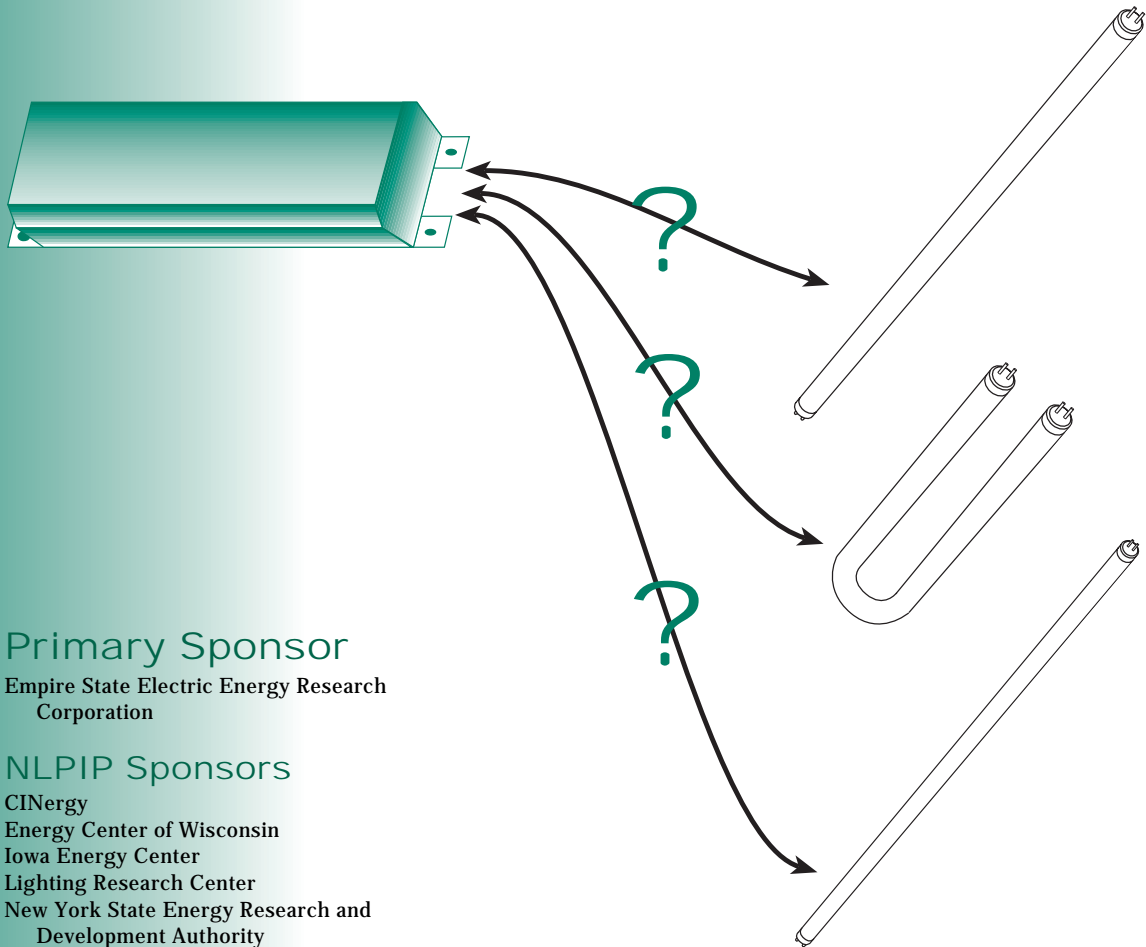


**NATIONAL  
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# *Guide to Fluorescent Lamp-Ballast Compatibility*

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## Overview

Lighting specifiers and end-users can minimize the problems of unreliable starting, end darkening, and reduced lamp life in fluorescent lighting systems by selecting compatible lamps and ballasts and checking to be sure that these products meet American National Standards Institute (ANSI) guidelines. This *Guide to Fluorescent Lamp-Ballast Compatibility* from the National Lighting Product Information Program (NLPIP) includes information about lamp-ballast compatibility and a table and product information sheet for use in specifying fluorescent lighting systems. The table also includes specification guidelines from ANSI.

When a lamp and ballast both meet all the guidelines in the table, they should be compatible. Meeting just one criterion does not assure lamp-ballast compatibility. For example, in a system that maintains lamp current crest factor below 1.7, failure to meet ANSI lamp starting voltage and ballast factor guidelines could still reduce lamp life.

Ballast manufacturers offer products that operate lamps outside of ANSI guidelines, usually to provide lamp-ballast systems that operate at lower power. In general, lamp manufacturers warrant their lamps only for operation on ballasts that meet ANSI guidelines. Therefore, when considering a ballast that does not meet

ANSI guidelines, specifiers should consult both the lamp and the ballast manufacturer to determine who will provide warranty coverage for the system should a problem occur after installation.

## Lamp Starting

A fluorescent lamp includes two electrodes, usually double- or triple-coiled tungsten wire coated with electron-emitting material, positioned at each end of the lamp. (ANSI documents refer to these electrodes as cathodes). For starting and operating, current flows from the electrode at one end of the lamp to the electrode at the other end.

Rapid-start ballasts heat the electrodes of fluorescent lamps before applying a high voltage [200-300 volts (V) for 4-foot (ft) lamps] to start the lamps. Preheating reduces the damage to the electrodes that occurs during the starting process. Instant-start ballasts do not preheat the electrodes so higher voltages (at least 400 V) are required to start the lamps.

The parameters that determine the starting characteristics of a lamp-ballast system are lamp starting voltage, lamp starting electrode voltage, electrode preheat time, and glow current. If a lamp-ballast combination meets the guidelines for these parameters as shown in the table, the lighting system is likely to start reliably.

## Lamp Operation

Once a lamp has started, a ballast maintains the lamp current. Most rapid-start ballasts also continue to provide electrode voltage to heat the electrodes during lamp operation, although cathode-disconnect ballasts and most instant-start ballasts do not heat the electrodes once the lamps are operating to reduce lighting system power. A lighting system that does not meet ANSI guidelines for lamp current crest factor, lamp operating electrode voltage, lamp current, and ballast factor may also cause increased lamp-end darkening and reduced lamp life.

## How To Use the Product Information Sheet

Copies of the product information sheet on the next page can be used to collect product-specific information from ballast manufacturers. You can ask ballast manufacturers to complete a sheet for each product of interest. The values entered in the shaded area of the product information sheet can be compared to the values in the table. NLPIP has also provided space for recording other ballast information.

## F40T12 and F32T8 Rapid-Start Lamp-Ballast Compatibility

Lamp or Ballast Parameters	ANSI Guidelines				Possible Effects			
	T12 <sup>a</sup>		T8		Reduced Lamp Life	End Darkening	Poor Starting	
	Minimum	Maximum	Minimum	Maximum				
<b>Lamp Starting</b>	Lamp Starting Voltage (one lamp) (V)	200	260	200	NA	+	+	-
	(two lamps in series)	256	330	300 <sup>b</sup>	NA	+	+	-
	(three lamps in series)	395	525	NA	NA	+	+	-
	Lamp Starting Electrode Voltage (V)	3.4	4.5	3.4	4.5	- / +	- / +	-
	Electrode Preheat Time (msec)	500	NA <sup>c</sup>	500	NA <sup>c</sup>	-	-	NA
Glow Current (mA)	NA	25	NA	25	+	+	NA	
<b>Lamp Operation</b>	Lamp Current Crest Factor	NA	1.7	NA	1.7	+	+	NA
	Lamp Operating Electrode Voltage (V)	2.5	4.0	2.5	4.4	- / +	-	NA
	Lamp Current (% of rated value)	NA	115/107.5 <sup>d</sup>	NA	115/107.5 <sup>d</sup>	+	+	NA
	Ballast Factor	0.925/0.85 <sup>d</sup>	NA	0.925/0.85 <sup>d</sup>	NA	-	-	NA

+ = Exceeding the maximum value may cause a problem.

- = Failure to meet the minimum value may cause a problem.

NA = Not applicable.

<sup>a</sup> Also applies to T10 lamps.

<sup>b</sup> For starting capacitors 0.08–0.12 μf (microfarads); 315 V for starting capacitors rated at 0.04–0.06 μf.

<sup>c</sup> Although ANSI does not set maximum limits for cathode preheat time, a delay of more than one second in lamp starting may not be acceptable to some end-users.

<sup>d</sup> First value indicates the maximum for low-frequency (60 Hz) operation. Second value indicates the maximum for high-frequency (20–60kHz) operation.

# PRODUCT INFORMATION SHEET: Fluorescent Lamp Ballasts

Manufacturer: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Catalog Number: \_\_\_\_\_ Trade Name: \_\_\_\_\_

Manufacturer's suggested retail price per unit (quantity of \_\_\_\_\_) (US\$): \_\_\_\_\_

Lamp data (choose only one response for each)

Rapid-start lamp:  F40T12  F40T10  F34T12  F32T8  Other \_\_\_\_\_

Number of lamps:  1  2  3  4

Voltage (V):  120  277  347

Physical data

### Starting characteristics

Method:  Instant Start  Rapid Start  Other \_\_\_\_\_

Circuit type (for multiple lamp types only):  Series  Parallel

### Operating characteristics

Frequency:  60 Hz  \_\_\_\_\_ kHz

Other available lamp types:  F40T12  F40T10  F34T12  F32T8  FB40T12  FB40T12/ES

FB31T8  Other \_\_\_\_\_

### Size

Overall dimensions (inches): length \_\_\_\_\_ width \_\_\_\_\_ height \_\_\_\_\_

Unit weight (lbs): \_\_\_\_\_

Performance data

### Electrical and photometric data

System input power (W): \_\_\_\_\_

Lamp starting voltage (V): \_\_\_\_\_

Lamp starting electrode voltage (V) (for rapid-start ballasts only) across dummy load:

minimum \_\_\_\_\_ maximum \_\_\_\_\_

Electrode preheat time (msec) (for rapid-start ballasts only): \_\_\_\_\_

Glow current (mA) (for rapid-start ballasts only): \_\_\_\_\_

Lamp current crest factor: \_\_\_\_\_

Lamp operating electrode voltage (V) (for rapid-start ballasts only): minimum \_\_\_\_\_ maximum \_\_\_\_\_

Lamp current (% of rated value): \_\_\_\_\_

Ballast factor (BF): \_\_\_\_\_

Ballast efficacy factor (BEF): \_\_\_\_\_

### Power quality

Power factor: \_\_\_\_\_  leading  lagging

Total harmonic distortion (THD): \_\_\_\_\_

### Life

Rated life: \_\_\_\_\_ for maximum ambient temperature of: \_\_\_\_\_  °C  °F

Warranty period: \_\_\_\_\_

### Other

Sound rating: \_\_\_\_\_

Minimum starting temperature: \_\_\_\_\_  °C  °F

Listed or certified by:  UL  CSA  CBM

Source:  Independent testing laboratory (cite report and lab name): \_\_\_\_\_

Manufacturer's testing laboratory or other (describe): \_\_\_\_\_

Date completed: \_\_\_\_\_ by: \_\_\_\_\_

## More Information

To purchase a report with further details on different lamp and ballast starting and operating parameters, and to obtain information on other publications from the National Lighting Product Information Program, please contact the Lighting Research Center, Rensselaer Polytechnic Institute, Troy NY 12180, phone (518)276-8716, fax (518)276-2999, e-mail [lrc@rpi.edu](mailto:lrc@rpi.edu).

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