CERN
CH-1211 Geneva 23
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the
Large Hadron Collider
project

LHC Project Document No.
LHC-DFBX-ES-0200.00 ver 1.0

CERN Div./Group or Supplier/Contractor Document No.
LBNL LH 20 00

EDMS Document No.
108080

DATE: 2000-02-07

Interface Specification

INNER TRIPLET FEEDBOXES GENERAL INTERFACES

Abstract

This specification establishes the framework in which the detailed interface requirements for the eight inner triplet feedboxes (DFBX) will be organized. The interface details will be found in a series of Interface Specifications that are referred to in this general overview Specification. The Functional Requirements for the DFBX are found elsewhere [1].

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History of Changes

Rev. No.	*Date*	*Pages*	*Description of Changes*
0.1-draft	1999-09-28	1-9	Initial draft
0.2-draft	1999-10-18	2-9	Various US LHC PM changes
0.3-draft	2000-01-18	6, 7	Corrected Main Party to AC-TCP in 5.5 and added LHC/CRI to 5.6
		8, 9	Removed Preliminary from Drawings
1.0	2000-02-07		First version released.

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1. INTRODUCTION

This specification establishes the framework in which the detailed interface requirements for the eight inner triplet feedboxes (DFBX) will be organized. The interface details will be found in a series of nine additional Interface Specifications that are referred to in this general overview Specification. The Functional Requirements for the DFBX are found elsewhere [1].

2. APPROACH

Because the DFBX has interfaces with many different hardware, laboratory, and functional groups, we divide the Interface Description into 9 individual Interface Specifications as listed in Section 3. The individual specifications will contain the details specific to the particular interface and represent a natural separation of the interfaces by Laboratory and/or group within a Laboratory.

3. APPLICABLE SPECIFICATIONS

The series of detailed DFBX Interface Specifications covered by this Specification are shown in the DFBX Specification Tree, Figure 3-1. The main parties for each interface specification are listed in section 5.

4. LOCAL COORDINATE SYSTEM

LBNL Drawings 24C2961 and 24C2971, given in Section 8, define the local co-ordinate system used to determine the location of the DFBX interface features. We show a right-handed system, where:

"X" points towards the machine center,

"Y" points along the beam in the clockwise direction, and

"Z" points vertically up from the plane of the machine.

The "y = 0" plane of the DFBX is defined to be the sealing surface of the vacuum flange facing Q3 because this feature is found on all DFBX.

This co-ordinate system is consistent with the system in the LHC Design Standards [2], except that we locate the origin at the IP end of each DFBX.

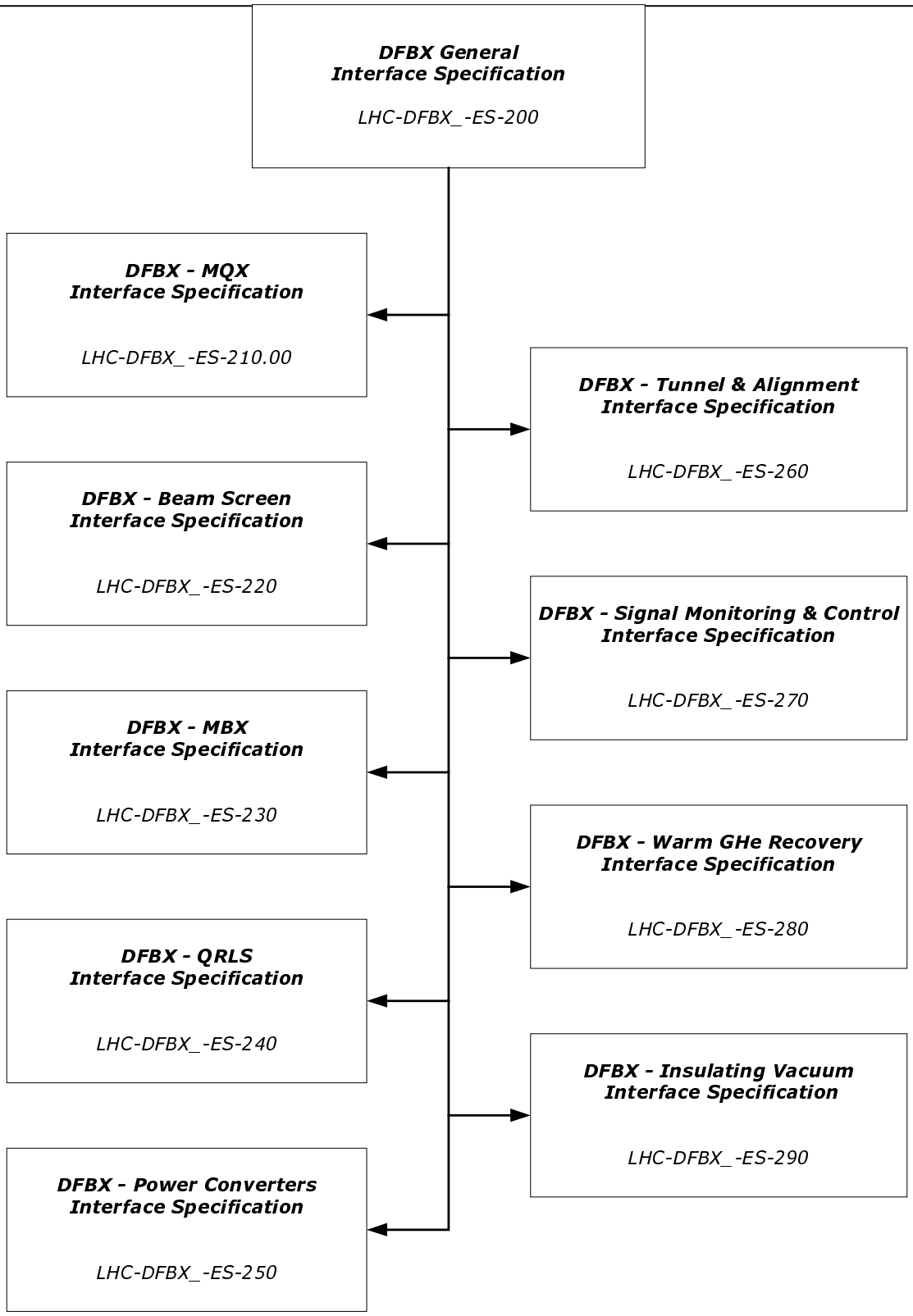


Figure 3-1 DFBX Specification Tree

5. OVERVIEW OF APPLICABLE SPECIFICATIONS

We describe the main parties, location, and hardware summary of the 9 individual interfaces. The details are found in the individual interface specifications.

5.1 LHC-DFBX_-ES-210, DFBX – MQX INTERFACE

Main Parties: LBNL and FNAL

Location: Y = 0 to approximately +500 mm for left-side DFBX

Y = 0 to approximately -500 mm for right-side DFBX

Summary: Bore tube connection, cryogenic piping, superconducting busses, electrical signal and quench heater power cables, thermal shield bridge, and outer vacuum sleeve.

5.2 LHC-DFBX_-ES-220, DFBX – BEAM SCREEN INTERFACE

Main Parties: LBNL and LHC/VAC

Location: Y = approximately -2650 to +250 mm for left-side DFBX

Y = approximately +2650 to –250 mm for right-side DFBX

Summary: Room temperature bore tube flange at IP 1 and 5, beam screen insert at all IP's, and beam screen cooling connections at IP's 2 and 8.

5.3 LHC-DFBX_-ES-230, DFBX – MBX INTERFACE

Main Parties: LBNL and BNL

Location: Y = approximately –2360 mm to -3170 mm for left-side DFBXB

Y = approximately +2360 mm to +3170 mm for left-side DFBXB

Summary: Bore Tube Connection, cryogenic piping, superconducting busses, electrical signal cables, thermal shield bridge, and outer vacuum sleeve.

5.4 LHC-DFBX_-ES-240, DFBX – QRLS INTERFACE

Main Parties: LBNL and LHC/ACR

Location: X = approximately - 223 mm plane for all DFBX; two locations at each DFBX

Summary: Cryogenic piping, thermal shield bridge, and outer vacuum sleeve.

5.5 LHC-DFBX_-ES-250, DFBX – POWER CONVERTERS INTERFACE

Main Parties: LBNL, CERN ST-EL and AC-TCP

Location: Top Face of each DFBX

Summary: DC Connections for Main and Corrector Magnet Current.

5.6 LHC-DFBX_-ES-260, DFBX – TUNNEL AND ALIGNMENT INTERFACE

Main Parties: LBNL, CERN EST/SU, EST/ESI, and LHC/CRI

Location: Outer Surface of each DFBX

Summary: Mounting to Tunnel Floor, Lifting Points, and Taylor-Hobson Mounting

5.7 LHC-DFBX_-ES-270, DFBX – SIGNAL MONITORING & CONTROL INTERFACE

Main Parties: LBNL and LHC/ICP

Location: Top Face of each DFBX

Summary: Receptacles for magnet and cryogenic diagnostics and control

5.8 LHC-DFBX_-ES-280, DFBX – WARM GHE RECOVERY INTERFACE

Main Parties: LBN and LHC/ACR

Location: Top Face of each DFBX

Summary: Connections to allow warm helium gas recovery from current leads and relief valves

5.9 LHC-DFBX_-ES-290, DFBX – INSULATING VACUUM INTERFACE

Main Parties: LBNL and LHC/VAC

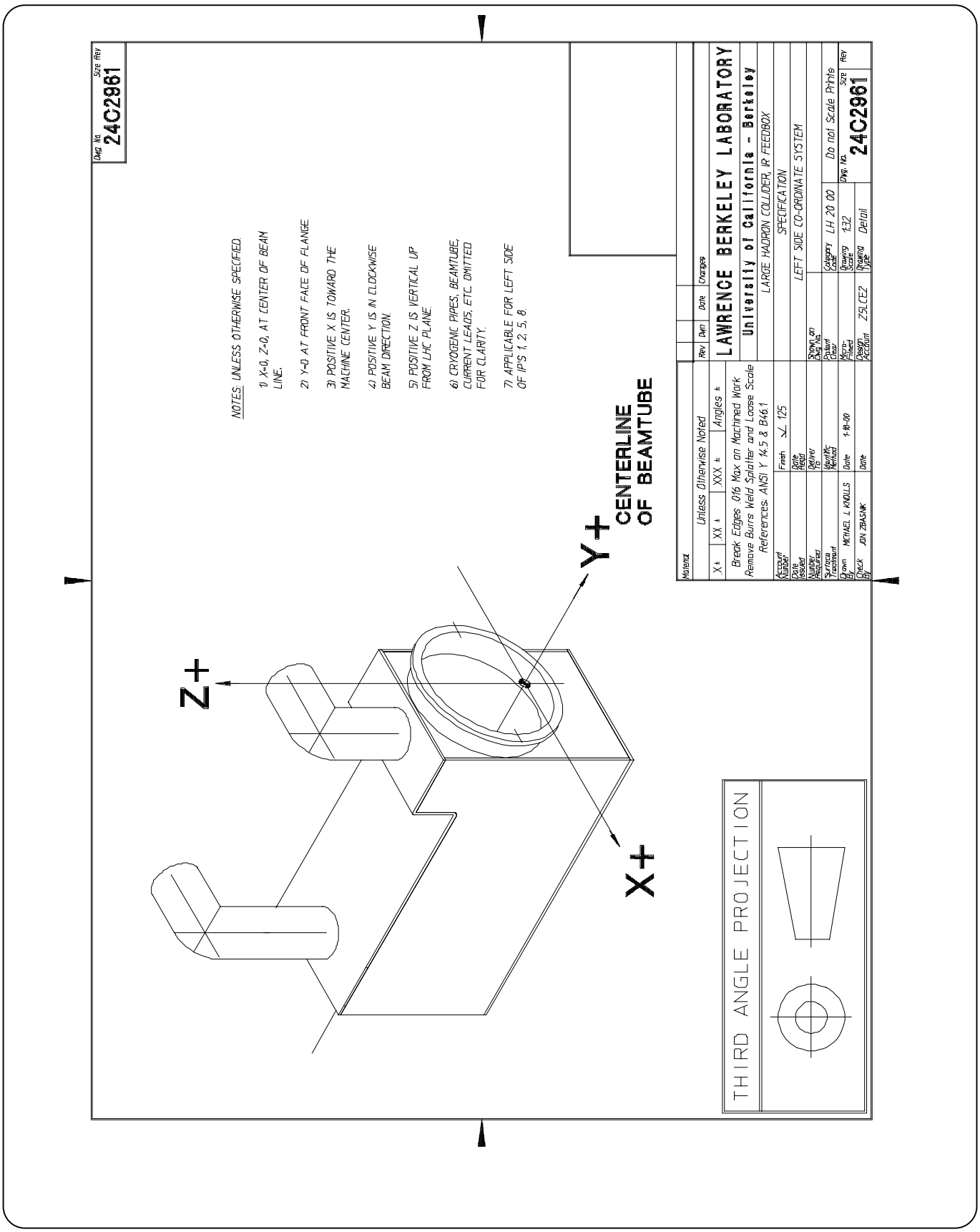
Location: Top Face of each DFBX

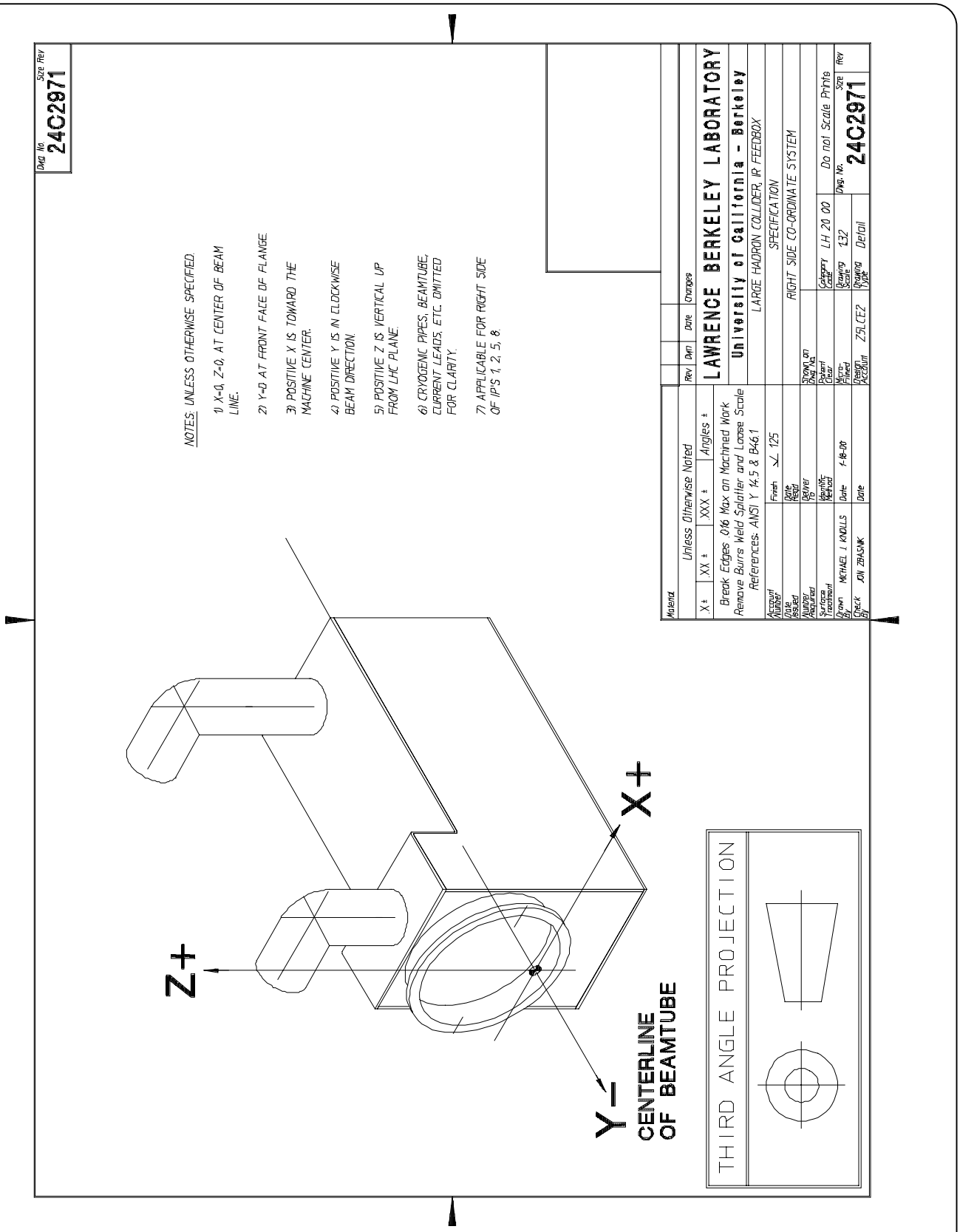
Summary: Flanges to allow pumpout and relief venting of the insulating vacuum

6. REFERENCED DOCUMENTS

1. LHC Functional Specification, “Inner Triplet Feedboxes, DFBX”, LHC-DFBX-ES-100.00.
2. LHC Quality Assurance Standard, “Design Standards - Mechanical Engineering and Installations”, LHC-PM-QA-402.00 rev 1.0.

7. FIGURES


Dwg No. 24C2961
Size Rev
NOTES: UNLESS OTHERWISE SPECIFIED.
1) X=0, Z=0, AT CENTER OF BEAM LINE.
2) Y=0 AT FRONT FACE OF FLANGE.
3) POSITIVE X IS TOWARD THE MACHINE CENTER.
4) POSITIVE Y IS IN CLOCKWISE BEAM DIRECTION.
5) POSITIVE Z IS VERTICAL UP FROM LHC PLANE.
6) CRYOGENIC PIPES, BEAMTUBE, CURRENT LEADS, ETC. OMITTED FOR CLARITY.
7) APPLICABLE FOR LEFT SIDE OF IP'S 1, 2, 5, 8.
Z+
Y+
X+
CENTERLINE OF BEAMTUBE
THIRD ANGLE PROJECTION
Material
Unless Otherwise Noted
X± XX± XXX± Angles ±
Break Edges .016 Max on Machined Work
Remove Burrs Weld Splatter and Loose Scale
References: ANSI Y 14.5 & B46.1
Account Number
Date Issued
Number Required
Surface Treatment
Drawn By MICHAEL L KNOLLS
Check By JON ZBASNIK
Finish ⊿ 125
Date Reqd
Deliver To
Identific Method
Date 1-18-00
Date
Rev Dwn Date Changes
LAWRENCE BERKELEY LABORATORY
University of California - Berkeley
LARGE HADRON COLLIDER, IR FEEDBOX
SPECIFICATION
LEFT SIDE CO-ORDINATE SYSTEM
Shown on Dwg No.
Patent Clear
Micro-Filmed
Design Account Z5LCE2
Category Code LH 20 00
Drawing Scale 1:32
Drawing Type Detail
Do not Scale Prints
Dwg. No. 24C2961
Size Rev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NOTES: UNLESS OTHERWISE SPECIFIED.
1) X=0, Z=0, AT CENTER OF BEAM LINE.
2) Y=0 AT FRONT FACE OF FLANGE.
3) POSITIVE X IS TOWARD THE MACHINE CENTER.
4) POSITIVE Y IS IN CLOCKWISE BEAM DIRECTION.
5) POSITIVE Z IS VERTICAL UP FROM LHC PLANE.
6) CRYOGENIC PIPES, BEAMTUBE, CURRENT LEADS, ETC. OMITTED FOR CLARITY.
7) APPLICABLE FOR RIGHT SIDE OF IP'S 1, 2, 5, 8.
Z+
X+
Y−
CENTERLINE OF BEAMTUBE
THIRD ANGLE PROJECTION
Material
Unless Otherwise Noted
X ± | XX ± | XXX ± | Angles ±
Break Edges .016 Max on Machined Work
Remove Burrs Weld Splatter and Loose Scale
References: ANSI Y 14.5 & B46.1
Account Number
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Surface Treatment
Drawn By MICHAEL I. KNOLLS
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Finish 125
Date Reqd
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Date
Rev Dwn Date Changes
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University of California - Berkeley
LARGE HADRON COLLIDER, IR FEEDBOX
SPECIFICATION
RIGHT SIDE CO-ORDINATE SYSTEM
Shown on Dwg No.
Patent Clear
Micro-Filmed
Design Account Z5LCE2
Category Code LH 20 00
Drawing Scale 132
Drawing Type Detail
Do not Scale Prints
Dwg. No. 24C2971
Size Rev