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| A. | <u>Application area</u> | For Industrial UV Water Treatment |
| This is a specification of electronic ballast for driving one low-pressure amalgam lamp. | | |
| B. | <u>Description</u> | |
| The ballast is capable of driving the Philips TUV 130W XPT SE lamp. The electrical characteristics within this specification are premised on the lamp, mounted within a sleeve, which is installed in a water chamber. The ballast converter topology is that of a <i>constant current source</i> . | | |

REVISION 0.3 DRAFT

0. REFERENCE DOCUMENTS

- 0.1 The physical dimensions of the ballast are specified in drawings “chassis 130W lamp driver.pdf” and “cover 130W lamp driver.pdf”.
- 0.2 The ballast weight is 1.7 kg (3.75 lbs).
- 0.3 The reference lamps are described by document “Product Requirements sheet TUV130W XPT SE.doc”.

1. INPUT CHARACTERISTICS

- 1.1 **Voltage and Frequency Range:** The ballast shall operate from a 50 or 60 Hz single-phase source over a range from 99 to 264 Vrms. This represents a nominal range from 110 to 240 Vrms +/-10%.
- 1.2 **Internal Fusing:** The ballast shall be internally protected (fused).
- 1.3 **Input Power:** Ballast maximum input power is 180 Watts.
- 1.4 **Power Factor:** The power factor shall not be less than 95%.
- 1.5 **Inrush Current:** Ballast must not sustain damage due to inrush current during start-up or short power interruptions.
- 1.6 **Leakage Current:** Maximum permissible leakage current must satisfy both UL and EN applicable standards requirements.

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2. OUTPUT CHARACTERISTICS

- 2.1 **General:** The ballast shall ignite and operate one low-pressure amalgam lamp. The ballast delivers fixed current to the lamp.
- 2.2 **Ignition of Each Lamp:** The ballast shall be of the instant start type, i.e. no pre-heat circuit. The minimum open circuit voltage of the ballast shall not be less than 1400V_{peak} and must be applied for no less than 300ms and no more than 600ms. The ballast will provide one ignition pulse only. The maximum OCV shall be 1750V_{peak}.
- 2.3 **Operation of Lamp:** Under steady state operating conditions, the ballast output characteristics shall be determined by the lamp impedance and shall conform to the following:
- Arc current shall be limited to 2.2 A rms +/- 8 %.
 - Minimum power factor on output not less than 0.99
 - Current crest factor (peak/rms ratio) not greater than 1.7 at nominal lamp power.
 - Operating frequency greater than 20kHz, with no visible flicker.

Table 1 – Lamp Data

| Engineering Part number | Mechanical Characteristics | | Typical Operating Conditions (Nominal Values) | | | |
|-------------------------|----------------------------|-----------------|---|-----------------------------|---|---|
| | Diameter (mm) | Arc Length (mm) | Nominal Lamp Power (Watts) | Nominal Lamp Current (Amps) | Minimum Open circuit Voltage (V _{peak}) | Maximum Open circuit Voltage (V _{peak}) |
| TUV 130W XPT SE | 19 | 740 | 152 | 2.2 | 1400 | 1750 |

- 2.4 **Regulation of Output:** The average output current shall be regulated to within +/-8% under input voltage deviations of +/-10% with the lamps at thermal steady state conditions.
- 2.5 **Electrical Efficiency:** The ballast electrical conversion efficiency shall be no less than 88% at maximum load i.e. 152 watts.
- 2.6 **Short Circuit or Open Circuit Operation:** The ballast shall not be harmed if operation is attempted during or after its output has been terminated with either a short or an open circuit.
- 2.7 **Residual Voltage:** The output residual voltage shall satisfy both UL and EN standard requirements
- 2.8 **Rectification Limits of Output:** The ballast shall not sustain damage when powering rectifying lamps during ignition, steady state or end of lamp life.
- 2.9 **End of Lamp Life Protection:** The ballast shall include a circuit that protects the lamp base from overheating when the lamp reaches it end of life, i.e. arc moves down hairpin assembly.

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3. REGULATORY REQUIREMENTS

- 3.1 The ballast shall meet the following requirements:
- a) UL 935
 - b) Safety: IEC 61347-2-3
 - c) EMC: EN 55011 (Class B), EN 61000-6-4, EN 61000-6-2
 - d) UL and CE markings are to be placed on ballast nameplate.
 - f) 2002/95/EC RoHS
 - g) 2002/96/EC WEEE

4. LABELS

- 4.1 Each ballast shall be labelled with a unique serial number and barcode
- 4.2 Appropriate warning labels (identifying i.e. high voltage hazard) and regulatory marks as required by both UL and EN standards shall be included.

5. ENVIRONMENT

5.1 Climatic Conditions for the Ballast During Operation:

- a) Ambient air temperature range from -20°C to 50°C.
- b) Protection against relative humidity from 5% to 95% and condensing environment to be covered via Asphalt potting.
- c) Atmospheric pressure corresponding to an elevation of 3,000 meters.

5.2 Vibration During Operation (ref. IEC-68-2-6):

- a) Amplitude: 0.05mm/0.5g
- b) Frequency: 10Hz to 150Hz
- c) Sweep time: 1 octave/minute
- d) Test time: 30 minutes per direction.
- e) Direction: X, Y, Z

5.3 Shock During Operation (ref. IEC-68-2-27)

5.4 Climatic Conditions for the Ballast During Storage and/or Transportation:

- a) Surrounding air temperature range from -40°C to +85°C.
- b) Relative humidity from 5% to 95%, condensing.

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