

# RT magnet design, fabrication and testing

Attilio Milanese



CAS course on Normal- and Superconducting Magnets

19 Nov. – 2 Dec. 2023

St. Pölten, Austria

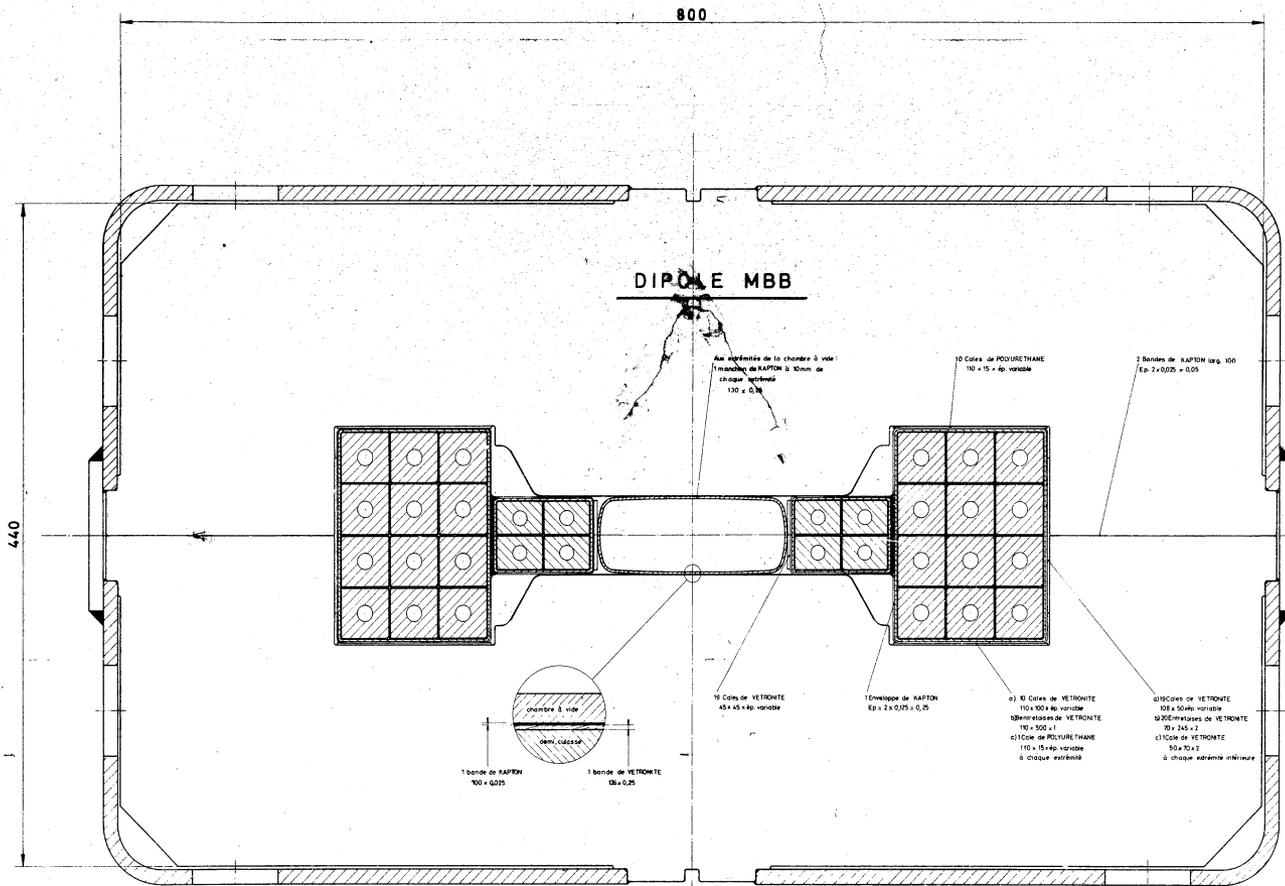
# Gallery of cross-sections







# SPS main bending MBB



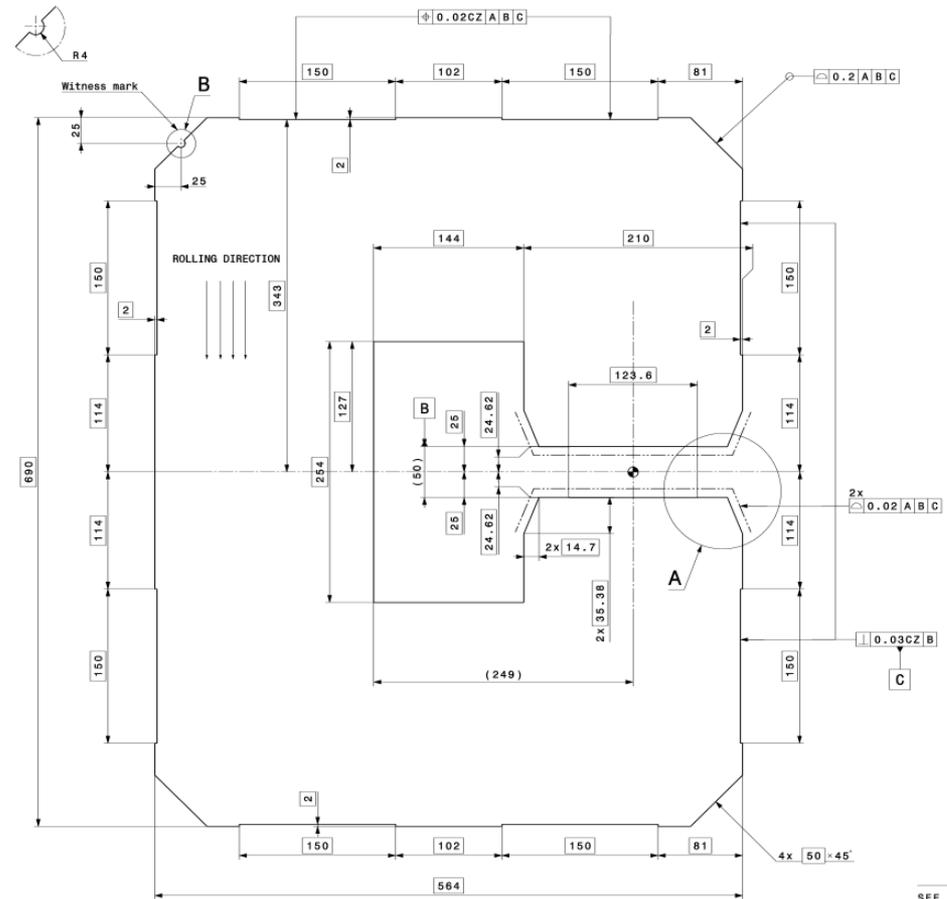
C) Mix & pour selon exécution  
 B) supprimer réservoirs libel  
 A) Modifier selon variations des sites

Titre: <b>DIPÔLE MBB</b> N°: <b>8011-2002-01</b> Date: <b>1982-11-22</b>		Révisé: <b>1</b> Approuvé: <b>1</b> Date: <b>1982-11-22</b>
Description: <b>CROSS-SECTION</b>		N°: <b>8011-2002-01</b> Date: <b>1982-11-22</b>
Laboratoire: <b>LAB II</b>		N°: <b>8011-2002-01</b> Date: <b>1982-11-22</b>
CERN		1982-11-22

# HIE-ISOLDE 45° bending

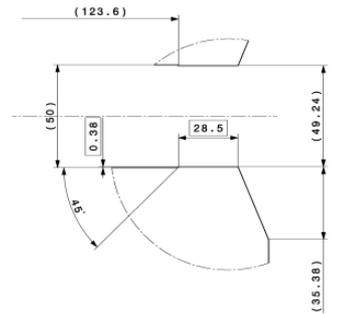
**Detail B**

Scale: 1:1



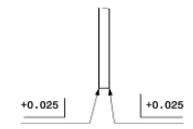
**Detail A**

Scale: 1:1



**Detail C**

Scale: 5:1



ISO 10579-NR

Flatness under stress: the lamination is held on all its area with a distributed force F=200N.  
 Planéité sous Contraintes: la lamination est maintenue sur toute sa surface avec une force distribuée de F=200N.

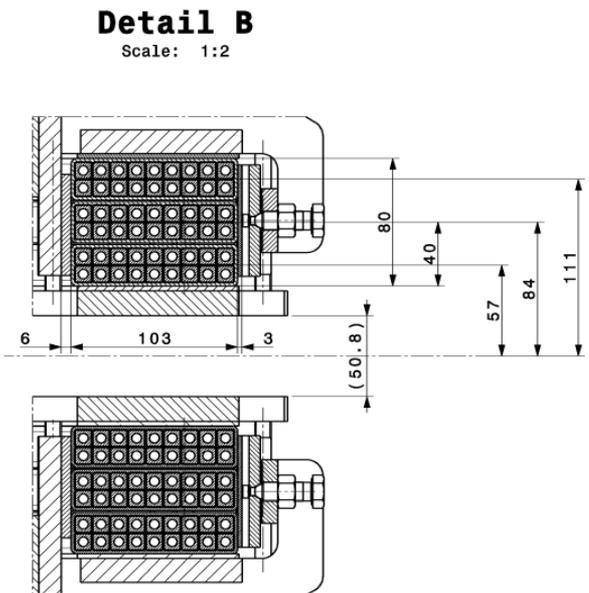
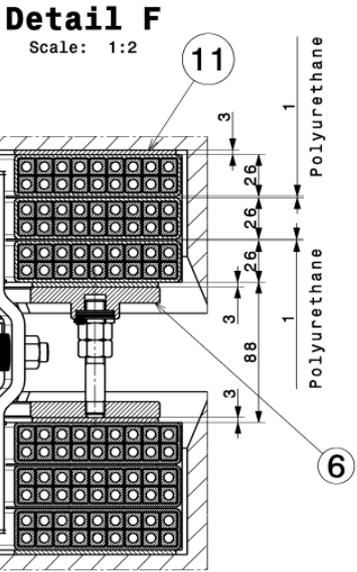
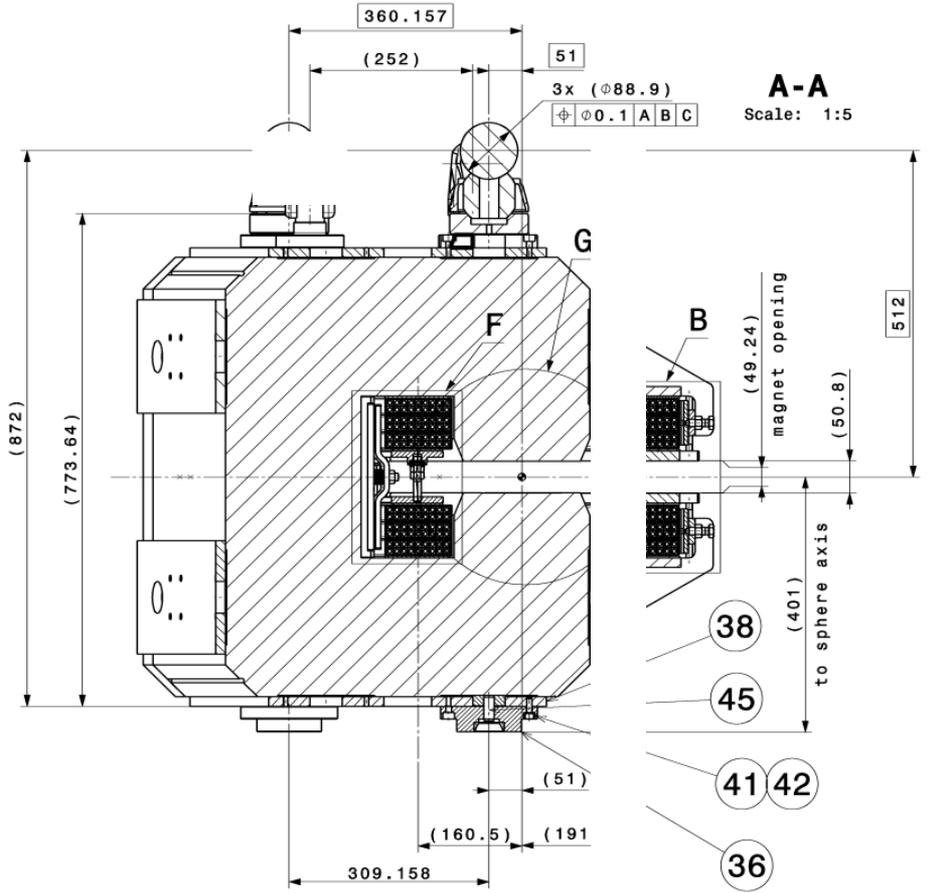
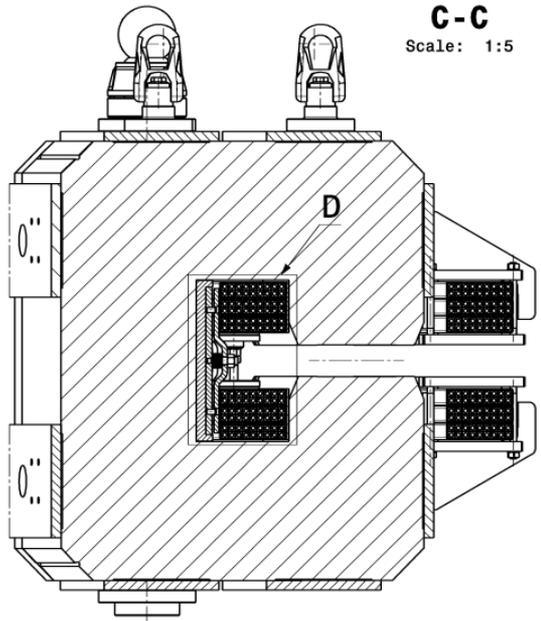
Mass: 2.6Kg

QTY	DESCRIPTION	POS.	MAT.	OBSERVATIONS	REF. GER.
1	Steel				
ENCL. A05		D. ENG/S. A05			
ISO 2768-MK	Re 0.8	ISO 13715	ISO 3	ISO 3	
Bending magnet, 45° HIE Isolde		SCALE	CONTROLLED	M. TIMMONS	2012-10-27
HEBT DIPOLE MAGNET 45		SCALE	CONTROLLED	I. GENTILE	2013-08-15
YOKE LAMINATION		SCALE	APPROVED	J. BAULE	2013-08-15
HEBT AIMANT DIPOLE 45		SCALE	DWS Document Number: STD430125_04		
LAMINATION CULASSE		SCALE	REVISED		
DRAWN BY		PROJECT ENGINEER	FBR	TENDER	1
CHECKED BY		ISLMBHEM0004		1	B

GERAT, MARILL, TSAMER  
 CONSTRUCTION DE LA PROJECTION  
 PROJECTIONS DE LA PROJECTION

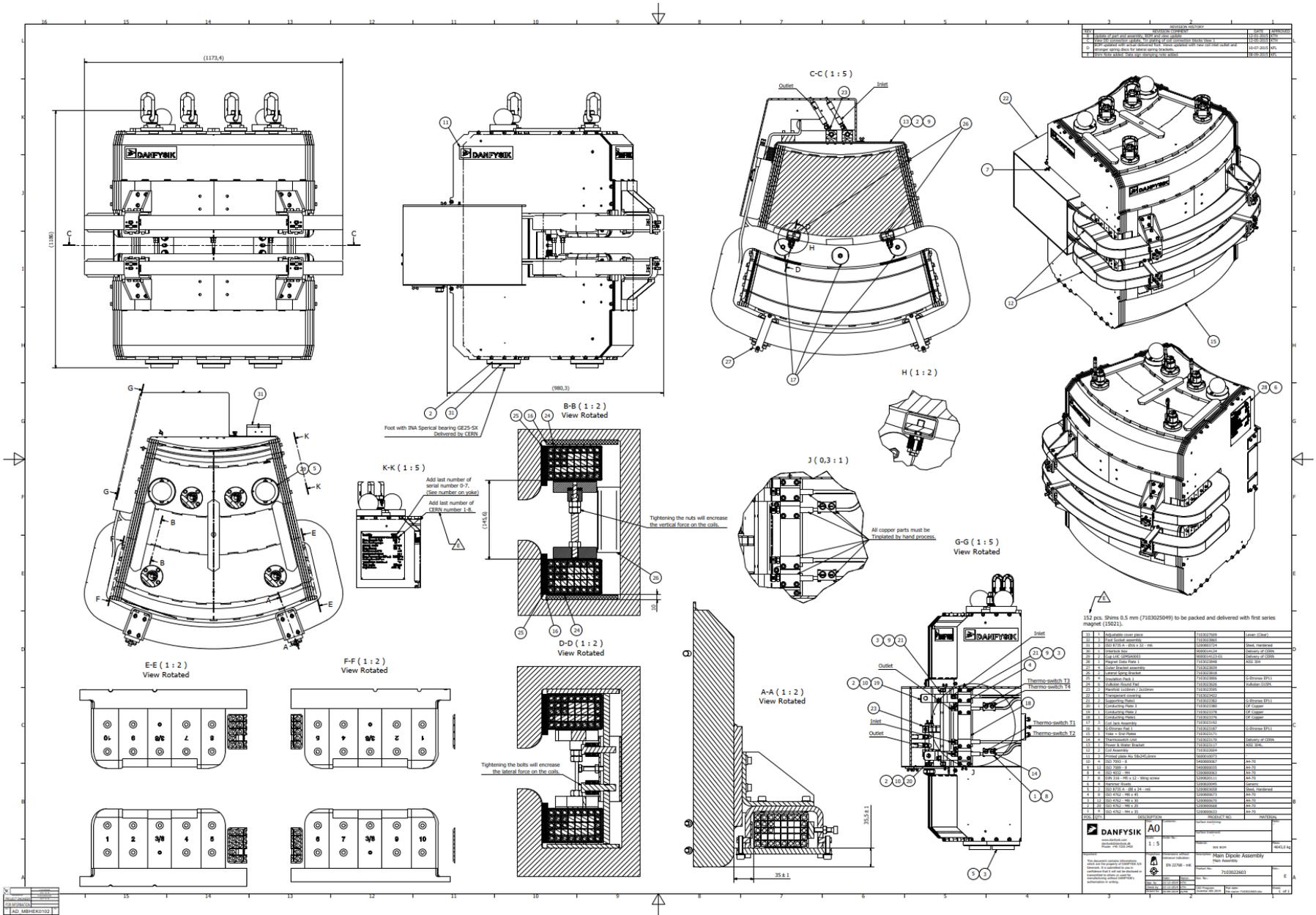
IND.	DATE	NOM/NOME	ZONE	MODIFICATION
B	2013-08-06	A. KUMAR		POLE SHAPE CHANGED
A	2013-08-02	M. TIMMONS		Note added

# HIE-ISOLDE 45° bending



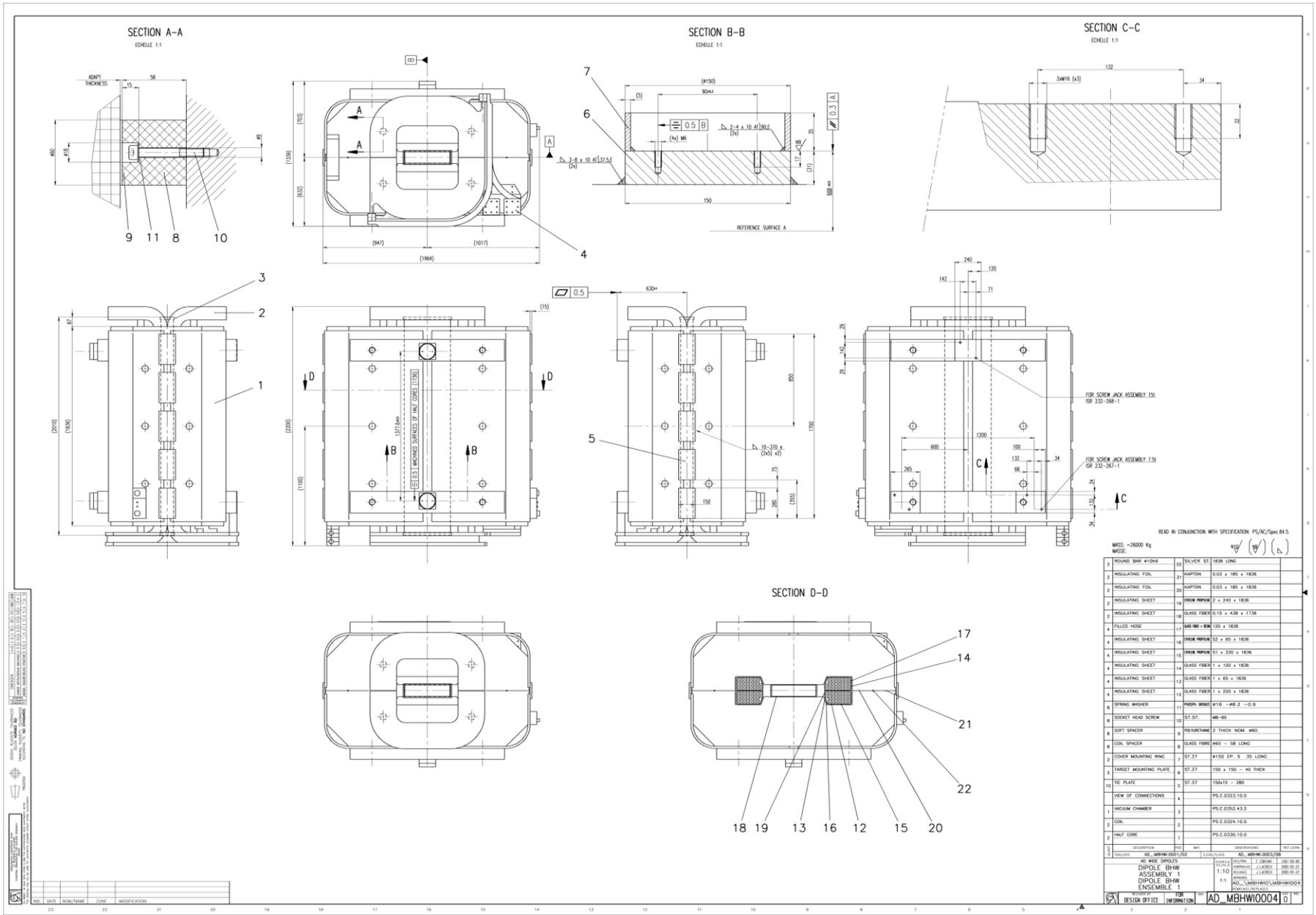


# ELENA main bending





# AD main bending, wide version

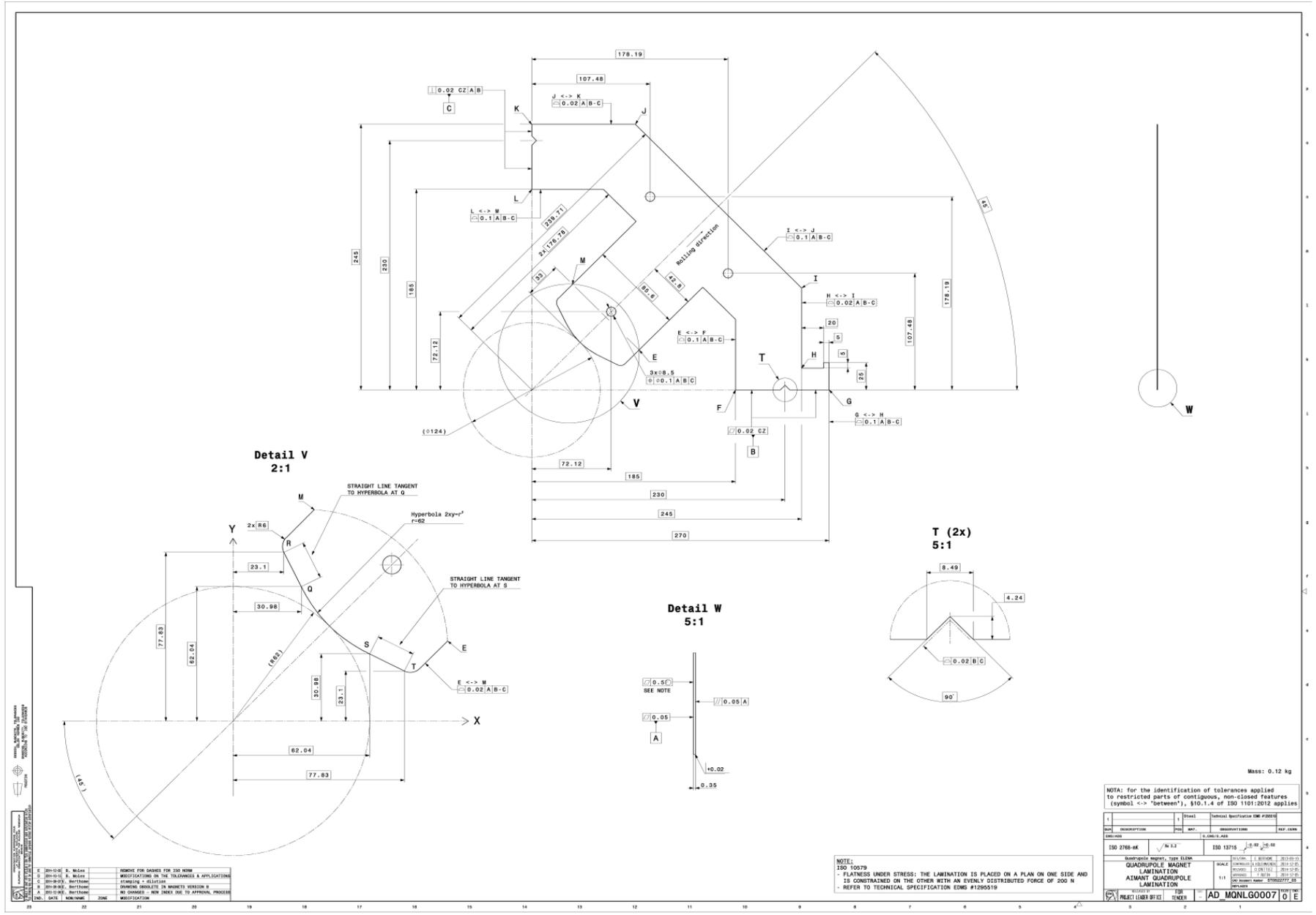




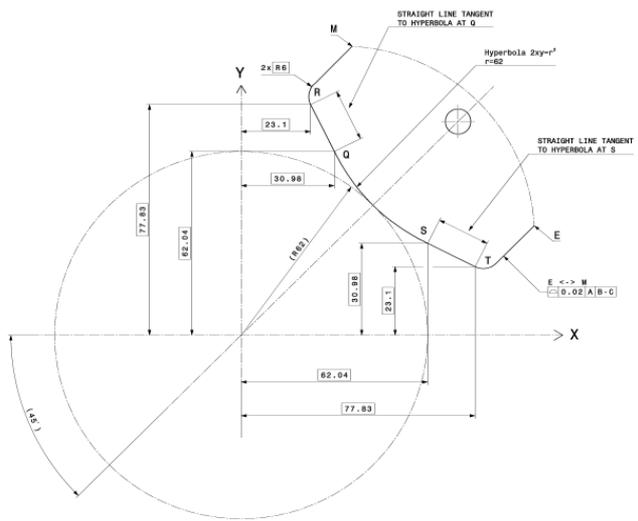




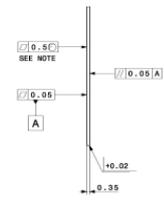
# ELENA main quadrupole



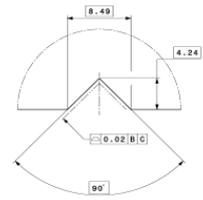
**Detail V**  
2:1



**Detail W**  
5:1



**T (2x)**  
5:1



Mass: 0.12 kg

NOTE: for the identification of tolerances applied to restricted parts of contiguous, non-closed features (symbol <-> 'between'), §10.1.4 of ISO 1101:2012 applies

NO.	DESCRIPTION	REV.	DATE	REVISIONS	REF. DESIG.
1					

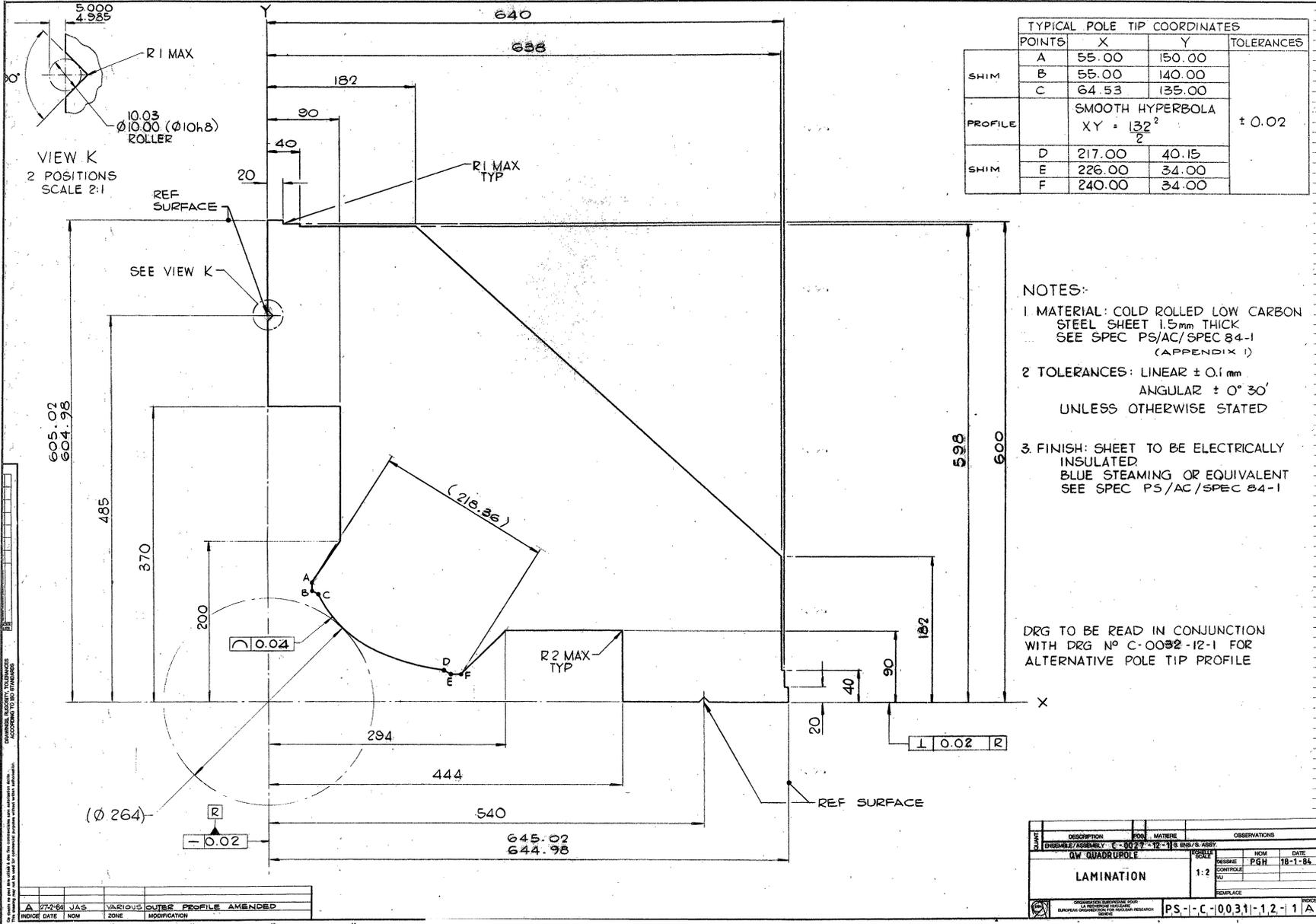
ISO 2768-MK	√/M 2.2	ISO 13715	√/S-MP 0.5-M
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NOTE:  
ISO 10579  
FLATNESS UNDER STRESS: THE LAMINATION IS PLACED ON A PLAIN ON ONE SIDE AND IS CONSTRAINED ON THE OTHER WITH AN EVENLY DISTRIBUTED FORCE OF 200 N  
REFER TO TECHNICAL SPECIFICATION EDMS #1285519

PROJECT LEADER BY DES: TENDER: AD MNLG0007 0 E

NO.	DATE	REV.	DESCRIPTION
1			

# AD main quadrupole, wide version



TYPICAL POLE TIP COORDINATES				
POINTS	X	Y	TOLERANCES	
SHIM	A	55.00	150.00	± 0.02
	B	55.00	140.00	
	C	64.53	135.00	
PROFILE	SMOOTH HYPERBOLA			
	$XY = \frac{132^2}{2}$			
SHIM	D	217.00	40.15	
	E	226.00	34.00	
	F	240.00	34.00	

- NOTES:
- MATERIAL: COLD ROLLED LOW CARBON STEEL SHEET 1.5mm THICK  
SEE SPEC PS/AC/SPEC 84-1 (APPENDIX 1)
  - TOLERANCES: LINEAR ± 0.1 mm  
ANGULAR ± 0° 30'  
UNLESS OTHERWISE STATED
  - FINISH: SHEET TO BE ELECTRICALLY INSULATED  
BLUE STEAMING OR EQUIVALENT  
SEE SPEC PS/AC/SPEC 84-1

DRG TO BE READ IN CONJUNCTION WITH DRG N° C-0032-12-1 FOR ALTERNATIVE POLE TIP PROFILE

INDICE	DATE	NOM	ZONE	MODIFICATION
A	27-84	JAS	VARIOUS	OUTER PROFILE AMENDED

DESCRIPTION	POLE	MATERIAL	OBSERVATIONS	
AD QUADRUPOLE			DESIGNER	NOM
LAMINATION			CONTROL	DATE
	1:2		PGH	18-1-84
REPLACE				

