



ANSI C136.31-2010

American National Standard

for Roadway and
Area Lighting Equipment—
Luminaire Vibration



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Luminaire Vibration**

Secretariat:

National Electrical Manufacturers Association

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For Roadway and Area Lighting Equipment— Luminaire Vibration

1 Scope

This standard covers the minimum vibration withstand capability and vibration test methods for roadway and area luminaires.

2 References

This standard is intended for use in conjunction with the following standards. When these standards are superseded by an approved revision, the latest revision shall apply.

ANSI C136.3 *American National Standard for Roadway and Area Lighting Equipment—Luminaire Attachments*

ANSI C136.14 *American National Standard for Roadway and Area Lighting Equipment—Elliptically Shaped, Enclosed Side-Mounted Luminaires for Horizontal-Burning High-Intensity-Discharge Lamps*

ANSI C136.16 *American National Standard for Roadway and Area Lighting Equipment—Enclosed, Post Top-Mounted Luminaires*

ANSI C136.18 *American National Standard for Roadway and Area Lighting Equipment—High-Mast Side-Mounted Luminaires for Horizontal- or Vertical-Burning High-Intensity Discharge Lamps*

3 Definitions

3.1 Fundamental Resonant Frequency

The lowest resonant frequency where the response is in phase with the excitation.

3.2 Luminaire

A complete lighting unit consisting of a lamp or lamps, or solid state light source, together with the parts designed to distribute the light, to position and protect the lamp(s), and to connect the lamp(s) to the power supply.

4 Types of Vibration

Roadway luminaires may experience several types of externally induced vibration. This standard is not intended to cover natural or catastrophic disasters.

4.1 Wind Induced Vibration

Wind can induce vibration in lighting systems that consist of luminaire, arm, and pole assemblies. The magnitude of this type of vibration is mostly a function of the size, shape, and rigidity of the luminaire and pole system and damping of the system.

4.2 Traffic Induced Vibration

Traffic induced vibration can be transferred to the luminaire system from a roadway, bridge, or overpass, being generated by the passage of vehicles. A similar type of vibration can occur in areas near heavy dynamic equipment.

5 Luminaire Vibration Test

The luminaire vibration test is designed to determine whether the luminaire is able to withstand vibration conditions that may be encountered in normal installations. The test is a mechanical performance evaluation. Therefore, the luminaire is not normally energized during the test. A lamp shall be installed in the luminaire for this test. The test criteria were developed with consideration to the effect of wind and traffic induced vibration.

The luminaire shall be attached as it would be mounted in the field to a vibration table capable of withstanding the loads and forces encountered during the test and tested in a manner to simulate a normal installation.

The luminaire shall be vibrated at or near fundamental resonant frequency. This frequency shall be determined for each of the three mutually perpendicular planes (x, y, and z) and should be between 2 and 30 hertz. The acceleration intensity measured at the luminaire's center of gravity shall be as specified in the corresponding levels as shown below. Level 1 should be used for normal roadway applications. Level 2 should be used for bridge and overpass applications. If the luminaire housing utilizes several different materials in its construction, the worst case criteria from the tables shall be used in the testing. During the vibration test, the frequency and displacement should be monitored. A major change in frequency or displacement is an indication of structural failure. The luminaire shall be capable of withstanding the described vibration for 100,000 cycles in each plane. A separate sample luminaire may be used for each plane to eliminate the effect of conjunctive material fatigue. Other test amplitudes and durations may be negotiated between the specifier and supplier as needed to simulate extreme fatigue. At the test conclusion, the luminaire shall meet its original specification. There shall be no damage to the enclosure, reduction of electrical spacings, or loosening of any part of the luminaire. If the light source is integral to the luminaire, it shall be fully operational at test completion.

Vibration Test Level 1—Normal Applications

All materials shall be 1.5 G (14.67 m/s^2)

Vibration Test Level 2—Bridge/Overpass Applications

All materials shall be 3.0 G (29.4 m/s^2)

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