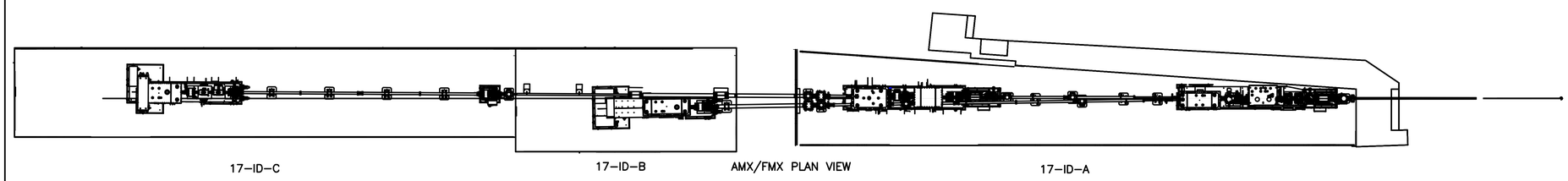
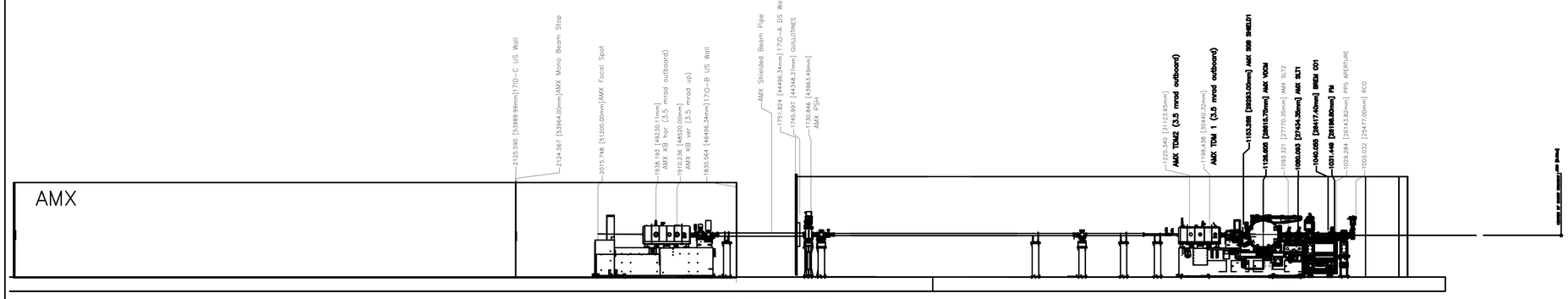
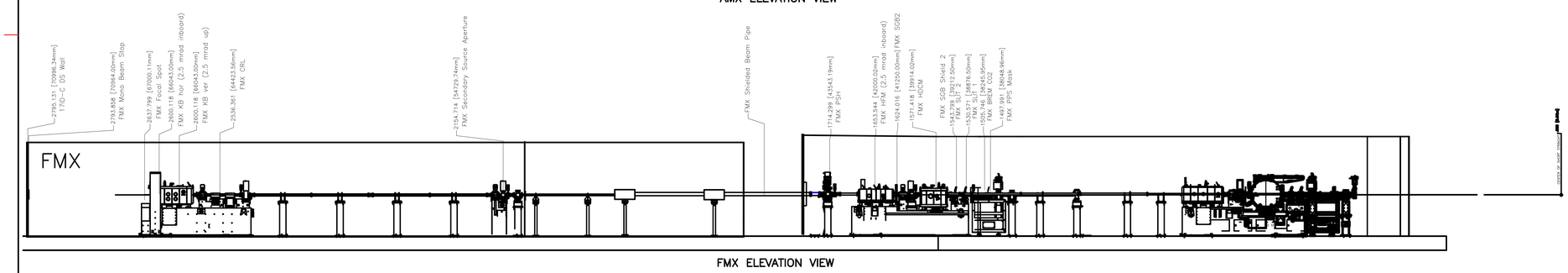
REVISION HISTORY					
REV	DESCRIPTION	DATE	DESIGNER	CHECKED BY	ENGINEER
A	RELEASE PER ECO 003527	12/2015	J.FABIJANIC	C.STELMACH	D.BHOGADI







NOTES:
1. FE REFERENCE DRAWING SR-FE-IVU17-1001 REV.C.
2. THE CENTER OF STRAIGHT IS THE ORIGIN FOR ALL DIMENSIONS UNLESS OTHERWISE NOTED.
3. BLUE AND MAGENTA COLORED RAYS ARE DETERMINED BY TOLERANCED APERTURES.
4. GREEN COLORED RAYS ARE DETERMINED BY NOMINAL APERTURES.
5. AMX FOCAL SPOT DOWNSTREAM OF KB MIRROR IS AT Y=1448.8 mm.
6. FMX FOCAL SPOT DOWNSTREAM OF KB MIRROR IS AT Y=1405.9 mm.

SPECIFICATIONS		REFERENCE
Project	ABBIX PROJECT	AB–C–XFD–RSI–001
Source	IVU 17–1.5m	AB–C–XFD–RSI–001
Beam Line Name	Highly Automated and Frontier Macro Molecular Crystallography Beamlines	AB–C–XFD–RSI–001
Abbreviation	AMX/FMX	AB–C–XFD–RSI–001
Period of Insertion Device	21 mm	AB–C–XFD–RSI–001
Long / Short Straight / Cell	SHORT, 17–ID	AB–C–XFD–RSI–001
Canting Angle	2.0 mrad	AB–C–XFD–RSI–001
Length of Source	1500 mm	AB–C–XFD–RSI–001
Location of Center of Sources (from Center of Straight)	D/S 1.321m U/S 1.305m	AB–C–XFD–RSI–001
Ray Tracing Procedure		PS–C–XFD–PRC–008 (Version 2)
Front End Ray Tracing Drawing		SR–FE–MU17–1001 (REV. C)

ABBREVIATIONS:
BREM CO - BREMSSTRAHLUNG COLLIMATOR
BREM STOP - BREMSSTRAHLUNG STOP
CRL - COMPOUND REFRACTIVE LENS
HDCM - HORIZONTAL OFFSET DOUBLE CRYSTAL MONOCHROMATOR (FMX)
VDCM - VERTICAL OFFSET DOUBLE CRYSTAL MONOCHROMATOR (AMX)
DS - DOWNSTREAM
FM - FIXED MASK
SSA - SECONDARY SOURCE APERTURE
US - UPSTREAM
WBS - WHITE BEAM STOP
HFM - HORIZONTAL FOCUSING MIRROR
TDM - TANDEM DEFLECTING MIRROR
SGB - SECONDARY GAS BREMSSTRAHLUNG SHIELD
FMX - FRONTEIR MACROMOLECULAR CRYSTALLOGRAPHY
AMX - HIGHLY AUTOMATED MACROMOLECULAR CRYSTALLOGRAPHY
PSH - PHOTON SHUTTER

AMX/FMX (17–ID) BEAMLINE LAYOUT
SCALE: 1:50

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
DIMENSIONS IN BRACKETS [xx.xx] ARE IN MILLIMETERS
ARE REFERENCE ONLY AND ARE FOR REFERENCE ONLY
INTERPRET DRAWING AS PER ANSI Y14.5M-1994 OR ISO 128-2-1975
DIMENSIONAL TOLERANCE: X ± 0.005, XX ± 0.030, XXX ± 0.015, XXXX ± 0.005
ANGULAR TOLERANCE: ± 1/2°
DEBURR & SHARP CORNERS 0.005 MIN. TO 0.020 MAX.
FINISH: 125

BROOKHAVEN NATIONAL LABORATORY
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK 11973
Exploring Life's Mysteries
Innovating the Future

DRAWN BY	J.FABIJANIC	12/2015
CHECKED BY	C.STELMACH	12/2015
ENGINEER	D.BHOGADI	12/2015
DESIGNER	J.FABIJANIC	12/2015
PROJECT ENGINEER	M.CARLUCI	12/2015
PROJECT MANAGER	J.BHOGADI	12/2015
PROJECT DIRECTOR	D.BHOGADI	12/2015
PROJECT SPONSOR	M.Bonnemeier	12/2015
NEXT ASSY:		
PROJECT: ABBIX		

NSLS II NATIONAL SYNCHROTRON LIGHT SOURCE II
PHOTON DIVISION
AMX/FMX (17-ID) BEAMLINE
RAYTRACE LAYOUT

SIZE E	PD-AMX-FMX-RAYT-0001	REV A
SHEET NO.	DRAWING NO. / NAME	REVISION
ESH&Q RISK LEVEL A1		SHEET 1 OF 9

WBS# | SCALE: AS NOTED | DO NOT SCALE DRAWING

RELEASED – EFFECTIVE

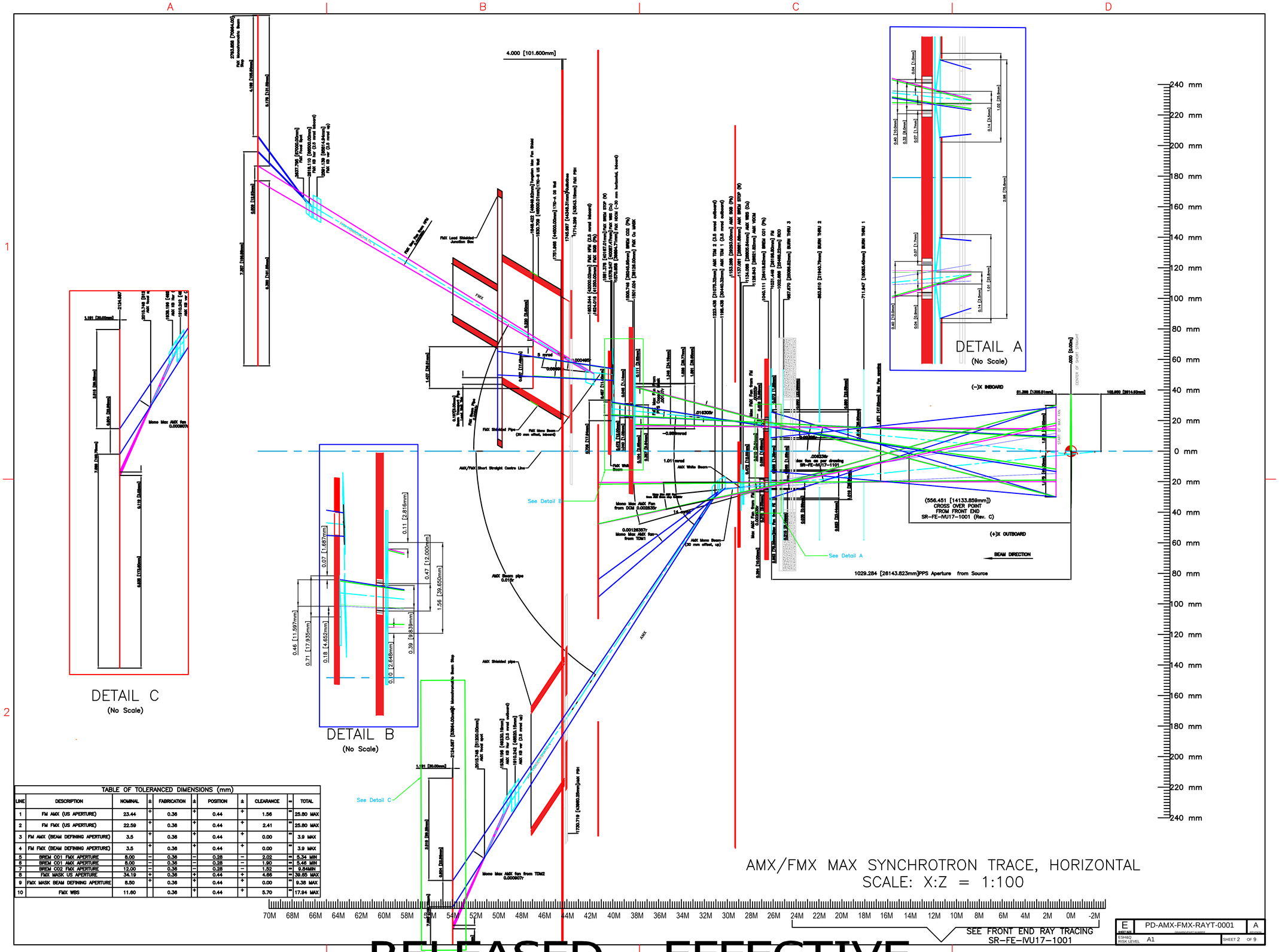


TABLE OF TOLERANCED DIMENSIONS (mm)

LINE	DESCRIPTION	NOMINAL	±	FABRICATION	±	POSITION	±	CLEARANCE	=	TOTAL
1	FM AMX (US APERTURE)	23.44	+	0.36	+	0.44	+	1.56	=	25.80 MAX
2	FM FMX (US APERTURE)	22.59	+	0.36	+	0.44	+	2.41	=	25.80 MAX
3	FM AMX (BEAM DEFINING APERTURE)	3.5	+	0.36	+	0.44	+	0.00	=	3.9 MAX
4	FM FMX (BEAM DEFINING APERTURE)	3.5	+	0.36	+	0.44	+	0.00	=	3.9 MAX
5	BREM C01 FMX APERTURE	8.00	−	0.36	−	0.28	−	2.02	=	5.34 MIN
6	BREM C01 AMX APERTURE	8.00	−	0.36	−	0.28	−	1.90	=	5.46 MIN
7	BREM C02 FMX APERTURE	12.00	−	0.36	−	0.28	−	1.52	=	9.84MIN
8	FMX MASK US APERTURE	34.19	+	0.36	+	0.44	+	4.66	=	39.65 MAX
9	FMX MASK BEAM DEFINING APERTURE	8.50	+	0.36	+	0.44	+	0.00	=	9.38 MAX
10	FMX WBS	11.60		0.36	+	0.44	+	5.70	=	17.94 MAX

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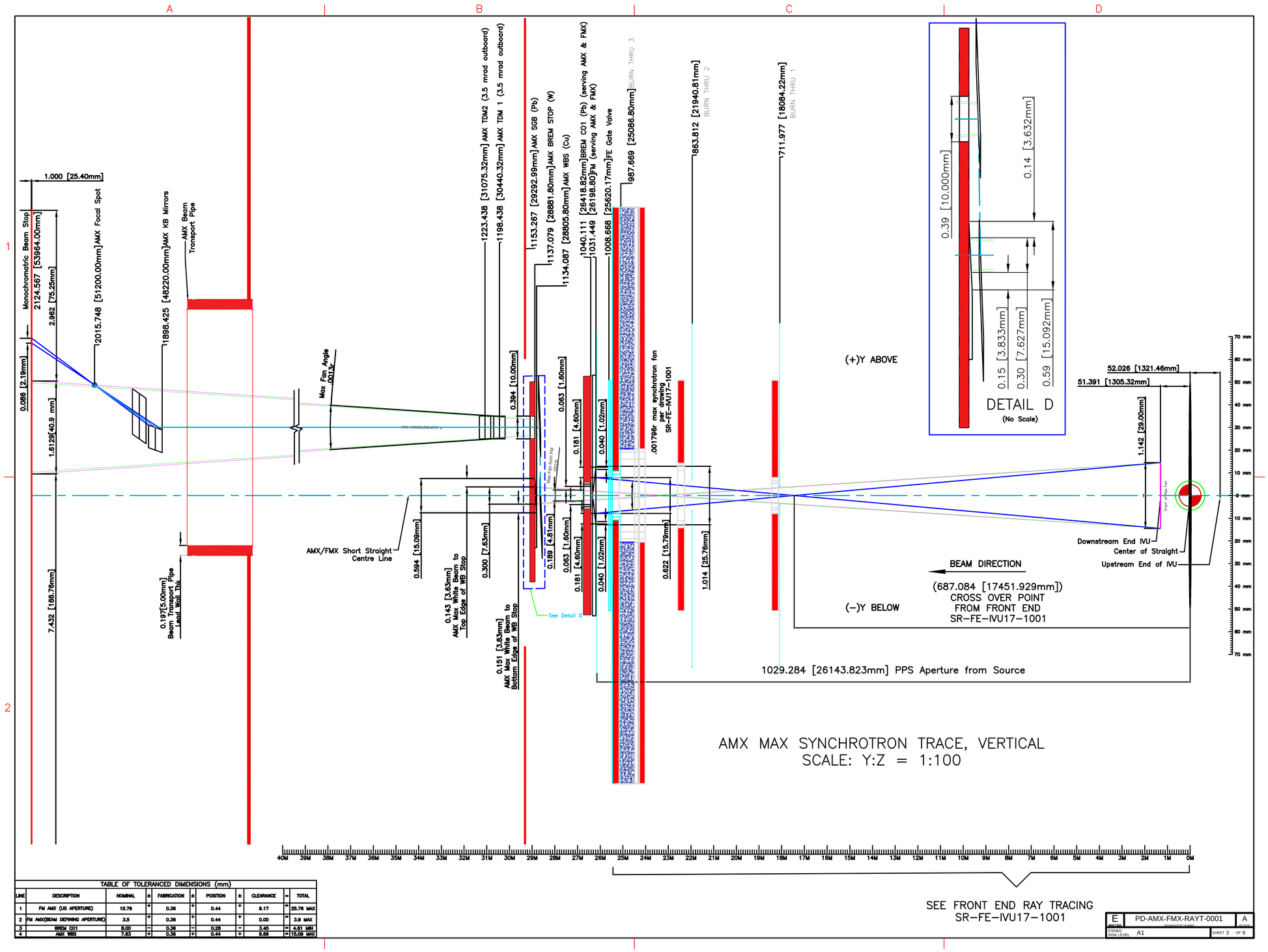

TABLE OF TOLERANCED DIMENSIONS (mm)

LINE	DESCRIPTION	NOMINAL	±	FABRICATION	±	POSITION	±	CLEARANCE	=	TOTAL
1	FM AMX (US APERTURE)	15.79	+	0.36	+	0.44	+	9.17	=	25.76 MAX
2	FM AMX(BEAM DEFINING APERTURE)	3.5	+	0.36	+	0.44	+	0.00	=	3.9 MAX
3	BREM C01	8.00	−	0.36	−	0.28	−	3.45	=	4.81 MIN
4	AMX WBS	7.63	+	0.36	+	0.44	+	6.66	=	15.09 MAX

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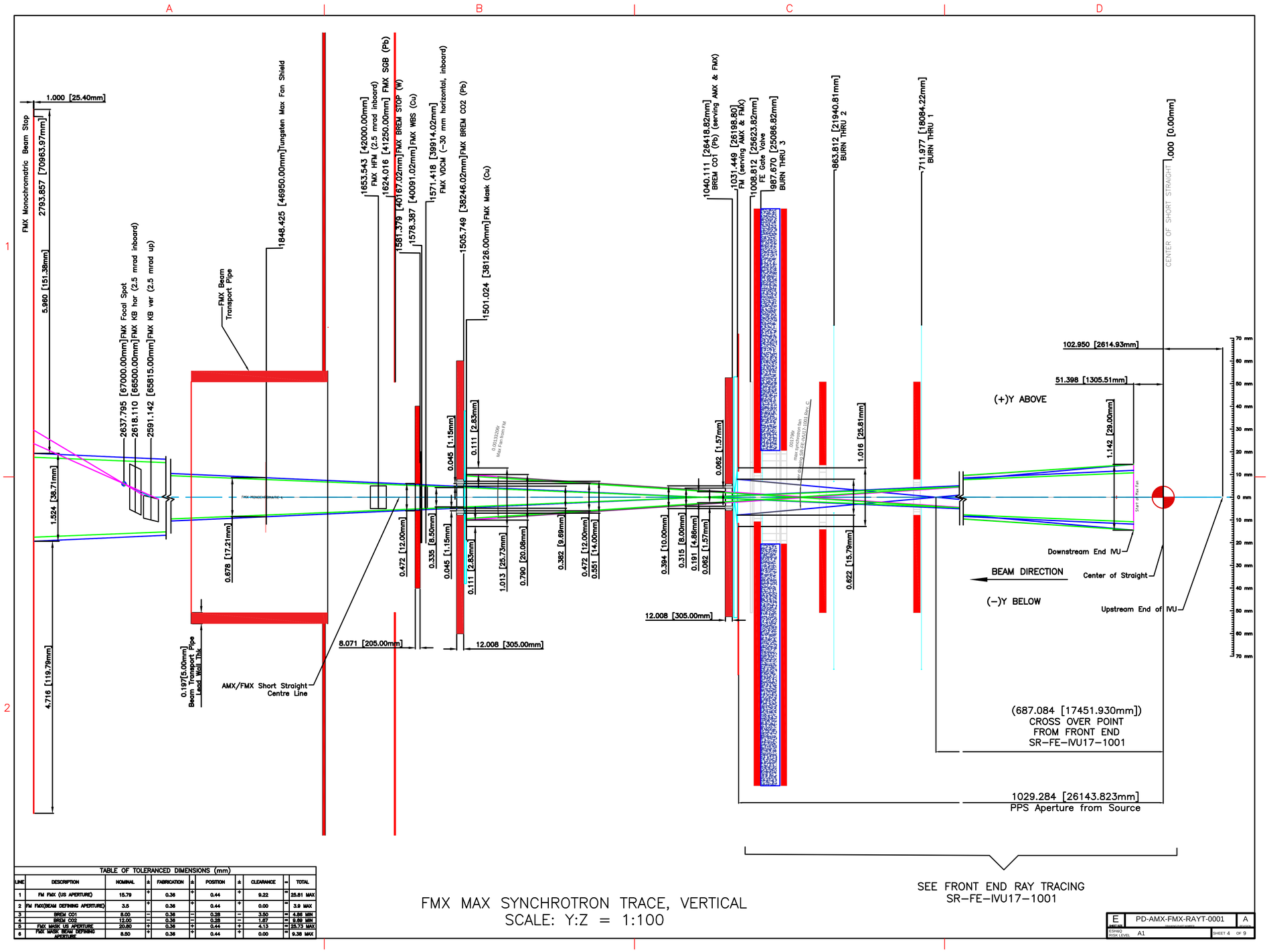

TABLE OF TOLERANCED DIMENSIONS (mm)

LINE	DESCRIPTION	NOMINAL	±	FABRICATION	±	POSITION	±	CLEARANCE	=	TOTAL
1	FM FMX (US APERTURE)	15.79	+	0.36	+	0.44	+	9.22	=	25.81 MAX
2	FM FMX(BEAM DEFINING APERTURE)	3.5	+	0.36	+	0.44	+	0.00	=	3.9 MAX
3	BREM CO1	8.00	±	0.36	±	0.28	±	3.50	=	4.86 MIN
4	BREM CO2	12.00	±	0.36	±	0.28	±	1.67	=	9.69 MIN
5	FMX MASK US APERTURE	20.80	+	0.36	+	0.44	+	4.13	=	25.73 MAX
6	FMX MASK BEAM DEFINING APERTURE	8.50	+	0.36	+	0.44	+	0.00	=	9.38 MAX

RELEASED — EFFECTIVE

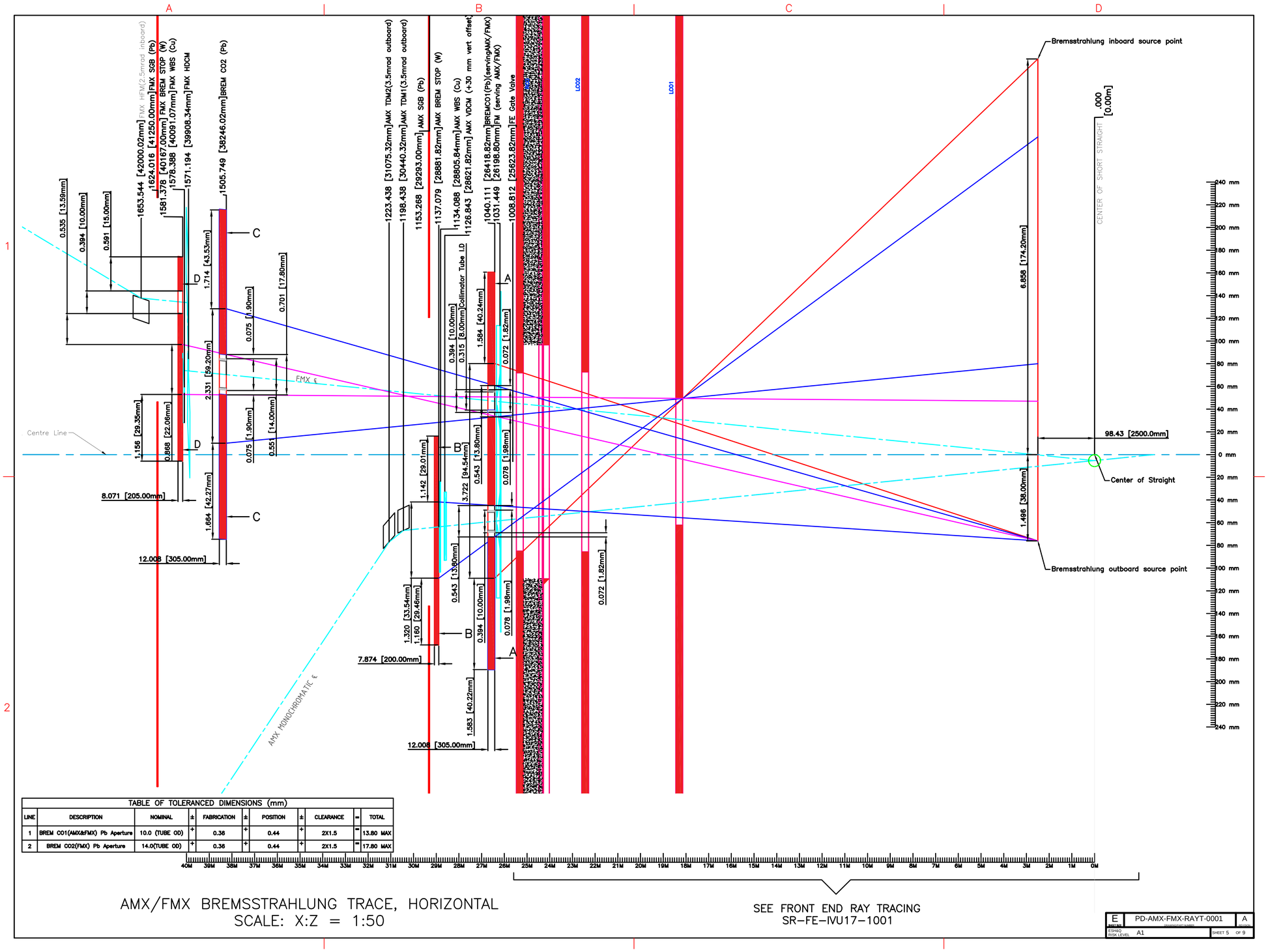

TABLE OF TOLERANCED DIMENSIONS (mm)										
LINE	DESCRIPTION	NOMINAL	±	FABRICATION	±	POSITION	±	CLEARANCE	=	TOTAL
1	BREM CO1(AMX&FMX) Pb Aperture	10.0 (TUBE OD)	+	0.36	+	0.44	+	2X1.5	=	13.80 MAX
2	BREM CO2(FMX) Pb Aperture	14.0(TUBE OD)	+	0.36	+	0.44	+	2X1.5	=	17.80 MAX

AMX/FMX BREMSSTRAHLUNG TRACE, HORIZONTAL
SCALE: X:Z = 1:50

SEE FRONT END RAY TRACING
SR–FE–IVU17–1001

E	PD-AMX-FMX-RAYT-0001	A
ESH&Q RISK LEVEL A1	SHEET 5 OF 9	

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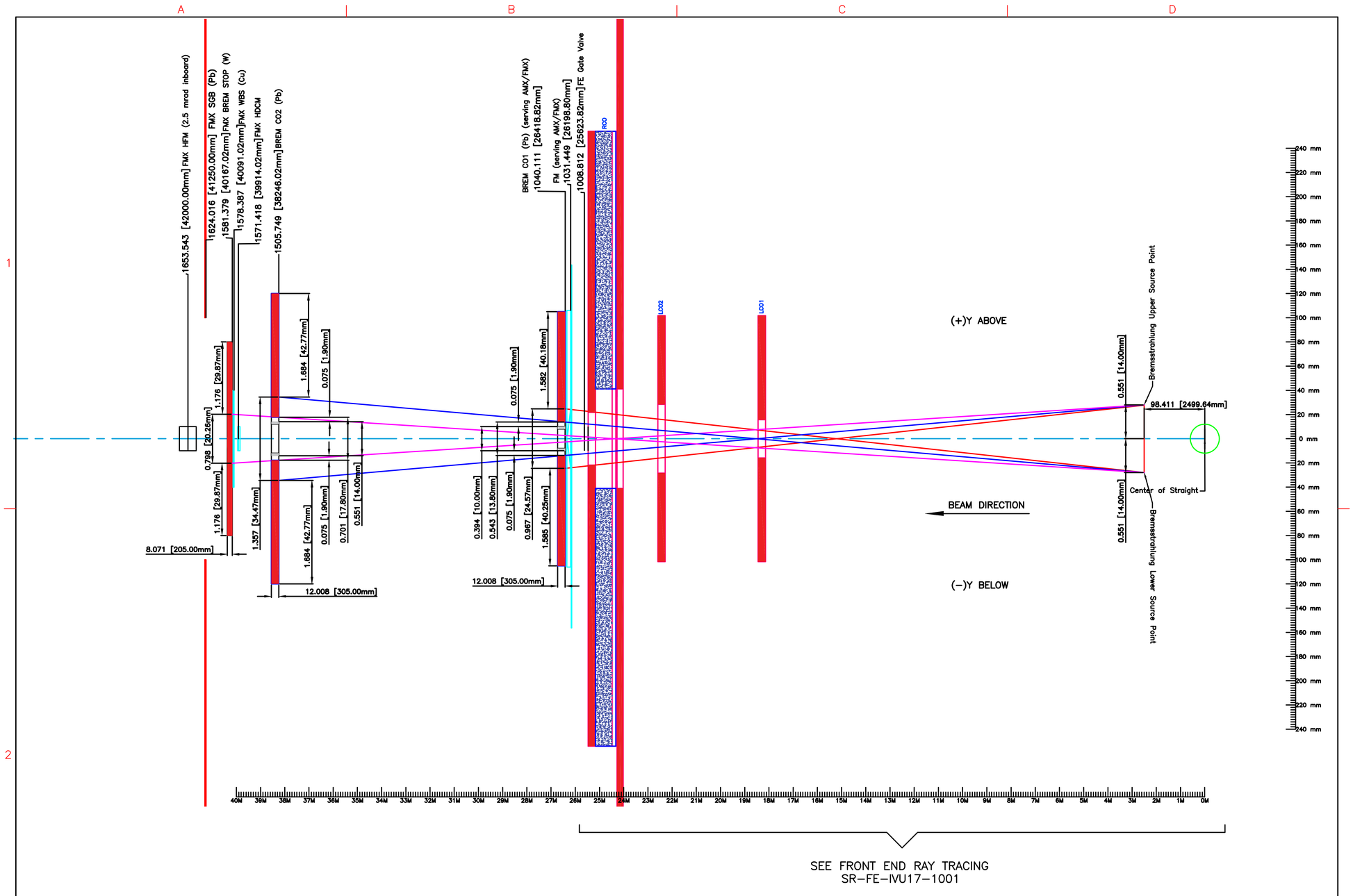

TABLE OF TOLERANCED DIMENSIONS (mm)

LINE	DESCRIPTION	NOMINAL	±	FABRICATION	±	POSITION	±	CLEARANCE	=	TOTAL
1	BREM CO1 Pb Aperture	10.0 (TUBE OD)	+	0.36	+	0.44	+	2X1.5	=	13.80 MAX
2	BREM CO2 Pb Aperture	14 (TUBE OD)	+	0.36	+	0.44	+	2X1.5	=	17.80 MAX

FMX BREMSSTRAHLUNG TRACE, VERTICAL
SCALE: Y:Z = 1:50

E	PD-AMX-FMX-RAYT-0001	A
ESH&Q RISK LEVEL A1		SHEET 6 OF 9

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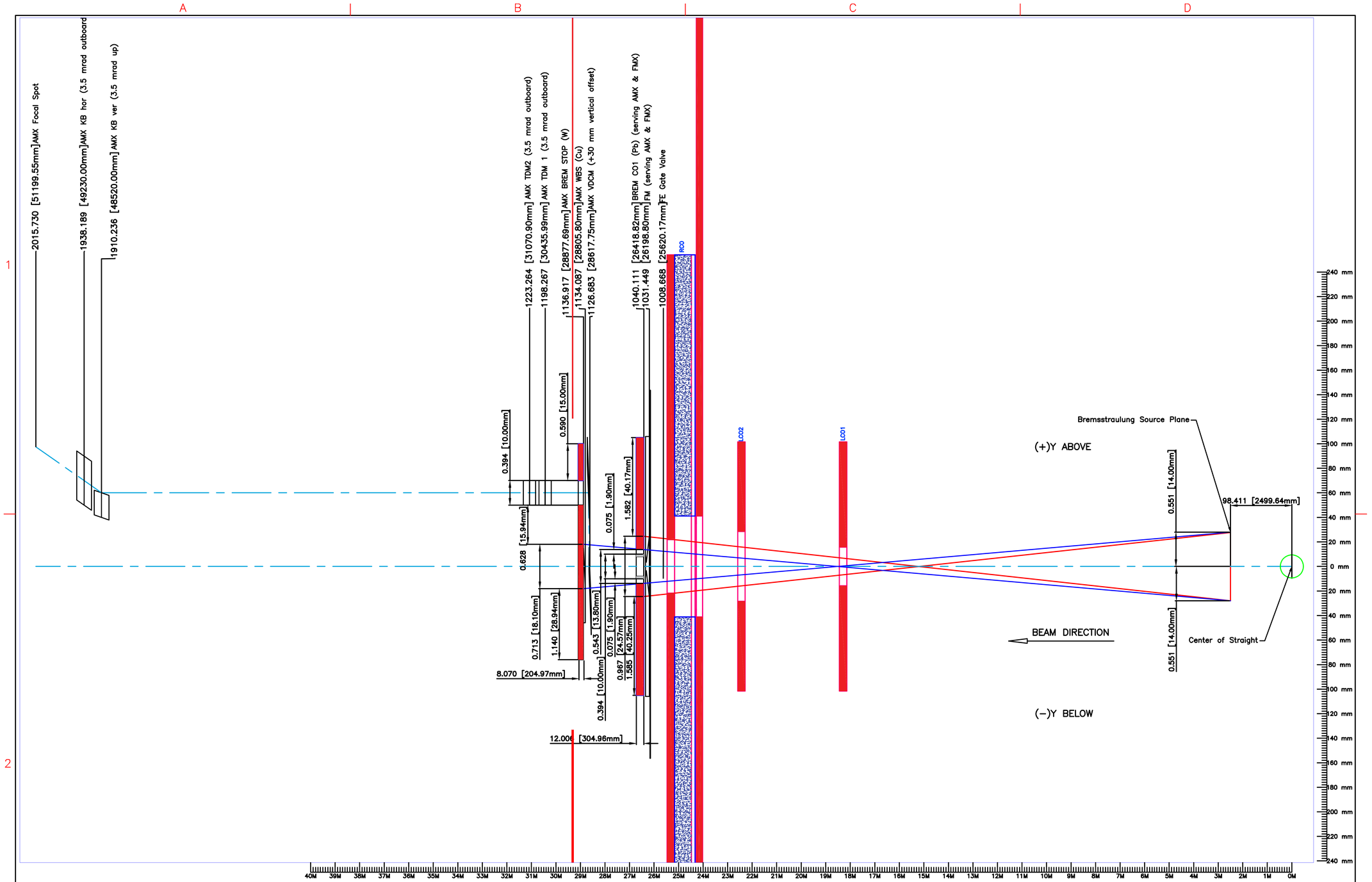

SEE FRONT END RAY TRACING
SR−FE−IVU17−1001

AMX BREMSSTRAHLUNG TRACE, VERTICAL
SCALE: Y:Z = 1:50

TABLE OF TOLERANCED DIMENSIONS (mm)

LINE	DESCRIPTION	NOMINAL	±	FABRICATION	±	POSITION	±	CLEARANCE	=	TOTAL
1	BREM C01 Pb Aperture	10.0(TUBE OD)	+	0.36	+	0.44	+	2X1.5	=	13.80 MAX

E	PD-AMX-FMX-RAYT-0001	A
ESH&Q RISK LEVEL A1	SHEET 7 OF 9	

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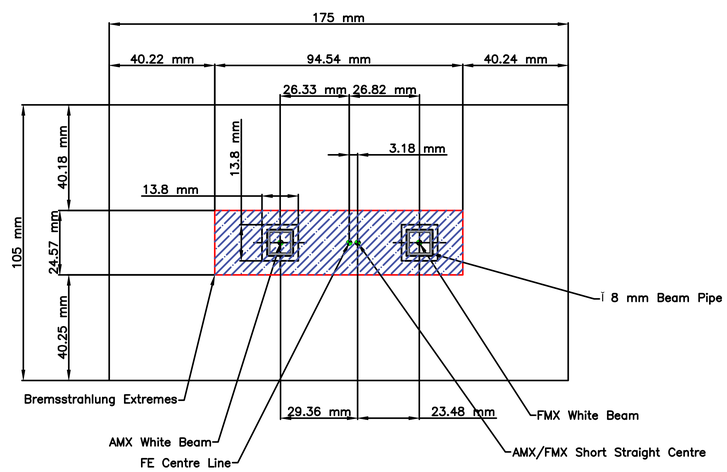
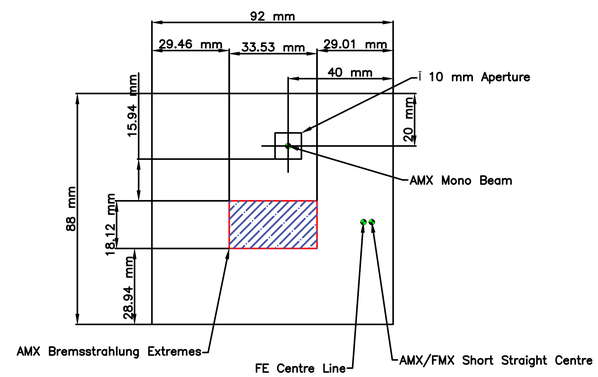
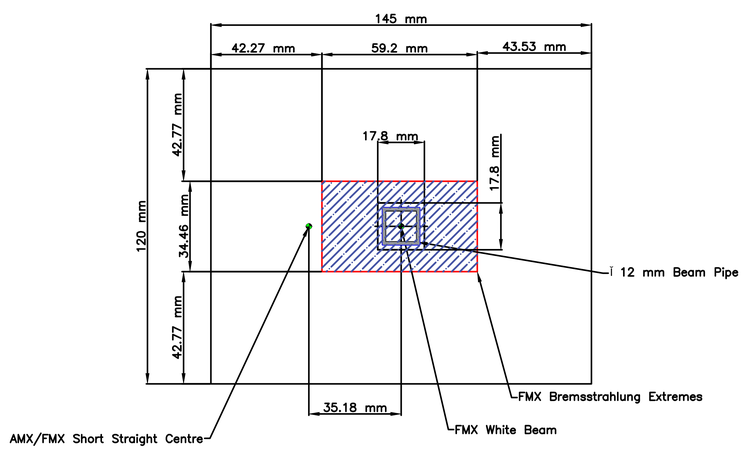
View Looking Downstream
AMX/FMX Brem Co 1 (Lead)
View – A – @ 26,418.8 mm



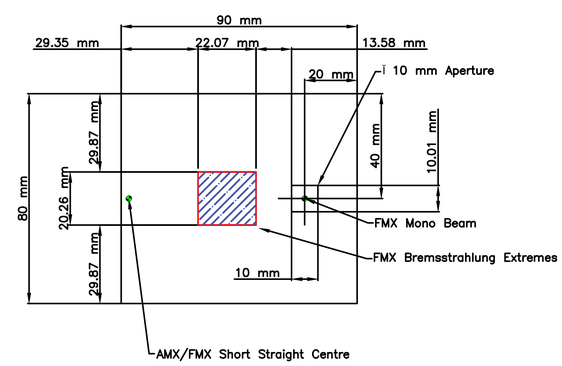
View Looking Downstream
AMX Brem Stop (Tungsten)
View –B – @ 28,881.8 mm



View Looking Downstream
Brem Co 2 (Lead) FMX only
View – C – @ 38,246 mm



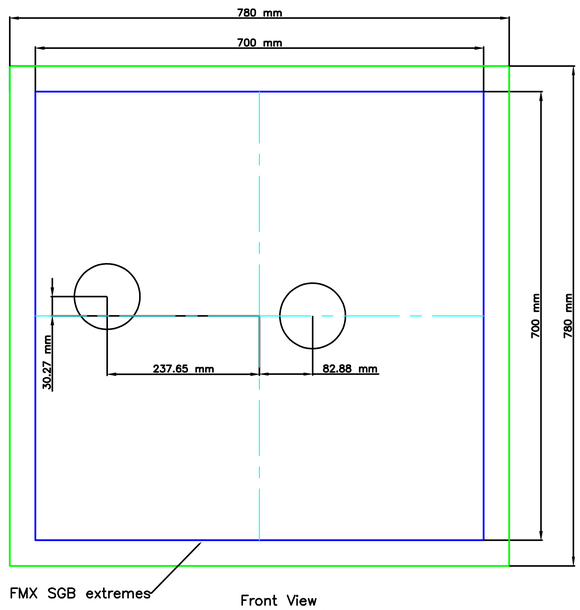
View Looking Downstream
FMX Brem Stop (Tungsten)
View – D – @ 40,167 mm



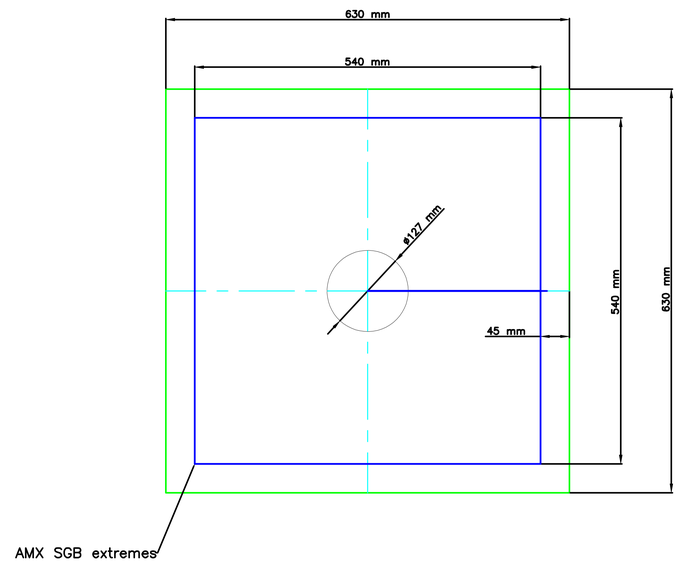
AMX & FMX BREMSSTRAHLUNG
COLLIMATORS AND STOP DETAILS

E	PD-AMX-FMX-RAYT-0001	A
ESHMO RISK LEVEL A1		SHEET 8 OF 9

RELEASED – EFFECTIVE



Front View
FMX SGB Shield (Lead)
View – A – @ 41250 mm



Front View
AMX SGB Shield (Lead)
View – A – @ 29292 mm

SECONDARY BREMSSTRAHLUNG SHEILD DETAILS

E	PD-AMX-FMX-RAYT-0001	A
ESHAQ RISK LEVEL A1		SHEET 9 OF 9

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