



Test Locations of Natural Weathering of Exterior Plastics

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. In many instances, GM has required natural weathering to take place in the Miami, Florida area and/or the Phoenix, Arizona area. This specification describes the process for approval of new test locations for natural weathering of exterior plastic materials, and also documents approved testing locations. Natural weathering shall be conducted in regions that offer extreme solar environments.

1.2 Applicability. This specification applies to natural weathering tests that are conducted on plastic materials intended for use on the exterior of vehicles. Natural weathering requirements can be found in the appropriate material specifications for the plastic material.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3059

3 Requirements

3.1 Approved Natural Weathering Test locations.

3.1.1 Miami, Florida United States of America (USA). Relative humidity shall be in the range of 50% to 100%. Additionally, depending on the length of exposure required in the applicable material specification for the plastic, the total solar radiation shall be equivalent as shown in Table 1.

Table 1: Solar Radiation Equivalents to Years in Miami, Florida USA

Years in Miami, Florida USA	Approximate Total Solar Radiation (MJ/m²)	Approximate Total Solar Radiation (Ly)
1	6300	150 500
2	12 600	301 000
3	18 900	451 500
4	25 200	602 000
5	31 500	752 500

3.1.2 Phoenix, Arizona USA. Relative humidity shall be < 50%. Additionally, depending on the length of exposure required in the applicable material specification for the plastic, the total solar radiation must be equivalent as shown in Table 2.

Table 2: Solar Radiation Equivalents to Years in Phoenix, Arizona USA

Years in Phoenix, Arizona USA	Approximate Total Solar Radiation (MJ/m ²)	Approximate Total Solar Radiation (Ly)
1	7600	181 200
2	15 200	362 400
3	22 800	543 600
4	30 400	724 800
5	38 000	906 000

3.2 Approved Alternatives to Miami, Florida USA Test Location.

3.2.1 Alta Cruz, Brazil. See Table A1 in Appendix A.

3.2.2 Allunga, Australia. See Table A2 in Appendix A.

3.3 Approved Alternatives to Phoenix, Arizona USA Test Location. As noted in Appendix B, there are no approved alternative test locations.

3.4 Process to Add Another Natural Weathering Alternative Test Location. Obtain a minimum of 5 years weathering information from the new natural weathering test site. This must include total solar radiation for 5 degrees direct exposure, and relative humidity.

For example, if the applicable plastic material specification requires 2 years natural weathering exposure in the Miami, Florida test location, then an alternate test location can be used, provided the relative humidity is 50% to 100%, and the testing is carried out until a total solar radiation of 12 600 MJ/m² (301 000 Ly) has been reached.

For example, if the applicable plastic material specification requires 5 years natural weathering exposure in the Phoenix, Arizona test location, then an alternate test location can be used, provided the relative humidity is < 50%, and the testing is carried out until a total solar radiation of 38 000 MJ/m² (906 000 Ly) has been reached.

4 Validation

4.1 General. Upon review of the new alternate weathering test site, if it can be shown that samples tested at that site can meet the relative humidity and solar radiation requirements, then the responsible GM Part Engineer shall review with the GM Materials Global Plastics Team who will revise this specification to add the new weathering site.

4.2 Validation Cross Reference Index. Not applicable.

4.3 Supporting Paragraphs. Not applicable.

5 Provisions for Shipping

Not applicable.

6 Notes

6.1 Glossary.

Langley (Ly): A unit of heat transmission, especially used to express the rate of solar radiation (or insolation) received by the earth.

6.2 Acronyms, Abbreviations, and Symbols.

IMDS	International Material Data System
Ly	Langley
USA	United States of America