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Introducing a study into Flame Ingression through Holes in Firewall, Assessing Impact of Geometry, Pressure Differential and Flame Characteristics for Calibrated Kerosene Burners Including the Sonic Burner. 2020-08-05



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Template Ref: QS00049-3

# R&D Problem Statement.

The industry and authorities alike have a renewed interest on the impact of fire during

- on-the-ground events and
- inflight scrubbing flame across surfaces.

The impact of such events on holes, slots and tubes when exposed to a calibrated flame is information which to Resonate Testing knowledge is not in the public domain.

Resonate Testing's goal is to assess the lengths for flame ingress when considering physical variables such as circular holes, slots and tubes (Length/Diameters- L/D).

Additional variables to be considered include functional

- Pressure differentials (Negative pressure drawing the flames in).
- Burner distances from the target location.

**The goal is to assess the approved kerosene burners (incumbent- Carlin and Sonic Burners) flame height and definition when compare to varying hole geometry and functional exposure**



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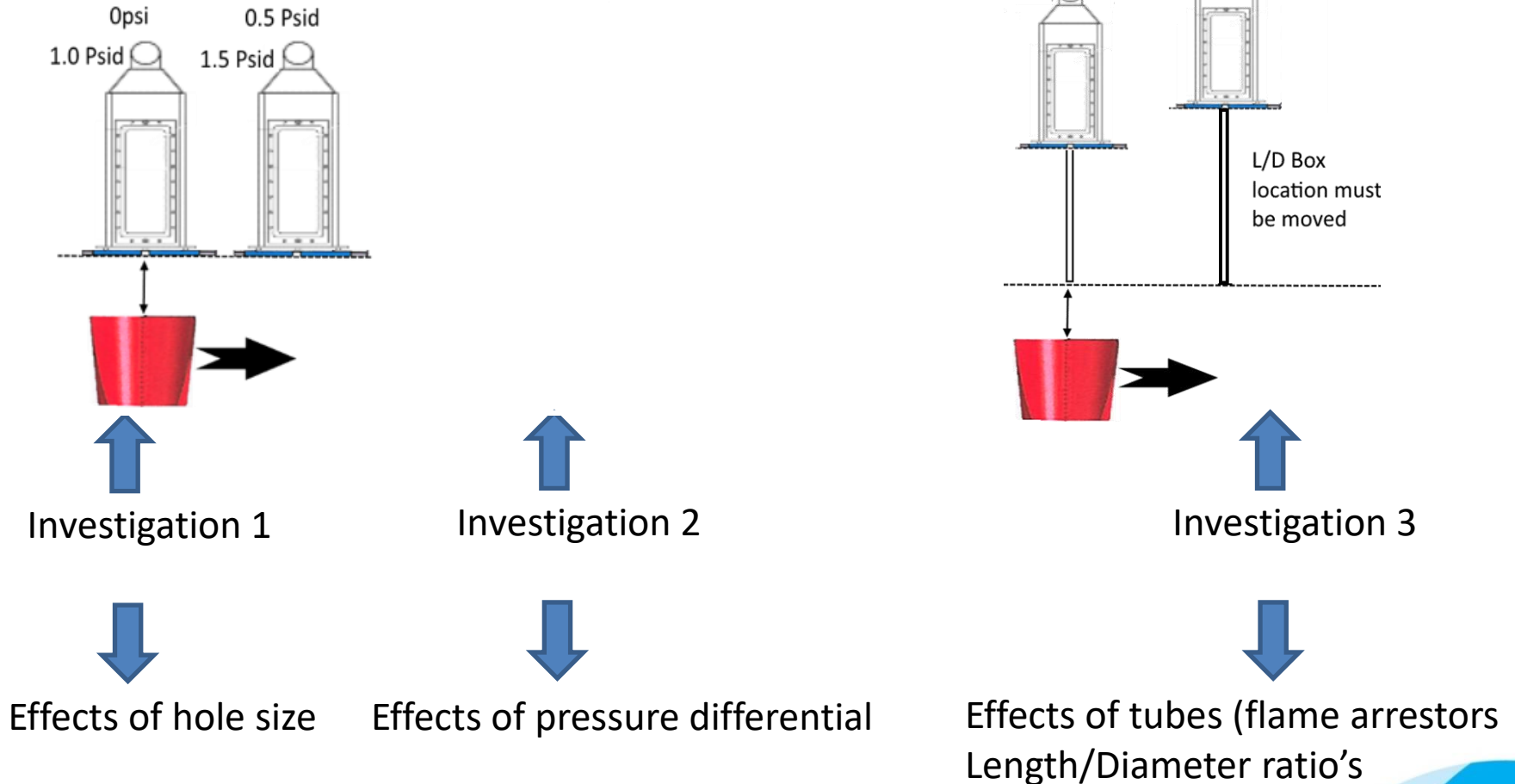
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## Key elements-

1. Calibrated Flame
2. Common flame for maximum data commonality
3. New TC's and accurate data acquisition.
4. Several data points for each functional measurement.
5. Aperture, Pressures differentials, and distances can be adjusted.



## Holes

## Pressures

## Tubes

## Will be evaluated

Hole Configuration	Orientation	$\Delta P$
-4 (1/4")	Horizontal	0.0 PSID
-8 (1/2 ")	Horizontal	0.5 PSID
-12 (3/4")	Horizontal	1.0 PSID
-16 (1")	Horizontal	2.0 PSID
-4 (1/4")	Vertical	0.0 PSID
-8 (1/2 ")	Vertical	0.5 PSID
-12 (3/4")	Vertical	1.0 PSID
-16 (1")	Vertical	2.0 PSID



Tube Configuration	L/D	$\Delta P$
-4 (1/4")	5	0.0 PSID 0.5 PSID 1.0 PSID 2.0 PSID
-8 (1/2")	10	
-12 (3/4")	15	
-16 (1")	20	
-4 (1/4")	5	
-8 (1/2")	10	
-12 (3/4")	15	
-16 (1")	20	



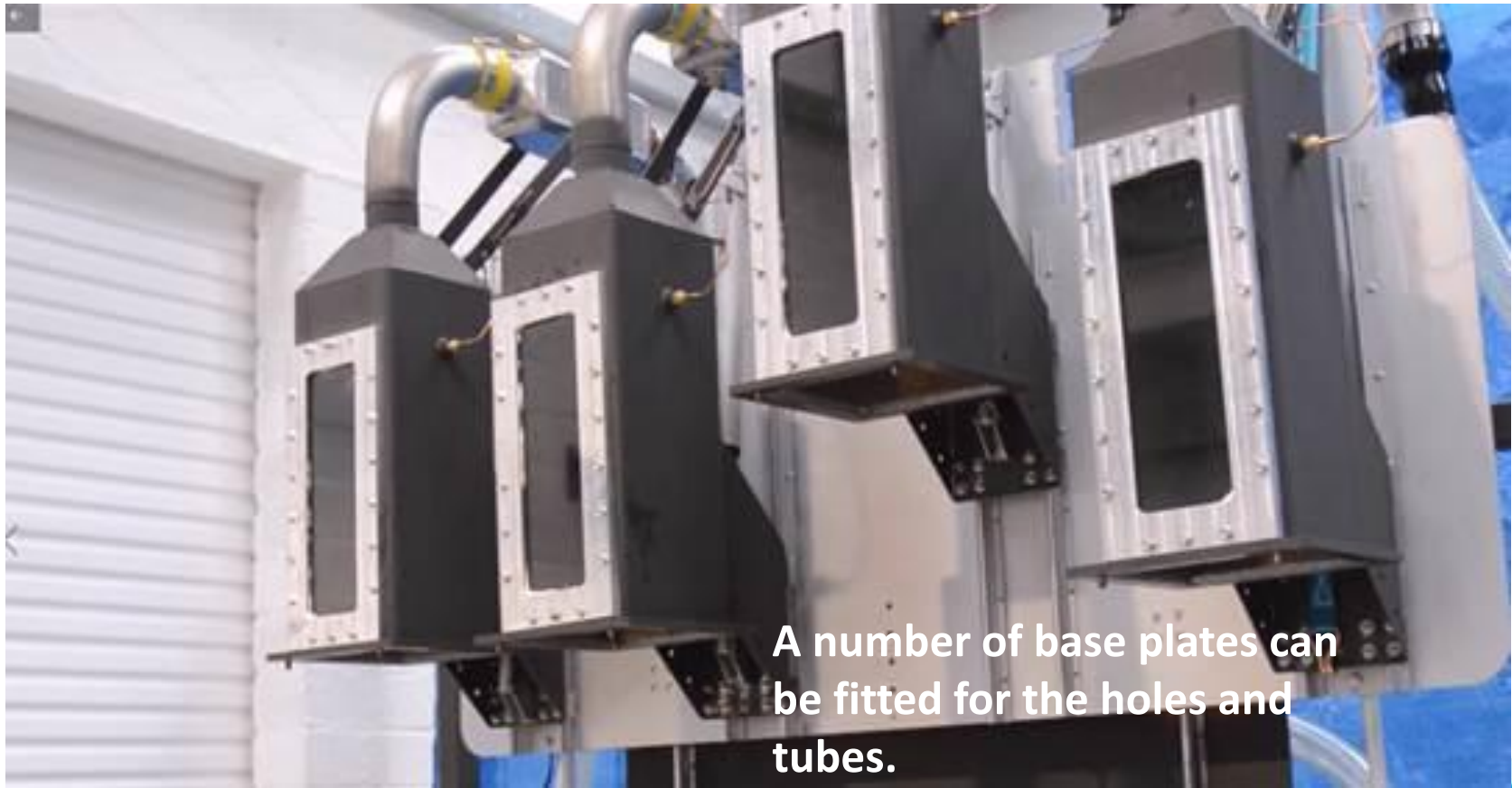
Some of the data points can be captured in the initial 'shortened' R&D trials.

After the initial R&D trials. We can evaluate the data and decide where to concentrate further testing.

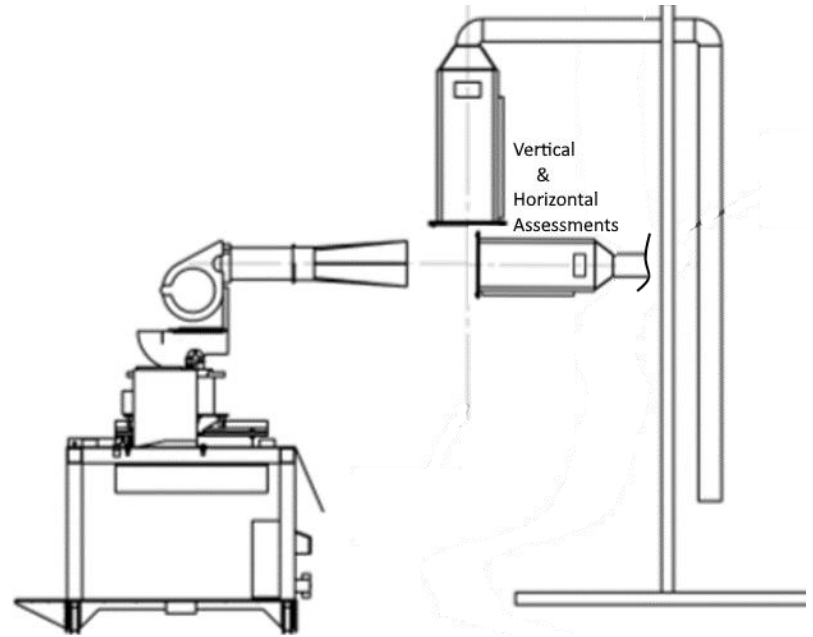
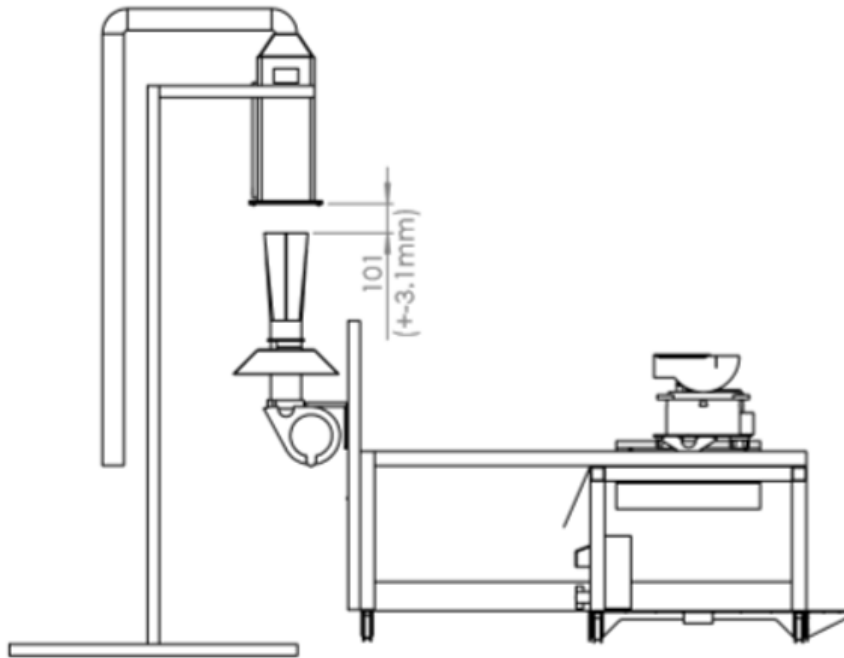
# The physical test rig.

The heights and pressure differentials can be independently changed.

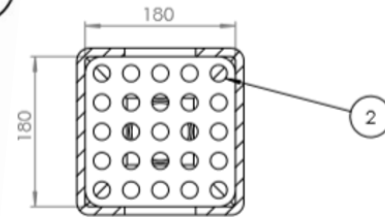
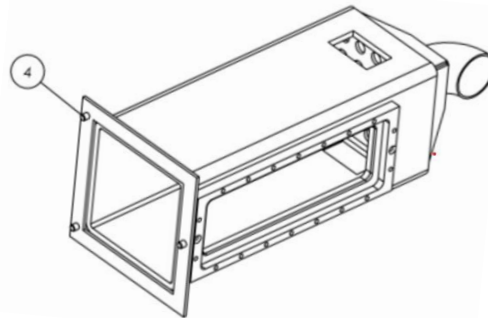
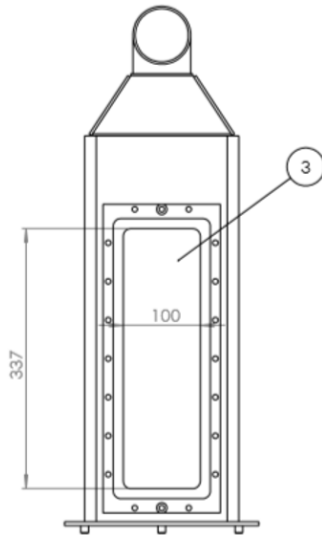
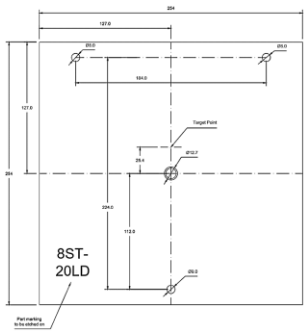
Flame height can be observed and measured.



A number of base plates can be fitted for the holes and tubes.



### Circular Holes



SECTION B-B



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