

Vertical Flame Propagation Test Method Update

Presented to: International Aircraft Materials
Fire Test Forum

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Date: October 16, 2023



**Federal Aviation
Administration**



Vertical Flame Propagation (VFP)

Proposed new test method for non-metallic, extensively used materials located in inaccessible areas, i.e.:

Composite skin, structure, and sub-components

Wires (insulations/jackets/sleeving)

Duct materials

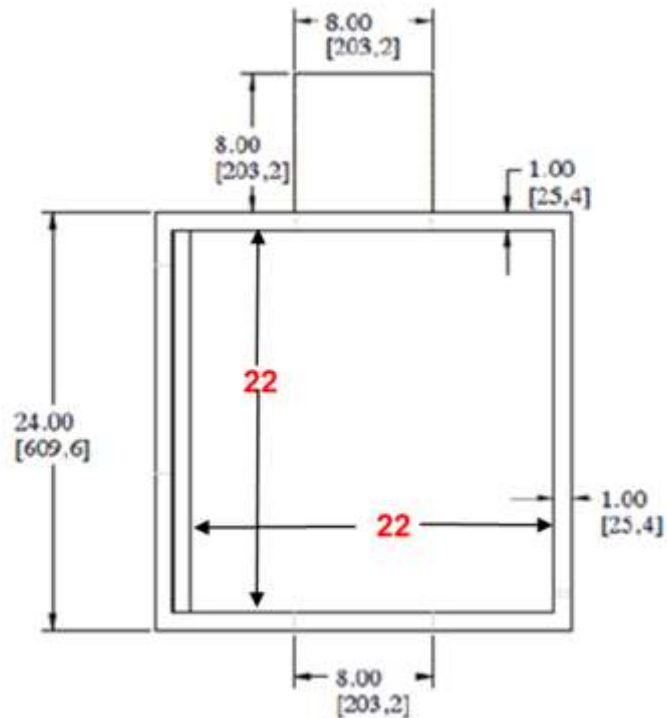


Today's Topics

- Differences in chamber sizes of VFP machines
- Heat flux gradient upon a sample



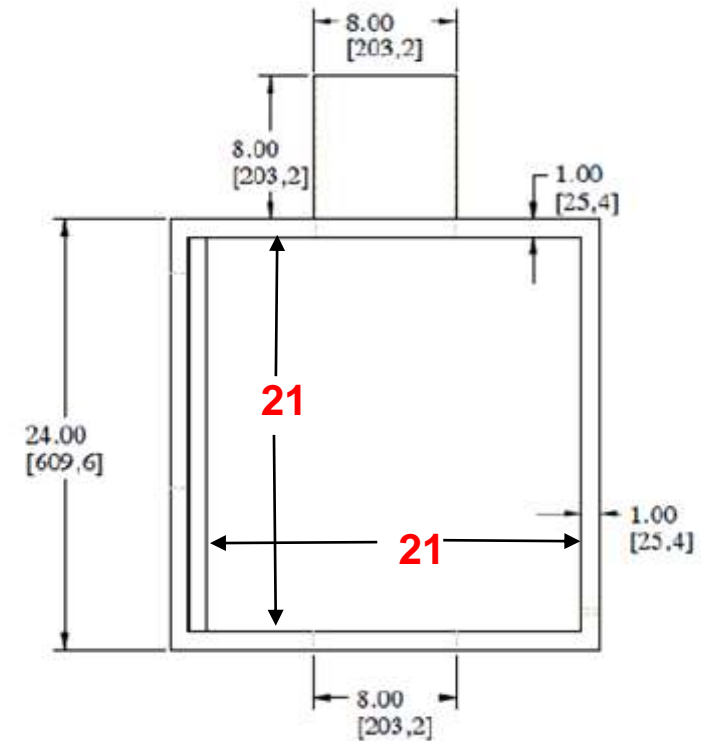
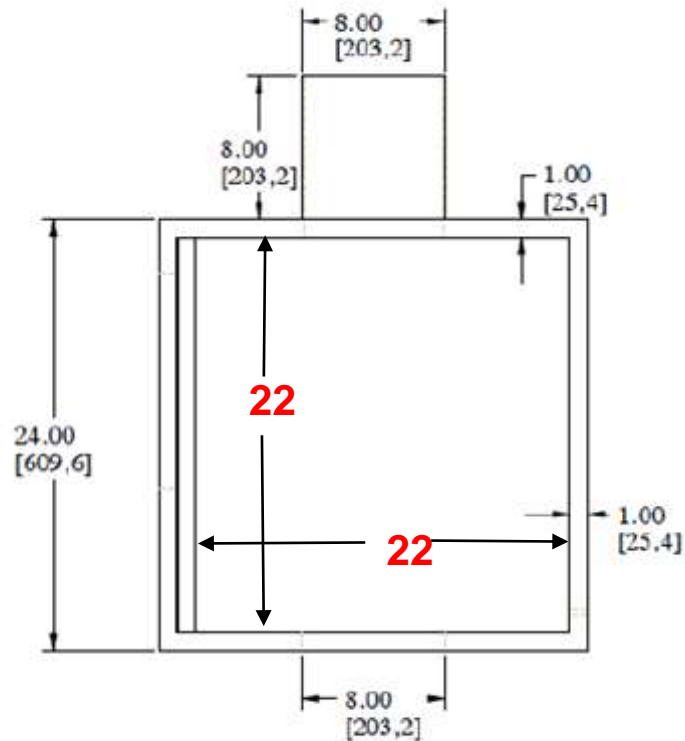
Differences in Internal Chamber Sizes



- Differences were found in the internal height and width of VFP chambers
- Depth of all machines is the same
- **22 x 22 inch**
- **21.25 x 21.75 inch**



Differences in Internal Chamber Sizes



Comparison of two internal chamber sizes to understand if this affects the function of the machine



Differences in Internal Chamber Sizes



Adjusted the larger chamber to 21" x 21"

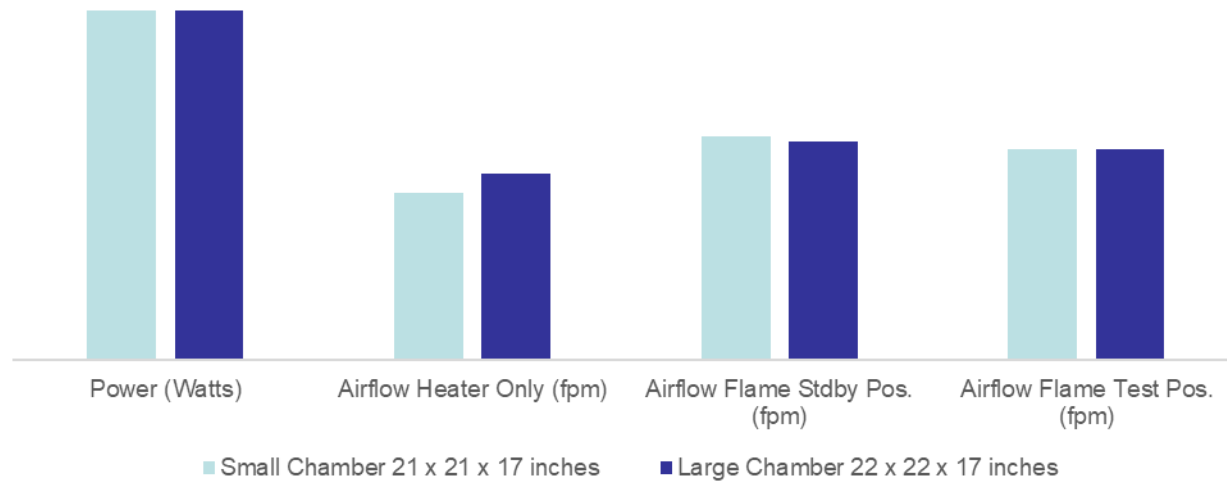
Goal is now to find acceptable internal chamber tolerances

Through:

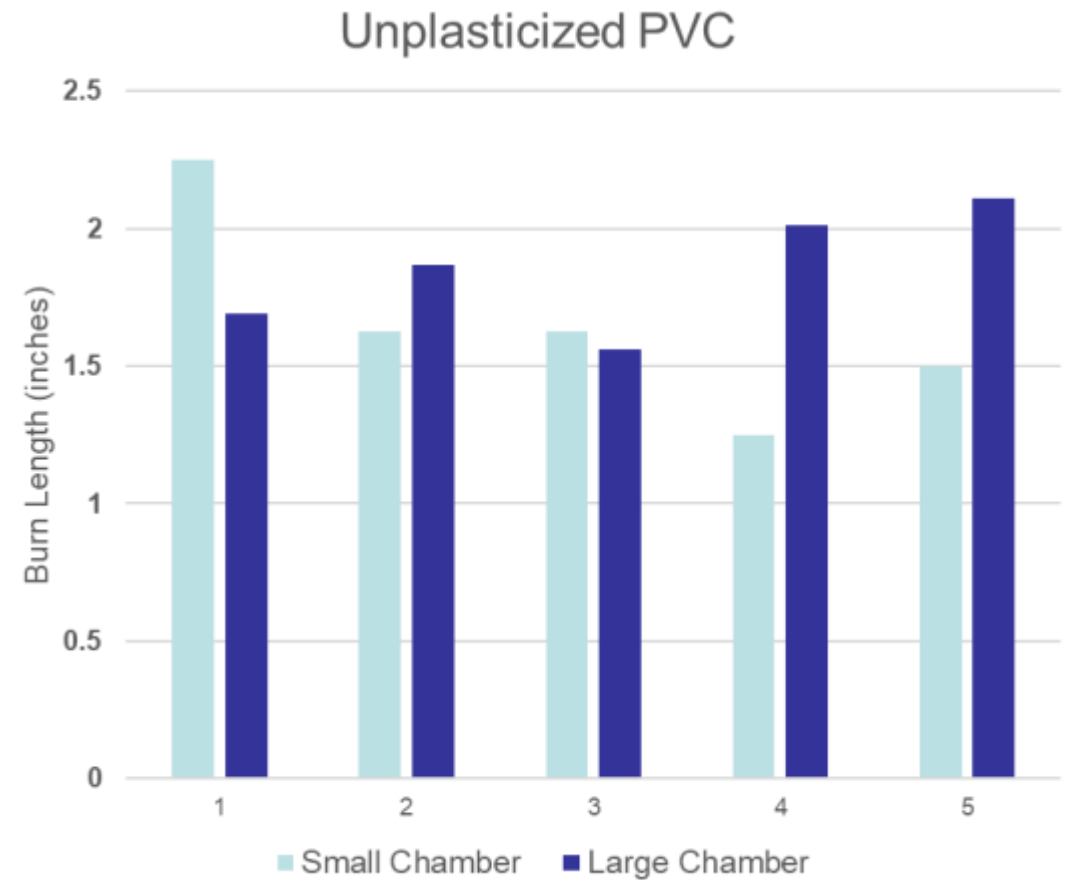
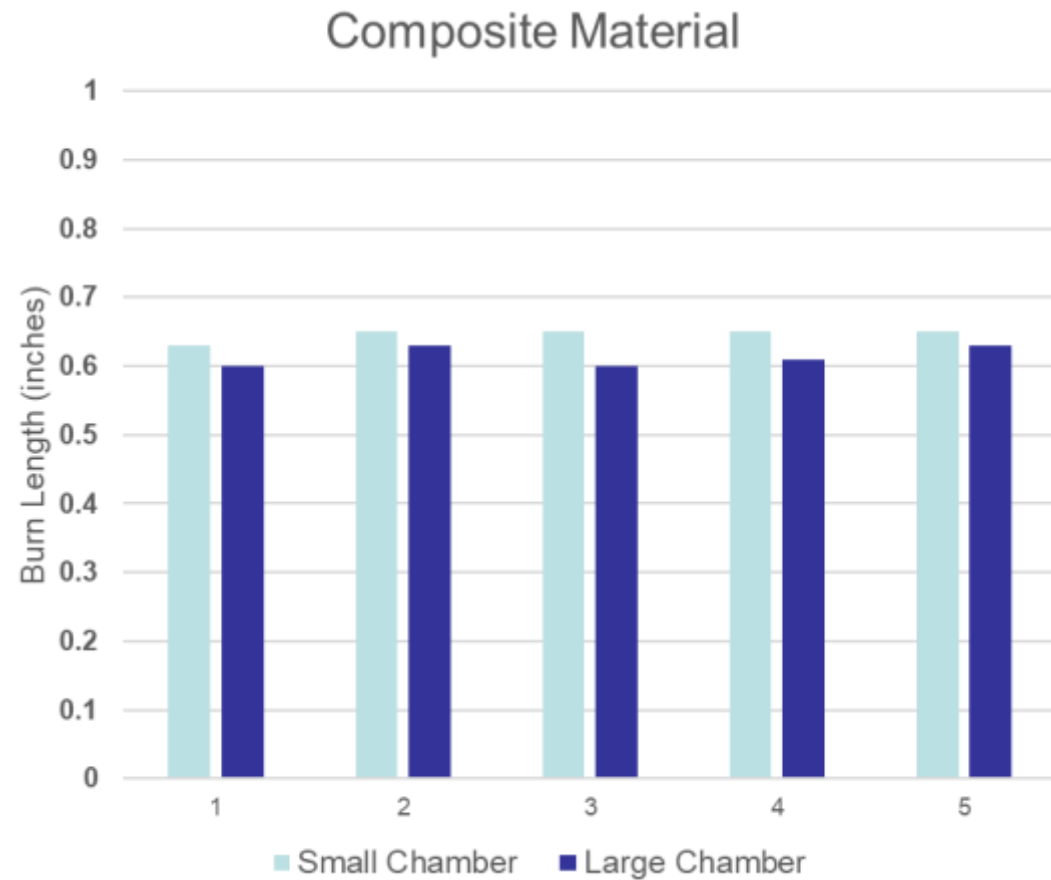
- Heat Flux
- Exhaust Air Speeds
- Burn Length of Materials

Differences in Internal Chamber Sizes

	Small Chamber 21 x 21 x 17 inches	Large Chamber 22 x 22 x 17 inches
Heat Flux (Watts/cm ²)	1.82	1.81
Power (Watts)	390	390
Airflow Heater Only (fpm)	187	208
Airflow Flame Stdbby Pos. (fpm)	250	244
Airflow Flame Test Pos. (fpm)	236	235

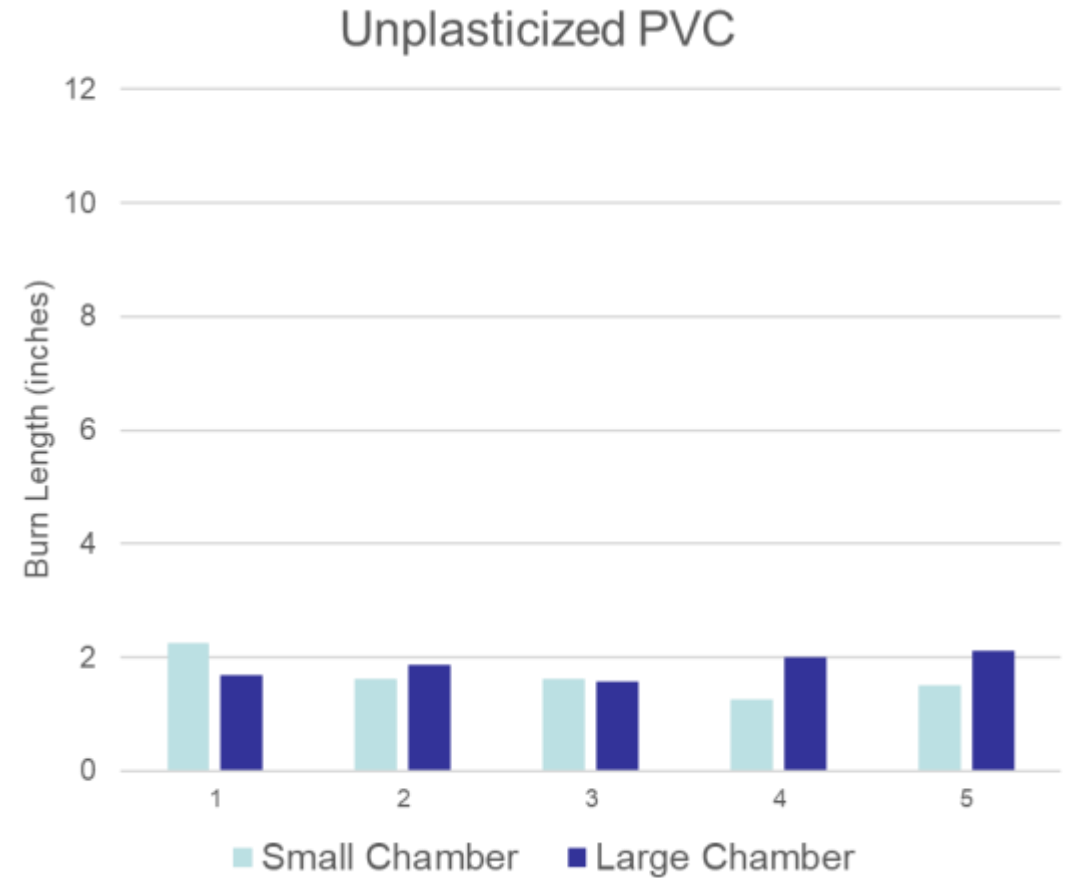
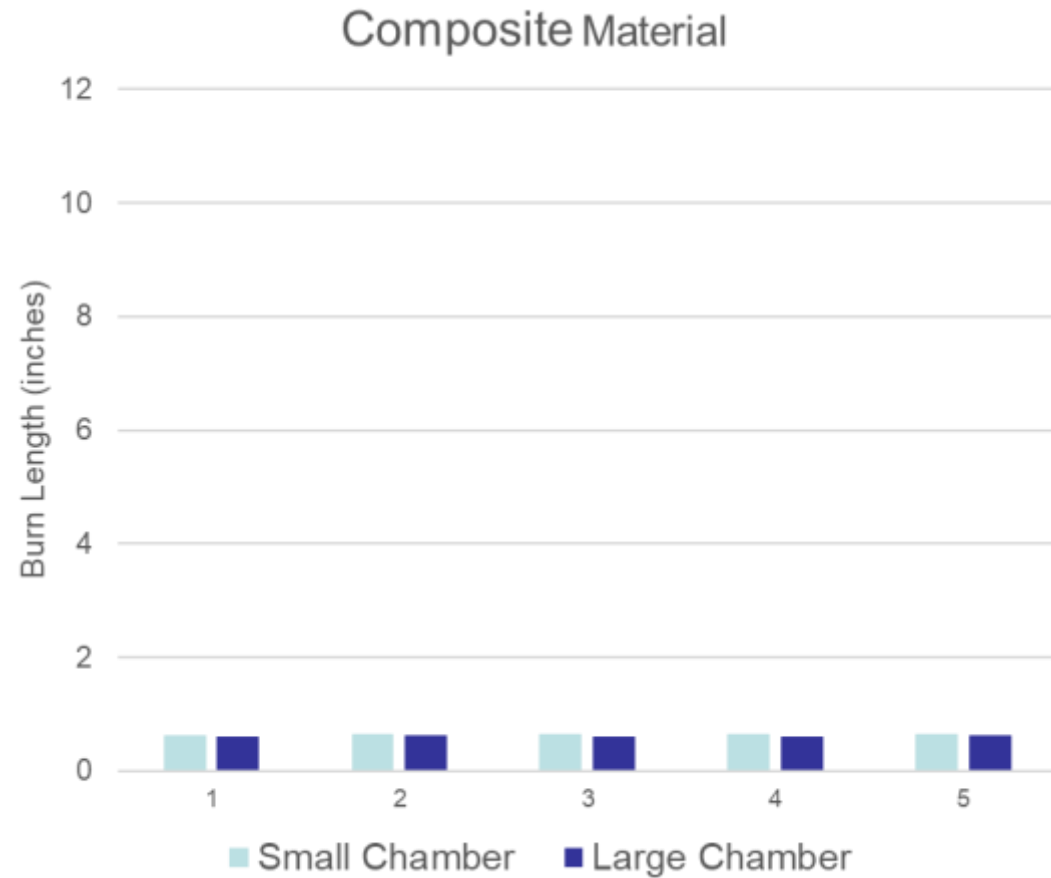


Differences in Internal Chamber Sizes

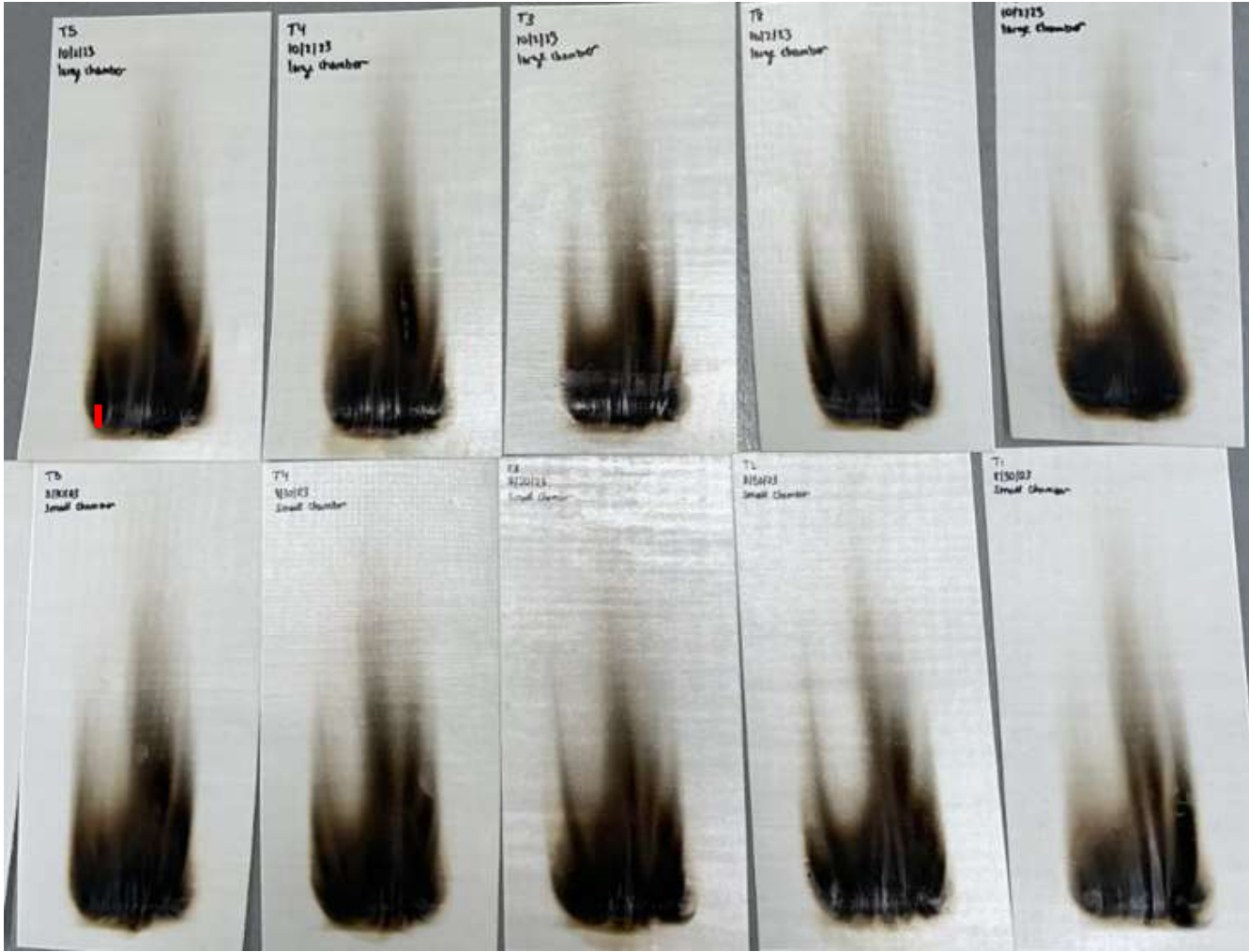


Differences in Internal Chamber Sizes

In Perspective



Composite



Large Chamber

Small Chamber

Unplasticized PVC



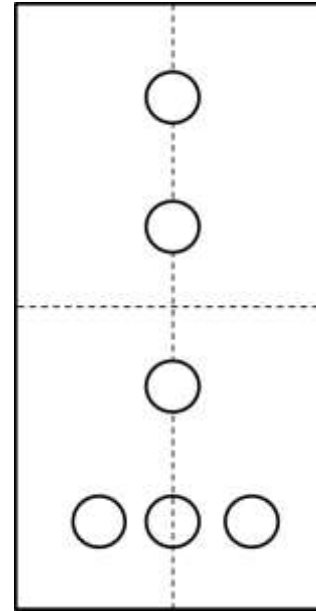
Small Chamber

Large Chamber

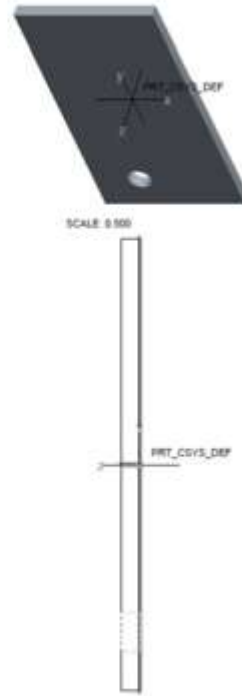
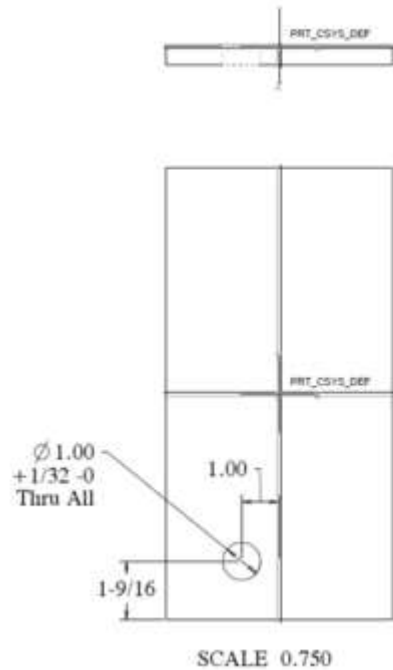
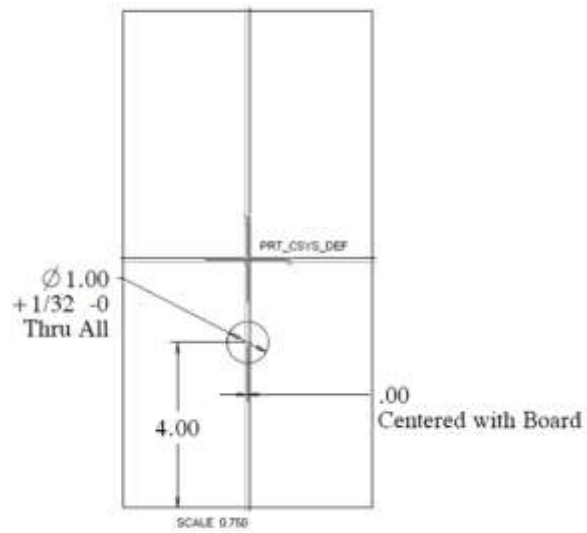


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Heat Flux Gradient Upon Sample



Heat Flux Gradient Upon Sample

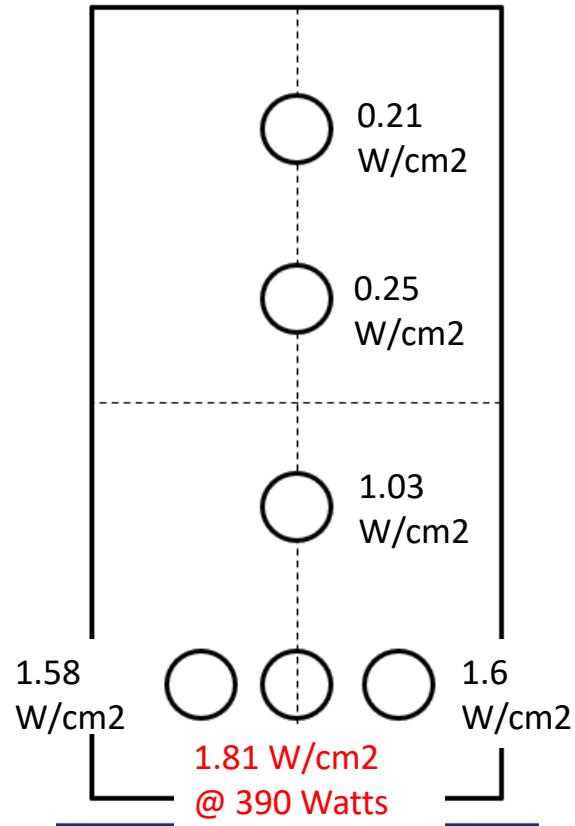


Board 1
Cut Through

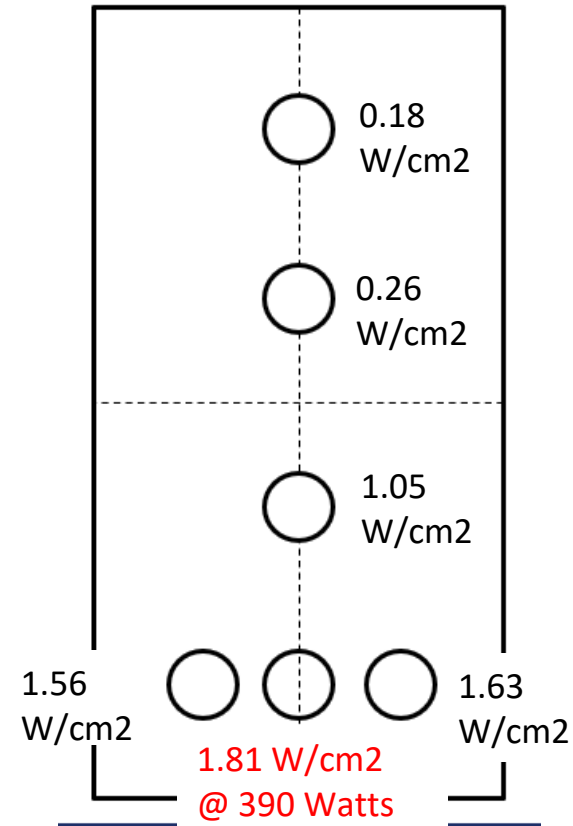


Heat Flux Gradient Upon Sample

Small Chamber

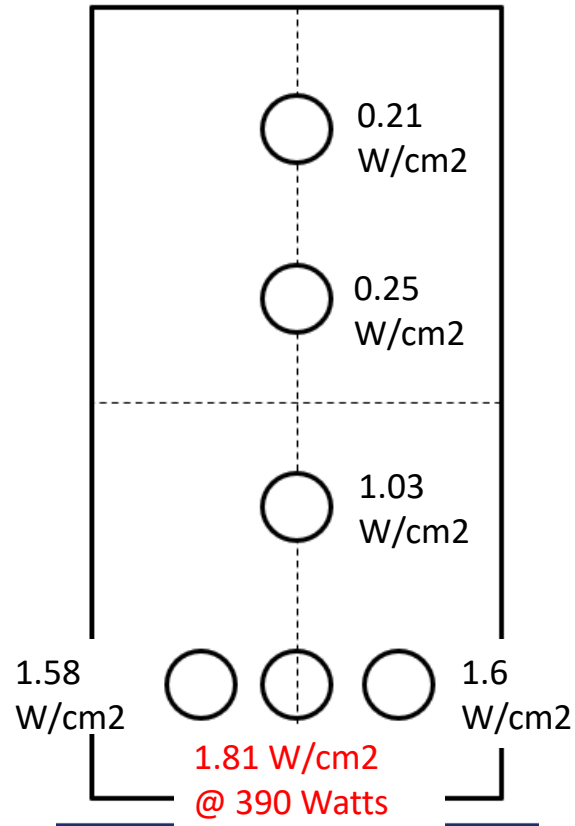


Large Chamber

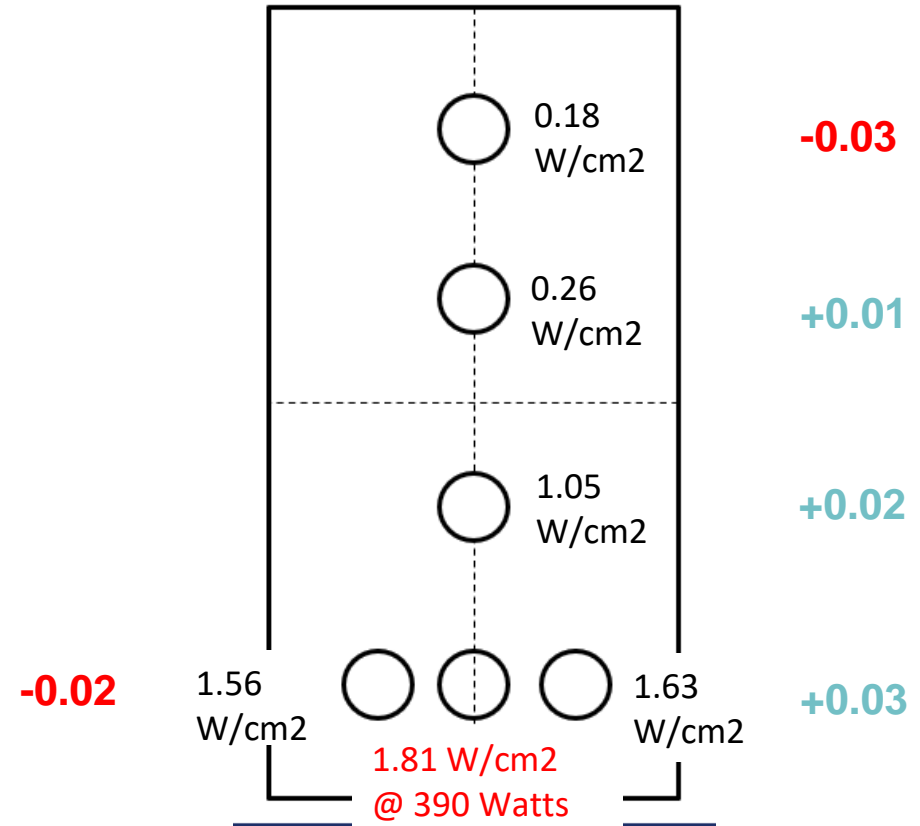


Heat Flux Gradient Upon Sample

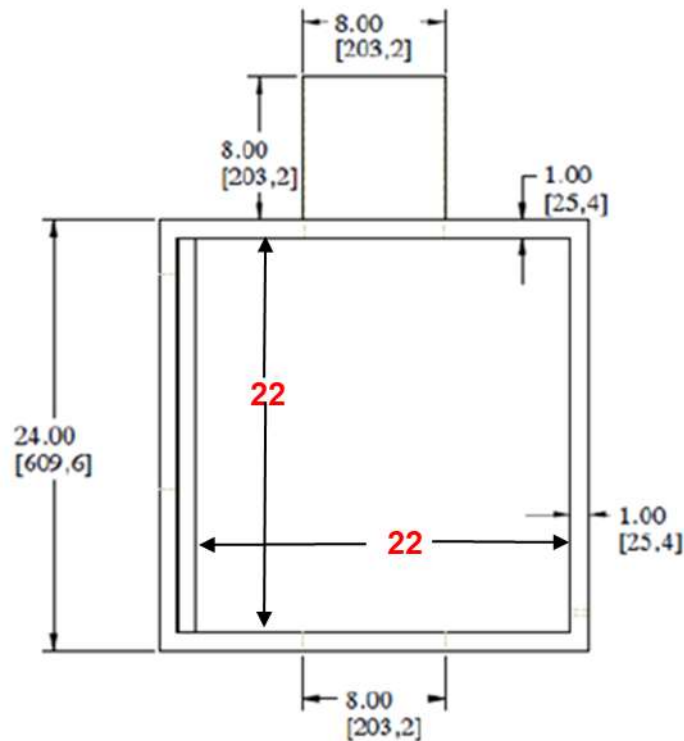
Small Chamber



Large Chamber



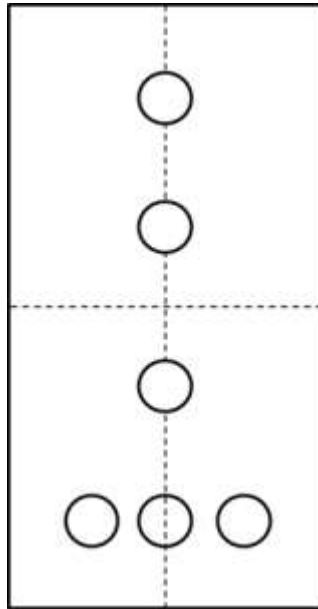
Differences in Internal Chamber Sizes



- There appears to not be a difference seen in the presented properties between 21 x 21 inch internal chamber size and 22 x 22 inch
- **Tolerances: 21.5 ± 0.5 in.**



Heat Flux Gradient Moving Forward



- Can this current map of heat flux measurements show a guideline for the development of VFP radiant heaters?

Presentation by Airbus During VFP Task Group

- A presentation will be given during the VFP Task Group Meeting
- Today, Monday October 16, 3:00 PM EST
- **Topic: A comparison of the differently manufactured VFP machines**



Questions?

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