

**DETERMINATION OF EMISSIONS OF ORGANIC AND CARBONYL COMPOUNDS
FROM MATERIALS BY MICRO-CHAMBER METHOD****Application**

This procedure is used as a material-level screening method for the emissions of selected volatile organic compounds (VOCs) from C₆ – C₁₆ and carbonyl compounds.

Apparatus and Materials Required**Micro-Chamber**

Markes M-CTE250™ (or equivalent) with inside diameter chamber cells equal to or larger than 64 mm (2.5 inches) or area larger than 0.0032 m² (4.9 inches²)

Gas Chromatograph / Mass Spectrometer (GC/MS)

Agilent GC6890N(7890A)/MS5975B (or equivalent) with Chemstation data acquisition / analysis software (version D.03.00.611 or equivalent)

Thermal Desorption (TD)

Markes TD-100

Thermal Desorption Unit (TDU)

Gerstel Twister (or equivalent) with CIS4 cold injection system and 012440-004-00 straight liner, no packing; including MAESTRO software (or equivalent)

Thermal Desorption System – Autosampler (TDSA)

Gerstel TDSA2 with CIS4 cold injection system and 013238-005-00 straight liner packed with 10 mg Tenax® TA; including MASTER software (or equivalent). **Note:** This system should not be used for the testing of leather.

TD Tubes

Gerstel TDU Tubes - Gerstel Carboxpack B / Carboxpack X (part number: 015954-005-00) **Note:** Preferred for the testing of leather.

Gerstel TDSA Tubes - Tenax® TA or Carbotrap 300. **Note:** Carbotrap 300 should not be used for the testing of leather.

Markes TD Tubes - Tenax® TA

High Performance Liquid Chromatography (HPLC)

Agilent 1100 or 1260 (or equivalent) with Chemstation data acquisition / data analysis software (or equivalent)

2,4-dinitrophenylhydrazine (DNPH) Cartridge

Waters Corporation: Sep-Pak silica cartridge, catalogue number WAT037500, (or equivalent)

Bonna-Agela Technologies: Cleanert IC-DNPH (or equivalent)

Date	Action	Revisions	Rev. 0
2015 10 01	Released		

**Documents**

D. Stark, NA

Document Sharing Hub

**Wire Stand**

Fabricated from McMaster-Carr #9322T4: Easy-To-Form Type 304 stainless steel wire cloth; 2"x2" mesh size; 0.047" wire diameter; 0.453" opening size. Dimensions of wire stand to be approximately 50 mm (1.97 inches) in diameter and 10 mm (0.39 inches) in height. See Figure 1.

Gas Flowmeter

Agilent AMD 2000 (or equivalent)

Test Material Conditioning

The test material shall remain in the sealed state, wrapped and bagged, prior to testing for not less than 24 hours at 23 °C $\pm$ 2 °C. Specimens shall be prepared and tested immediately after removing the material from packaging.

Preparation of Test Specimens

The number of specimens required will be identified in the material/performance specification. If the number of specimens is not specified, then test six specimens (which include duplicate specimens). Use one specimen per TD sampling tube. Use two specimens per DNPH cartridge. The quantity of mass collected on the DNPH cartridge from one specimen is small and the increased mass of two specimens ensures ample collected mass for reliable material assessments.

Test Specimen Dimensions

The diameter, height (thickness) and/or mass will be identified in the material/performance specification. If the test specimen dimensions are not specified then the test specimen shall be an outer diameter of 50 mm (1.97 inches) and a maximum thickness of 25 mm (0.98 inches). Sample thickness for molded resin plaques and laminated fabrics is typically 3 mm (0.12 inches).

Procedure

1. Record the pre-test specimen height (thickness) in units of millimeters (mm), and mass in units of grams (g).
2. Follow ISO 12219-3:2012, with the exceptions:
 - The test specimen shall be cut using a clean die punch to an outer diameter of 50 mm (1.97 inches)
 - Report the pre-test specimen thickness in units of millimeters (mm) and pre-test specimen mass in units of grams (g).
 - Place the sample tube or cartridge on the micro-chamber outlet.
 - The test specimen shall be placed on the wire stand, centered in the chamber cell. See Figure 2.
 - Use no sampling collection delays (no equilibration time). Collect sample for the entire time air flow is over specimen.
 - Check the flow rate to ensure flow accuracy. If the flow is low, check for leaks. A flow rate of 100 mL/min shall be used for all specimens and samples.
 - Test one specimen per TD tube. Collect sample on the TD tube for 15 minutes.
 - Test two specimens per DNPH cartridge. Collect sample for 120 minutes total; 60 minutes for the first specimen then replace with the second specimen and test for an additional 60 minutes.
 - The emission data generated shall be reported in units of nanograms (ng).

Analyses of Samples

Analyze the TD tubes per ISO 16000-6. Analyze the DNPH cartridge per ISO 16000-3 and CARB 1004.