



U.S. DEPARTMENT OF
ENERGY



Super Dry MSD Series Drybox

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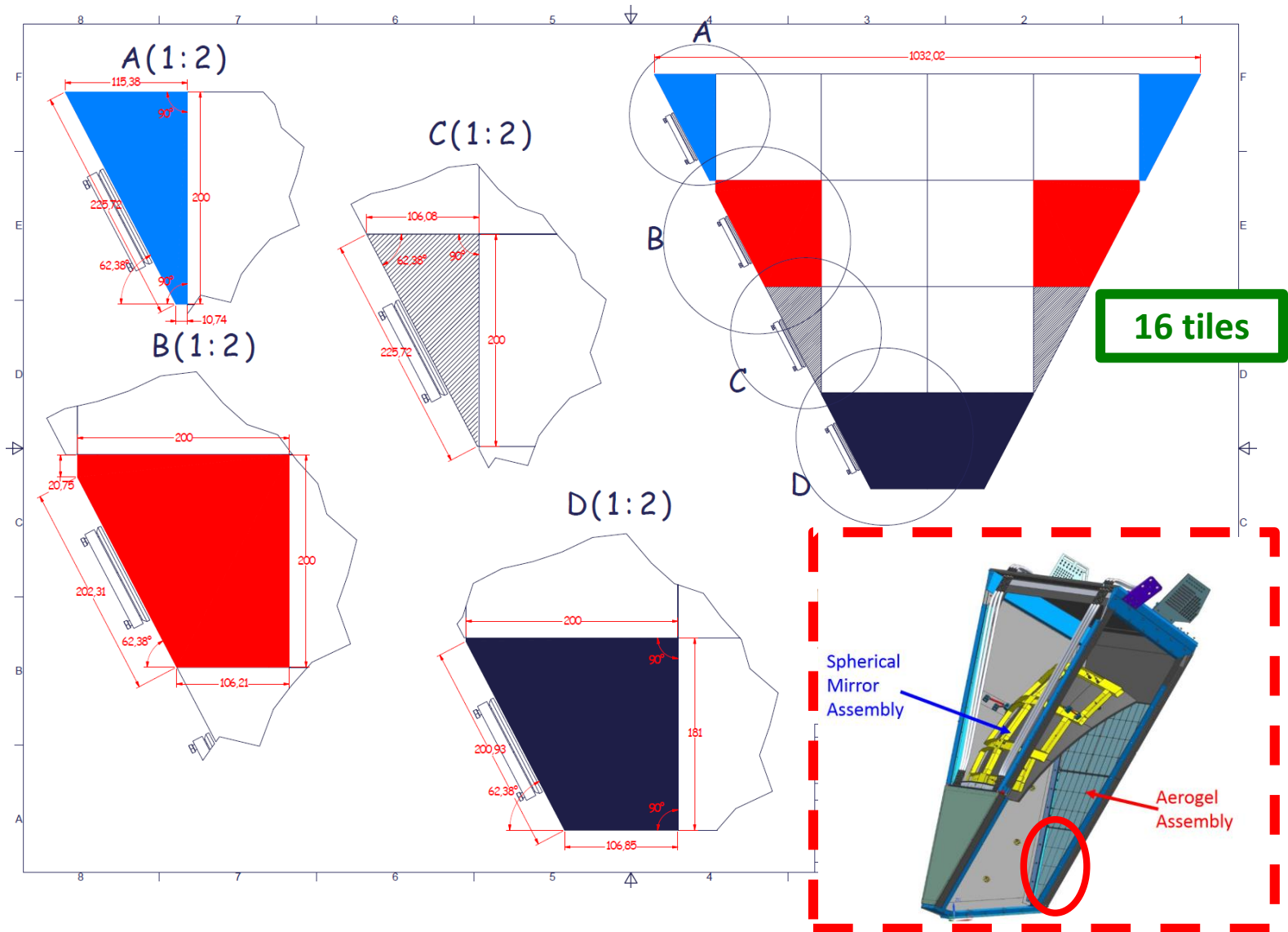
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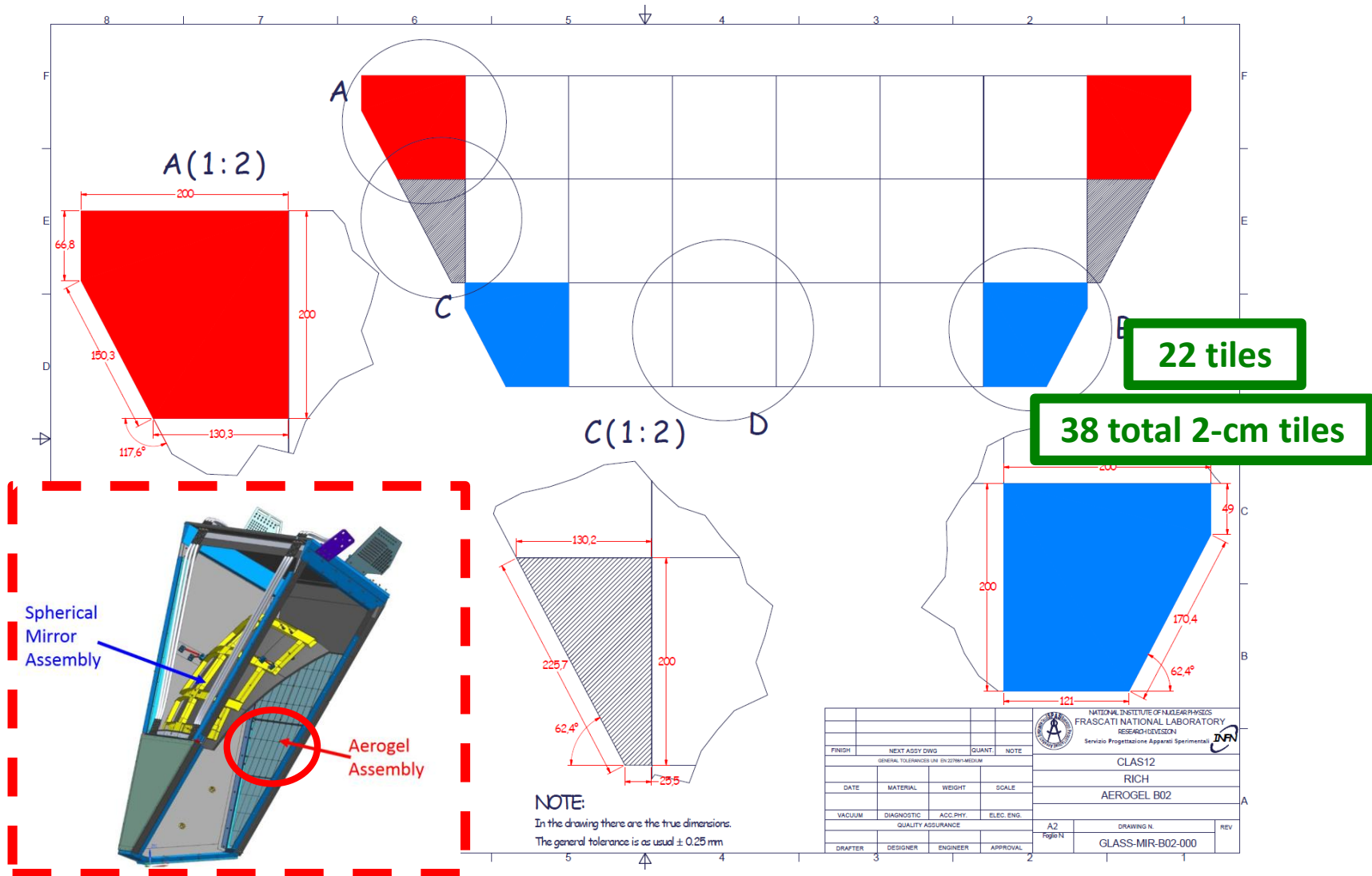
RICH Aerogel

- Silica-based aerogel tiles
 - Must be kept in sub-5 % RH environment to prevent tiles from absorbing moisture
 - Moisture absorbance lowers tiles' effectiveness as a Cherenkov radiator
- Different tile geometries make up triangular area in front of RICH
 - Double layer of 3 cm tiles at top
 - Single layer of 2 cm tiles at bottom
 - **For storage space calculations, all tiles treated as 20 cm x 20 cm x 3 cm tiles to ensure there is more than enough shelf space**

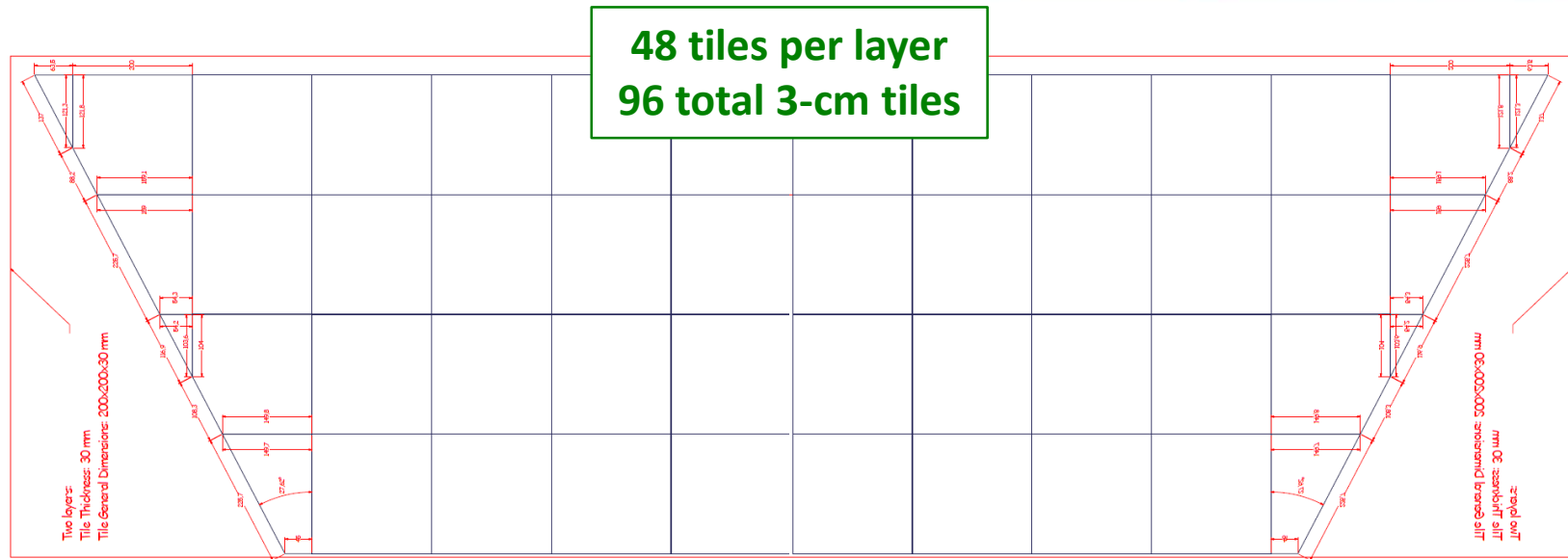
Lower 2 cm Tile Layer



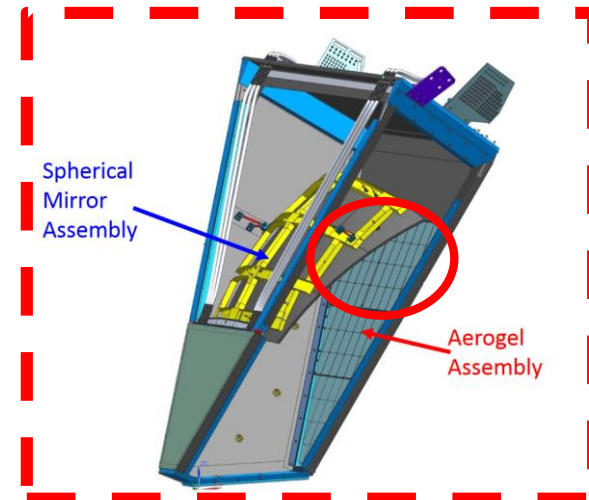
Upper 2 cm Tile Layer



Double Layer of 3 cm Tiles



DISREGARDING ANY DIFFERENT TILE GEOMETRIES:
96 total 3-cm tiles + 38 total 2-cm tiles
= 134 total tiles



Super Dry MSD Series Drybox

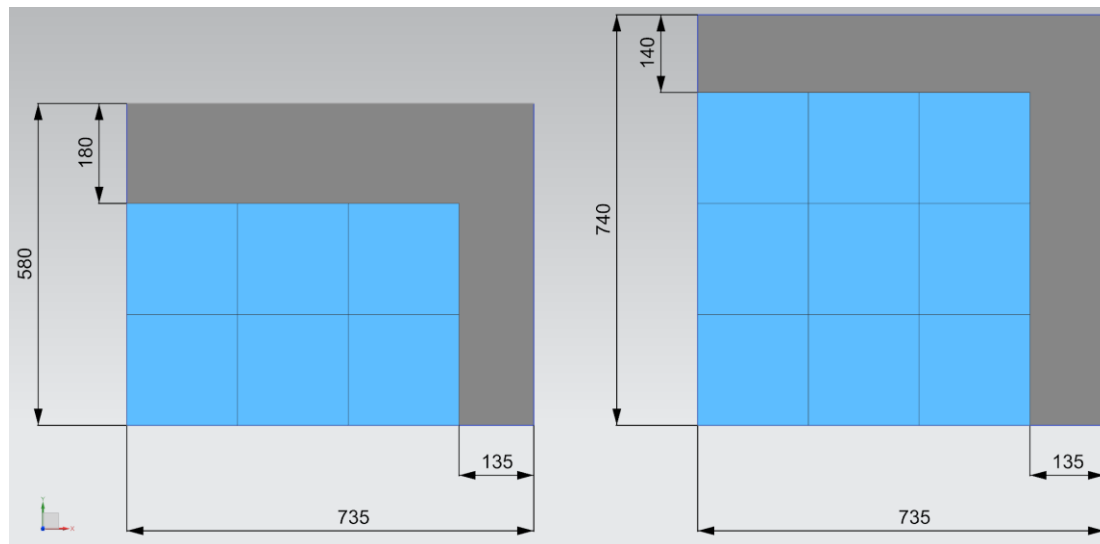
- One main unit plus one expansion unit
 - 2400 L total
 - Main unit's dryer unit can dry up to three additional expansion units
- 0.5 % RH level capability
- 120 V power
- Comes standard with eight total shelves
 - Two “short” shelves in lower section of main unit
 - Shelves are shorter because drying unit extends into storage space
 - Shelf dimensions: 735 mm x 580 mm
 - Six “long” shelves in upper section of main unit and in the entirety of expansion unit
 - Shelf dimensions: 735 mm x 740 mm



Sales photo of main unit (left) and expansion unit (right). In normal operation, both units are fastened together to create one, sealed volume

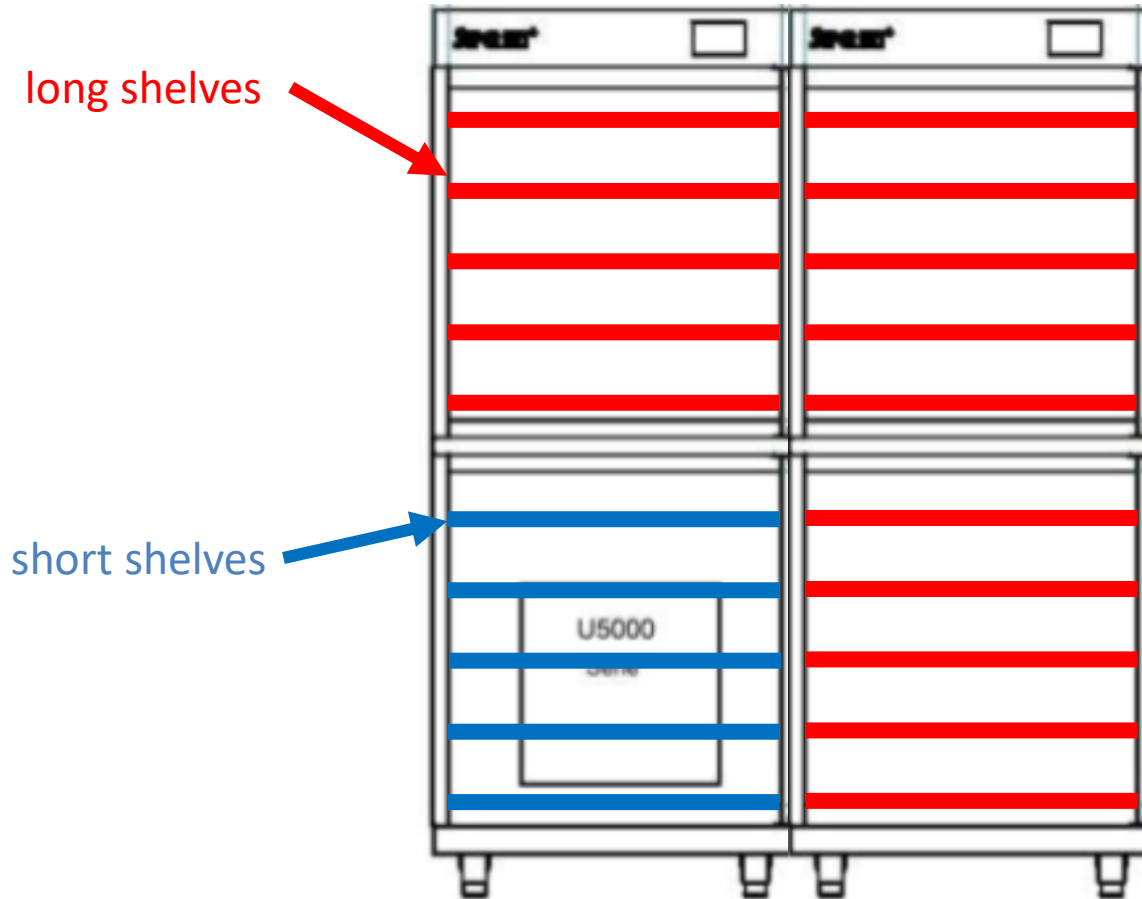
Determining Number of Additional Shelves Needed

- Created sketch of each shelf type in NX 12
- Added as many 20 cm x 20 cm tiles that would fit without hanging off side of shelf
 - Six tiles fit on short shelf
 - Nine tiles fit on long shelf



NX12 sketch of short (left) and long (right) shelves and the amount of aerogel tiles they can hold

Determining Number of Additional Shelves Needed



Sketch showing main unit,
expansion unit, and all shelves

- Propose buying 20 total shelves:
 - Five short shelves
 - 15 long shelves
- **Total storage capability: 165 tiles**
 - ~10 cm between shelves is more than adequate for 3 cm tiles

MSD Series Drybox Additional Features

- Standard through-hole penetrations
 - Would allow connection of our remote monitoring sensors and cRIO
- All shelves are retractable
- Optional nitrogen connection
 - Connections for two flow modes:
 - Continuous purge
 - Temporary make-up purge
 - For quickly decreasing humidity



Optional N₂ connection

Conclusion

- RICH-II needs to store 134 aerogel tiles in a low humidity environment before they are installed into the detector
- A Super Dry MSD Series drybox with one main unit, one expansion unit, and a total of 20 shelves will allow storage of up to 165 tiles
- Quoted cost for drybox setup is \$22,640