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 lamp 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 anodes). 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.

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

<table>
<thead>
<tr>
<th>Lamp or Ballast Parameters</th>
<th>ANSI Guidelines</th>
<th>Possible Effects</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>T12</td>
<td>T8</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Lamp Starting Voltage (one lamp) (V)</td>
<td>200</td>
<td>260</td>
</tr>
<tr>
<td>(two lamps in series)</td>
<td>256</td>
<td>330</td>
</tr>
<tr>
<td>(three lamps in series)</td>
<td>396</td>
<td>520</td>
</tr>
<tr>
<td>Lamp Starting Voltage (V)</td>
<td>3.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Electrode Preheat Time (msec)</td>
<td>500</td>
<td>NAc</td>
</tr>
<tr>
<td>Glow Current (mA)</td>
<td>NA</td>
<td>25</td>
</tr>
<tr>
<td>Lamp Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamp Current Cresf Factor</td>
<td>NA</td>
<td>1.7</td>
</tr>
<tr>
<td>Lamp Operating Voltage (V)</td>
<td>2.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Lamp Current (% of rated value)</td>
<td>NA</td>
<td>115/107.5d</td>
</tr>
<tr>
<td>Ballast Factor</td>
<td>0.925/0.85d</td>
<td>NA</td>
</tr>
</tbody>
</table>

+ = Exceeding the maximum value may cause a problem.
– = Failure to meet the minimum value may cause a problem.
NA = Not applicable.

a Also applies to T10 lamps.
b For starting capacitors 0.08–0.12 μf (microfarads); 315 V for starting capacitors rated at 0.04–0.06 μf.
c 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.
d 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): _________________
  ☐ 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.