

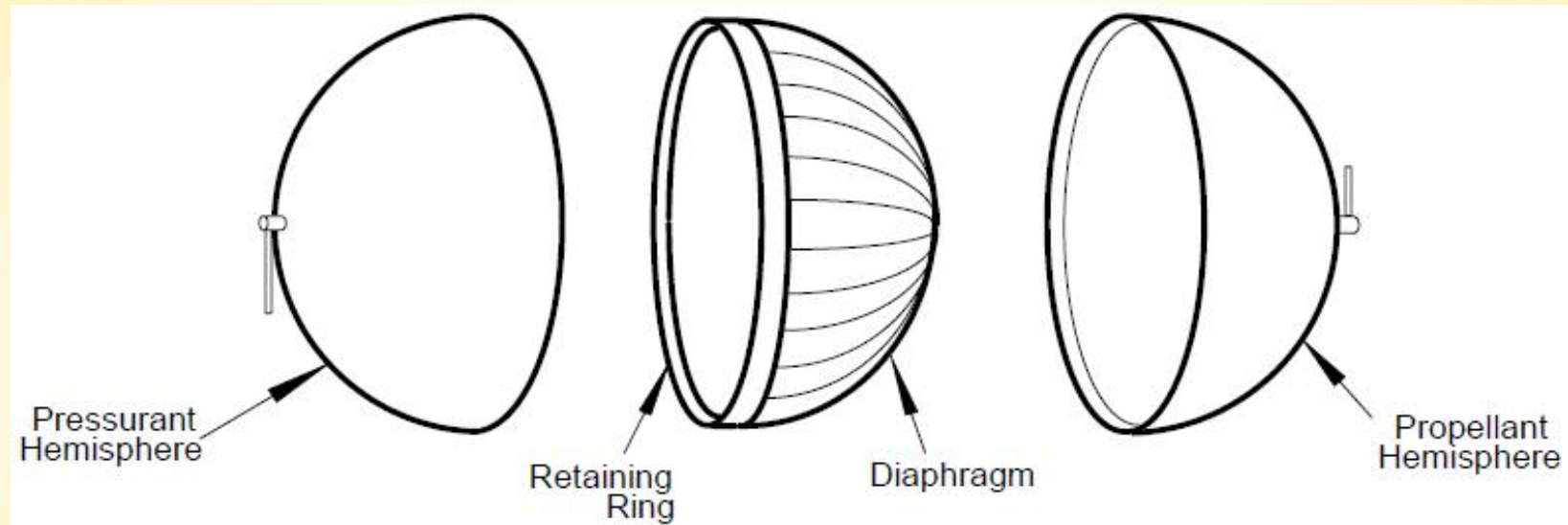
# Characterization of Elastomeric Diaphragm Motion in a 12.88 inch Diameter Tank under 1-DOF Sinusoidal Excitation



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# Elastomeric Diaphragm Assembly



- Utilize positive expulsion (pressure differential) for liquid propellant control and delivery.
- Hemispherical or Pill-shaped diaphragms.
- Clamped in place between the two halves of the tank.
- Designed to produce greater than 99.9% propellant expulsion.

# 12.88" Tank at Various Fill Fractions



100%

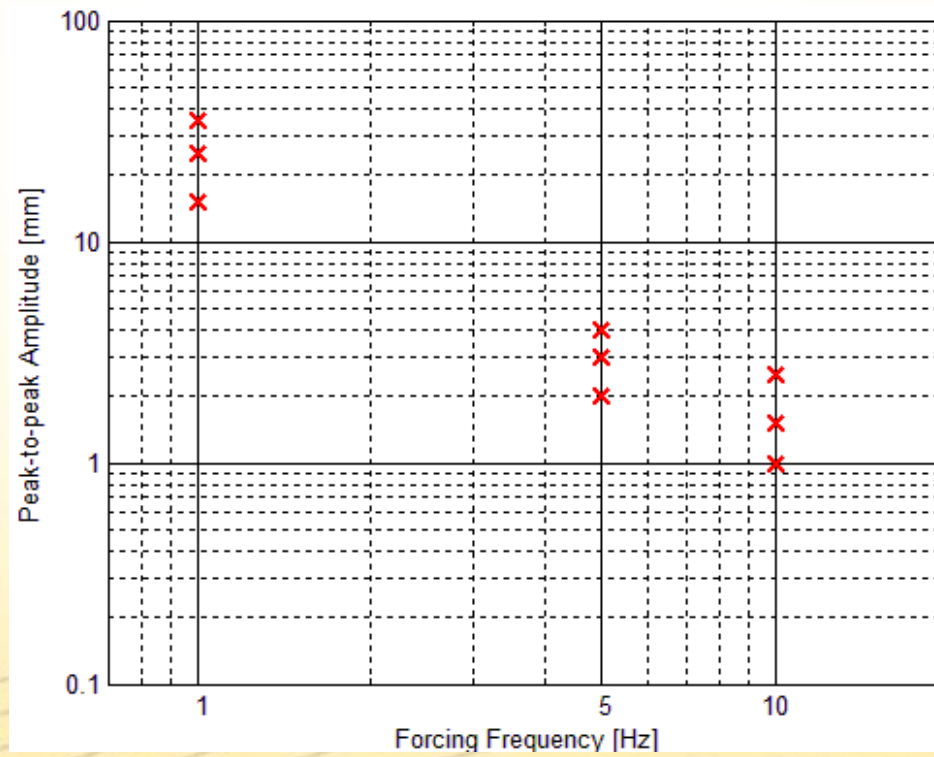
75%

50%

- Diaphragm is relatively smooth.
- Contact with itself or the tank wall.
- Note: Propellant side is down and the pressurant side is up.

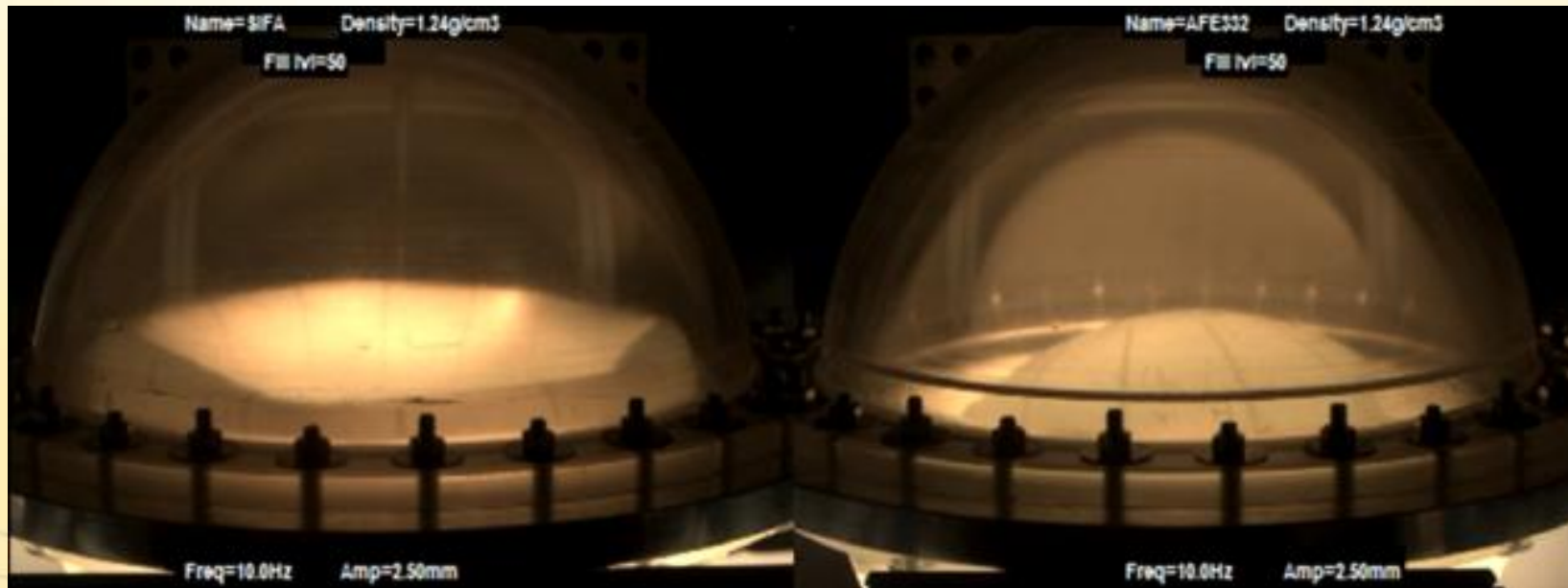
# Test Matrix

Diaphragms	Densities (g/cm <sup>3</sup> )	Fill Fractions (%)	Frequency and Peak-to-peak Amplitude
SIFA & AFE-332	1.02	100	@ 1 Hz: 15 mm, 25 mm, 35 mm
	1.24	75	@ 5 Hz: 2.0 mm, 3.0 mm, 4.0 mm
	1.30	50	@ 10 Hz: 1.0 mm, 1.5 mm, 2.5 mm

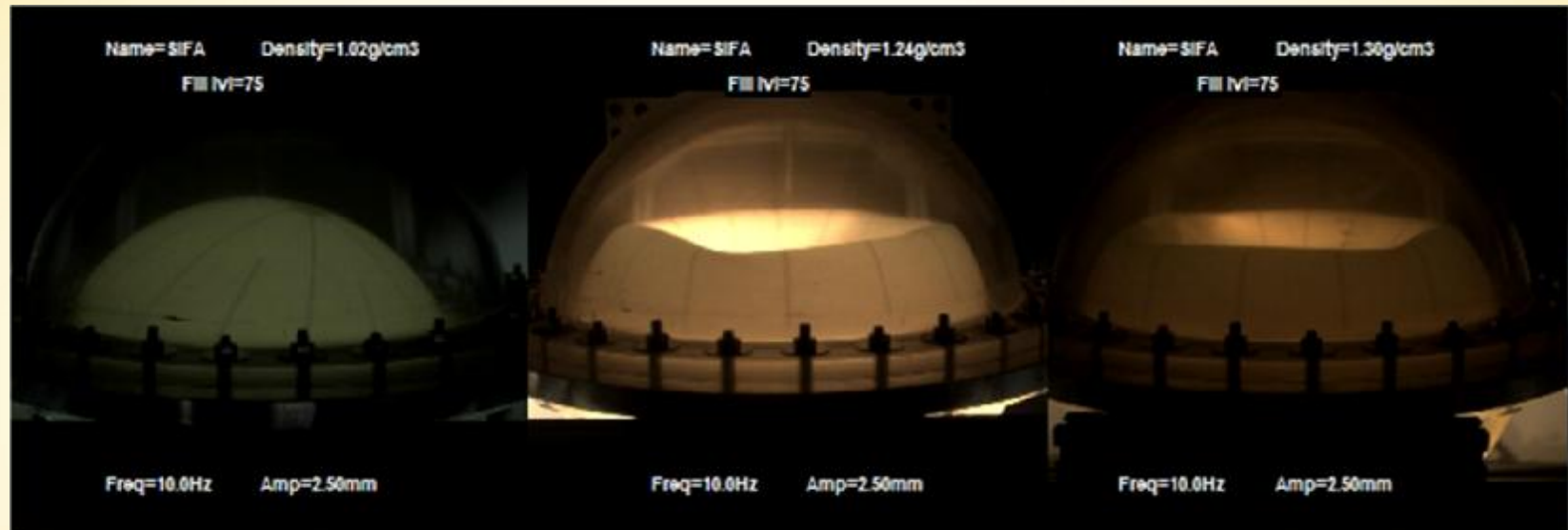


# Comparison Videos Generated

Video Number	Same parameters	Different parameter
1-9	SIFA, Density, max amplitude at each frequency	Fill Fraction
10-18	AFE-332, Density, max amplitude at each frequency	Fill Fraction
19-27	AFE-332, fill fraction, max amplitude at each frequency	Density
28-36	SIFA, fill fraction, max amplitude at each frequency	Density
37-63	Density, Fill fraction, max amplitude at each frequency (Side by side comparison)	Membrane

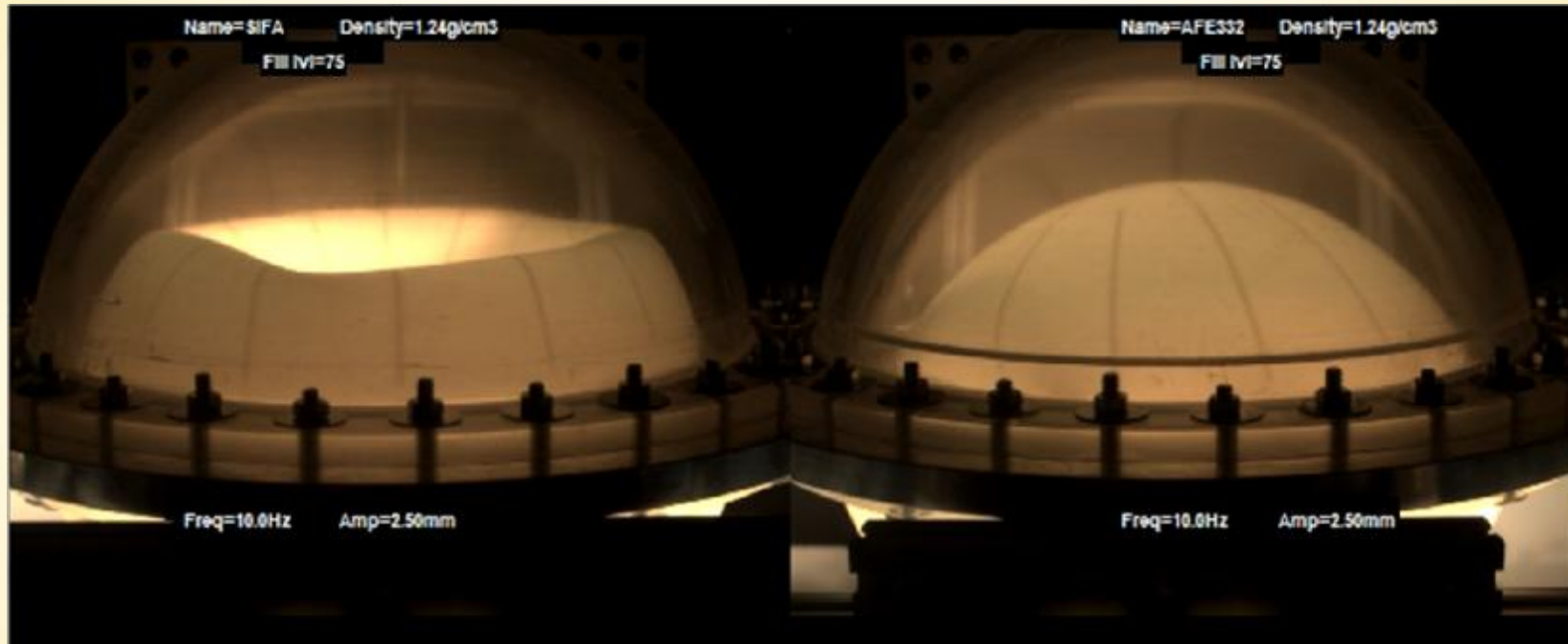


# Comparison of Different Densities



- SIFA Diaphragm with various densities at 75% fill fraction level excited at 10 Hz with 2.5 mm double amplitude.

# Side by Side Diaphragm Comparison



- SIFA vs AFE332 for 1.24 g/cm<sup>3</sup> for 75% fill fraction excited at 10 Hz with 2.5 mm double amplitude.