



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.

None

3 Resources

3.1 Facilities. Not applicable.

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. Not applicable.

3.3 Test Vehicle/Test Piece. Not applicable.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation. 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.

4.2 Conditions.

4.2.1 Environmental Conditions.

4.2.1.1 Miami, Florida. As an alternate to the Miami, Florida area, 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 must be equivalent as shown in Table 1.

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

Years in Miami, Florida	Approximate Total Solar Radiation (MJ/m ²)	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

For example, if the applicable plastic material specification requires 2 years natural weathering exposure in the Miami, Florida area, then an alternate test site 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.

4.2.1.2 Approved Test Locations Include:

- Miami, Florida
- Alta Cruz, Brazil (see Appendix A, Table A1 for data)
- Allunga, Australia (see Appendix A, Table A2 for data)

4.2.1.3 Phoenix, Arizona. As an alternate to the Phoenix, Arizona area, 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

Years in Phoenix, Arizona	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

For example, if the applicable plastic material specification requires 5 years natural weathering exposure in the Phoenix, Arizona area, then an alternate test site 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.

4.2.1.4 Approved Test Locations Include:

- Phoenix, Arizona

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.

4.3 Instructions. 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 Engineer shall review with the GM Global Plastics Team and revise this specification to add the new weathering site.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Not applicable.