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ANSI C82.7-1983
Revision of ANSI C82.7-1971

American National Standard

for mercury lamp transformers – constant-current (series) supply type

Approved December 21, 1982 Administrative Secretariat: National Electrical Manufacturers Association

1. Scope

This standard is intended to cover mercury lamp transformers (ballasts) for operation on constant-current (series) supply circuits normally supplied by constant-current transformers of the moving-coil type.

2. Related Standards

This standard is intended for use in conjunction with the following American National Standards. When these standards are superseded by a revision approved by the American National Standards Institute, the revision shall apply.

Specifications for Mercury Lamps, ANSI C78.40-1979

Method for the Designation of High-Intensity-Discharge Lamps, ANSI C78.380-1977

Mercury Lamps – Methods of Measuring Characteristics, ANSI C78.386-1983

Specifications for High-Intensity-Discharge-Lamp Reference Ballasts, ANSI C82.5-1983

Methods of Measurement of High-Intensity-Discharge-Lamp Ballasts, ANSI C82.6-1980

Definitions for High-Intensity-Discharge-Lamp Ballasts and Transformers, ANSI C82.9-1981

Power Systems – Insulation Coordination, ANSI C92.1-1982

Voltage Classification of Luminaires Used in Roadway Lighting Equipment, ANSI C136.2-1979

Dictionary of Electrical and Electronics Terms, ANSI/IEEE 100-1977

3. Definitions

Definitions of terms that apply specifically to the subject treated in this standard are given in ANSI C82.9-1981 and in ANSI C92.1-1971 (R1978). For additional definitions see ANSI/IEEE 100-1977.

4. Transformer Marking

4.1 Permanent Marking. Transformers shall be permanently marked to give the information listed herein. Where the transformer is originally built into or integrated with the luminaire or enclosure, the marking

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may be appropriately located on or in the luminaire or enclosure except for items (1), (2), and (3), which shall be on the transformer. Information shall include the following:

(1) Manufacturer's name or trademark.

(2) Catalog number.

(3) Input current rating(s). A virgule (/) shall be used to separate currents obtained by use of taps.

(4) Frequency.

(5) Rated primary circuit voltage.

(6) American National Standard H number and lamp wattage rating. (See ANSI C78.380-1977.)

4.2 Identification of Transformer Leads. Marking shall be provided to indicate the correct connections of the various leads if taps are used on either winding of the transformer. Connections of transformers without taps need not be marked.

Table 1
Temperature Requirements

Type of Apparatus	Insulation Class	Winding Max Temp Rise, °C*	Case Max Temp Rise, °C
Independent			
Aerial	105 (A)	70	65
	130 (B)	95	65
Pole-Base or Vault†	105 (A)	70	65
	130 (B)	95	65
Built-In‡	105 (A)	70	–
	130 (B)	95	–
	155 (F)	115	–
	180 (H)	135	–

*Temperature rise by resistance method.

†This apparatus shall be tested as an encapsulated ballast assembly in an ambient air temperature of 25°C ± 5°C.

‡A built-in transformer shall be installed in the luminaire in which it is intended to operate, with the entire luminaire in an ambient air temperature of 25°C ± 5°C.

5. Transformer Performance

5.1 General. All measurements necessary to determine transformer performance in accordance with this specification shall be made in accordance with ANSI C82.6-1980.

5.2 Starting. Values for starting voltage and current are dependent on many factors external to the transformers covered by this standard.

5.3 Lamp Power and Current. When rated primary current and frequency are supplied from a constant-current source, 5.3.1 and 5.3.2 shall apply.

5.3.1 Lamp Operating Power. The transformer shall deliver to a reference lamp in its specified operating position (either vertical or horizontal) a wattage within ± 7.5 percent of the wattage delivered to the same lamp in the same position by a reference ballast in the circuit shown in ANSI C82.5-1983. The reference ballast shall be operated at rated input voltage and frequency and the transformer under test at rated input current and frequency from a constant-current transformer of the moving-coil type. See ANSI C78.386-1983 and ANSI C82.6-1980.

5.3.2 Lamp Operating Current. The transformer shall deliver to a reference lamp in its specified operating position (either vertical or horizontal) an rms current that does not exceed 110 percent of the rms current delivered to the same lamp in the same position by a reference ballast when the latter is operated at its rated voltage and frequency.

5.4 Operating Lamp Current Wave Shape. When supplied with rated primary current and frequency from a moving-coil-type constant-current transformer, the transformer shall supply to a normally operating stabilized reference lamp in the vertical burning position a current that shall have a crest factor not exceeding the limits specified in ANSI C78.40-1979 for the appropriate lamp.

5.5 Temperature Rise. The transformer shall be supplied with rated primary current and frequency from a moving-coil-type constant-current transformer and shall operate a reference lamp until the transformer is thermally stable in an ambient air temperature of 25°C ± 5°C. The temperature rise of any coil, when measured by the resistance method under the foregoing conditions, shall not exceed the values given in Table 1.

5.6 Dielectric Requirements

5.6.1 Applied Potential Test on New Transformers. Transformers, while hot from the temperature rise test (see 5.5), shall be capable of withstanding for one minute, between windings and between each winding and core or enclosure, the successive application of a 60-hertz sinusoidal voltage in accordance with Table 2.

5.6.2 Applied Potential Test on Transformers in the Field. It is recognized that dielectric tests impose a severe stress on the insulation and if applied frequently will hasten breakdown or may cause breakdown. Thus, the more voltage imposed, the more severe the stress. Hence, practice in this matter has varied widely among operating companies, and the advisability of periodic testing may be questionable.

It is recommended that field tests of insulation not

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Table 2
Withstand Voltages

Transformer Type	Test Potential, rms kilovolts				
	6.6-Ampere Primary Winding	7.5-Ampere Primary Winding	15-Ampere Primary Winding	20-Ampere Primary Winding	Secondary Winding
Independent	22.0	21.0	16.0	12.0	2.5
Built-In*	19.0	18.0	13.0	10.0	2.5

*This specification is limited to built-in ballasts used in luminaires covered by ANSI C136.2-1979. All other circuits and metal parts shall be grounded during the test.

Table 3
TIL Kilovolts*

Type	6.6-Ampere Primary Winding	7.5-Ampere Primary Winding	15-Ampere Primary Winding	20-Ampere Primary Winding
Independent	45	44	33	25
Built-In	30	29	24	20

*This value shall be determined by the application of a standard full impulse voltage wave from the input winding to core-case and output winding.

be in excess of 75 percent of the test voltage in Table 2. For old apparatus rebuilt in the field, tests should not be in excess of 65 percent of the test voltage in Table 2. These recommendations relate to dielectric tests applied between windings and ground and to induced voltage tests.

5.6.3 Transient Insulation Level. The transformer shall have a TIL in accordance with Table 3.

5.7 Sound Level. Noise is an inherent characteristic of transformers and cannot be completely eliminated. Limits have not yet been established.

5.8 Input Characteristics. When rated primary current and frequency are supplied from a constant-current source, 5.8.1 and 5.8.2 shall apply.

5.8.1 Input Current. The input current shall be one of the following:

(1) 6.6 amperes (rms)
(2) 7.5 amperes (rms)
(3) 15 amperes (rms)
(4) 20 amperes (rms)

Table 4
Rated Primary Circuit Voltage

Transformer Rating	Amperes	OCV
50 kw	6.6	10 277
50 kw	7.5	9 000
50 kw	15	4 500
50 kw	20	3 375

Sample calculation:

$$OCV = \frac{50 \times 1.35^{*} \times 10^{3}}{6.6A} = 10{,}227V$$

*Overvoltage design criteria empirically found to provide satisfactory performance.

5.8.2 Rated Primary Circuit Voltage. The insulating series transformer shall be designed to operate with its primary winding at the rated circuit voltage, which is the highest rated voltage of the secondary winding of the constant-current transformer supplying the series circuit. Table 4 is based on a 50-kilowatt constant-current transformer.

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6. Physical Requirements – Independent Transformers

6.1 Mounting Dimensions. The mounting bracket for mounting an aerial-type transformer shall be of the satchel-handle type, with provisions for accepting two 5/8-inch-diameter bolts whose centerline mounting dimensions may vary up to 4-5/8 inches.

The clearance between the transformer housing and the inside of the satchel handle shall be a minimum of 1 inch.

6.2 Length of Flexible Leads. The flexible leads shall have a minimum length of 8 inches.

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