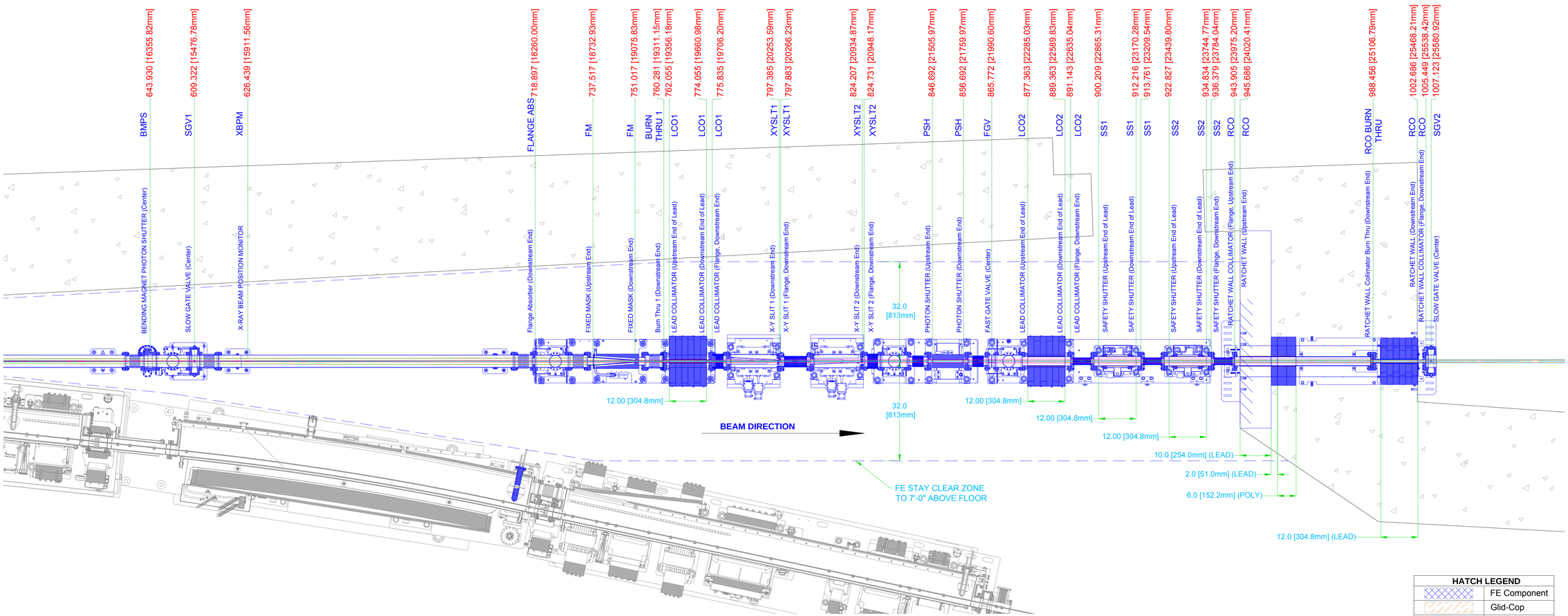
REVISION HISTORY					
REV	DESCRIPTION	DATE	DESIGNER	CHECKED BY	ENGINEER
A	RELEASE PER ECO-001884	1/2014	J.FABIJANIC	C.AMARITO	C.AMUNDSEN
B	RELEASE PER ECO-002447	10/2014	J.FABIJANIC	C.AMARITO	C.AMUNDSEN
C	RELEASE PER ECO-003057	4/2015	J.FABIJANIC	C.AMARITO	C.AMUNDSEN



HATCH LEGEND	
	FE Component
	Glid-Cop
	Lead
	Poly
	Lead (SS)

NOTE:
1. THE CENTER OF STRAIGHT IS THE ORIGIN FOR ALL DIMENSIONS UNLESS OTHERWISE NOTED.
2. BENDING MAGNET FAN NOT SHOWN, LAYOUT TO BE SUPPLIED BY VACUUM GROUP.

REFERENCES (NSLS II SHAREPOINT):
1. FRONT END SPECIFICATIONS: NSLS-II GROUP SITES > NSLS-II ACCELERATOR SYSTEMS > MECHANICAL DESIGN AND ENGINEERING > FRONT ENDS > FRONT END REQUIREMENTS.
2. NSLS II TECHNICAL NOTE NUMBER 00020 BREMSSTRAHLUNG RAY TRACING GUIDELINES OR NSLS II BEAMLINES AND FRONT ENDS.
3. NSLS II TECHNICAL NOTE NUMBER 014 PRELIMINARY SHIELDING ESTIMATES FOR NSLS II BEAMLINES AND FRONT ENDS.
4. NSLS II CONTROLLED DOCUMENT NO. NX-C-XFD-RSI-001, (VERSION 4) RSI FOR THE INSERTION DEVICES AND FRONT-ENDS FOR THE NEXT BEAMLINES.
5. ID GROUP INTERFACE CONTROL DRAWING: SR-ID-ESM-EPU-1000 REV D.
6. FRONT END RAY TRACING PROCEDURE DOC. PS-C-ASD-PRC-147 VER 4.

SPECIFICATIONS		SPEC REFERENCE
Project	NEXT	
Source	Elliptically Polarized Undulator (EPU)	NX-C-XFD-RSI-001
Beam Line Name	Electron Spectro-Microscopy	NX-C-XFD-RSI-001
Abbreviation	ESM	NX-C-XFD-RSI-001
Period of insertion device	105	NX-C-XFD-RSI-001
Long / Short Straight / Cell	SHORT / 21-ID	NX-C-XFD-RSI-001
Canting Angle	NONE	NX-C-XFD-RSI-001
Length of Source	US 1400 mm / DS 2800 mm	NX-C-XFD-RSI-001
Location of Center of Source 1	-1492.0	SR-ID-ESM-EPU-1000
Location of Center of Source 2	790.0	SR-ID-ESM-EPU-1000
Nominal Radiation Fan (Horizontal)	4.15 mrad (LH)	NX-C-XFD-RSI-001
Nominal Radiation Fan (Vertical)	2.73 mrad (LV)	NX-C-XFD-RSI-001
Fixed Aperture Mask, (Outboard) Downstream, Aperture (Horizontal)	0.7 mrad	NX-C-XFD-RSI-001
Fixed Aperture Mask, (Outboard) Downstream, Aperture (Vertical)	0.7 mrad	NX-C-XFD-RSI-001
Fixed Aperture Mask, (Inboard) Downstream, Aperture (Horizontal)	N/A	N/A
Fixed Aperture Mask, (Inboard) Downstream, Aperture (Vertical)	N/A	N/A

SPECIFICATIONS		SPEC REFERENCE
Active Interlock Envelope	AIE-ID-B	PS-C-ASD-SRP-SPC-002
Frontend Raytracing Procedure		Doc. PS-C-ASD-PRC-147 (VERSION 2)
Manufacturing & Positional Tolerance	±1.5 mm	Ray Tracing Procedure Doc. PS-C-ASD-PRC-147 (VERSION 2)
Bremsstrahlung Source Dimension (Vertical)	+/- 12.5 mm	NSLS-II Technical Note No. 00020
Bremsstrahlung Source Dimension (Horizontal - Outboard)	+ 37.5 mm	NSLS-II Technical Note No. 00020
Bremsstrahlung Source Dimension (Horizontal - Inboard)	See Spec Ref	Determined by FE Collimator Apertures
Bremsstrahlung Source Location (Short Straight)	+ 2500 mm	NSLS-II Technical Note No. 00020
Fixed Mask (Max Horizontal Beam Incidence Angle)	Angle ≤ 4.5°	FEA - Front End (Oct 15, 2010)
Fixed Mask (Max Vertical Beam Incidence Angle)	Angle ≤ 4.5°	FEA - Front End (Oct 15, 2010)

NEXT ASSY:	N/A
PROJECT:	

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
DIMENSIONS IN BRACKETS [xx.xx] (WHERE PRESENT) ARE MILLIMETERS AND ARE FOR REFERENCE ONLY
INTERPRET DRAWING AS PER ANSI Y14.5-1994 OR Y32.2-1975

DIMENSIONAL TOLERANCES: X. ± 0.060, X.X ± 0.030, .XX ± 0.015, .XXX ± 0.005
ANGULAR TOLERANCE: ± .5°
FINISH: 125
BREAK EDGES & SHARP CORNERS 0.005 MIN. TO 0.030 MAX.

THIRD ANGLE PROJECTION
SCALE: SEE DWG VIEW

BROOKHAVEN NATIONAL LABORATORY
BROOKHAVEN SCIENCE ASSOCIATES
UPTON, NEW YORK 11973
Exploring Life's Mysteries, Protecting Its Future

NSLS II NATIONAL SYNCHROTRON LIGHT SOURCE II

DRAWN BY	J.FABIJANIC	1/2014
CHECKED BY	C.AMARITO	1/2014
RADIATION APPROVAL	PK.JOB/Z.ZHONG	1/2014
ENGINEER APPROVAL	C.AMUNDSEN	1/2014
SUPERVISOR APPROVAL	S.SHARMA	1/2014
RAD SAFETY APP	P.ILIINSKI	1/2014
TOP OFF SAFETY	Y.LI	1/2014
ESHH APPROVAL	A. ACKERMAN	1/2014
QA APPROVAL	J.HAWKES	1/2014

WBS# 1.03.04.07.03

STORAGE RING
FRONT END, ESM BEAMLINE
RAY TRACING

ESM, COMPONENT LAYOUT

SHEET SIZE: D
DRAWING/PART NUMBER: SR-FE-EPU21-1001
REVISION: C
ESH&Q RISK LEVEL: A1
SHEET 1 OF 7

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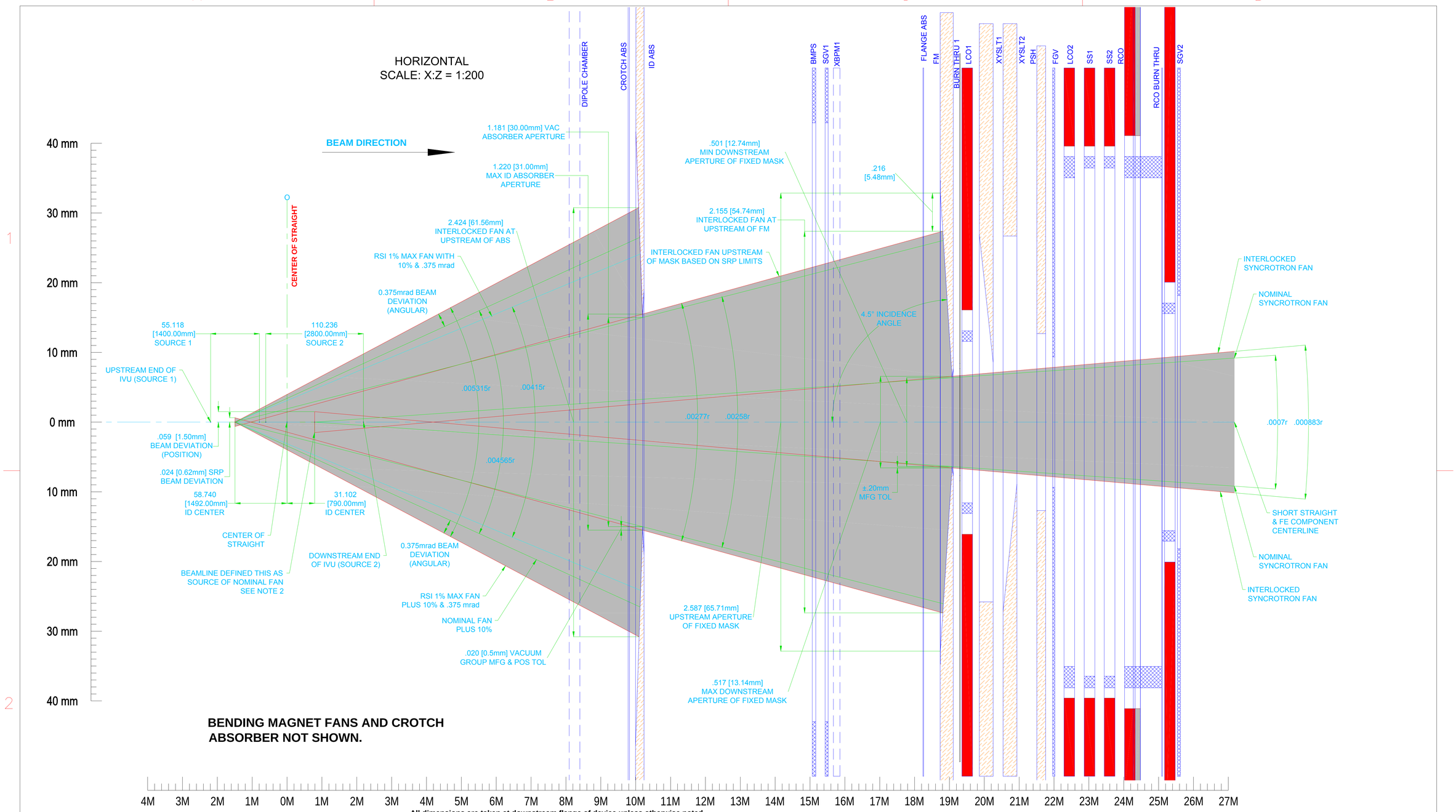

BENDING MAGNET FANS AND CROTCH ABSORBER NOT SHOWN.

All dimensions are taken at downstream flange of device unless otherwise noted.

1	MIN APERTURE OF BMPS (Center)	47.56 mm	11	MIN APERTURE OF XYSLT1	17.19 mm
2	MIN APERTURE OF SGV1 (Center)	48.55 mm	12	MIN APERTURE OF XYSLT2	17.79 mm
3	~~MIN APERTURE OF XBPM1 (Center)~~ NOT USED	------- mm	13	MIN APERTURE OF PSH	18.54 mm
4	~~MIN APERTURE OF XBPM2 (Center)~~ NOT USED	------- mm	14	MIN APERTURE OF FGV (Center)	18.71 mm
5	MIN UPSTREAM APERTURE OF FLANGE ABS	56.74 mm	15	NOM INTERNAL TUBE APERTURE OF LCO2	See Sheet 6
6	MIN UPSTREAM APERTURE OF FM	61.74 mm	16	MIN TUBE APERTURE OF SS1	37.39 mm
7	MIN DOWNSTREAM APERTURE OF FM	12.74 mm	17	MIN TUBE APERTURE OF SS2	39.91 mm
8	MAX DOWNSTREAM APERTURE OF FM	13.14 mm	18	MIN APERTURE OF BURN THRU DEVICE 2	23.48 mm
9	MIN APERTURE OF BURN THRU DEVICE 1	16.83 mm	19	NOM INTERNAL TUBE APERTURE OF DS RCO	See Sheet 6
10	NOM INTERNAL TUBE APERTURE OF LCO1	See Sheet 6	20	MIN APERTURE OF SGV2	21.94 mm

NOTE:

1. Min aperture of collimators and safety shutters shown in table as tube inside dimension.
2. Nominal fan defined from center of downstream device (EPU105 2.8M long) as per Elio Vescovo 9/10/13 .

ESM, INTERLOCKED SYNCHROTRON RAY TRACING, HORIZONTAL

D (SHEET SIZE)	SR-FE-EPU21-1001 (DRAWING/PART NUMBER)	C (REVISION)
ESH&Q RISK LEVEL A1	SHEET 2 OF 7	

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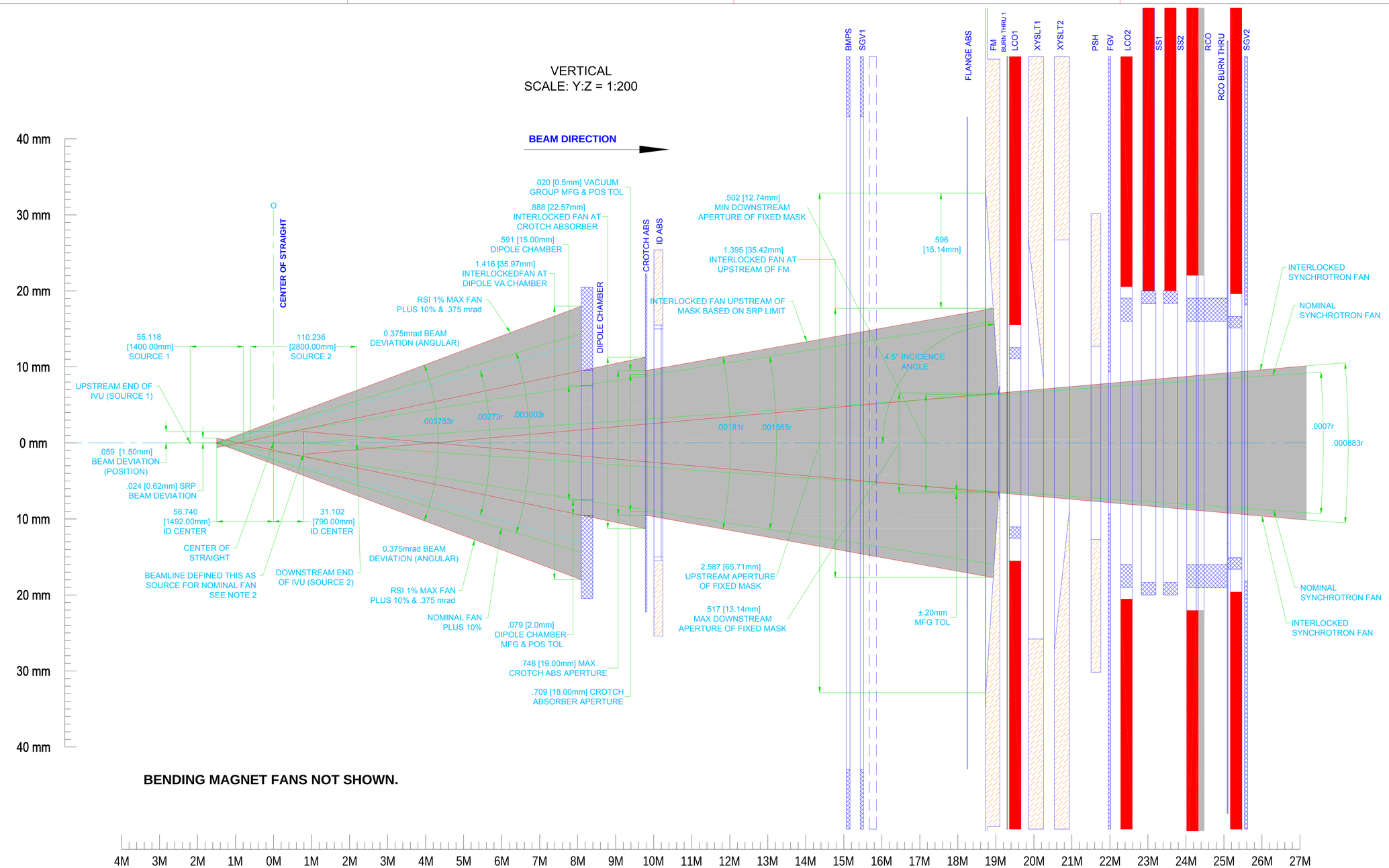


BENDING MAGNET FANS NOT SHOWN.

All dimensions are taken at downstream flange of device unless otherwise noted.

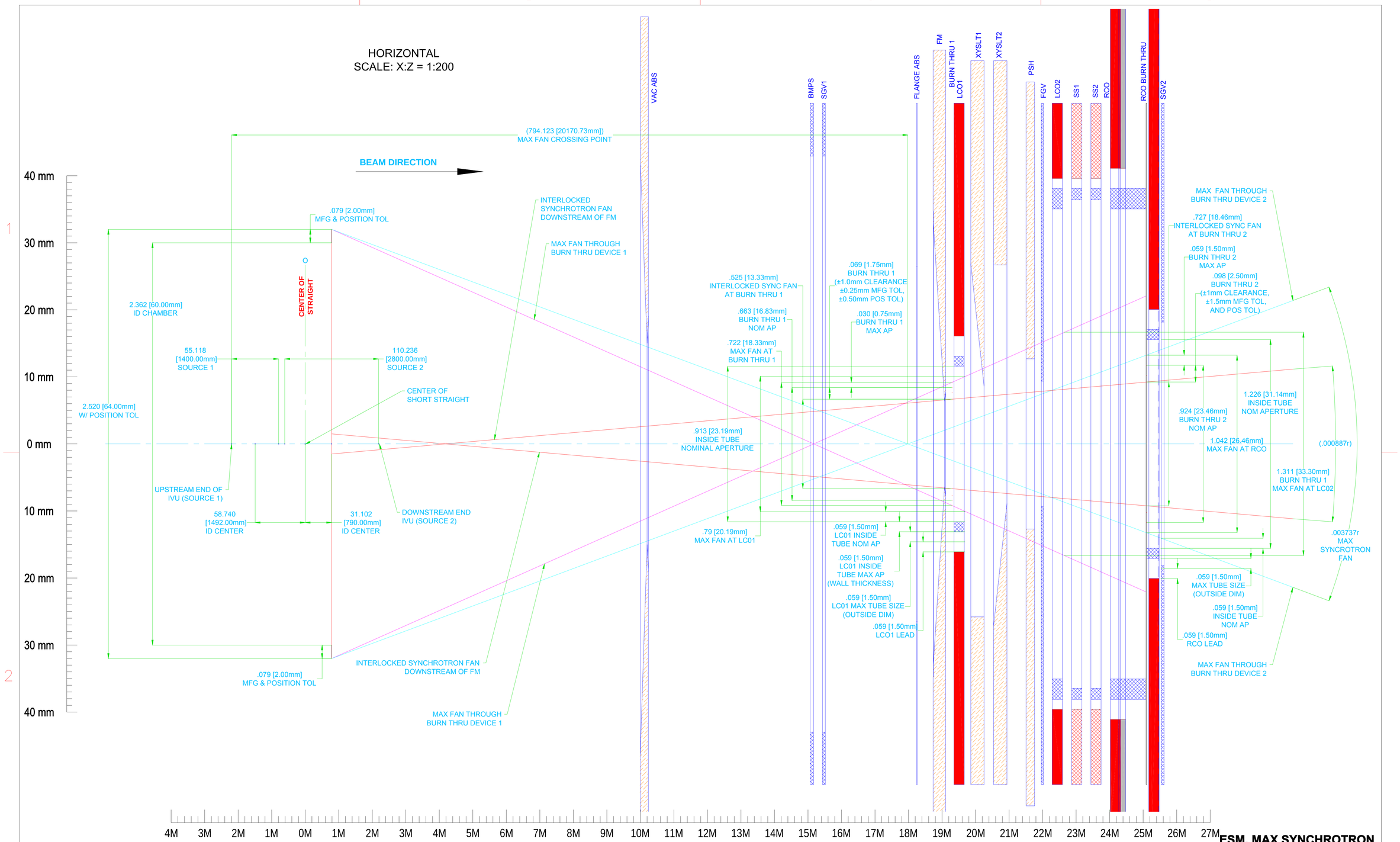
1	MIN APERTURE OF BMPS (Center)	31.57 mm	11	MIN APERTURE OF XYSLT1	17.19 mm
2	MIN APERTURE OF SGV1 (Center)	32.22 mm	12	MIN APERTURE OF XYSLT2	17.79 mm
3	~~MIN APERTURE OF XBPM1 (Center)~~ NOT USED	------- mm	13	MIN APERTURE OF PSH	18.54 mm
4	~~MIN APERTURE OF XBPM2 (Center)~~ NOT USED	------- mm	14	MIN APERTURE OF FGV (Center)	18.71 mm
5	MIN UPSTREAM APERTURE OF FLANGE ABS	37.22 mm	15	NOM INSIDE TUBE APERTURE OF LCO2	SEE SHEET 7
6	MIN UPSTREAM APERTURE OF FM	45.37 mm	16	MIN TUBE APERTURE OF SS1	27.02 mm
7	MIN DOWNSTREAM APERTURE OF FM	12.74 mm	17	MIN TUBE APERTURE OF SS2	28.07 mm
8	MAX DOWNSTREAM APERTURE OF FM	13.14 mm	18	MIN APERTURE OF BURN THRU DEVICE 2	23.48 mm
9	MIN APERTURE OF BURN THRU DEVICE 1	16.84 mm	19	NOM INTERNAL TUBE APERTURE OF DS RCO	SEE SHEET 7
10	NOM INSIDE TUBE APERTURE OF LCO1	SEE SHEET 7	20	MIN APERTURE OF SGV2	21.94 mm

NOTE:
1. Min aperture of collimators and safety shutters shown in table as tube inside dimension.
2. Nominal fan defined from center of downstream device (EPU105 2.8M long) as per Elio Vescovo 9/10/13 .

ESM, INTERLOCKEDSYNCHROTRON RAY TRACING, VERTICAL

D (SHEET SIZE)	SR-FE-EPU21-1001 (DRAWING/PART NUMBER)	C (REVISION)
ESH&Q RISK LEVEL A1	SHEET 3 OF 7	

RELEASED – EFFECTIVE



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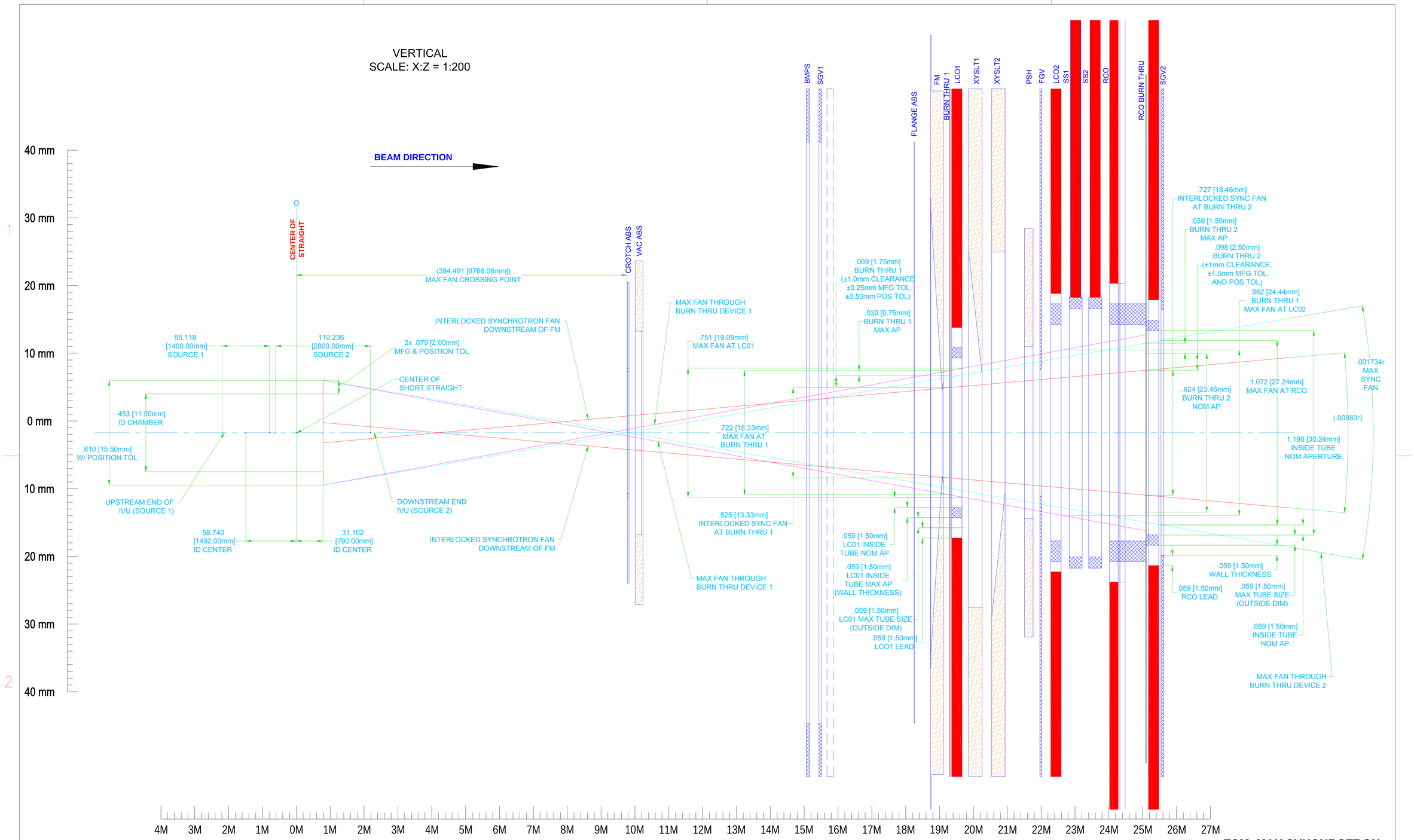

ESM, MAX SYNCHROTRON RAY TRACING, VERTICAL

D (SHEET SIZE)	SR-FE-EPU21-1001 (DRAWING/PART NUMBER)	C (REVISION)
ESH&Q RISK LEVEL A1	SHEET 7 OF 7	

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