

# Environmental Testing

## Comprehensive Space Environment Testing

- Over 80 collective years of environmental testing experience
- First in class cycling rates achieved in Ultra-Fast Cycling Chamber
- O<sub>2</sub>, Dewpoint sensing
- Automated independent and redundant alarm systems for test article and chamber safety
- In-situ test article monitoring; insulation resistance, continuity monitoring through solar cell and/or bypass diode"
- All chambers and ovens procured new, incorporating Spectrolab's proprietary designs
- All chambers and Space Simulator to be used exclusively for space-flight hardware (meeting silicone NASA outgassing requirements)



**Ultra – Fast Chamber**

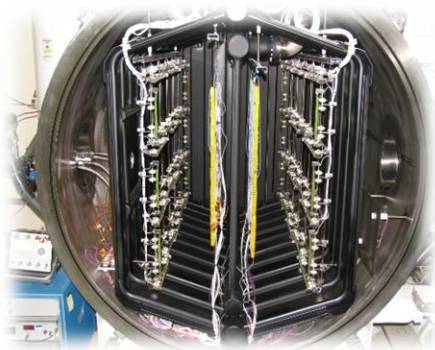
### Volume, Dimensions and Ranges

Chambers	Quantity	Chamber Internal Volume (ft <sup>3</sup> )	Test Article Maximum Dimensions (H" x W" x D")	Range (°C / % RH)
Humidity	1	27	30 x 30 x 30	Ambient to +95 / 20 to 95
Thermal Shock	2	2.8	23 x 15 x 13	+180 to -175
Thermal Cycling, including Ultra-Fast	Various	8 to 1400	20 x 18 x 16 up to 96 x 96 x 144	+180 to -175
Space Simulator (Thermal Vacuum)	1	---	Test Plane: (36 x 60) x 2	+180 to -175
Ovens	Various	8 to 335	16 x 16 x 16 up to 69 x 110 x 60	Ambient to +400 <sup>(1)</sup>

### Max Rate, Pressure Ranges and Optional Sensing

Chambers	Max Rate (°C/min) <sup>(1)</sup>	Pressure	Optional Sensing
Humidity	2	N/A	Temp/RH
Thermal Shock	200	GN2 purged	N/A
Thermal Cycling, including Ultra-Fast	Up to 80	GN2 purged	O <sub>2</sub> , Dewpoint
Space Simulator (Thermal Vacuum)	100	1.0 x 10 <sup>-4</sup> to 2.0 x 10 <sup>-8</sup> Torr	TQCM, ASTM E 834 Cold Finger
Ovens	2	GN2 purged	O <sub>2</sub> , Dewpoint

<sup>(1)</sup> Does not apply to all chambers/ovens



**Testing Chambers feature a wide array of temperature ranges**



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## Volume, Dimensions and Ranges – Metric Units

Chambers	Quantity	Chamber Internal Volume (ft <sup>3</sup> )	Test Article Maximum Dimensions (H" x W" x D")	Range (°C / % RH)
Humidity	1	0.76	76.2 x 76.2 x 76.2	Ambient to +95 / 20 to 95
Thermal Shock	2	0.08	58.4 x 38.1 x 33.02	+180 to -175
Thermal Cycling, including Ultra-Fast	Various	.227 to 39.644	50.8 x 45.7 x 40.6 up to 243.8 x 243.8x365.8	+180 to -175
Space Simulator (Thermal Vacuum)	1	-	Test Plane: (91.4 x 152.4) x 5.08	+180 to -175
Ovens	Many	.227 to 9.490	40.64 x 40.64 x 40.64 up to 175.3 x 279.4 x 152.4	Ambient to +400 <sup>(1)</sup>

## Large Volume Chamber



ENVIRONMENTAL MANAGEMENT SYSTEM  
CERTIFIED BY DNV  
**ISO 14001**

7/16/18