

Hall C Target Configuration September 2022



Engineering Report

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Document Title: Hall C Target Configuration September 2022	
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Description: Configuration report for the Hall C Target ladder installed for the September 2022 run period. This document gives BDS positions, target thicknesses, cell thicknesses and overall assembly data.

1 Revision History

Revision: 0	10/2/2022	Original
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2 Purpose and Scope

This report documents the configuration for the Hall C Target as installed for September 2022. Target thicknesses and uncertainties are included.

3 Target list and lifter positions

The following lifter positions were determined by alignment of the system. The BDS positions were adjusted for cooldown and vacuum motion by 4 mm down (larger BDS values).

Target Position	Actual	Adjusted for beam	Material
Loop 1 10 cm	31444060	31648860	LD2
Loop 2 10 cm	23870300	24075100	LH2
Optics 1 +/-8 cm	19112909	19317709	Carbon
10 cm Dummy	18300109	18504909	AL 7075
Beryllium	16511949	16716749	Be
Ca40	15374029	15578829	Ca40
Ca48	14236109	14440909	Ca48
C (natural)	13098189	13302989	Carbon
B4C-11	11960269	12165069	B4C-11
B4C-10	10822349	11027149	B4C-10
Sn	9684429	9889229	Sn
Ti	8546509	8751309	Ti
Fe	7408589	7613389	Fe
Ag	6270669	6475469	Ag
Th	5132749	5337549	Th
Ni-58	3994829	4199629	Ni-58
Ni-64	2856909	3061709	Ni-64
Hole	1817170	2021970	N/A
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4 Target Thicknesses

4.1 Cells

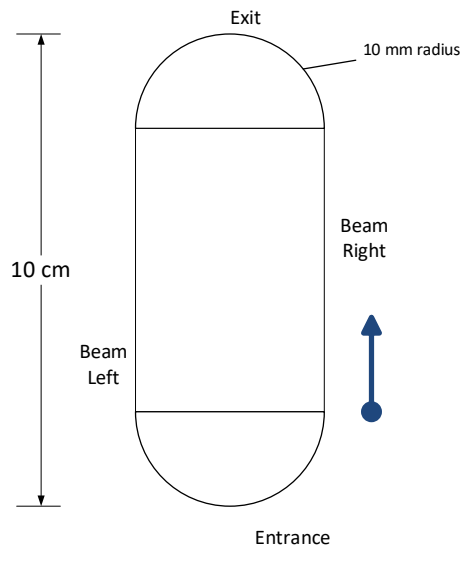
Hydrogen loops entrance and exit window thicknesses are given below. Loop 2 is connected to the H2 panel and Loop 1 is connected to the D2 panel.

Target	Entrance (mm)	Exit (mm)	Right (mm)	Left (mm)
Loop 1 (10 cm) Cell #3	0.168 ± 0.009	0.2024 ± 0.0056	0.462 ± 0.0011	0.330 ± 0.0008
Loop 2 (10 cm) Cell #5	0.264 ± 0.082	0.208 ± 0.0035	0.444 ± 0.0015	0.329 ± 0.0007

Each cell is 99.98 mm long. The entrance and exit of each cell was reduced by hand to values listed above. Uncertainties in the hand working process are larger than machine worked sides as expected. Target cells are fabricated from Al7075 (lot # 308151).

[Material Certification \(lot # 308151\) for AL7075 to be used for Hall C 10 cm exit windows | Jefferson Lab Electronic Logbook \(jlab.org\)](#)

A schematic of the cell is shown below:



4.2 Dummy Targets

The dummy targets are aluminum foils mounted on separate frames with foils located at Z positions corresponding to the cryotarget exit and entrance windows. The material is same as that of target cells.

Target	Thickness Total (g/cm ²)
10 cm Dummy Upstream	0.240 ± 0.003
10 cm Dummy Downstream	0.236 ± 0.003

4.3 Optics Target

The optics target has two positions with carbon (99.95% C) foils in a linear array with foils located nominally at:

1. Two foils located at Z = ± 8 cm

The nominal thickness of each carbon foil is: 0.044 ± 0.001 g/cm². This is same target that was used in the previous configuration (see TGT-RPT-22-003

4.4 Solid Targets

Solid targets are located on the solid target ladder nominally at Z = 0.

Target Position	Thickness (g/cm ²)	Chem Pure (%)	Enrichment (%)
Beryllium	0.986±0.003	99.5	NAT
Ca40	0.785±0.003	99.99	99.97
Ca48	1.051±0.003	99.99	90.04
C (natural)	0.574±0.002	99.99	NAT
B4C-11	0.633 ± 0.002	99.99	99.8
B4C-10	0.576 ± 0.002	99.99	96.6
Sn	0.4562±0.0006	99.75	NAT
Ti	0.294±0.001	99.99	NAT
Fe-54	0.367±0.001	99.99	97.68
Ag	0.528±0.002	99.9	NAT
Th	0.409±0.001	99.5	NAT
Ni-58	0.2408±0.0004	99.9	99.5
Ni-64	0.2607±0.0005	99.9	95

Certified material test reports have been uploaded to the e-logs where available. The solid targets are centered at the nominal z=0 position prior to vacuum and cryo motion.

5 Alignment

Target was aligned on September 14, 2022. Data transmittal C2049 has been filed on the E-log. The solid target ladder used for the experiment was not installed at the time of the alignment to prevent exposure of Ca to air. Instead, a mock solid target ladder having only the hole target was installed. Using Hall coordinates the hole target was found to be 0.8 mm beam left and 0.0 mm vertical. Picture of the alignment configuration is shown below.

