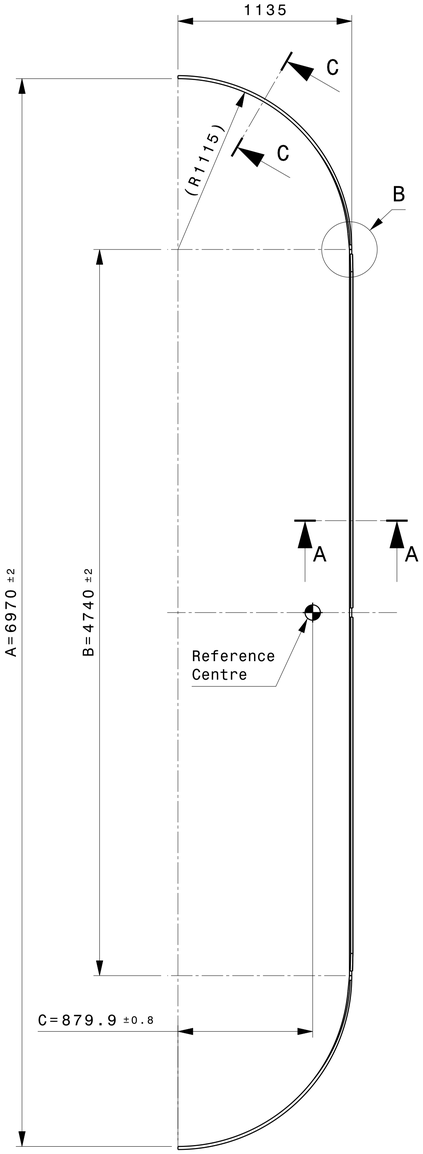


Detail G
Scale: 1:5
Typical, 4 places

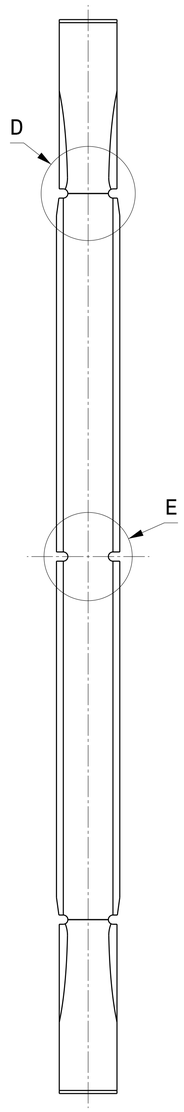
Note:
-DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
-For dimensions A, B and C see drawing 010301 503002
-For dimension D see drawing 010301 503006

FOR TENDER			ref. to 3D CatProduct: 010301-203001
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 Fusion Italy-Frascati Research Centre	CUSTOMER: Fusion-for-Energy
REV DATE	REVIEWED BY	DRAWING TITLE	Straight Leg Outboard Toroidal Field Coil
	CHECKED BY		
FIRST ISSUE DATE 10-11-2011	SCALE NTS	CONTROLLED BY A.CUCCHIARO	DRAWN BY G. BROLATTI
		CODE ENEA ID: DD-JT60TF-NCO	
SHEET SIZE A1	FIRST ANGLE PROJECTION	WBS 3 LEVELS 0 1 0 3 0 1	Drawing Number 503001
SHEET 02 /02	REVISION 00	MATURITY	

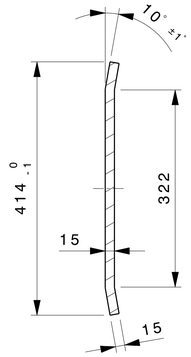
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



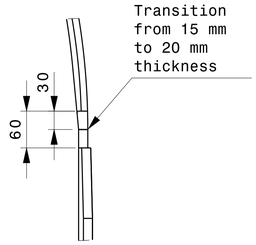
Front view
Scale: 1:20



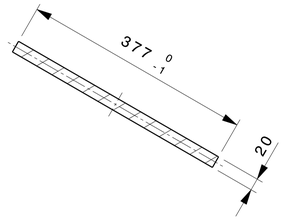
Left view
Scale: 1:20



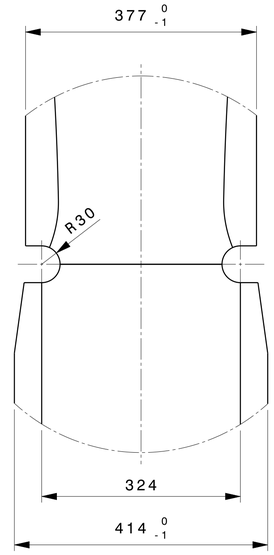
Section A-A
Scale: 1:5



Detail B
Scale: 1:5



Section C-C
Scale: 1:5



Detail D
Scale: 1:5

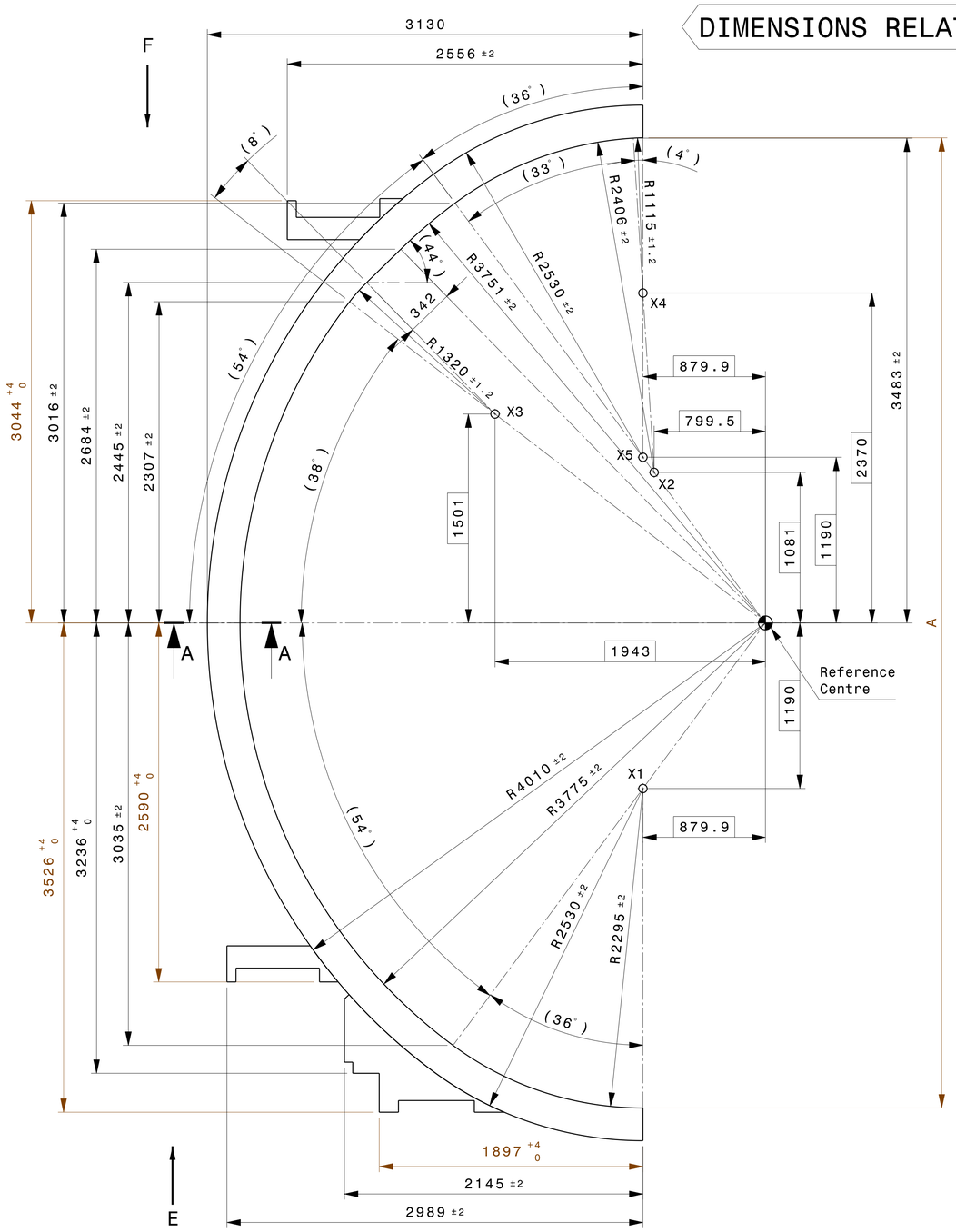
Top view
Scale: 1:20

Detail E
Scale: 1:5

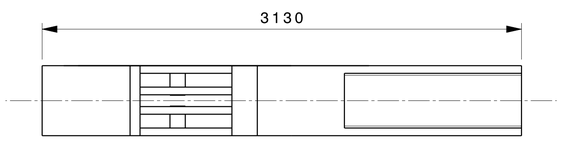
Note:
-DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
-A is required for machining of mating parts see drawing 010301 503001, 010301 503003, 010301 503004
-B is required for machining of mating part see drawing 010301 503001
-C is required for machining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

FOR TENDER			ref. to 3D CatProduct: 010301-203002
CONFIDENTIAL UNLESS AUTHORISED 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 REVIEWED BY: CHECKED BY:	ENEA Fusion Italy-Frascati Research Centre	CUSTOMER: Fusion-for-Energy
REV DATE	CONTROLLED BY: A.CUCCHIARO	DRAWING TITLE	Straight leg inboard Toroidal Field Coil
FIRST ISSUE DATE: 10-11-2011	SCALE: NTS DRAWN BY: G. BROLATTI	CODE ENEA ID: DD-JT60TF-NCO	
SHEET SIZE: A1	FIRST ANGLE PROJECTION	WBS 3 LEVELS: 0 1 0 3 0 1	Drawing Number: 503002
SHEET: 01 /01	REVISION: 00	MATURITY:	

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)

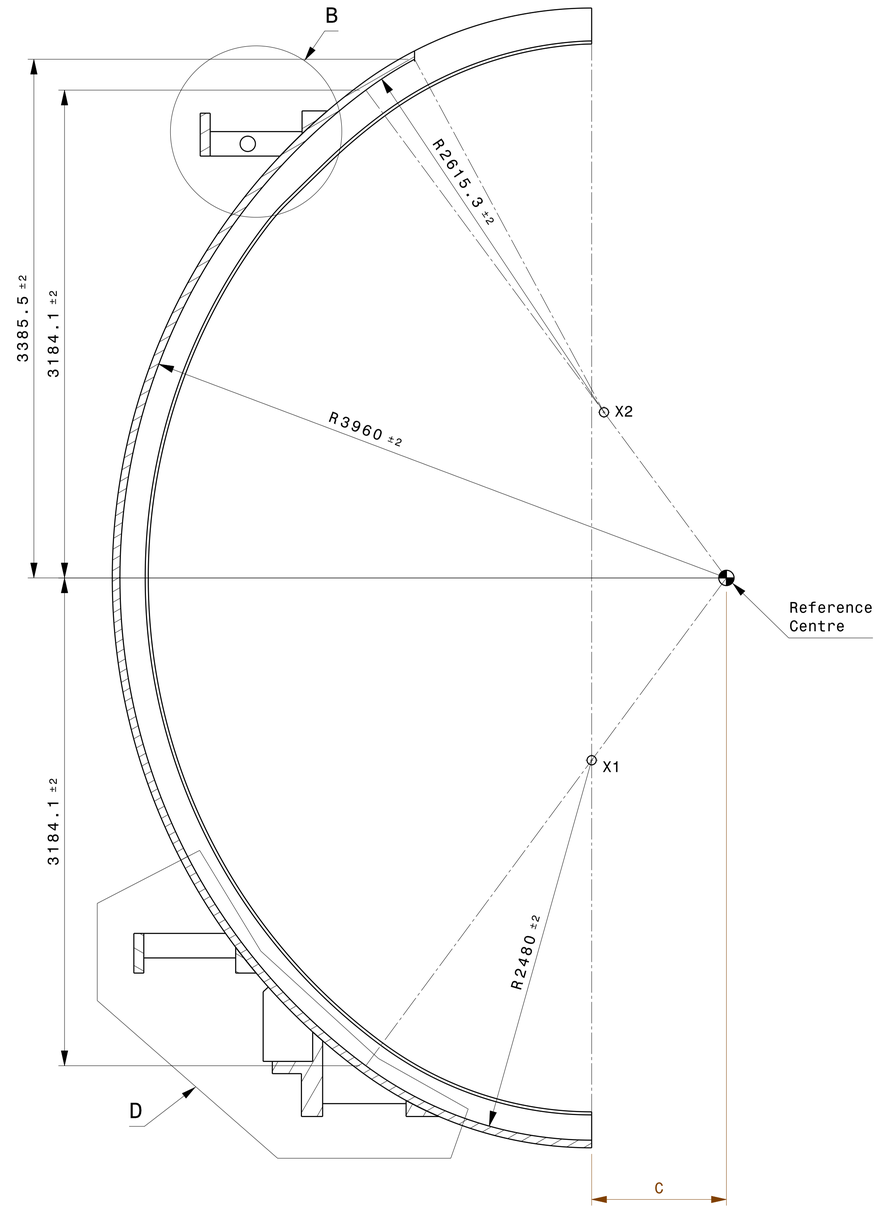


Front view
Scale: 1:20



Top view
Scale: 1:20

Left view
Scale: 1:20

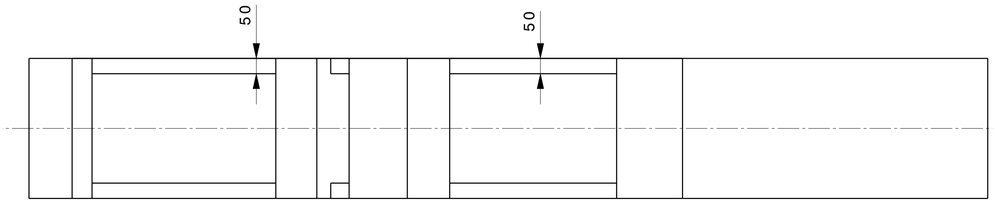


Section C-C
Scale: 1:20

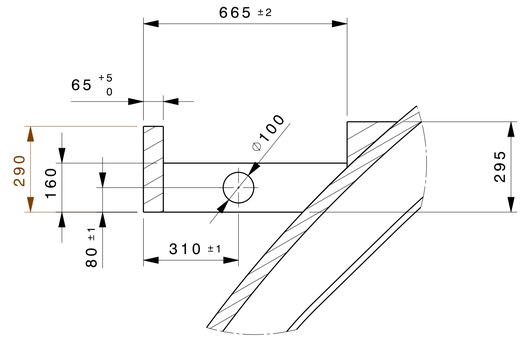
Note:
-DIN ISO 2768-1 & 2768-2 general medium tolerance class for all machining unless otherwise specified
-For dimension A see drawing 010301 503002
-For dimension C see drawing 010301 503002
-X1, X2, X3, X4, X5 are the centre points of the radii
-For machining of all inner surfaces radii must blend
-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 REVIEWED BY CHECKED BY CONTROLLED BY A.CUCCHIARO	ENEA Fusion Italy-Frascati Research Centre	CUSTOMER: Fusion-for-Energy
REV DATE		DRAWING TITLE	Curved Leg Outboard Toroidal Field Coil
FIRST ISSUE DATE 10-11-2011	SCALE NTS	DRAWN BY G. BROLATTI	CODE ENEA ID: DD-JT60TF-NCO
SHEET SIZE A1	FIRST ANGLE PROJECTION	WBS 3 LEVELS 0 1 0 3 0 1	Drawing Number 503003
SHEET 01 /03	REVISION 00	MATURITY	

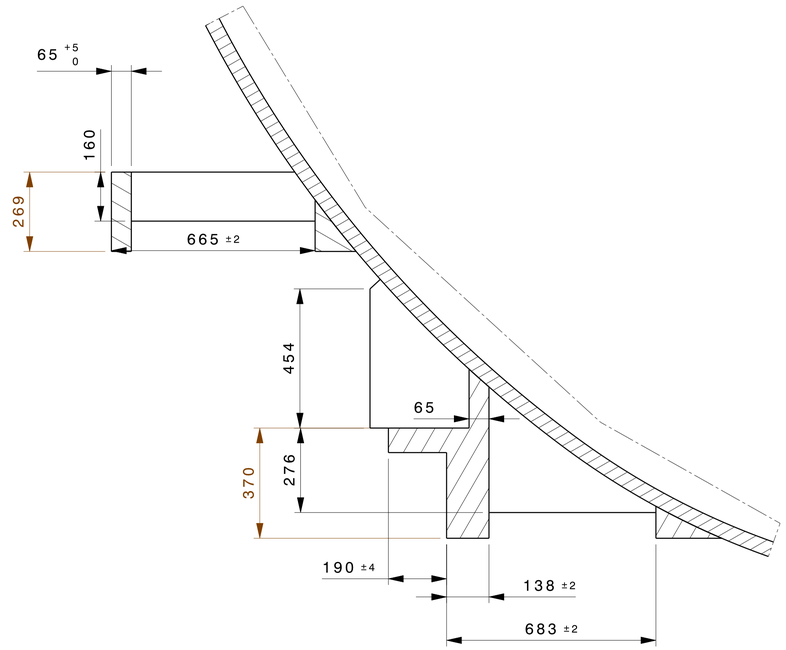
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



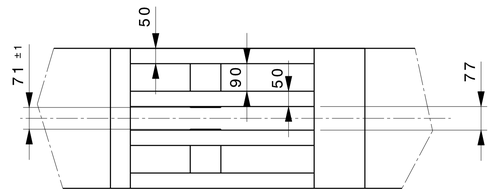
View E
Scale: 1:10



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

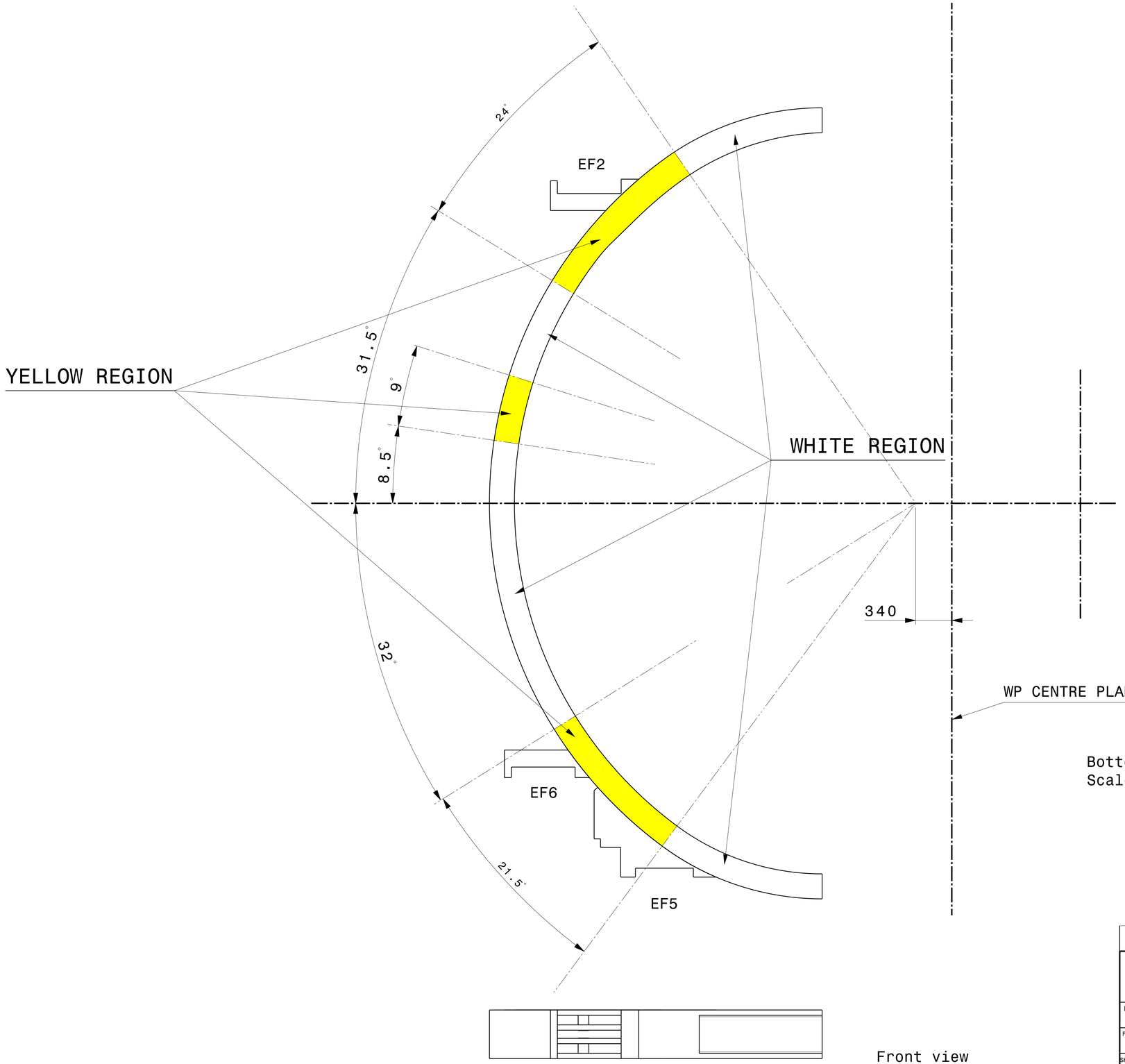
FOR TENDER

ref. to 3D CatProduct: 010301-203003

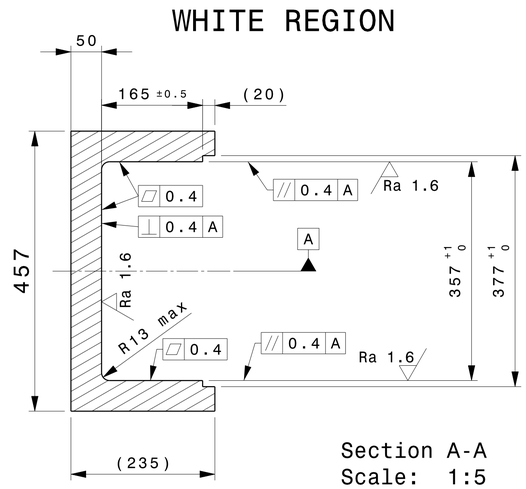
APPROVED BY	A.CUCCHIARO
REVIEWED BY	
CHECKED BY	
CONTROLLED BY	A.CUCCHIARO
DRAWN BY	G. BROLATTI
REV DATE	
FIRST ISSUE DATE	10-11-2011
SCALE	
CUSTOMER:	Fusion-for-Energy
DRAWING TITLE	Curved Leg Outboard Toroidal Field Coil
CODE ENEA ID:	DD-JT60TF-NC0
SHEET SIZE	A1
FIRST ANGLE PROJECTION	
WBS 3 LEVELS	01 03 01
Drawing Number	503003
SHEET	02 /03
REVISION	00
MATURITY	

ENEA Fusion Italy-Frascati Research Centre

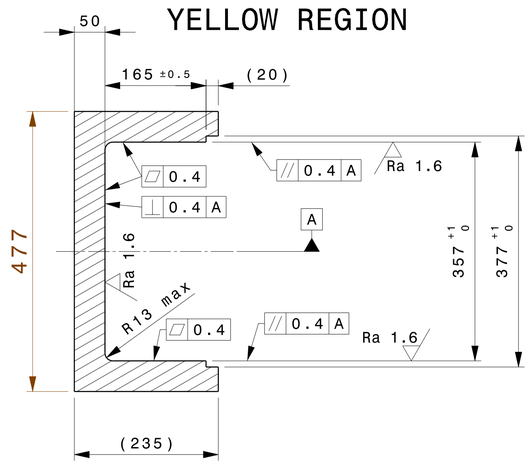
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Bottom view
Scale: 1:20



Section A-A
Scale: 1:5



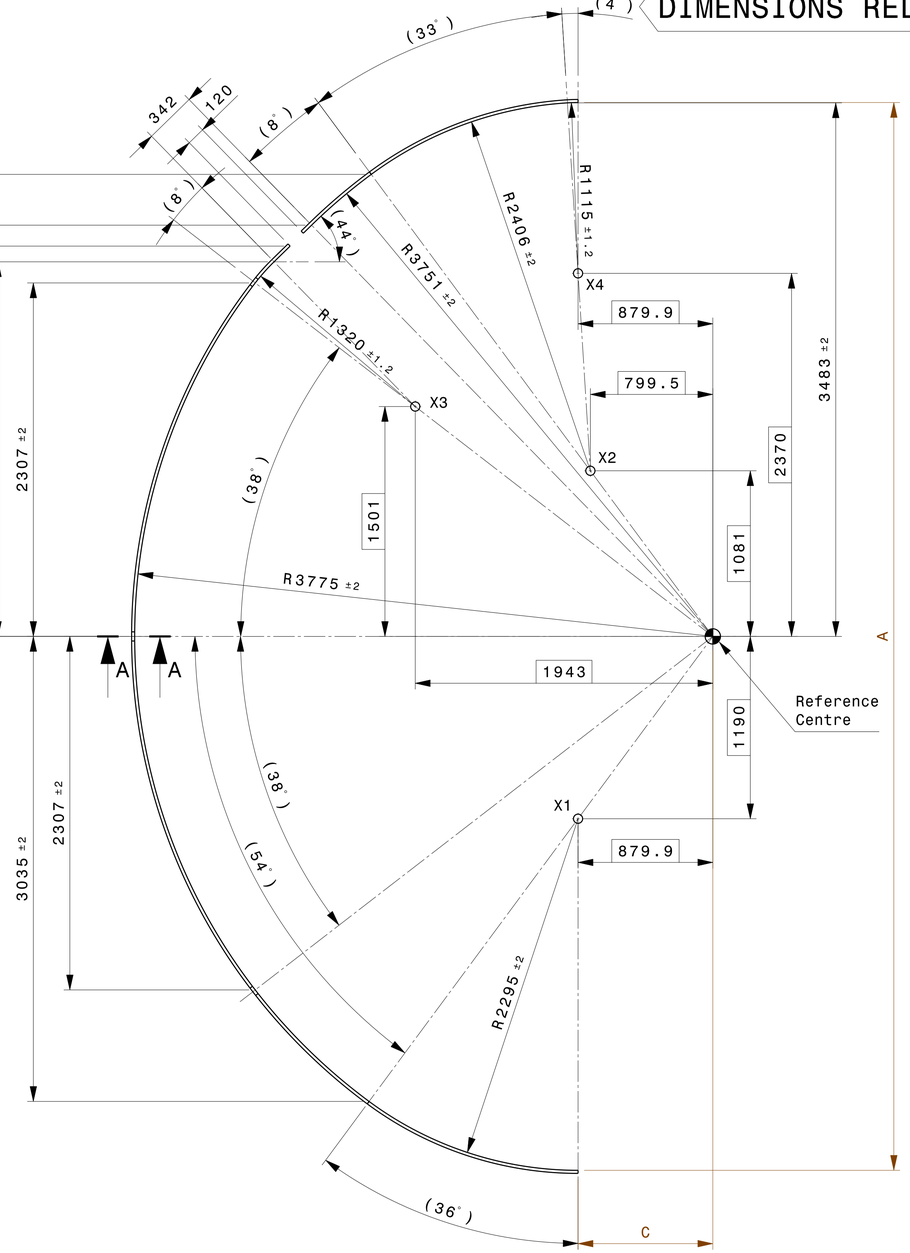
NOTE:

The yellow zones are copied by drawing 010202-503200 sheet1

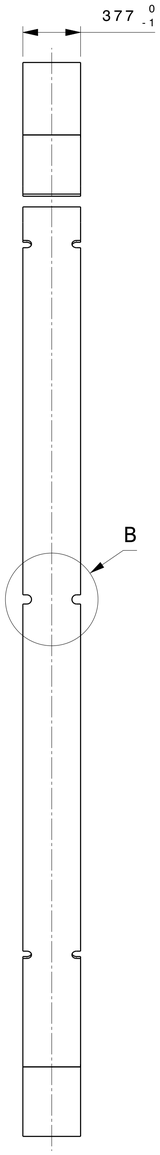
Front view
Scale: 1:20

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			ENEA 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							
FIRST ISSUE DATE 10-11-2011	SCALE NTS	DRAWN BY G. BROLATTI		CODE ENEA ID: DD-JT60TF-NCO				
SHEET SIZE A1	FIRST ANGLE PROJECTION	WBS 3 LEVELS	0 1 0 3 0 1	Drawing Number	503003	SHEET 03 /03	REVISION 00	MATURITY

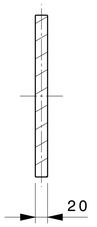
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



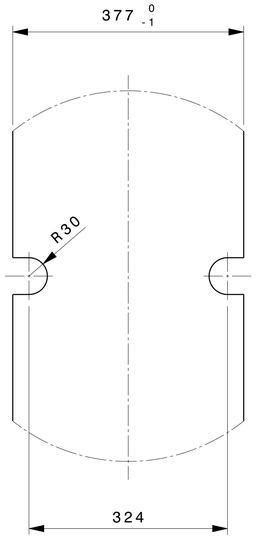
Front view
Scale: 1:20



Left view
Scale: 1:20



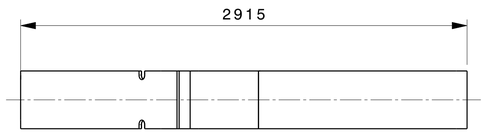
Section A-A
Scale: 1:5



Detail B
Scale: 1:5

Typical 3 places

Slots to be machined
perpendicular to the radius



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

FOR TENDER

ref. to 3D CatProduct: 010301-203004

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APPROVED BY: A.CUCCHIARO
REVIEWED BY:
CHECKED BY:
CONTROLLED BY: A.CUCCHIARO
DRAWN BY: G. BROLATTI

REV DATE
FIRST ISSUE DATE: 10-11-2011
SCALE: NTS

ENEA Fusion Italy-Frascati Research Centre

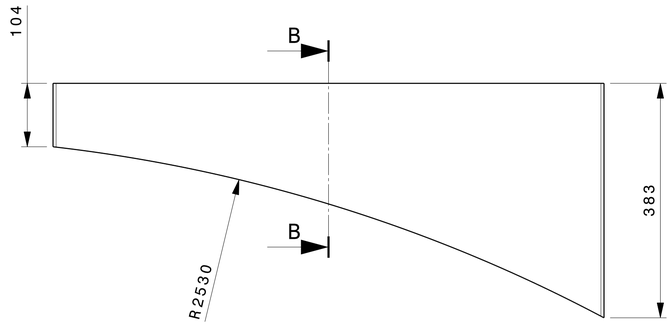
CUSTOMER: Fusion-for-Energy

DRAWING TITLE
Curved Leg Inboard Toroidal Field Coil

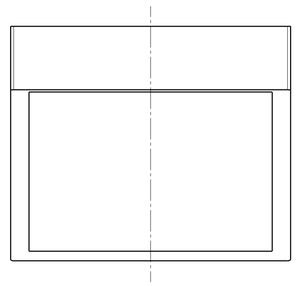
CODE ENEA ID: DD-JT60TF-NCO

SHEET SIZE	FIRST ANGLE PROJECTION	WBS 3 LEVELS	Drawing Number	SHEET	REVISION	MATURITY
A1		01 03 01	503004	01 /01	00	

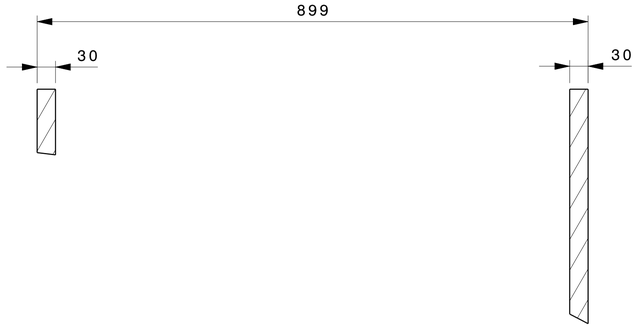
DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



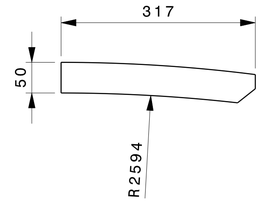
Front view terminal plates
Scale: 1:5



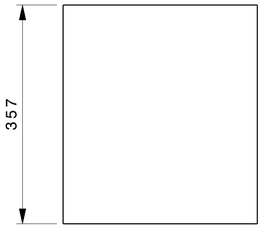
Left view terminal plates
Scale: 1:5



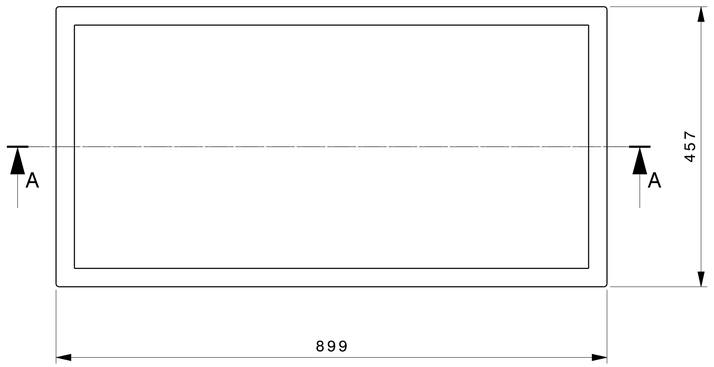
Section A-A
Scale: 1:5



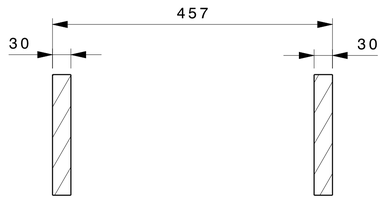
Front view closure plate
Scale: 1:5



Top view closure plate
Scale: 1:5

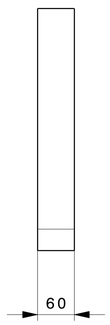


Top view terminal plates
Scale: 1:5

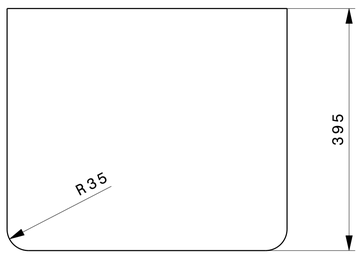


Section B-B
Scale: 1:5

SUPPORT RETENTION PLATE



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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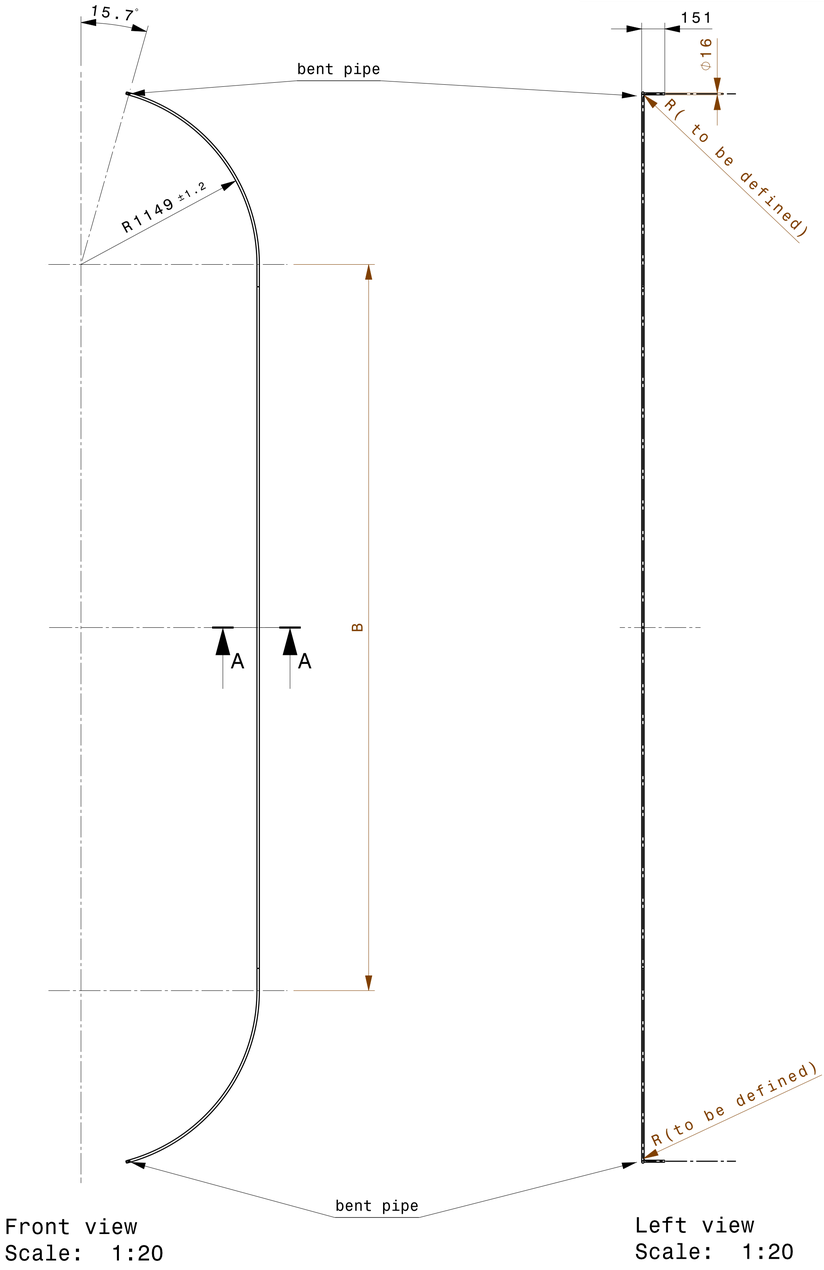
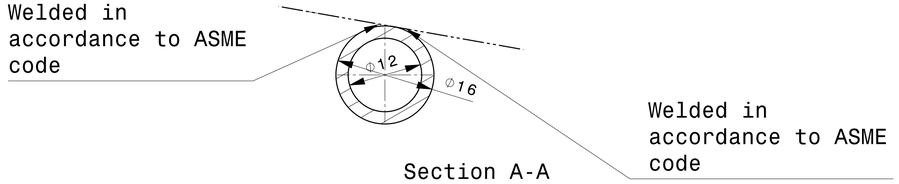
	REVIEWED BY	DRAWING TITLE	Miscellaneous Components Toroidal Field Coil
REV DATE	CHECKED BY		
	CONTROLLED BY A.CUCCHIARO		
FIRST ISSUE DATE 10-11-2011	SCALE NTS	DRAWN BY G. BROLATTI	CODE ENEA ID: DD-JT60TF-NCO
SHEET SIZE A1	FIRST ANGLE PROJECTION	WBS 3 LEVELS 01 03 01	Drawing Number 503005
SHEET 01 /01	REVISION 00	MATURITY	

DIMENSIONS RELATE TO ROOM TEMPERATURE (293K)



Front view
Scale: 1:20

Left view
Scale: 1:20



Section A-A
Scale: 2:1

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
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REV DATE		DRAWING TITLE	Inner He Cooling Layout Toroidal Field Coil
FIRST ISSUE DATE 10-11-2011	SCALE NTS	CODE ENEA ID:	DD-JT60TF-NCO
SHEET SIZE A1	FIRST ANGLE PROJECTION	WBS 3 LEVELS	0 1 0 3 0 1
Drawing Number	503006	SHEET 01 /01	REVISION 00 MATURITY