SAFETY MANAGEMENT SERVICES

Training Module

Title: **Heat Plate Test**	No.: **SMS-171-TM**	Page: **1 of 4**
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NOT VALID UNLESS BEARING BOTH UNIQUE ORIGINAL SIGNATURES		

THIS TRAINING MODULE IS TO BE USED AS A COMPANION TO THE ET USERS' GROUP TEST METHODS MATRIX™		
1.0	**SCOPE**	
1.1	This document describes the basic safety requirements and procedures for conducting the Heat Plate Test. Sample preparation, test configuration, and test operations for the test are discussed. The procedure for analyzing, evaluating, and interpreting the data is also described. This test is performed on materials to determine their sensitivity to rapid changes in temperature. In the Heat Plate Test, the sample material is subjected to temperatures of up to 1400 °F (760 °C) in approximately 3 minutes.	
1.2	This procedure is approved for use with materials that present no worse than the following hazards:	
1.2.1	**Substances**	
1.2.1.1	☒ **Forbidden**	☒ Propellants:
1.2.1.2	☒ **HME/ IED**	☒ Pyrotechnics:
1.2.1.3	☒ Wetted primaries:	☒ Solids
1.2.1.4	☒ Secondaries:	☒ Liquids
1.2.1.5	Thermite or other substances with initiation temperatures greater than 700 °C are not recommended for this test.	
2.0	**REQUIREMENTS**	
2.1	Copies of this procedure shall be made available in the testing area control room.	
2.2	Persons conducting this test must be trained in this procedure and the applicable support procedures. The record of this training must be properly documented.	
2.3	The general operating procedure for the test site shall be the overall governing procedure and shall be followed in conjunction with the safety rules and techniques in this procedure.	
3.0	**APPLICABLE DOCUMENTS**	
3.1	General Operating Procedure for the test site ("Tooele Army Depot Standard Operating Procedure for Explosives Testing", TE-0000-S-609, Rev 2 (2/26/13) or current revision)	

3.2	Management of Change Procedure for Testing, SMS-100-MOC, current revision.		
3.3	Definition of Terms for Explosives, SMS-100-DEF, current revision		
3.4	Energetic Material Transportation, SMS-134-TM, current revision		
3.5	Verifying Articles/ Substances are Spent, Collecting and Disposing of Tested Substances/Articles, SMS-141-TM, current revision		
3.6	Explosives Spill Handling Procedure, SMS-144-TM, current revision		
3.7	United Nations (UN) Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, current edition.		
3.8	Joint Technical Bulletin TB 700-2, NAVSEAINST 8020.8C, TO 11A-1-47, “Department of Defense Ammunition and Explosives Hazard Classification Procedures”, current edition.		
3.9	Safety Data Sheet (SDS) for each material to be tested.		
3.10	Approved test plans when used in conjunction with this procedure.		
4.0	**HEALTH, SAFETY & ENVIRONMENTAL (HSE) CONSIDERATIONS**		
4.1	**General**		
4.1.1	**Review SDS’s for safety and health considerations.**		
4.1.2	The test samples shall not be brought to the test area until needed for testing.		
4.1.3	Any spills of energetic materials shall be handled in accordance with the spill handling procedure (SMS-144-TM).		
4.1.4	Only one sample shall be placed on the Heat Plate at a time, or as approved by the testing supervisor.		
4.1.5	Prior to testing, samples shall be examined for homogenous mixing. Record any irregularities in the sample.		
4.1.6	Prior to testing, inspect the ceramic block for cracks or exposed porous sections. Report any anomalies to the supervisor.		
4.1.7	Prior to testing, inspect the ceramic block and surrounding areas for excessive contamination. Ensure that any collections of unburned or unconsumed energetic materials are properly cleaned /desensitized/consumed prior to completing testing.		
4.1.8	Operators should not be directly grounded when completing testing, i.e. resistance between operator and ground should be greater than 2 MΩ and less than 1 GΩ to limit electrocution hazards and limit any potential ESD discharge.		
4.1.9	**Do not touch the Heat Plate for any reason before making sure it is at a safe temperature (<50°C).**		
4.1.10	**The Heat Plate shall be immediately turned off once the sample has reacted or it has reached 1100 °F (600 °C). The Heat Plate can reach temperatures of 1400 °F but it is not recommended.**		
4.1.11	**Tests are to be performed only in well ventilated areas or with fume extraction**		
4.2	**Personal Protective Equipment (PPE) Description**	**Use***	**Application**
4.2.1	Safety shoes (steel toed)	X	All steps
4.2.2	Safety glasses	X	All steps
4.2.3	Flame-retardant lab coats, coveralls, or coat	X	All steps involving hazardous materials or ash cleanup
4.2.4	Leather gloves	X	Test cleanup (prevent contact with hot objects)

4.2.5	Static dissipative wrist strap or dissipative shoes (resistance between 2 MΩ and 1 GΩ; or equivalent	X	Handling explosives, preparing or loading samples
4.2.6	Other: As outlined in specific test plan	X	See specific test plan
4.2.7	*Legend: X–Required; O–Optional		
4.3	**HSE Equipment/ Facilities**	**Function**	
5.0	**MATERIALS AND EQUIPMENT LIST**		
5.1	**Material**	**Quantity / Description**	
5.1.1	Test material	Furnished by requestor, less than 2 grams.	
5.1.2	Cleaning wipes	Cloth rags, paper towels, and Kimwipes	
5.1.3	Cleaning solvents	Acetone, Alcohol, others as needed per test plan	
5.1.4	Ice	100 g placed inside the cooling pipe or cup, used to cool down Heat Plate quickly if needed	
5.2	**Equipment**	**Quantity / Description**	
5.2.1	Thermocouple readout	For measuring temperature of Heat Plate and determining point of ignition.	
5.2.2	Tape	Non-charge producing tape	
5.2.3	Brushes	Natural bristle or wire brush	
5.2.4	Balance/scales	Capable of accurately reading 30 mg	
5.2.5	Cooling container	A container made of heat resistant and high thermal conductivity to be filled with ice and placed on the Heat Plate to quickly cool the plate	
6.0	**OPERATING LIMITS**		
6.1	**Limit**	**Consequence of Deviation**	
6.1.1	No lightning within 15 miles	Increased risk of initiation and explosion due to lightning strike	
7.0	**CHANGE PROTOCOL**		
7.1	This document and associated hazards analysis may be redlined for conditions and circumstances specific to unique conditions that could not be foreseen. The redline changes require approval from an SMS manager or higher.		
8.0	**TEST PLANNING**		
8.1	Verify that all required materials and equipment are available; replace any items as necessary.		
8.2	Safely verify condition of equipment and condition or clean the equipment as necessary.		
9.0	**SAMPLE PREPARATION**		
9.1	NOTE: Instructions in this section dictate the standard method for preparing samples. Samples should generally come ready to test from the test requestor. If a test sample has a non-standard morphology then special testing instructions from the test engineer or test requestor must accompany the sample.		
9.2	The temperature and humidity shall be recorded on the test record sheet.		
9.3	While bonded/ grounded (or with resistance <1 GΩ), examine samples for homogeneity; record any irregularities in the sample. Sample irregularities may require multiple tests to accurately estimate the effects of ignition and the approximate temperature of ignition.		
9.4	**Sample size of materials tested should not exceed 30 mg.**		

Remaining pages not included here.

Please contact Safety Management Services, Inc. at 801-567-0456 or at admin@smsenergetics.com for further information.