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کنترل کننده تغذیه چراغهای ال ای دی

Controlgear for LED lighting fixtures



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شرکت ملی گاز ایران



ابلاغ مصوبه هیأت مدیره



مدیر محترم پژوهش و فناوری و رئیس شورای استاندارد

باسلام،

به استحضار می‌رساند در جلسه ۱۵۴۱ مورخ ۱۳۹۲/۲/۸ هیأت مدیره، نامه شماره ک.ا.دب/۰۰۰/۹۸۴۱ مورخ ۹۲/۲/۳ مدیر پژوهش و فناوری و رئیس شورای استاندارد در مورد تصویب نهایی استاندارد تحت عنوان « مشخصات فنی کنترل کننده تغذیه چراغ های ال ای دی » به شماره تقاضای « 2((0) - IGS - M - EL024 » مطرح و مورد تصویب قرار گرفت .

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FOREWORD

This standard is intended to be mainly used by NIGC and contractors, and has been prepared based on interpretation of recognized standards, technical documents, knowledge, backgrounds and experience in natural gas industry at national and international level.

Iranian Gas Standards (IGS) are prepared, reviewed and amended by technical standard committees within NIGC Standardization division and submitted to the NIGC's "STANDARDS COUNCIL" for approval.

IGS Standards are subject to revision, amendment or withdrawal, if required. Thus the latest edition of IGS shall be checked/inquired by NIGC employees and contractors.

This standard must not be modified or altered by NIGC employees or its contractors. Any deviation from normative references and / or well-known manufacturer's specifications must be reported to Standardization division.

The technical standard committee welcomes comments and feedbacks about this standard, and may revise this document accordingly based on the received feedbacks.

GENERAL DEFINITIONS:

Throughout this standard the following definitions, where applicable, should be followed:

- 1- "STANDARDIZATION DIV." is organized to deal with all aspects of standards in NIGC. Therefore, all enquiries for clarification or amendments are requested to be directed to mentioned division.
- 2- "COMPANY": refers to National Iranian Gas Company (NIGC).
- 3- "SUPPLIER": refers to a firm who will supply the service, equipment or material to IGS specification whether as the prime producer or manufacturer or a trading firm.
- 4- "SHALL ": is used where a provision is mandatory.
- 5- "SHOULD": is used where a provision is advised only.
- 6- "MAY": is used where a provision is completely discretionary.

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1- Scope

This Standard specification covers minimum NIGC requirements for LED lighting fixture controlgear for use in general lighting on DC supplies up to 250 V or AC supplies up to 1000 V at 50 Hz and at an output frequency which can deviate from the supply frequency, associated with LED modules.

Note 1: This standard is to be read in conjunction with IGS-M-EL-024-1(0): 2012

Note 2: Particular requirements for stationary independent SELV controlgear, which are part of the wiring in installations, shall be according to Annex I of IEC 61347-2-13.

Note 3: Plug-in controlgear, being part of the luminaires, are covered as for built-in controlgear by the additional requirements of the luminaires standard (IEC 60598-1 and IEC 62722-2-1).

2- References

Throughout this standard specification the following standards are referred to. The editions of these standards that are in effect at the time of issue of this standard specification (2013) shall, to the extent specified herein, form part of this standard specification. The applicability of changes in standards that occur after the date of this standard specification shall be mutually agreed upon by the purchaser and the supplier.

2.1 Normative References

- 1- IEC 61347-2-13:2006, *Controlgear - Particular requirements for d.c. or a.c. Supplied electronic controlgear for LED modules.*
- 2- IEC 62384 -1:2011, *DC or AC supplied electronic controlgear for LED modules – Performance Requirements.*
- 3- IEC 62384 -A1:2009, *DC or AC supplied electronic controlgear for LED modules – Performance Requirements.*
- 4- IEC 61347-1: 2000, *Lamp controlgear - Part 1: General and safety requirements*

2.2 Informative References

- 1-IEC 62504:2011, *General lighting - LEDs and LED modules - Terms and definitions.*
- 2-IEC 61547: *Equipment for general lighting purposes - EMC immunity requirements*
- 3-IEC 62386-207:2009, *Digital addressable lighting interface - Part 207: Particular requirements for controlgear - LED modules (device type 6).*
- 4-IEC 60598-1:2003, *Luminaires – Part 1: General requirements and tests*
- 5-IEC 62031, *LED modules for general lighting – Safety requirements*
- 6- IEC 60838-2-2:2012, *Miscellaneous lamp holders - Part 2-2: Particular requirements - Connectors for LED-modules*
- 7- IEC 60065:2011, *Audio, video and similar electronic apparatus - Safety requirements*
- 8- IEC 60364-4-41:2005, *Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock*
- 9- IEC 60083:2009, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

10- IEC 60906:2011, *IEC system of plugs and socket-outlets for household and similar purposes - Part 2: Plugs and socket-outlets 15 A 125 V a.c. and 20 A 125 V a.c.*

3-Terms and definitions

3.1 Electronic controlgear

Unit inserted between the supply and one or more LED modules which serves to supply the LED module(s) with its (their) rated voltage or rated current. The unit may consist of one or more separate components and may include means for dimming, correcting the power factor and suppressing radio interference.

3.2 Control unit of the controlgear

Electronic device, being part of the controlgear, responsible for controlling the electrical energy to the LEDs as well as color mixing, response to depreciating luminous flux and further performance features.

NOTE : In semi-ballasted LED modules, the control unit of the controlgear is on board the module and separate from the power supply of the controlgear.

3.3 power supply of the controlgear

Electronic device, being part of the controlgear, capable of controlling current, voltage or power within design limits. This device contains no additional LED control capabilities.

NOTE : For semi-ballasted LED modules, the power supply of the controlgear is separate from the LED module on a distant location.

3.4 Built-in controlgear

Controlgear generally designed to be built into a luminaire , a box, an enclosure or the like and not intended to be mounted outside a luminaire, etc. without special precautions. The controlgear compartment in the base of a road lighting column is considered to be an enclosure.

3.5 Independent controlgear

Controlgear consisting of one or more separate elements so designed that it can be mounted separately outside a luminaires, with protection according to the marking of the controlgear and without any additional enclosure. This may consist of a built-in controlgear housed in a suitable enclosure which provides all the necessary protection according to its markings.

3.6 Integral Controlgear

Controlgear which forms a non-replaceable part of a luminaires and which cannot be tested separately from the luminaires

3.7 associated controlgear

controlgear designed to supply specific appliance(s) or equipment, incorporated or not incorporated

NOTE: An example of an associated controlgear is an electronic controlgear within an emergency unit where it is assigned in a one-to-one relation to a battery driven ballast.

3.8 stationary controlgear

Either a fixed controlgear or one which cannot be easily moved from one place to another

3.9 plug-in controlgear

Controlgear incorporated in an enclosure provided with an integral plug as the means of connection of the electrical supply

3.10 Safety extra-low voltage (SELV)-equivalent controlgear (under consideration)

Built-in or associated controlgear for operating one or more LED module(s) with an output voltage equivalent to SELV(Safety Extra Low Voltage).

3.11 independent SELV controlgear

controlgear providing a SELV output isolated from the supply mains by means such as a safety isolating transformer, as specified in IEC 61558-1:1998

3.12 rated output voltage for constant voltage controlgear

Output voltage, at rated supply voltage, rated frequency and at rated output power, assigned to the controlgear.

3.13 rated output current for constant current controlgear

Output current, at rated supply voltage, rated frequency and at rated output power, assigned to the controlgear.

3.14 Supply voltage

Voltage applied to the complete circuit of lamp(s) and Controlgear

3.15 Supply current

Current supplied to the complete circuit of lamp(s) and Controlgear

3.16 Voltage range

Range of supply voltage over which the controlgear is intended to be operated.

3.17 Maximum output voltage

maximum voltage which can occur between the output terminals for constant current controlgear in any load condition

3.18 Rated maximum temperature t_c

Highest permissible temperature which may occur on the outer surface of the controlgear under normal operating conditions and at the rated voltage/current/power or the maximum of the rated voltage/current/power range.

3.19 Total circuit power

Total power dissipated by controlgear and LED module(s) in combination, at rated supply voltage of the controlgear and at the highest rated output load.

3.20 Power factor λ

Ratio of the measured controlgear power consumption to the product of the supply voltage and the supply current.

4- General Requirements

4.1 Controlgear shall be so designed and constructed that in normal use (see manufacturer's instruction) they operate without danger to the user or surroundings.

4.2 Heat produced by Controlgear during normal operation and in voltage/current/power limits shall be so dissipated that "Rated maximum temperature t_c " doesn't exceed.

4.3 Controlgear which are intended to be used in special areas such as hazardous classified, dusty, ingressive areas or other especial cases shall be certified for those areas/cases.

4.4 Controlgears are expected to ensure satisfactory operation between 92 % and 106 % of the rated supply voltage, taking into account the specifications of the Controlgears

4.5 Independent SELV controlgear shall comply with the requirements of Annex I of IEC 61347-2-13. This includes insulation resistance, electric strength, creepage distances and clearances of the outer case.

4.6 Controlgear which is not of the pure voltage and current types are tested according to the requirements of either a voltage source or a current source, whichever comes closer to the electrical behavior of the controlgear.

4.7 Interface between lighting sources and controlgear shall be based on IEC 62386-207

4.8 The rated operating temperature range is -30°C to $+65^{\circ}\text{C}$ The lower value has to be complied with by all systems unless they are restricted to indoor use only. For relevant application notice and symbol see IEC 60598-1.

5- General performance requirements

The requirements of clauses 7 to 11 of IEC 62384 shall be applied.

Main topics of these requirements are as:

- **Output voltage and current requirements**
- **Total circuit power**
- **Circuit power factor**
- **Supply current**
- **Impedance at audio-frequencies**

6- General Notes on Tests

6.1 Tests according to this standard are type tests. Type tests shall be carried out on one sample consisting of one or more items submitted for the purpose of the type test. In general, all tests shall be carried out on each type of product or, where a range of similar products is involved, for each wattage in the range or on a representative selection from the range, as agreed with the manufacturer.

NOTE: Compliance of the type-test sample does not ensure compliance of the whole production of a manufacturer with this standard. Conformity of production is the responsibility of the manufacturer and may need routine tests and quality assurance in addition to type tests.

6.2 Unless otherwise specified, the tests shall be made in a draught-free room and at an ambient temperature within the range 20°C to 27°C.

6.3 All electrical measurements, unless otherwise specified, shall be carried out at voltage limits (min/max), current limits (min/max) or power limits (min/max) and minimum frequency, in a draught-free room at the temperature limits of the allowed range specified by the manufacturer. Unless the manufacturer indicates the most critical combination, all combinations (min/max) of voltage/current/power and temperature shall be tested.

6.4 The tests for controlgear shall be carried out with the length of the output cable of both 20 cm and 200 cm unless otherwise declared by the manufacturer.

6.5 For tests which are carried out with a LED module or LED modules, this (these) LED module(s) shall fulfill the following requirements:
The wattage of the LED module(s) when measured at its(their) rated voltage or rated current (d.c. and/or a.c.) shall not differ from the rated wattage by more than +6 % and – 0 %.

6.6 For SELV operated LED modules, the requirements of IEC 61347-2-13, Annex I, apply additionally.

7- Tests and Measurements

Tests for controlgear shall be done based on clauses 12, 14 to 16 and Annexes A, C, D, F and H of IEC 61347-2-13 and clauses 11 to 13 and annex A of IEC 62384.

Major Topics of measurements, characteristics and tests for controlgear which are described in above references are as followings:

- **Test to establish whether a conductive part is a live part which may cause an electric Shock.**
- **Particular requirements for electronic Controlgear with means of protection against overheating.**
- **Operational tests for abnormal conditions**
- **Measurement of Impedance at audio-frequencies**

- **Endurance (temperature cycling shock test and a supply voltage switching test)**
- **Electric strength**
- **Fault conditions**
- **Transformer heating**
- **Heating tests of thermally protected Controlgears**
- **Abnormal conditions**

8- Classifications

8.1 Controlgears are classified, according to the method of installation, as

- built-in;
- independent;
- integral.

8.2 Controlgears are classified, according to: protection against electric shock:

- SELV-equivalent or isolating controlgear (this type of controlgear can be used instead of double-wound transformers with reinforced insulation; see IEC 60598-2-6 (to be read as for LED modules where lamps are mentioned));
- Auto-wound controlgear;
- Independent SELV controlgear.

8.3 Controlgears are classified, according to the load:

- Single value load controlgear: This type of controlgear is designed for use with one specific output wattage only, which may be dissipated by one or more LED modules.
- Multiple value load controlgear: This type of controlgear is designed for use with one or more LED modules with a total load within the declared wattage range.

8.4 Controlgears are classified, according to the output voltage:

- Controlgear having a stabilized output voltage
- Controlgear without a stabilized output voltage

8.5 Controlgears are classified, according to the output current:

- a) Controlgear having a stabilized output current
- b) Controlgear without a stabilized output current

9- Connectors

The requirements of IEC 60838-2-2 shall be used together with the followings:

9.1 For resistance to excessive residual stresses (season cracking) and to rusting
The requirements of Clause 17 of IEC 60838-1 apply.

9.2 Screws, current-carrying parts and mechanical connections, the failure of which might cause the controlgear to become unsafe, shall withstand the mechanical stresses occurring in normal use.

NOTE: Compliance is checked by inspection and the tests of 4.11 and 4.12 of section 4 of IEC 60598-1.

10- Terminals

10.1 For screw terminals, the requirements of IEC 60598-1, Section 14, shall be used, if applicable.

10.2 For screwless terminals, the requirements of IEC 60598-1, Section 15, shall be used, if applicable.

NOTE: The electrical connection/clamping means shall be adequately locked against loosening, and it shall not be possible to loosen the electrical connection/clamping means by hand without the use of a tool. For screwless terminals, it shall not be possible to loosen the clamping means/electrical connection unintentionally. The requirements of IEC 61347-1, Clause 9, apply.

11- Marking

11.1 Mandatory markings:

Controlgear, other than integral controlgear, shall be clearly and durably marked, in accordance with the requirements of 7.2 of IEC 61347-1, with the following mandatory markings:

- Items a), b), c), d), e), f), k), l), and m) of 7.1 of IEC 61347-1 together with:
 - For constant voltage types: rated output voltage;
 - For constant current types: rated output current and maximum output voltage;
 - If applicable: an indication that the controlgear is suitable for operation with LED modules only.
 - Circuit power factor; e.g. $\lambda = 0,9$
- If the power factor is less than 0,95 leading, it shall be followed by the letter "C", e.g. $\lambda = 0,9 C$.

11.2 In addition to the above mandatory markings, the following information, if applicable, shall be given either on the controlgear, or be made available in the manufacturer's catalogue or similar:

- items h), i), and j) of 7.1 of IEC 61347-1 together with:
- mention whether the controlgear has mains-connected windings,
- mention that they are SELV-equivalent controlgear, if applicable.
- if applicable: limits of the permissible temperature range;
- if applicable: an indication that the controlgear has a stabilized output voltage;
- if applicable: an indication that the controlgear has a stabilized output current;
- if applicable: an indication that the controlgear is suitable for operation with a mains supply dimmer;
- if applicable: an indication of the operation mode, e.g. phase control.
- total circuit power;
- if applicable: the symbol Z which indicates that the controlgear is designed to comply with conditions for audio-frequency impedance;
- If applicable: a symbol which indicates that the controlgear is a short-circuit proof type

11.3 Durability and legibility of marking

Marking shall be durable and legible.

Compliance is checked by inspection and by trying to remove the marking by rubbing the area lightly by hand for 15 s with a piece of smooth cloth, dampened with water.

The marking shall be legible after the test.

12- Provisions for protective earthing

The requirements of IEC 61347-1, Clause 9, apply.

13- Protection against accidental contact with live parts

The requirements of IEC 61347-1, Clause 10, shall be applied together with followings: Controlgears shall be sufficiently protected against accidental contact with live parts when installed as in normal use.

Parts providing protection against accidental contact shall have adequate mechanical strength and shall not work loose in normal use. It shall not be possible to remove them without the use of a tool..

13.1.1 For SELV-equivalent controlgear, the accessible parts shall be insulated from live parts by double or reinforced insulation.

Subclauses 8.6 and 13.1 of IEC 60065 apply.

13.1.2 Output circuits of SELV- or SELV equivalent controlgear may have exposed terminals if:

- the rated output voltage for constant voltage controlgear or maximum output voltage for constant current controlgear under load does not exceed 25 V r.m.s.;
- the no-load output voltage does not exceed 33 V r.m.s. and the peak does not exceed 33.2 V.

NOTE: The limits of the output voltage for SELV or SELV equivalent controlgear are in accordance with IEC 60364-4-41.

14- Moisture resistance and insulation

Controlgears shall be moisture-resistant. They shall not show any appreciable damage after being subjected to the insulation resistance test described in IEC 61347-1, Clause 11.

For SELV-equivalent controlgear, the insulation between input and output terminals not bonded together shall be adequate.

With double or reinforced insulation, the resistance shall not be less than 4 MΩ.

15- Conformity testing during manufacture

This test is carried out at 100 % of production. It is combined with the measurement of input power at rated voltage/current. The luminous flux of no module should be significantly lower than that of the rest of the production.

For independent and built-in modules, IEC 60598-1, Annex Q, is applicable, but without polarity check.

NOTE : Very low values of the luminous flux indicate internal losses that may be safety relevant, like current bridges.

16- Constructions

The requirements of Clause 15 of IEC 61347-1 apply, together with the following additional requirement.

Socket-outlets in the output circuit shall not accept plugs complying with IEC 60083 and IEC 60906; neither shall it be possible to engage plugs accepted by socket-outlets in the output circuit with socket-outlets complying with IEC 60083 and IEC 60906.

Compliance is checked by inspection and by manual test.

17- Creepage distances and clearances

Unless otherwise specified in Clause 14, the requirements of clause 16 of IEC 61347-1 apply.

18- Resistance to heat, fire and tracking

The requirements of Clause 18 of IEC 61347-1 shall be applied.

19- Resistance to corrosion

Ferrous parts, the rusting of which might cause the lamp controlgear to become unsafe, shall be adequately protected against rusting.

Compliance is checked by the test of 4.18.1 of section 4 of IEC 60598-1.

Protection by varnish is deemed to be adequate for the outer surfaces.

For independent controlgears the requirements of Clause 19 of IEC 61347-1 apply.

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20- Data Sheet

General			
ROW	Specification	Client requirement	Vendor specification
1	Project Title/No.		
2	Client		
3	Supplier/ Manufacturer		
4	Purchase Order No./Date		
5	standard	IGS-M-EL-024-2(0)	
6	Model number		
7	Country of origin		
8	Type	Integral Independent Associated Others	Built-in Plug-in Stationary
9	Characteristics	SELV Single value load controlgear Multiple value load controlgear with stabilized output voltage without stabilized output voltage with stabilized output current without stabilized output current Others	
10	Area Classification	Hazardous Area : Zone:..... Safe Area	
11	Supply Voltage (volts)	DC: AC:110 AC:230 Others	
12	Efficiency%%
13	Power Factor	> 0.95	
14	Heat Dissipation System	Aluminum Heat Sink Fan Al. H. Sink + Fan Others:	Aluminum Heat Sink Fan Al. H. Sink + Fan Others:
15	Maintenance	Maintenance free for at least first 5 years of operation	
16	Working Voltage range		
17	Ambient Temp. range	-10 to 55° C -30 to 40° C Others:	
18	Working Humidity range	10% - 90% RH	
19	Max. Surface Temp.	<60° C	
20	Total Power Consumption(watts)		
21	Electromagnetic Compatibility(EMC)	No Magnetic Interference	

22	Certification for hazardous areas	ATEX,IECEX ,....	
23	Ingress Protection	IP.....	
24	Dimming	Dimmable Non-Dimming	
25	Total Harmonic Dist (THD)	voltage THD < 5% current THD <20%	
26	Life time	Over 50000 hours continues operation.	
27	Dimensions, including dimensional tolerances		
28	Warranty/Guarantee	Over 5 years Guaranty & 15 years Warranty	
29	Body Material		
30	Packaging		

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