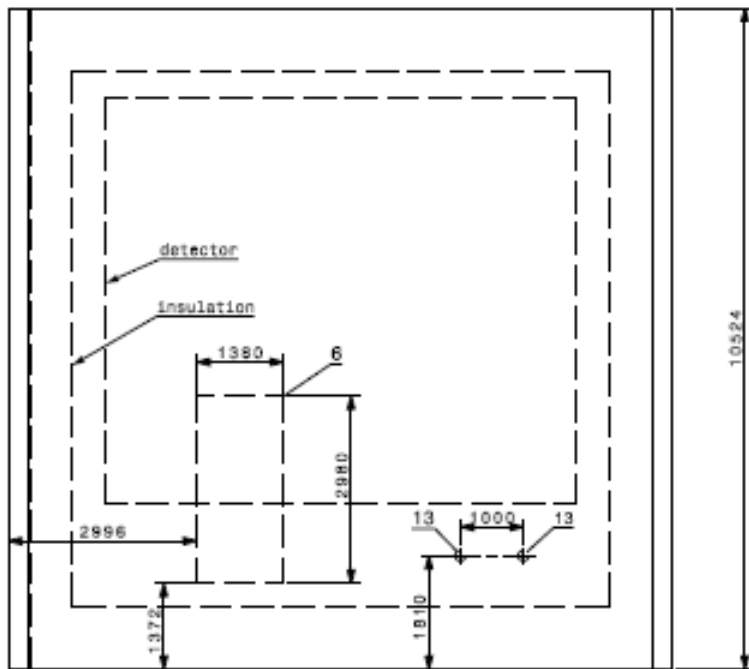


ProtoDUNE cryostat penetrations

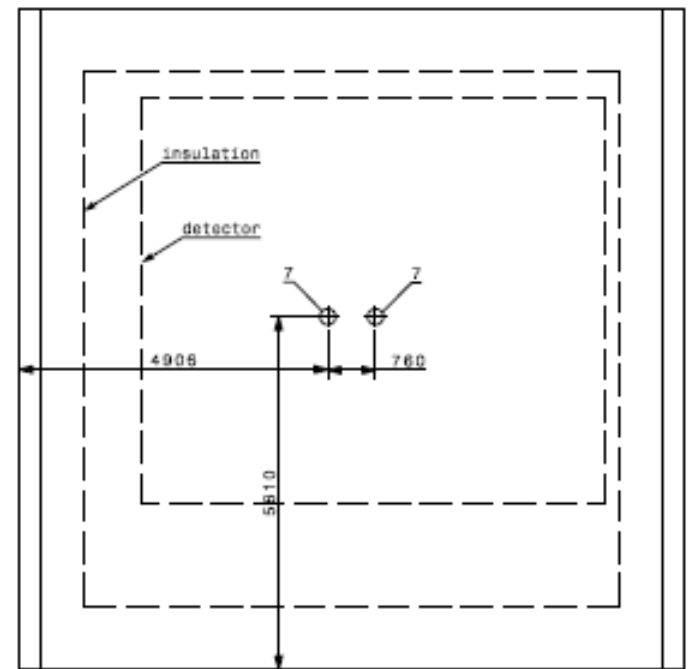
Jack Fowler

TCO, Pumps and Beam Windows

Front view
1:60
technical construction, pumps



Left view
1:60
beam windows



Top view
1:35

Listing of penetrations

Detector penetrations

Pos.	Diameter [mm]	Qty.	Description
1	Ø150	15	3xCenter CPA Support Rail 6xAPA support rail 3.6m Drift 6xAPA support rail 2.5m Drift
2	Ø250	12	Signal Chimneys FTS
3	Ø156	1	High Voltage Feedthrough
4	Ø609	1	Manhole
5	2980x1380mm	1	Access Hatch for instalation
6	2980x1380mm	TCO	Technical Construction Opening
7	Ø250	2	Beam Window

All of this information can be found at
<https://edms.cern.ch/document/1543241/1>

The specification document for the cryostat is at
<https://edms.cern.ch/document/1543254/1>

Cryogenic penetrations

Pos.	Diameter [mm]	Qty.	Description
8	Ø304	1	GAr Combo
9	Ø152	7	LAr Cooldown LAr Distribution Lar to Cold Roof LAr Cooldown to Condenser Gar Boil Off Spare Spare
10	Ø304	4	Cryostat Pressure Relief 1 Cryostat Pressure Relief 1 Cryostat Pressure Relief 2 Cryostat Pressure Relief 2
11	Ø125	1	Instrumentation
12	Ø38	4	LAr level probe LAr level probe Instrumentation Instrumentation
13	Ø168	2	LAr Pump 1 LAr Pump 2