



New Federal Regulations Eliminate Lower-Efficacy Fixtures and Lamps

On August 8, 2005, President Bush signed a critical piece of legislation into law. The 2005 Energy Policy Act (EPAAct 2005) was the first comprehensive revision of the United States' energy policy in over a decade and a landmark step in the country's efforts to rid itself of energy dependency. On December 19, 2007, the President took the next step by enacting the Energy Independence and Security Act of 2007. Building upon the EPAAct 2005, the Energy Independence and Security Act included provisions that expanded energy-efficiency standards.

Some of the efficiency standards dictated by the two pieces of legislation include articles for lighting and other commercial and industrial products. As part of the new standards, two different commercial and industrial lighting products will not be available within the U.S. market. Beginning in 2008 and 2009, mercury vapor lamps and 150 to 500 watt metal halide ballasts, respectively, will no longer be available and need to be substituted with more energy efficient alternatives. This topic brief will discuss these new regulations and the possible substitutions as a planning guide for the installation and replacement of lighting systems.

HIGHLIGHTS OF THIS BRIEF

New Federal regulations are mandating higher-efficiency lighting fixtures

As of January 1, 2008, mercury lamps have been discontinued

On January 1, 2009, pulse-start metal halide lamps will replace many probe-start metal halide models

Lower operational costs offset the higher purchase price of more efficient lighting fixtures

Mercury Lamps Find Trouble in Washington

Beginning January 1, 2008, ballast and lamp manufacturers have been prohibited from producing and selling mercury lamps. Mercury lamps offered some benefits. Their bluish-green light was often preferred over high-pressure sodium's reddish-gold. Mercury lamps featured lower unit costs and a higher-than-average lifespan compared to incandescent. However, the EPC Act 2005 targeted mercury lamps due to their inefficiencies compared to other light sources.

Mercury lamps averaged efficacy ratings from 25 to 60 lumens per watt. By comparison, high-pressure sodium lamps typically offer efficacy ratings more than double those of mercury lamps. Mercury lamps' efficacy also drops considerably over its lifespan. After a few years of use, a mercury lamp can only produce roughly half of its original light output while still consuming the same amount of power. Formerly, some metal halide ballasts were UL listed to operate both mercury and metal halide lamps. UL is supporting the ban by voiding the listing of metal halide ballasts labeled for use with mercury lamps.

According to the last U.S. Lighting Market Characterization (DOE 2002), mercury vapor lighting represents 24 percent of the lighting used across the country.¹ That number had been in a decline before that census was taken, and is likely significantly lower today. Metal halide fixtures are the standard replacement for mercury lamps for all new installations and replacements.

Higher Efficiency Places Pulse-start Ahead of Probe-start

Effective January 1, 2009, the Energy Independence and Security Act will place efficiency minimums on the manufacture and sales of probe-start metal halide products from 150 to 500 watts. The minimum ballast efficiencies for electronic ballasts (non pulse-start) become 90 percent for wattages of 250 or less and 92 percent for wattages 250 or more. Magnetic pulse-start metal halide ballasts must have

a minimum ballast efficiency of 88%. Magnetic probe-start ballast efficiency minimums must be no less than 94%. These efficiency minimums clearly favor pulse-start over probe-start. As of this printing, there are no commercial probe-start lamp ballasts available that meet these tight efficiency requirements.

Pulse-start metal halides offer higher efficiencies through their external starter. Probe-start metal halide lamps are designed with the starting electrode within the lamp. The starting electrode initiates the arc that produces light. Pulse-start lamps replace the internal starting electrode with an external high-voltage igniter. Removing the starting electrode allows the arc tube to be condensed. The condensed arc tube allows for a brighter, whiter light. It also reduces heat loss, start-up times and the tungsten build-up that degrades lamp performance over time. Because of their superior ability to provide and maintain lumens over their lifespan, pulse-start lamps allow users to reduce operational costs by installing lower wattage lamps in different applications. As an example, the following chart shows how a 350 watt pulse-start lamp delivers a thousand more initial lumens than a 400 watt probe-start metal halide. Additionally, analysis of pulse-start metal halide lamps has shown reduced power consumption by 5 to 20 watts per fixture depending on lamp wattage.

The U.S. Lighting Market Characterization (DOE 2002) estimates that 34.8 million metal halide lamps were being used in commercial, industrial and outdoor applications.¹ Traditionally, pulse-start lamps have higher initial costs over their probe-start siblings. Lately, that difference has been decreasing, but is still appreciable. However, operating costs for pulse-start metal halides are much lower. Projections made by the American Council for an Energy-Efficient Economy approximate the present value of the lamp's lifetime cost savings to be \$246, nearly five times the incremental price difference of pulse-start over probe-start metal halides.²

¹ U.S. Census Bureau. 2003. Electric Lighting Fixtures: 2001. Current Industrial Reports. MA335L(01)-1(RV). Washington, DC: U.S. Census Bureau.

² Amann, Jennifer Thorne. American Council for an Energy-Efficient Economy. "Analysis of Standards Options for High-Intensity Discharge Lighting Fixtures." Codes and Standards Enhancement Initiative for PY2008: Title 20 Standards Development. January 30, 2008.

Probe-start ballasts (actual control gear) should never be changed out to pulse-start ballasts. Doing so is labor intensive, would falsify the nameplate, nullify UL Listings and void the warranty. For maintenance of existing fixtures, probe start ballasts and lamps will be available for the foreseeable future.

Appleton pioneered pulse-start metal halide fixtures for use in hazardous locations more than four years ago. Today, our pulse-start offerings span applications from floodlights to project lighting. Appleton also offers a complete product line of High Pressure Sodium and Induction lamping options that range from 35 watts to 400 watts. Our induction lamping for adverse and hazardous locations, another Appleton first for explosive atmospheres, offers 100,000-hour lamp life.

EGS Electrical Group Is Your Partner

EGS Electrical Group understands the needs of your customers and will help you guide them through the lighting alternatives mandated by this new legislation. The chart below shows the suggested replacement pulse-start metal halide fixture for mercury vapor and metal halide fixtures that are, and will be obsolete, as a result of this legislation. We will also provide information on appropriate regulations as they arise. In the meantime, please be aware of the impacts that the EPA Act 2005 and the Energy Independence and Security Act of 2007 will have on current and future lighting procurement. To see our full line of lighting products, including substitutions for mercury and probe-start metal halide lamps, visit www.appletonelec.com or call your Appleton representative.

LAMP COMPARISON

Wattage	Ordering Abbreviation	Status	2009 Suggested Alternate based on Lumens	2009 Suggested Alternate based on Watts	Base	Average Lamp Life (Hours)	CRI	Initial Lumens Rated	Efficacy (Lumens per Watt)	Time to Start (Minutes)	Time to Restrike (Minutes)
MERCURY VAPOR											
100	H38JA100/DX	Obsolete 1/1/2008	MH100/U/ED28	MH100/U/ED28	Mogul	24,000+	45	4,000	42	5-7	3-6
175	H39KC175/DX	Obsolete 1/1/2008	MH100/U/ED28	MS175/BU/PS	Mogul	24,000+	45	7,800	49	5-7	3-6
250	H37KC250/DX	Obsolete 1/1/2008	MS175/BU/PS	MS250/BU/PS	Mogul	24,000+	45	11,200	48	5-7	3-6
400	H33GL400/DX	Obsolete 1/1/2008	MS250/BU/PS	MS400/BU/PS	Mogul	24,000+		22,500	56	5-7	3-6
METAL HALIDE											
175	M175BUBDONLY	Obsolete 1/1/2009	MS175/BU/PS	MS175/BU/PS	Mogul	10,000	65	13,500	77	4	15-20
250	M250/U	Obsolete 1/1/2009	MS200/BU/PS	MS250/BU/PS	Mogul	10,000	65	20,800	82	4	15-20
400	M400/U	Obsolete 1/1/2009	MS350/BU/PS	MS400/BU/PS	Mogul	20,000	65	36,000	90	4	15-20
PULSE-START METAL HALIDE											
50	PA50/U/MED				Medium	10,000	65	4,100	75	4	15-20
70	PA70/U/MED				Medium	16,000	65	6,200	89	4	15-20
100	PA100/U/MED				Medium	16,000	65	9,500	95	4	15-20
150	MS150BUMEDPS				Medium	15,000	65	14,000	93	2	3-4
175	MS175BUMEDPS				Medium	15,000	65	17,500	100	2	3-4
175	MS175/BU/PS				Mogul	15,000	65	17,500	100	2	3-4
200	MS200/BU/PS				Mogul	15,000	65	21,000	105	2	3-4
250	MS250/BU/PS				Mogul	15,000	65	23,800	95	2	3-4
320	MS320/BU/PS				Mogul	20,000	65	33,000	103	2	3-4
350	MS350/BU/PS				Mogul	20,000	65	36,500	106	2	3-4
400	MS400/BU/PS				Mogul	20,000	65	44,000	110	2	3-4



Appleton offers a full line of electrical products for hazardous and industrial locations. Each product is designed and built to maintain a safe and productive workplace in robust environments. Appleton's leading edge engineering facilities include explosion, environmental, photometric, electric and mechanical labs that are staffed with a team of experienced engineers dedicated to developing the best hazardous location electrical products available anywhere in the world.

Under the EGS Electrical Group family of brands, Appleton engineers help shape the industry by working closely with organizations such as UL, NECA, NFPA, CSA, NEMA, ANSI, IEC AND IEEE for new standards that promote safety and technical innovations. EGS Electrical Group's Electrical Code Review for hazardous locations, published every three years in conjunction with the NEC code updates, helps educate facility engineers and inspectors. For over 150 years, EGS brands have been providing a rich tradition of long-term, practical, high quality solutions. Distributors, contractors, engineers, electricians and site maintenance professionals around the world trust EGS brands to make electrical installations safer, more productive and more reliable.

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