



ANSI C136.26-2010 (R2015, S2020)
ANSI C136.26-2010 (R2015)

*American National Standard for Roadway and
Area Lighting Equipment—Troubleshooting Guide for
High-Intensity Discharge (HID) Luminaires*

Secretariat:

National Electrical Manufacturers Association

Approved: March 19, 2020

American National Standards Institute, Inc.

NOTICE AND DISCLAIMER

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

ANSI Standards and guideline publications, of which the document contained herein is one, are developed through a voluntary consensus Standards development process. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While NEMA administers the process to promote fairness in the development of consensus, it does not write the document and it does not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in its Standards and guideline publications.

NEMA disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. NEMA disclaims and makes no warranty or warranty, expressed or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. NEMA does not undertake to guarantee the performance of any individual manufacturer or seller's products or services by virtue of this Standard or guide.

In publishing and making this document available, NEMA is not undertaking to render professional or other services for or on behalf of any person or entity, nor is NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other Standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

NEMA has no power, nor does it undertake to police or enforce compliance with the contents of this document. NEMA does not certify, test, or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of compliance with any health- or safety-related information in this document shall not be attributable to NEMA and is solely the responsibility of the certifier or maker of the statement.

AMERICAN NATIONAL STANDARD

Approval of an American National Standard requires verification by The American National Standards Institute, Inc. (ANSI) that the requirements for due process, consensus, and other criteria for approval have been met by the Standards developer. An American National Standard implies a consensus of those substantially concerned with its scope and provisions. Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly, and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The existence of an American National Standard does not in any respect preclude anyone, whether s/he has approved the Standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the Standards. It is intended as a guide to aid the manufacturer, the consumer, and the general public.

The American National Standards Institute, Inc., does not develop Standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute, Inc. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on this title page.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute, Inc., require that action be taken periodically to reaffirm, revise, or withdraw this Standard. Purchasers of American National Standards may receive current information on all Standards by calling or writing the American National Standards Institute, Inc.

Published by

**National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209**

© 2020 National Electrical Manufacturers Association

All rights, including translation into other languages, reserved under the Universal Copyright Convention, the Berne Convention for the Protection of Literary and Artistic Works, and the International and Pan American copyright conventions.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher.

Printed in the United States of America

CONTENTS

1	Scope	1
2	Safety	1
3	Summary of Possible Actions (Assuming Daylight Troubleshooting)	1
4	Detailed Report on Possible Actions	4
5	Other Maintenance Aids	6

Foreword

At the time this Standard was approved, the ANSI C136 committee was composed of the following Members:

Acuity Brands	LED Roadway Lighting
Alabama Power Company	Legrand, North America
American Electric Power	Leotek Electronics, USA Corp
Amphenol Canada Corp.	Light Smart
Atlas Lighting Products, Inc.	Littlefuse, Inc.
California Lighting Technology Center, UC Davis	Lumispec Consulting
Caltrans	Mississippi Power
CIMCON Lighting	National Grid
City of Kansas City, Missouri	NightSwitch LLC
City of Los Angeles, Bureau of Street Lighting	OSRAM SYLVANIA, Inc
Comptek Technologies	Pacific Northwest National Laboratory
Cooper Lighting Solutions	Phoenix Lighting
Cree Lighting	PSEG Power
Dominion Energy	Radian Research, Inc.
Duke Energy	Realterm Energy.
Duke Energy Progress	Ripley Lighting Controls LLC
EPRI	ROAM/DTL
Excellence Opto, Inc.	SELC Ireland Limited
EYE Lighting International	Signify North America Corporation
Florida Power and Light Company	Solais Lighting, INC.
Gateway International 360.	South Carolina Electric & Gas
GE Current, a Daintree Company	StressCrete/King Luminaire
Georgia Power Company	Sunrise Technologies, Inc.
Graeme Lister Consulting	Tampa Electric Company
GreenStar Products, Inc.	TE Connectivity
Hancock Consulting	Telematics Wireless
Hapco Aluminum Pole Products	Telensa
Howard Lighting	TESCO The Eastern Specialty Company.
Hubbell Lighting, Inc.	Ubicquia
Intelligent Illuminations, Inc.	Utility Metals Division of Fabricated Metals, LLC
Intermatic Incorporated	Valmont Composite Structures
Intertek USA	Valmont Industries, Inc.
Itron, Inc.	Vandal Shields
JEA	Watthour Engineering Company, Inc.
Kauffman Consulting, LLC	Westire Technology Limited

<This page intentionally left blank.>

1 Scope

This troubleshooting guide is intended to help the service person quickly diagnose an HID luminaire with magnetic ballast and also ensure that the problem is fixed on the first attempt. This guide addresses the four commonly encountered problems in two manners: 1) Summary of possible actions for those needing only a checklist; and 2) A detailed report on possible actions for those needing additional information.

The commonly encountered problems are:

- a. Lamp on continuously
- b. Lamp cycles on and off
- c. Lamp will not start
- d. Lamp burns dimly

2 Safety

Personal safety and the safety of the public should be the troubleshooter's first consideration. Personal protective equipment should be worn at all times while servicing HID luminaires, including but not limited to electrical gloves properly rated for the voltage expected to be encountered and eye protection. Extreme care must be taken regarding the surroundings as well since many luminaires are mounted close to energized electrical distribution equipment and in high vehicular traffic areas. One should follow all applicable work zone protection guidance.

3 Summary of Possible Actions (Assuming Daylight Troubleshooting)

When troubleshooting, it is advisable to use components such as lamps, starters, and photocontrols that have been previously tested and are known to be in working order. Occasionally, new, out-of-the-box components will be defective. Using tested components will prevent the introduction of a second problem into a system that already contains at least one problem.

a. Lamp on continuously ("day burner")

1. Replace photocontrol with a new one of correct ANSI type and voltage and leave uncovered. If lamp continues to burn, then:
2. Check for loose or broken neutral from luminaire supply to photocontrol socket.

b. Lamp cycles on and off

1. Replace lamp with new lamp of correct ANSI type and wattage. If lamp continues to cycle, then:
2. Check for loose connections, including "seating" the lamp in the socket. If lamp continues to cycle, then:
3. Check that the photocontrol is correctly wired and that load and line are not reversed. Then:
4. Check for line voltage fluctuations. Then:
5. Ensure that photocontrol photo cell is not aimed at a highly reflective surface or another light source. Follow-up inspection at night may be necessary to ensure proper photocontrol aiming.

c. Lamp will not start

1. Check that supply voltage matches the ballast installed. Then:
2. Check for proper photocontrol operation. If lamp does not start, then:
3. Visually inspect the ballast for burned windings. If ballast appears undamaged, then:
4. Replace lamp with known good lamp of proper ANSI type and wattage. If lamp does not start, then:

5. Check supply voltage at the luminaire terminal strip and at the luminaire control receptacle. If lamp does not start, then:
6. Check the luminaire wiring for loose or broken wires. If lamp does not start, then:
7. Check lamp socket voltage with lamp removed and photocontrol covered and compare to voltages listed in Table 1.

CAUTION—IF LUMINAIRE IS EQUIPPED WITH IGNITER, DISCONNECT IGNITER BEFORE TESTING VOLTAGE WITH VOLTMETER TO AVOID DAMAGE TO METER.

If open-circuit voltage is in range for the type ballast as listed in Table 1, replace the igniter (if so equipped), then:

8. If the lamp fails to start, replace the luminaire.
- d. Lamp burns dimly
1. Check for low supply line voltage. If voltage is correct and lamp continues to burn dimly, then:
 2. Ensure that the luminaire voltage rating and supply line voltage match. If lamp continues to burn dimly, then:
 3. Ensure that correct wattage lamp is installed. If lamp continues to burn dimly, then:
 4. Check condition (swollen or damaged case) and verify the value (μF) of capacitor matches the manufacturer's data label, if luminaire is so equipped. If lamp continues to burn dimly, then:
 5. Check luminaire for loose or broken wiring. If lamp continues to burn dimly, then:
 6. Check for correct voltage tap if luminaire is equipped with multi-tap ballast. If lamp continues to burn dimly, then:
 7. Replace the luminaire.

**Table 1
OPEN-CIRCUIT VOLTAGE RANGES**

Mercury Vapor		
Wattage	ANSI #	Voltage
50	H46	215-270
75	H43	220-275
100	H38	225-285
125	H42	230-290
175	H39	200-290
250	H37	210-290
400	H33	210-285
2-400 (Series)	2-H33	445-545
1000	H36	385-465
Metal Halide—Probe Start		
35/39	M130	205-290
50	M110 or M148	235-300
70	M85	200-270
70	M98 or M143	205-290
70	M139	220-280
100	M90 or M140	210-315
150	M81	215-265
150	M102 or M142	180-300

175	M57 or M107	275-355
250	M58	270-345
250	M80	215-265
400	M59	250-360
2-400 (ILO)	2-M59	300-360
1000	M47	385-485
1500	M48	405-530
1650	M112	420-510
2000	M134	405-495
Metal Halide—Pulse Start		
*CAUTION—DISCONNECT IGNITER BEFORE TESTING WITH VOLTMETER!		
100	M90	210-257*
150	M102	235-290*
175	M137 or M152	250-340*
200	M136	215-330*
250	M138 or M153	245-330*
320	M132 or M154	240-310*
350	M131	240-315*
400	M135 or M155	235-340*
400	M128	285-345*
450	M144	235-340*
750	M149	305-390*
875	M166	375-455*
1000	M141	370-475*
High Pressure Sodium		
*CAUTION—DISCONNECT IGNITER BEFORE TESTING WITH VOLTMETER!		
35	S76	114-126*
50	S68	114-140*
70	S62	100-135*
100	S54	95-135*
150	S55	100-135*
150	S56	165-250*
200	S66	205-260*
250	S50	170-255*
310	S67	155-255*
400	S51	170-255*
430	SonAgro S145	180-220*
600	S106	200-265*
750	S111	200-245*

1000	S52	395-485*
Low Pressure Sodium		
18	L69	280-330
35	L70	430-530
55	L71	430-530
90	L72	430-575
180	L74	610-760

4 Detailed Report on Possible Actions

a. Lamp on continuously (day burner)

1. This is the most common photocontrol failure mode. Replace the photocontrol with a known good one, but do not cover. If, after allowing time for any built-in time delay to reset (usually 3–5 seconds), the lamp continues to burn, then:
 2. Check for a bad neutral connection or loose neutral wire between the luminaire supply and the photocontrol receptacle. The most common wiring problems are the loss of the neutral or the disconnection of the white wire from the photocontrol receptacle. In some cases, a photocontrol is replaced not because it is defective, but because it was not making good contact in the receptacle on the luminaire (neutral blade on the photocontrol). There are times when the photocontrol receptacle contacts have lost their tension because of overheating and a good connection between the photocontrol blades and the receptacle contacts cannot be made. This can be determined by a visual inspection of the receptacle. In this case, the photocontrol and receptacle must be replaced. If a replacement receptacle is unavailable, then the luminaire should be replaced.

b. Lamp cycles on and off

1. This is the most common complaint regarding an HID system and can usually be corrected by replacing the lamp with a new one of the proper ANSI type and wattage. Lamp cycling is a good indication that the lamp has reached end of life. If a new lamp does not solve the problem, then:
 2. Check for loose or intermittent connections in the electrical system. One should check all of the following: supply connections, luminaire internal wiring, that the lamp is properly “seated” in the socket, the photocontrol receptacle and loose connections in the lamp such as broken welds, loose screw base broken arc tube mount or broken electrodes. Loose connections will typically show up when the fixture is vibrated or shaken.
 3. Line voltage fluctuations such as those produced when a motor that is connected to the same power supply as the luminaire starts can cause the lamp to cycle. This can be corrected by connecting the luminaire to a power supply that does not have a motor load connected to it. Regulated luminaire ballasts can also help to reduce lamp drop-out that is due to line voltage fluctuations.
 4. High vibration installations such as those found in bridges or tall poles can cause the lamp to cycle. The best solution for this type of cycling is to identify the source of vibration and apply some dampening device to the pole. Cycling may be the first symptom of a vibration problem and should be corrected as soon as possible in order to avoid lamp and fixture damage.

5. High ambient light levels or a photocontrol aimed at a high light level source can cause lamp cycling. In some cases, the “eye” of the photocontrol aimed at a highly reflective surface such as a light-colored wall or nearby foliage can trigger the photocontrol and cause the lamp to cycle. To solve this type of problem, it is recommended that a night inspection be made and the photocontrol be aimed away from other light sources and/or reflective surfaces. Foliage becomes more reflective at night as dew forms and may not be apparent during daylight hours. In severe cases, a shield may need to be installed on the photocontrol.
- c. Lamp will not start
1. If the lamp will not start, first ensure that power is available at the fixture’s terminal strip. If power is available and the lamp will not start, then:
 2. Check voltage in the lamp socket with photocontrol covered or a shorting cap installed. Proper voltage for the type and wattage ballast is located in Table 1.
 - a. CAUTION—DISCONNECT IGNITER IF SO EQUIPPED BEFORE TESTING LAMP SOCKET VOLTAGE TO PREVENT DAMAGE TO THE METER.
 3. An alternate method for testing the lamp socket voltage if the starter is difficult to disconnect is: for 52–55 volt HPS, insert a low wattage incandescent lamp into the socket; a similar wattage mercury lamp may be used for 200–400 watt luminaires or an incandescent lamp may be used provided it is rated for 250 volts. If the voltage is within the indicated range or if a test lamp is used and it lights, it is a good indication that the ballast and associated wiring is functioning properly and the igniter is faulty. Replace the igniter with a known good one and reinstall the correct lamp.
 4. Visually inspect the ballast, capacitor, photocontrol receptacle, and internal wiring for burned windings and wiring or loose wires. If the ballast, capacitor, receptacle, and wiring appear undamaged, then:
 5. Remove and inspect the photocontrol. If the photocontrol legs or receptacle show signs of burning or arcing, replace both the control and the receptacle. If the lamp will not start ,then:
 6. Install and cover a known good photocontrol or install a shorting cap. Check that line voltage is present on the red lead from the photocontrol receptacle.
 7. If the above checks fail to solve the problem, then replace the luminaire.
- d. Lamp burns dimly
1. Check for low supply line voltage. This will nearly always be caused by a high resistance connection on either the line or the neutral coming into the luminaire. The voltage should be checked with the photocontrol covered or a shorting cap installed because a high resistance connection may show proper voltage if no load is applied. If the line voltage is proper and the lamp is still dim, then:
 2. Ensure that the luminaire voltage rating and the line voltage match and that the supply line is connected to the proper ballast tap if ballast is multi-tap. This can be done by reading the voltage rating of the luminaire on the manufacturer’s label inside the luminaire. If the luminaire is properly rated for the supply voltage and lamp still burns dimly, then:
 3. Ensure that the correct wattage and type lamp is installed. Again, this information can be observed on the manufacturer’s label found inside the luminaire. The ANSI lamp type and wattage is stamped on the lamp envelope. A higher wattage lamp installed in a lower wattage

fixture such as a 150-watt lamp installed in a 100-watt luminaire will cause a dim lamp condition. If the lamp and ballast are correct, then:

4. Check the internal parts of the luminaire. A capacitor that is open internally, sized incorrectly, or one with a lead loose can cause a dim lamp condition.
5. If the service person has the means to correct the above possible problems, then the luminaire can be returned to service rather quickly. If these methods do not result in a serviceable luminaire, then it should be replaced with a new one.

5 Other Maintenance Aids

There are a number of commercially available luminaire testers that can aid in identifying failed components. In addition, troubleshooting materials, such as manuals, videos, and checklists are available from most luminaire, photocontrol, and lamp manufacturers.

§