



**PERFORMANCE, CERAMIC CONDUCTORS, FUSED,
ELECTRICALLY HEATED, GLASS**

WSB-M12P2-B

**PERFORMANCE, NON-CERAMIC CONDUCTORS,
ELECTRICALLY HEATED, POLYCARBONATE**

WSS-M12P2-B2

1. SCOPE

These specifications define the performance requirements for a heated glass or polycarbonate comprised of conductive materials either fired or fused to float glass, or thermally cured materials that are printed or applied onto polycarbonate glazing systems.

2. APPLICATION

These specifications were originally released to define performance requirements for various applications of silver on glass. Typical applications include but are not limited to: electrically heated backlites for defroster and/or defogger purposes, backlite and quarter glass antennas, heated wiper rests for windshields, and local camera heating.

In addition to the requirements listed in this specification, requirements listed in the SDS must be met unless otherwise agreed to by Ford Engineering.

3. REQUIREMENTS

3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Unless otherwise indicated on the engineering drawing, the following requirements are applicable to full size parts or suitable size test specimens, prepared concurrently with the parts. The size of the test specimens used shall be governed by the test conditions and unless otherwise stated, a minimum of five specimens shall be tested for each requirement of this specification.

All test plaques must be made with materials identical to the production manufactured part with a production representative process.

3.2 APPROVED SOURCES

This specification requires the use of approved sources. Only the sources identified on the Ford Approved Source List (ASL) can be used when this specification is listed on the drawing, CAD file, or other documents. The list of approved sources is located within Ford at www.mats.ford.com or available externally through a Ford Materials Engineer.

3.3 SUBSTRATES

(Unless otherwise specified on engineering drawing)

Glass, safety, heat-treated float - WSS-M28P1-B1/B2/B3/B4/B5 latest version
Polycarbonate, optical grade, coated - WSS-M28P1-B6/B7 latest version

Date	Action	Revisions	Rev. 03
2018 06 20	Revised	See Summary of Revisions	P.Konopka NA
2009 01 29		Balloted for Globalization	J. Hess, NA
1992 01 31	Released		TRB, R. Moore, LWM, NA



3.4 STANDARDS

When silver filled ceramic conductors are fused to glass or non-ceramic conductors printed or applied to polycarbonate, the assembly must meet all requirements of the most current homologation requirements in the region of use.

In addition to meeting the performance requirements of this specification, silver materials must conform to the Ford RSMS WSS-M99P9999-A1 (most current version) including lead free solder where required.

3.5 CONDUCTOR COLOR

See WSS-M28P1-B1 through B7 latest version

3.6 APPEARANCE

Conductors shall be fused, printed, or applied in a continuous coating without craters, pinholes, seediness or abnormal roughness. No blisters are permitted at the silver print / glass interface as viewed through the glass opposite the print. There shall be no skips or breaks in the conductors detectable by visual or electrical means which would affect the normal functioning of heated glass or polycarbonate.

3.7 ADHESION OF DECORATIVE MATERIAL TO GLASS

1.6 mm, max

FLTM BI 106-01

Scribe the painted area with a sharp blade held at 90° to the glass surface. Determine initial adhesion of the decorative material by applying a fiber reinforced tape (per FLTM BI 106-01) to the scratched area with firm thumb pressure. Remove the tape by pulling at a 90° angle with moderate speed. Any removal of decorative materials more than 1.6 mm from the scribe line (excluding glass chips) or evidence of blistering shall be basis for rejection.

Note: Laminated samples will be evaluated prior to laminating.

3.8 HUMIDITY RESISTANCE

There shall be no loss of adhesion or electrical continuity between the conductors and the substrate when subjected to 336 hours humidity age at 98 +/- 2 % RH and 50 +/- 2 °C.

3.9 THERMAL SHOCK ADHESION

The glass or polycarbonate specimens shall be placed in a cold box at -40 +/- 2 °C for a period of 16 hours minimum or overnight. On removal from the cold box, the specimens shall be placed immediately in an oven at 80 +/- 2 °C for a period of 2 hours.

There shall be no loss of adhesion or electrical continuity between the conductors and the substrate when subjected to 4 cycles.

3.10 WEATHERING RESISTANCE

Xenon Arc Weatherometer

AATCC Rating 3

FLTM BO 116-01 (Interior), 3609.6kJ/m² exposure

Silver lines face light source, test a minimum of three specimens

After exposure, the material shall show no color change in excess of specified Grey Scale rating. Any silver discoloration must be evaluated by Materials and Core Glass Engineering. In addition, there shall be no cracking, crazing or excessive surface discoloration.

Coating shall not exhibit any loss of adhesion (as evidence by an abrasion test conducted under conditions described in para 3.12).