

Meeting AMS2750 Class 1 Temperature Uniformity Standards with SH Scientific



In the aerospace industry, precision is a strict regulatory requirement. The standard that governs the temperature management of heat treatment equipment in this sector is AMS2750. For facilities processing mission-critical aerospace materials, managing and documenting your thermal environment is essential.

At Lab and Furnace, we partner with manufacturers who engineer equipment capable of meeting these extreme tolerances. Recent Temperature Uniformity Survey (TUS) data confirms that specific SH Scientific custom furnaces deliver the thermal stability required to satisfy AMS2750 Class 1 uniformity parameters.

(Note: While the temperature uniformity of these furnaces satisfies Class 1 requirements, full AMS2750 compliance involves additional facility-level protocols, including ongoing sensor calibration and rigorous documentation.)

Understanding AMS2750 Core Requirements

To maintain strict temperature control, the AMS2750 standard outlines several critical management protocols. Two of the most vital are:

TUS (Temperature Uniformity Survey):

This requires the user to periodically measure the temperature consistency across the entire working zone of the furnace. Typically, this involves placing sensors at nine distinct points within the chamber to map the thermal environment.

SAT (System Accuracy Test):

This is a periodic verification of the furnace's sensor accuracy. It is conducted by the user by comparing the readings of the furnace's built-in control sensor against a highly calibrated reference sensor to account for any drift.

Based on these measurements, the furnace's thermal environment is categorized into distinct classes:

Class	Temperature Uniformity
Class 1	± 3°C
Class 2	± 6°C
Class 3	± 8°C
Class 4	± 10°C
Class 5	± 14°C

SH Scientific Temperature Uniformity Test Results

To validate their engineering, SH Scientific conducted thorough temperature uniformity tests using Process Temperature Control Rings (PTCR) across multiple points within their furnace chambers. The data below outlines the thermal variance for various muffle and tube furnace models.

Aerospace Custom Muffle Furnaces (Class 1 Uniformity)

SH-FU-27MG-OM

Custom model for Aerospace AMS2750 Class 1 (1200°C Muffle Furnace, 300×300×300mm chamber)

Test 1 (600°C Target): Ramp up rate 5°C/min, hold for 2 hours. The average temperature was 650.6°C. Uniformity measured at ± 1.6°C (0.5%), satisfying Class 1.

Test 2 (700°C Target): Ramp up rate 5°C/min, hold for 2 hours. The average temperature was 748.4°C. Uniformity measured at + 1.4°C (0.4%), satisfying Class 1.

Temperature Uniformity Test Data

SH-FU-27MG-OM · 1200°C Muffle Furnace · 300 × 300 × 300 mm

MODEL
SH-FU-27MG-OM

1. MODEL

SH-FU-27MG-OM

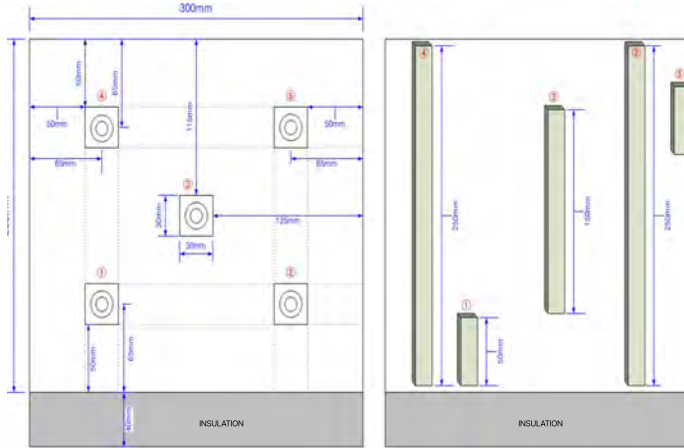
1200°C Muffle Furnace. 300 × 300 × 300mm chamber

(Custom model for Aerospace AMS2750 Class 1)

2. TEST CONDITION

Ramp up rate 5 °C/min up to 600 °C (120min) and hold for 2 hours.

3. Measurement Points



SH-FU-27MG
DOOR SIDE

4. PTCR Locations



5. Uniformity Result

NO.	PTCR (mm)	Converted Temperature (°C)	Average Temperature (°C)	Uniformity (°C)
1	19.98	652	650.6	± 1.6 (0.5%) AMS2750 Class 1 (+/-3°C)
2	19.99	651		
3	20.00	649		
4	19.98	652		
5	20.00	649		

Temperature Uniformity Test Data

SH-FU-27MG-OM · 1200°C Muffle Furnace · 300 × 300 × 300 mm

MODEL
SH-FU-27MG-OM

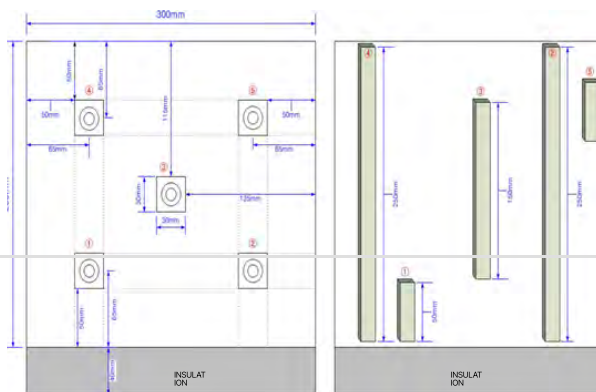
1. MODEL

1200°C Muffle Furnace. 300 × 300 × 300mm chamber
(Custom model for Aerospace AMS2750 Class 1)

2. TEST CONDITION

Ramp up rate 5 °C/min up to 700 °C (140min) and hold for 2 hours.

3. Measurement Points



SH-FU-27MG
DOOR SIDE

4. PTCR Locations



5. Uniformity Result

NO.	PTCR (mm)	Converted Temperature (°C)	Average Temperature (°C)	Uniformity (°C)
1	18.93	749	748.4	± 1.4 (0.4%) AMS2750 Class 1 (+/-3°C)
2	18.93	749		
3	18.93	749		
4	18.95	747		
5	18.94	748		

SH-FU-70MGV-OM

Large Scale Vacuum Muffle Furnace (1200°C, 415×415×415mm chamber)

Test: Multi-stage ramp up to 850°C, hold for 1 hour, followed by a controlled cooling rate to 500°C.

Result: The average temperature across measured points was 847.51°C.

Uniformity measured at $\pm 1.95^\circ\text{C}$ (0.5%), satisfying Class 1.

Temperature Uniformity Test Data

SH-FU-70MGV-OM · 1200°C Large Scale Vacuum Muffle Furnace · 415 × 415 × 415 mm

MODEL
SH-FU-70MGV-OM

1. MODEL

SH-FU-70MGV-OM

1200°C Large Scale Vacuum Muffle Furnace.
415 × 415 × 415 mm chamber

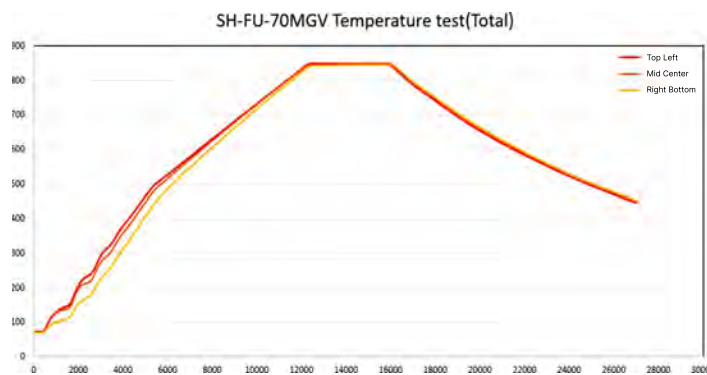
2. TEST CONDITION

- 2-1. Ramp up rate 5°C/min up to 500°C (100min)
- 2-2. Ramp up rate 3°C/min from 500°C to 850°C (116min) and hold for 1 hour
- 2-3. Cooling rate 3°C/min from 850°C to 500°C (116min)

3. Measurement Points



4. Uniformity Data



NO.	Measurement Point	Measured Temperature (°C)	Average Temperature (°C)	Uniformity Data (°C)
1	Top Right	847.41	847.51	± 1.95 (0.5%)
2	Mid Center	849.46		
3	Left Bottom	845.66		

Standard High-Temperature Muffle Furnaces

SH-FU-27MGQ

1200°C Quartz Chamber Muffle Furnace (300×300×300mm chamber)

Test: Ramp up rate 5°C/min to 800°C, hold for 2 hours.

Result: The average temperature was 834°C. Uniformity measured at ± 3°C (0.7%).

Temperature Uniformity Test Data MODEL
SH-FU-27MG-OM

SH-FU-27MGQ · 1200°C Quartz Chamber Muffle Furnace · 300 × 300 × 300 mm

1. MODEL

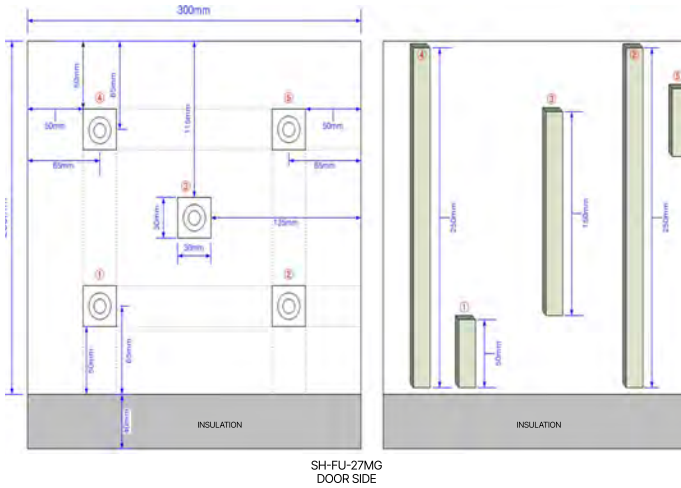
SH-FU-27MG-OM

1200°C Quartz Chamber Muffle Furnace.
300 × 300 × 300mm chamber

2. TEST CONDITION

Ramp up rate 5 °C/min to 800 °C (160min) and hold for 2 hours.

3. Measurement Points



4. PTCR Locations



5. Uniformity Result

NO.	PTCR (mm)	Converted Temperature (°C)	Average Temperature (°C)	Uniformity (°C)
1	18.01	831	834	± 3 (0.7%)
2	17.99	833		
3	17.98	834		
4	17.96	836		
5	17.96	836		

SH-FU-11MS

1900°C Muffle Furnace (200 W x 270 D x 200 H mm chamber)

Test: Ramp up rate 10°C/min up to 1600°C, hold for 2 hours.

Result: The average temperature was 1644.4°C. Uniformity measured at an exceptional $\pm 0.6^\circ\text{C}$ (0.1%).

Temperature Uniformity Test Data

SH-FU-11MS · 1900°C Muffle Furnace · 200 W x 270 D x 200 H mm

MODEL
SH-FU-11MS

1. MODEL

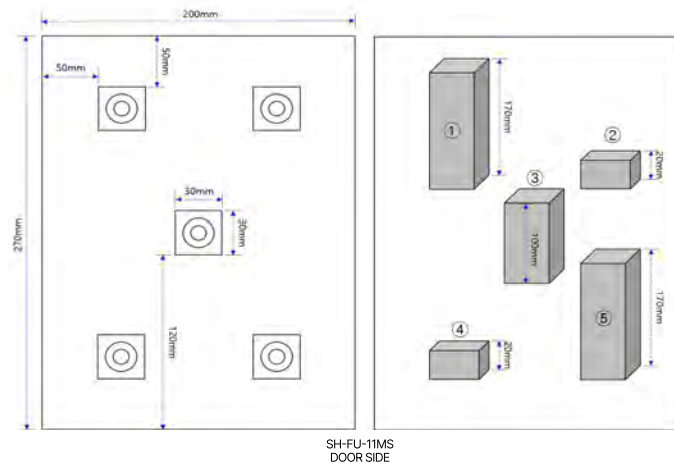
SH-FU-11MS

1900 °C Muffle Furnace. 200 W x 270 D x 200 H mm chamber

2. TEST CONDITION

Ramp up rate 10 °C/min up to 1600 °C (160min) and hold for 2 hours.

3. Measurement Points



4. PTCR Locations



5. Uniformity Result

NO.	PTCR (mm)	Converted Temperature (°C)	Average Temperature (°C)	Uniformity Data (°C)
1	18.67	1644	1644.4	±0.6 (0.1%)
2	18.67	1644		
3	18.66	1645		
4	18.67	1644		
5	18.66	1645		

Tube Furnaces

SH-FU-100LTG (3 Zone)

1200°C 3-zone tube furnace (OD 100mm tube & 600mm hot zone)

Test 1: Ramp up rate 5°C/min up to 750°C, hold for 2 hours. The average temperature was 815.35°C. Uniformity measured at ± 7.35°C (1.8%) within a 400mm center area.

Test 2: Ramp up rate 5°C/min up to 1000°C, hold for 2 hours. The average temperature was 1065.00°C. Uniformity measured at ± 7.00°C (1.3%) within a 400mm center area.

Temperature Uniformity Test Data
 SH-FU-100LTG 3 Zone · 1200°C · OD 100mm tube & 600mm hot zone

MODEL
SH-FU-100LTG

1. MODEL

SH-FU-100LTG 3 Zone

1200°C 3 zone tube furnace.
 OD 100mm tube & 600mm hot zone

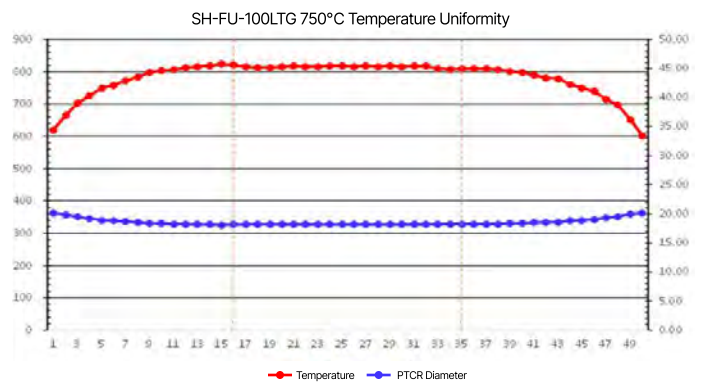
3. PTCR Locations



2. TEST CONDITION

Ramp up rate 5 °C/min up to 750°C (150min) and hold for 2 hours.

4. Uniformity Data



Center Area (400mm)				
No	PTCR (mm)	Converted Temperature (°C)	Average Temperature (°C)	Uniformity Data (°C)
16	18.13	820	815.35	±7.35 (1.8%)
24	18.15	818		
32	18.16	817		
40	18.38	797		
45	18.92	750		

Temperature Uniformity Test Data

SH-FU-100LTG 3 Zone · 1200°C · OD 100mm tube & 600mm hot zone

MODEL
SH-FU-100LTG

1. MODEL

SH-FU-100LTG 3 Zone

1200°C 3 zone tube furnace.
OD 100mm tube & 600mm hot zone

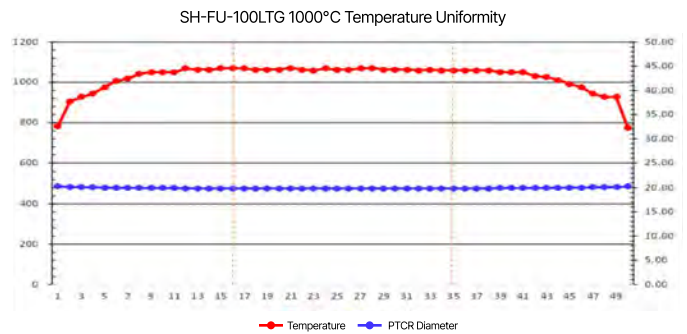
2. TEST CONDITION

Ramp up rate 5 °C/min up to 1000°C (200min) and hold for 2 hours.

3. PTCR Locations



4. Uniformity Data



Center Area (400mm)				
No	PTCR (mm)	Converted Temperature (°C)	Average Temperature (°C)	Uniformity Data (°C)
16	19.87	1072	1065.00	±7.00 (1.3%)
24	19.88	1068		
32	19.90	1060		
40	19.92	1051		
44	19.99	1013		

SH-FU-80LTG

1200°C tube furnace (OD 80mm tube & 600mm hot zone)

Test: Ramp up rate 5°C/min up to 750°C, hold for 2 hours.

Result: The average temperature was 827.9°C.

Uniformity measured at ± 6.1°C (1.5%) within a 200mm center area.

Temperature Uniformity Test Data

SH-FU-80LTG · 1200°C tube furnace · OD 80mm tube & 600mm hot zone

MODEL
SH-FU-80LTG

1. MODEL

SH-FU-80LTG

1200 °C tube furnace.
OD 80mm tube & 600mm hot zone

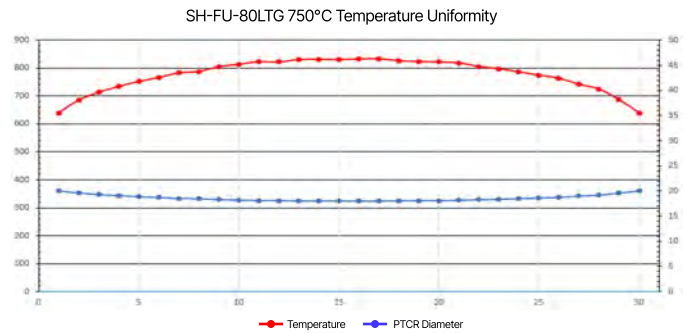
2. TEST CONDITION

Ramp up rate 5 °C/min up to 750°C (150min) and hold for 2 hours.

3. PTCR Locations



4. Uniformity Data



Center Area (200mm)				
No	PTCR (mm)	Converted Temperature (°C)	Average Temperature (°C)	Uniformity Data (°C)
11	18.09	823	827.9	±6.1 (1.5%)
13	18.01	831		
15	18.01	831		
17	17.98	834		
20	18.10	822		

SH-FU-30STG

1200°C mini tube furnace (OD 30mm tube & 150mm hot zone)

Test: Ramp up rate 5°C/min up to 750°C, hold for 2 hours.

Result: The average temperature was 809.8°C.

Uniformity measured at $\pm 9.8^\circ\text{C}$ (1.2%) within a 100mm center area.

Temperature Uniformity Test Data

SH-FU-30STG · 1200°C mini tube furnace · OD 30mm tube & 150mm hot zone

MODEL
SH-FU-30STG

1. MODEL

SH-FU-30STG

1200°C mini tube furnace.
OD 30mm tube & 150mm hot zone

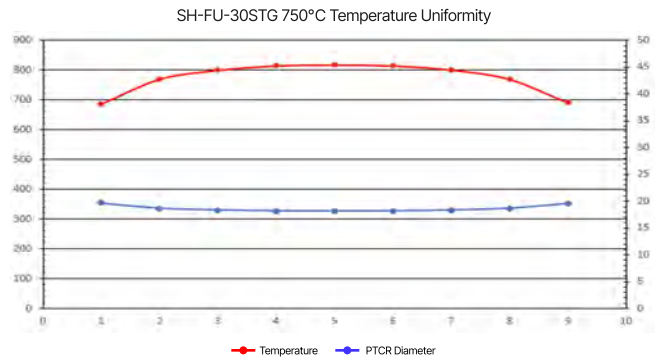
2. TEST CONDITION

Ramp up rate 5°C/min up to 750°C (120min) and hold for 2 hours.

3. PTCR Locations



4. Uniformity Data



Center Area (100mm)				
No	PTCR (mm)	Converted Temperature (°C)	Average Temperature (°C)	Uniformity Data (°C)
3	18.34	800	809.8	±9.8 (1.2%)
4	18.18	815		
5	18.15	818		
6	18.18	815		
7	18.33	801		

| The Lab and Furnace Approach

When you are processing materials where failure is not an option, you need equipment capable of maintaining absolute thermal consistency. The TUS data demonstrates that SH Scientific's specialized aerospace models provide the thermal uniformity necessary to satisfy AMS2750 Class 1 parameters.

By delivering a baseline variance of $\pm 3^{\circ}\text{C}$ or better, these furnaces provide operators with the stable foundation needed to successfully implement a fully compliant heat treatment program.

For more information on configuring an SH Scientific furnace for your precision applications, explore our catalog or contact the technical sales team at labandfurnace.com.

SH SCIENTIFIC CORPORATION

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