

AMS 2750F Pyrometric requirements of thermal processing equipment

AMS is an acronym for *Aerospace Material Specifications* put forth by the Society of Automotive Engineers or SAE. AMS specifications are a comprehensive database composed of individual directives that standardize procedures, equipment and processes related to aerospace material processing. They are continuously updated and revised to keep pace with advances in material science and processes technologies.

Originally published in April 1980, AMS 2750 is the most widely known pyrometric specification in the thermal processing world. This specification continues to be the “bible” for all pyrometric processes connected with the aerospace industry, and it is often recognized as the standard in many other industries as well; examples: CQI-9 REV 4 (automotive industry), BAC 5621 (Boeing), RPS 953 (Rolls Royce), Military Specifications (MIL-SPECS)

In its latest revision, AMS 2750F released in 2020, SAE clarifies issues with the previous version (AMS 2750E) which caused confusion and has been a source of findings during NADCAP 1702 audits. Quite a few changes within AMS2750F are merely an integration of the Nadcap pyrometry reference guide requirements. Once AC 7102/8 Rev A takes effect, all audits will be done to AMS2750F.

AMS 2750F addresses the four main sections of thermocouples, calibrations, SAT and TUS.

Examples of process and pyrometric heat treat specifications:

AMS 2750F	Covers pyrometric requirements for thermal processing equipment used for heat treatment. It covers temperature sensors, instrumentation, thermal processing equipment, system accuracy tests and temperature uniformity surveys.
CQI-9	Continuous Process Improvement (CQI), established by the North American Automotive Association, is a heat treat management system assessment that is not just about pyrometry, it includes also process specifications.
BAC 5621	Establishes equipment classifications and instrumentation types for processes requiring controlled temperatures. (similar to AMS 2750F) Boeing process specification title: “temperature control for processing materials”.
RPS953	Rolls Royce specifications for “laboratory control procedure for heating furnaces and Associated equipment and the thermal processing of materials”. Equipment shall meet AMS 2750F Class 2 for temperatures <1380degF.
NADCAP AS7102	This aerospace standard (AS) establishes the requirements for heat treating accreditation by the National Aerospace and Defense Contractors Accreditation Program (NADCAP).

A United States **defense standard**, often called **military standard**, "**MIL-STD**", or informally "**MIL-SPEC**", is used to help achieve standardization objectives by the U.S. Department of Defense.

AMS 2750F Furnace class uniformity tolerances and instrumentation type.

Sensor(s) Required by Instrumentation Type	Instrumentation Type ⁽¹⁾					
	A	B	C	D+	D	E
One control sensor per zone that controls and displays temperature	X	X	X	X	X	X
The temperature indicated by the control sensor in each control zone shall be recorded by a recording instrument. Alternatively, the recording instrument may be connected to a second sensor contained in the same sheath or holder as the control sensor and separated from the control sensor by no more than 0.38 inch or 10mm.	X	X	X	X	X	
At least two additional recording sensors in each control zone shall be located to best represent the actual coldest and hottest temperatures in each control zone at any temperature of use based on the results from the most recent temperature uniformity survey. It is recognized that certain furnace designs/load configurations can prevent the location of these sensors in the precise coldest and hottest locations, but these sensors shall be located as close as practical (see 3.3.5 and 3.3.6). These recording locations may change over time. See 3.5.16 for relocation requirements.	X		X			
At least one recording load sensor in each control zone. During production in multi-zone furnaces, empty zones (i.e., no material is placed in or intrudes into the zone) do not require a load sensor. However, a notation must be made to the furnace load record that the zone was entirely empty.	X	X				
At least one additional recording sensor in each control zone located at least 3 inches or 76 mm from the control sensor position and of a different sensor type.				X		
Each control zone shall have over-temperature protection (see 2.2.40).	X	X	X	X	X	

Furnace Class	Temperature Uniformity Tolerance, °F	Temperature Uniformity Tolerance, °C
1	± 5.0	± 3.0
2	± 10.0	± 6.0
3	± 15.0	± 8.0
4	± 20.0	± 10.0
5	± 25.0	± 14.0
6	± 50.0	± 28.0

Source: <https://www.sae.org/standards/content/ams2750f/>