



Belt Assembly - Dust Exposure

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. To determine the effect of environmental dust on the performance of safety belt retractors and buckles.

1.2 Applicability. To all safety belt retractors and buckles.

1.3 Remarks.

1.3.1 Method A: FMVSS 209. Environmental dust can affect the proper operation of safety belt retractors and buckles. The intent of this procedure is to expose the safety belt assemblies to a dusty environment as defined by FMVSS 209. After the assemblies are exposed to the dust, performance and durability tests must be conducted to determine if the belt assemblies have been affected by the exposure to dust.

FMVSS 209 defines the dimensions for the dust chamber. The size of this chamber does not easily accommodate passive safety belt assemblies or multiple samples. However, the dimensions of the chamber may be modified provided that the dust concentration (grams per cubic meter) in the chamber remains at an equivalent level. Therefore, the Test Engineer, at his discretion, may choose to use the chamber and instructions defined by FMVSS 209 S5.2 (k) or a chamber that produces an equivalent dust concentration.

1.3.2 Method B: Additional Testing for Buckle Assemblies - Coarse Dust Exposure. This procedure also exposes seat buckle assemblies to additional dust/grit contamination. The buckle assemblies are exposed to dust ranging in size: $\approx 33\%$ weight proportion $< 32 \mu\text{m}$ and $\approx 67\%$ weight proportion for $32 \mu\text{m}$ to $600 \mu\text{m}$. All buckle assemblies are checked for proper operation before and after exposure to the dust sequence.

2 References

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

2.1 External Standards/Specifications.

CMVSS 209 FMVSS 209 ISO 12103-1

2.2 GM Standards/Specifications.

GMW14831

2.3 Additional References.

- American National Standard for Calibration, Calibration Laboratories and Measuring and Test Equipment – General Requirements.
- Analysis, Design Verification Plan and Report (ADVP&R).
- GM Math File Log.

3 Resources

3.1 Facilities. GM certified test lab.

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

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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 Environmental Dust Chamber.

3.2.1.1 ISO 12103-1, A4 coarse grade test dust (used for Method A).

3.2.1.2 Arizona extra coarse grade test dust: $\approx 33\%$ weight proportion $< 32 \mu\text{m}$ and $\approx 67\%$ weight proportion $32 \mu\text{m}$ to $600 \mu\text{m}$ (used for Method B).

3.2.2 Retractors and buckle assemblies to be tested.

Note: All equipment must be calibrated in accordance with American National Standard for Calibration, Calibration Laboratories and Measuring and Test Equipment - General Requirements.

3.3 Test Vehicle/Test Piece. As applicable safety belt retractors and buckles and dusty environment.

3.4 Test Time.

Calendar time: 3 days

Test hours: 6 h

Coordination hours: 4 h

3.5 Test Required Information. Note function of part.

3.6 Personnel/Skills. Test Technician or Test c.

4 Procedure

4.1 Preparation. See GMW14831 (Appendix G; Analysis, Design Verification Plan and Report (ADVP&R) outline).

4.2 Conditions. See GMW14831 (Appendix G; Analysis, Design Verification Plan and Report (ADVP&R) outline).

4.2.1 Environmental Conditions. Not applicable.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc. Deviations from the requirements of this standard shall be approved by GM Engineering and documented in the GM Math File Log.

4.3 Instructions. Method A: FMVSS 209 and CMVSS 209 Instructions.

4.3.1 Adjust airline pressure for proper dust concentration of $550 \text{ kPa} \pm 55 \text{ kPa}$ entering through an orifice $1.5 \text{ mm} \pm 0.1 \text{ mm}$ in diameter for the dust chamber as defined by FMVSS 209.

4.3.2 Load the dust chamber with sufficient dust to archive the required dust concentration of 0.9 kg for the FMVSS 209 defined chamber.

4.3.3 Mount the retractors and/or buckles without the latch plate in the dust chamber and block out the sensor mechanism, if necessary.

4.3.4 Fully extract the webbing from the retractor assembly and suspend the webbing to the top of the chamber.

4.3.5 Cycle the dust chamber per 4.3.5a thru 4.3.5c.

- Agitate the dust in the chamber for 5 s to achieve the required dust concentration level (grams per cubic meter). Refer to FMVSS 209 S5.2K for further information.
- Cycle the safety belt assemblies to full extraction and retraction for ten (10) cycles within one (1) to two (2) minutes after the agitation of the dust (air off).
- Repeat this sequence every 20 minutes and continue testing for 5 h.

4.3.6 After the dust chamber has completed the 5 h cycle, remove the assemblies from the dust chamber. Check for any binding or malfunction of the safety belt assemblies or buckles and record the results. The assembly must meet all performance and durability requirements after exposure to dust.

4.4 Instructions. Method B: Additional Testing for Buckle Assemblies Instructions.

4.4.1 Coarse Dust Exposure.

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