



## Procedure for the Manufacture of Carbon Fiber Sediment

### 1 Introduction

**Note:** Nothing in this standard supercedes applicable laws and regulations.

**Note:** In the event of conflict between the English and domestic language, the English language shall take precedence.

**1.1 Purpose.** Produce representative friction material debris for transmission controls testing.

**1.2 Applicability.** The carbon fibers produced with this procedure are applicable to transmission and transmission component testing requiring typical carbon fiber debris. Two grades of carbon fiber are produced with this standard. Fine grade carbon fiber is typical of long term wear debris. Long grade carbon fiber is typical of debris generated during initial break-in of the Torque Converter Clutch (TCC).

**1.3 Remarks.** The debris generated by carbon fiber torque converter clutch friction materials used in GM automatic transmissions is electrically conductive (nominally  $1.1 \times 10^{-3} \Omega\text{-cm}$ ). These fibers have the potential to affect the performance of exposed electrical devices as well as inhibit the motion of control valves.

### 2 References

**Note:** Only the latest approved standards are applicable unless otherwise specified.

#### 2.1 External Standards/Specifications.

None

#### 2.2 GM Standards/Specifications.

None

#### 2.3 Additional References.

- GM Materials Specification 24217879 (ID)
- IBR Laboratories, Uniform Resource Locator (URL) <http://ibr-usa.com/> 11599 Morrissey Road, Grass Lake, Michigan 49240, United States of America, Voice: +1 517 522 8453 or 4 Davy Avenue, Knowlhill, Milton Keynes, K5 8NL, United Kingdom, Voice: +44 (0) 1908 528 800
- W.S. Tyler Wire Cloth Products, URL <http://wstyler.com/>, 8570 Tyler Boulevard, Mentor, Ohio, 44060, Unites States of America, Voice: +1 440 974 1047

(ID) = This standard is limited to internal distribution within General Motors and shall not be distributed outside this company. Contact the GM Lead Engineer for further instructions.

### 3 Resources

**3.1 Facilities.** Accredited testing laboratory specialized in quantitative filtration testing in oil. The recommended facility is IBR Laboratories, Uniform Resource Locator (URL) <http://ibr-usa.com/> 11599 Morrissey Road, Grass Lake, Michigan 49240, United States of America, Voice: +1 517 522 8453 or 4 Davy Avenue, Knowlhill, Milton Keynes, K5 8NL, United Kingdom, Voice: +44 (0) 1908 528 800.

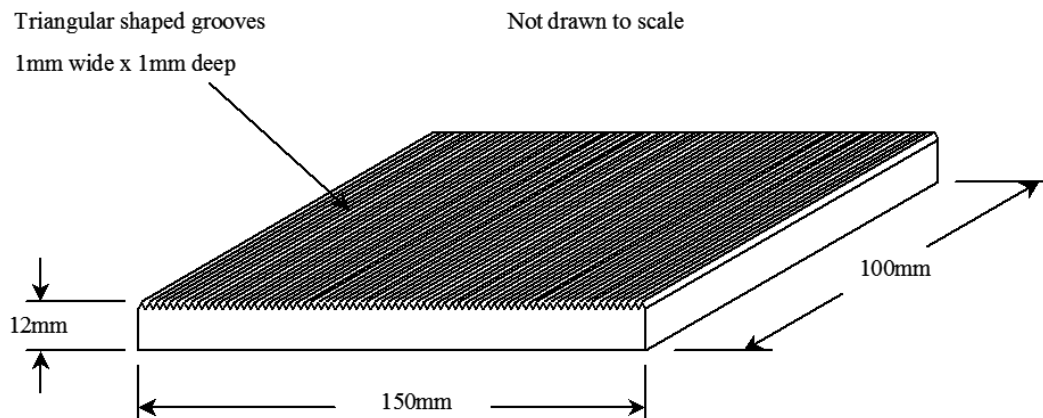
**3.1.1 Calibration.** The test facilities and equipment shall be in good working order and shall have a valid calibration label.

**3.1.2 Alternatives.** Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

### 3.2 Equipment.

**3.2.1** Hydraulic press with flat parallel heated platens capable of maintaining a temperature of  $232\text{ }^{\circ}\text{C} \pm 15\text{ }^{\circ}\text{C}$ .

**3.2.2** Machined block, with grooves for shedding the carbon fibers from the base pads. See Figure 1.



Overall length and width can be  
adjusted for ease of use.

Make from SAE 1010 cold roll.

**Note:** SAE 1010 cold roll is an SAE International type of steel.

**Figure 1: Machined Block, With Grooves for Shedding Carbon Fibers from the Cured Pads**

**3.2.3** Sieve shaker, with  $212\text{ }\mu\text{m}$ ,  $53\text{ }\mu\text{m}$ , and  $38\text{ }\mu\text{m}$  mesh screens. The recommended supplier is W.S. Tyler Wire Cloth Products, URL <http://wstyler.com/>, 8570 Tyler Boulevard, Mentor, Ohio, 44060, United States of America, Voice: +1 440 974 1047.

**3.2.4** Episcopic microscope for size verification.

**3.3 Test Vehicle/Test Piece.** Current production carbon fiber friction material per GM Materials Specification 24217879.

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### 3.4 Test Time.

Calendar time: 14 d to 21 d

Test time: 112 h to 168 h

Coordination time: 1 h

**3.5 Test Required Information.** Not applicable.

**3.6 Personnel/Skills.** Laboratory technician familiar with quantitative filtration testing in oil.

## 4 Procedure

**4.1 Preparation.** Preconditioning of the friction material is not required.

**4.1.1** Record friction material lot number.

**4.1.2** Preheat hydraulic bonding press per laboratory procedure.

**4.1.3** Prepare cleaned area for collection of the fibers.

**4.1.4** Prepare shaker screen stack with  $212\text{ }\mu\text{m}$ ,  $53\text{ }\mu\text{m}$ , and  $38\text{ }\mu\text{m}$  screens.