Development of a New Test Method for Evacuation Slide Materials

Updated to New Test Method

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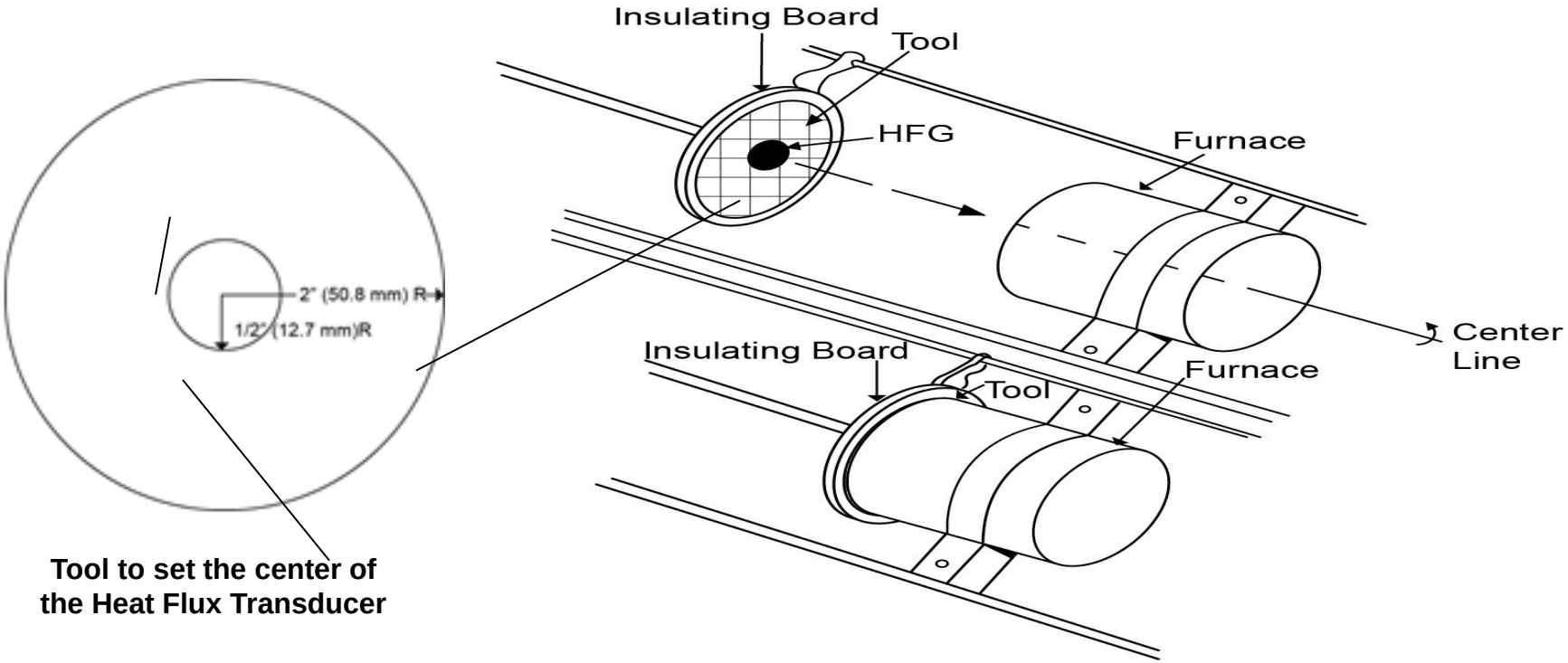
Activities

FAA visited Lab A and Lab B to ensure they set up the test properly.

Purpose-built calibration tools were used to set up the apparatus:

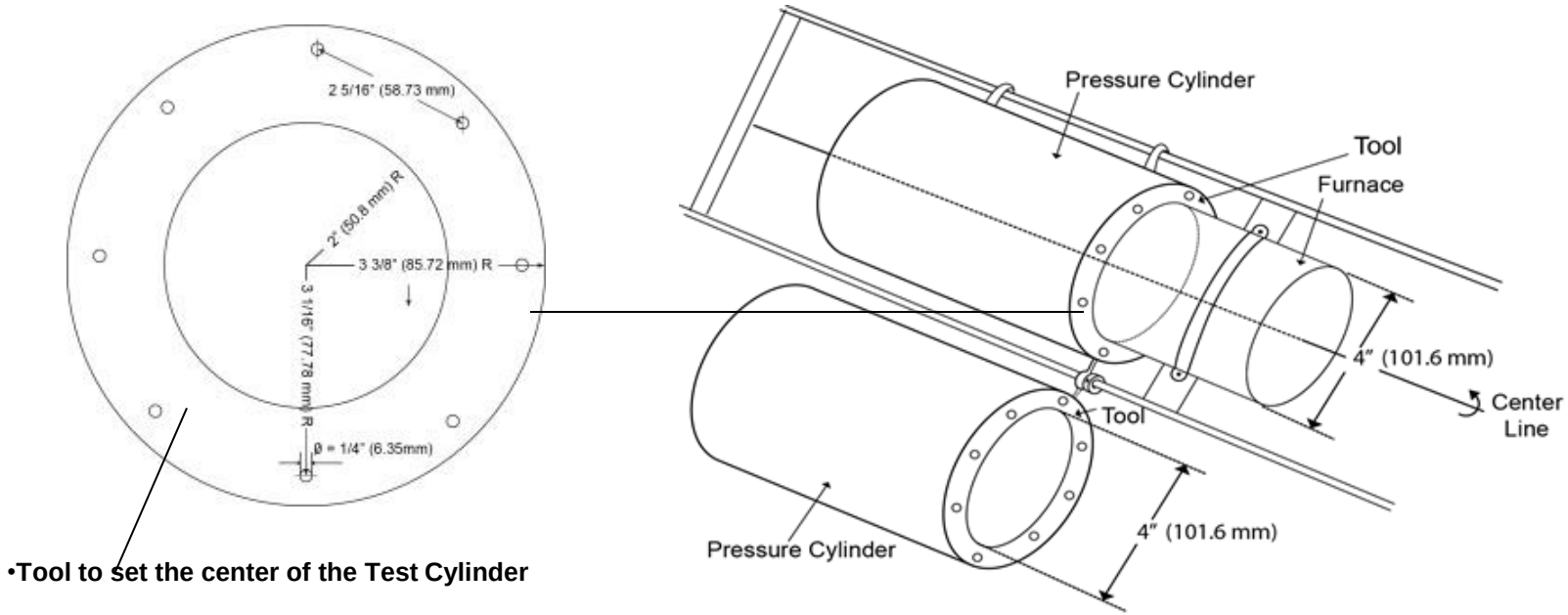
- ***The center of the Heat Flux Assembly centered with the centerline of Radiant Heat Furnace***
- ***The center of the Pressure Cylinder centered with the centerline of Radiant Heat Furnace***
- ***The distance of the Calorimeter Assembly to the heater***
- ***The distance of the center of expanded surface of slide material to furnace***

Center of the Heat Flux Transducer Centered with Centerline of the Radiant Heat Furnace



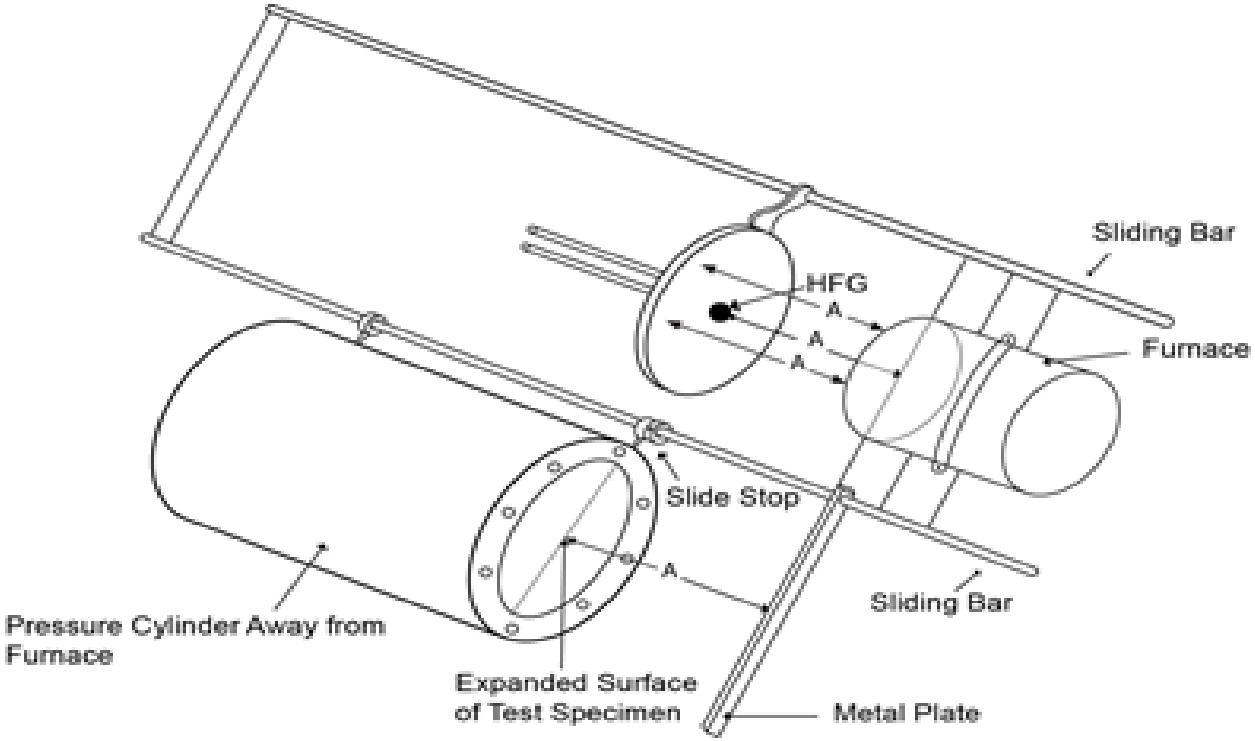
The tool is *also a ring. The 4 inch outer diameter of the tool has the same outer diameter as the furnace. The inner diameter of this tool is approximately 1 to 1 1/16 inches to accommodate the HFG. This tool will be installed on the insulating block. In order that the centerline of HFG is centered with the furnace, the perimeter of the tool must align with the furnace*

Center of the Test Cylinder Aligned with Centerline of the Furnace



The first tool is an aluminum ring. The 6 ¾ inch OD of the tool has the same outer diameter as the aluminum retaining ring. The 4 inch ID of the ring is the same as the OD of the furnace. This ensures that the centerline of the furnace is aligned with the pressure cylinder when the inner opening of the tool is lined up with the furnace

Distance from Calorimeter and Test Specimen to the Furnace (2 inches)



Install the metal plate (measuring tool) on the bar of the test frame. This measuring tool slides along the bar. The distance of this metal plate to the center of the expanded surface of the test specimen placed on the pressure cylinder is the same distance as the front of the furnace is to the center of the expanded surface of the test specimen placed on the pressure cylinder. These distances are 2 inches. This metal plate protects the test operator from the radiant heat when measuring the distance from the cylinder to the furnace. Several measuring aids to verifying the distance include but are not limited to a solid fixture measuring tool used to verify the distance from the furnace to the sample and the furnace to the HFG:

Calibrations and Tests Conducted at Each Lab

FAA visited Lab A and Lab B to ensure the correct test equipment and proper set up of apparatus and to determine how labs use the power input to calibrate the radiant heat furnace

- ***Furnace Type:***

  Lab A : used the Solid Coil Furnace (Part # 68086038000) that was the same as the FAA's Furnace

  Lab B : used the Wire Coil Furnace (incorrect for new test procedure)

- ***Tests conducted at Labs A and B:***

  One Calibration Test

  Two different slide tests

- ***Tests conducted at FAA Lab:***

  FAA conducted one Calibration

  FAA conducted two different slide tests

Evacuation Slide Tests Conducted at Working Group Labs

Calibration:

Energize the radiant heat furnace and other required instrumentation and allow 30 to 45 minutes for warm up.

Adjust the transformer voltage to produce a heat flux of 1.5 Btu/ft^{2}sec at a distance of 2 inches in front of the radiant heat furnace.

Do not turn off the furnace. Use this radiant heat output for the test.

Test Procedure: **(*Use power setting achieved during calibration)***

Pressurize the cylinder with test specimen to the normal operating pressure and check the distance of the center of the expanded surface of the test specimen, which must be 2 inches in front of the radiant heat furnace.

Ensure that the test specimen holds pressure for at least 3 minutes before the test.

Rotate the pressure cylinder with the test specimen in front of the radiant heat furnace.

Simultaneously start the timer.

Record time (in seconds) to the first observed pressure loss.

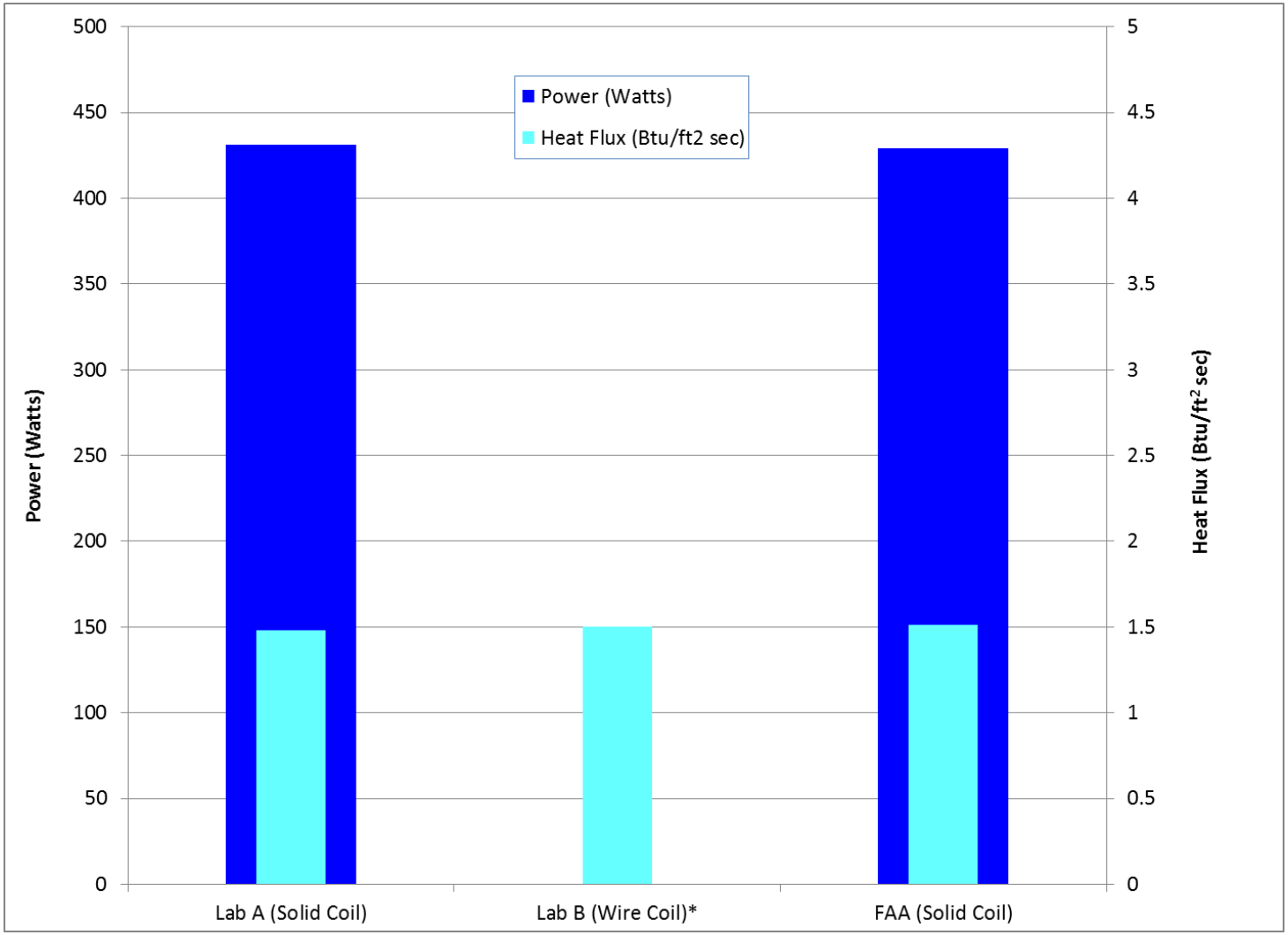
Each specimen must maintain correct pressure for a minimum of 180 seconds to pass the test.

Calibrations Conducted to Determine the Power Input that Produced a Heat flux of 1.5 Btuft^{2}sec at 2 inches from the Radiant Heat Furnace

Lab Name	Furnace Type	Heat Flux	Power input	Distance from the coil to the face of furnace	Distance from the Heat flux Transducer to the face of the furnace
Lab A	Solid Coil Part #=*68086038000*	1.48 Btu	431 Watts	About 1 ½ " at the center And about 1 5/8 " right and 1 9/16 " left at the edge of the coil	2 Inches
Lab B	Wire Coil	1.5 Btu	N/A	N/A	2 inches
FAA	Solid Coil Part #=*68086038000*	1.51 Btu	429 Watts	1 ½ inches	2 inches

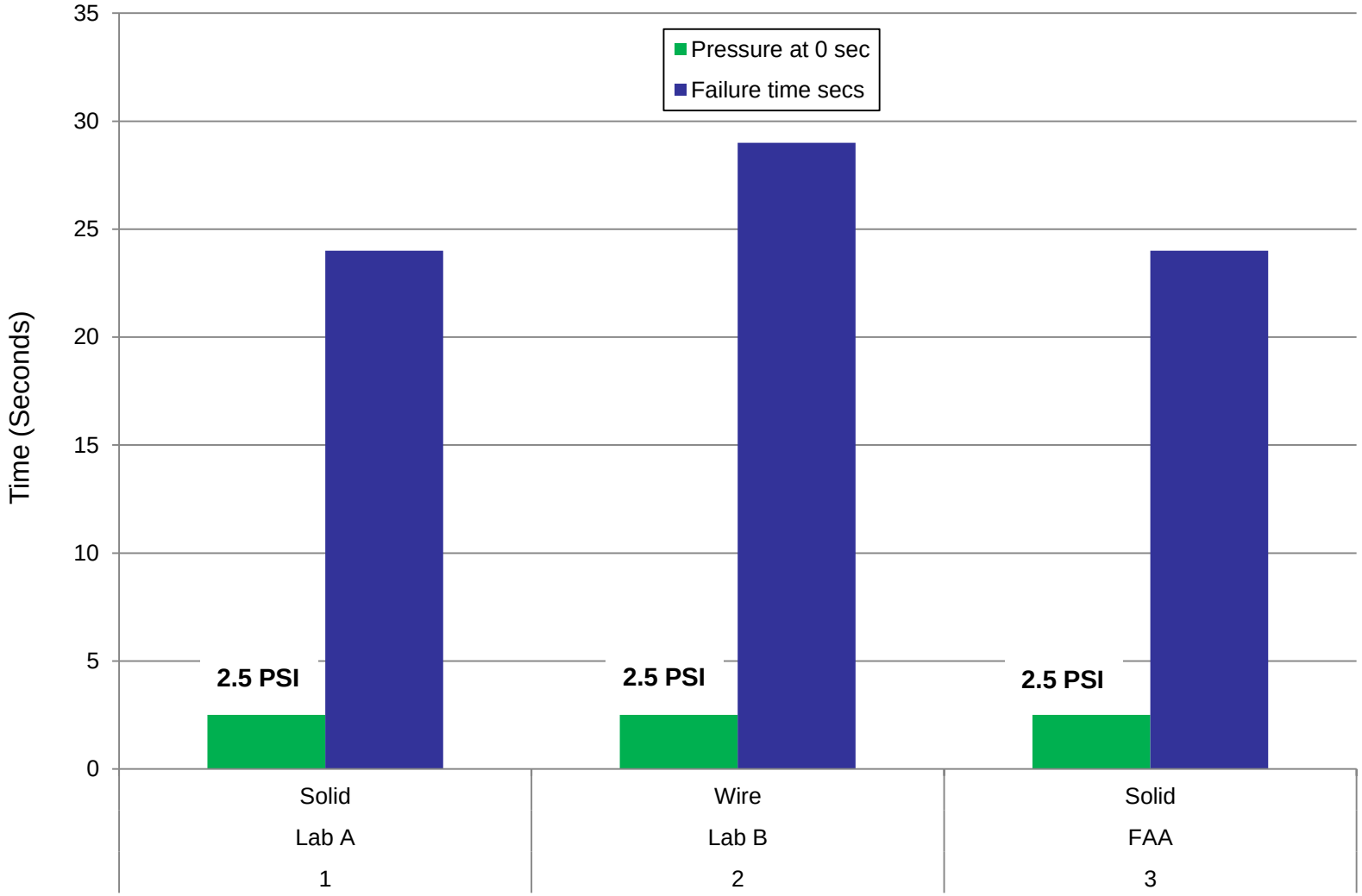
Standard Power Input is about (425 +/- 4 Watts)

Test Results of the Power Inputs of Lab A and FAA

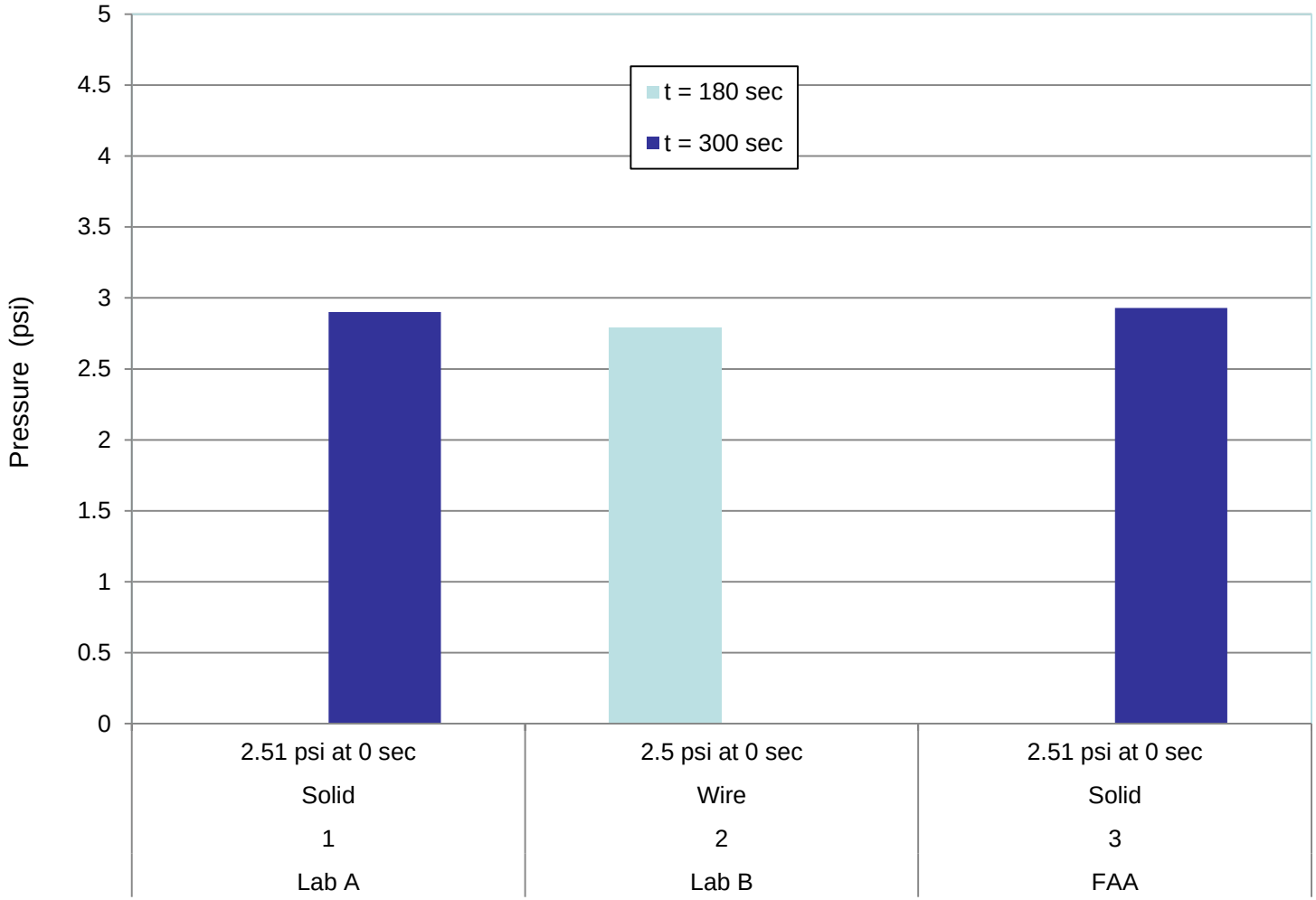


* (Lab B was unable to record the power input and also had the wire coil furnace that could not be used for the new test method)

Mustard/Mustard Material Test Results



Yellow /Silver Material Test Results



Conclusions

- ***Lab A and the FAA have the same type furnace (Part # 6808038000) and have same power input to provide a heat flux of 1.5 Btu/ft^2 sec at 2 inches in front of the heater.***

- ***Lab B has the wire coil furnace and will require correct solid coil furnace (Part # 6808038000) to use for the new test method. Previous testing has shown that the 2 different furnaces require different power settings.***

- ***Lab A and the FAA had the same test results of both slide materials.***

- ***Lab B results differed slightly during both slide material tests.***

Future Work

- ***Assist labs in obtaining the correct furnace (Part # 6808038000) and re-visit lab to ensure correct apparatus arrangement, calibration, and test execution.***

- ***Round Robin 5 will be conducted using the new test method, and presented at next meeting. Only labs with the correct furnace will participate.***