

**Technical Guidance Note TGN 25 on Measurements of harmonics to EN 61000-3-2**

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**1. Introduction**

Standard EN 61000-3-2(2006) covers:

All the electrical and electronic products supplied by the public low voltage network, not exceeding a current of 16 A per phase.

*Note: The limits for the professional equipment exceeding 1 kW of rated power are not defined.*

**Question** is how to interpret and apply this standard in particular for the luminaires , lighting chains and LED Drivers

**2. Guidelines:**

For the vocabulary one recalls the §3.19 EN 61000-3-2 (2006):

**Lighting equipment**

Equipment with a primary function of generating and/or regulating and/or distributing optical radiation by means of incandescent lamps, discharge lamps or LED's

Included are:

- lamps and luminaires;
- the lighting part of multi-function equipment where one of the primary functions of this is illumination;
- independent ballasts for discharge lamps and independent incandescent lamp transformers;
- ultraviolet (UV) and infrared (IR) radiation equipment;
- illuminated advertising signs;
- dimmers for lamps other than incandescent.

Excluded are:

- lighting devices built in equipment with another primary purpose such as photocopiers, overhead projectors and slide projectors or employed for scale illuminating or indication purposes;
- dimmers for incandescent lamps.

The luminaires, lighting chains and LED drivers are “lighting equipment” within the meaning of the standard.

- Application of the EN 61000-3-2 standard to the luminaires with (or without) dimmers of light or drivers, the analysis is done by the type of lamp, then per type of dimmer, then by the power.
- However, if this material is of professional use, no limit are applicable if  $P > 1\text{kW}$  (see note in preamble)

1st case: incandescent lamp:

- luminaire with integrated dimmer: class C (cf §5 and lighting equipment within the meaning of the §3.19). **BUT** application of the limits of table 1 for the luminaires more than 25W (§7.3 lines 5 to 7) **and** nothing for the luminaires less than 25W.
- independent dimmer for incandescent lamps: class A **BUT** not limit for  $P < 1\text{kW}$  (4th indent of the §7) **and** table 1 for  $P > 1\text{kw}$ .

2nd case: gas-discharge lamp

Under the §3.19 the luminaires and the dimmers which are not for incandescent lamps are lighting equipments (6th indent of the §3.19).

- Independent dimmer or luminaire with built-in dimmer: class C (cf §5 and lighting equipment within the meaning of the §3.19).
  - **BUT** application of the limits of table 2 for the dimmers more than 25W (§7.3 lines 8 to 16)
  - and special rules for the dimmers less than 25 W (**table 3 column 2**: (standard limit D) or (rules H3 H5 and angles)) (§7.3 b)

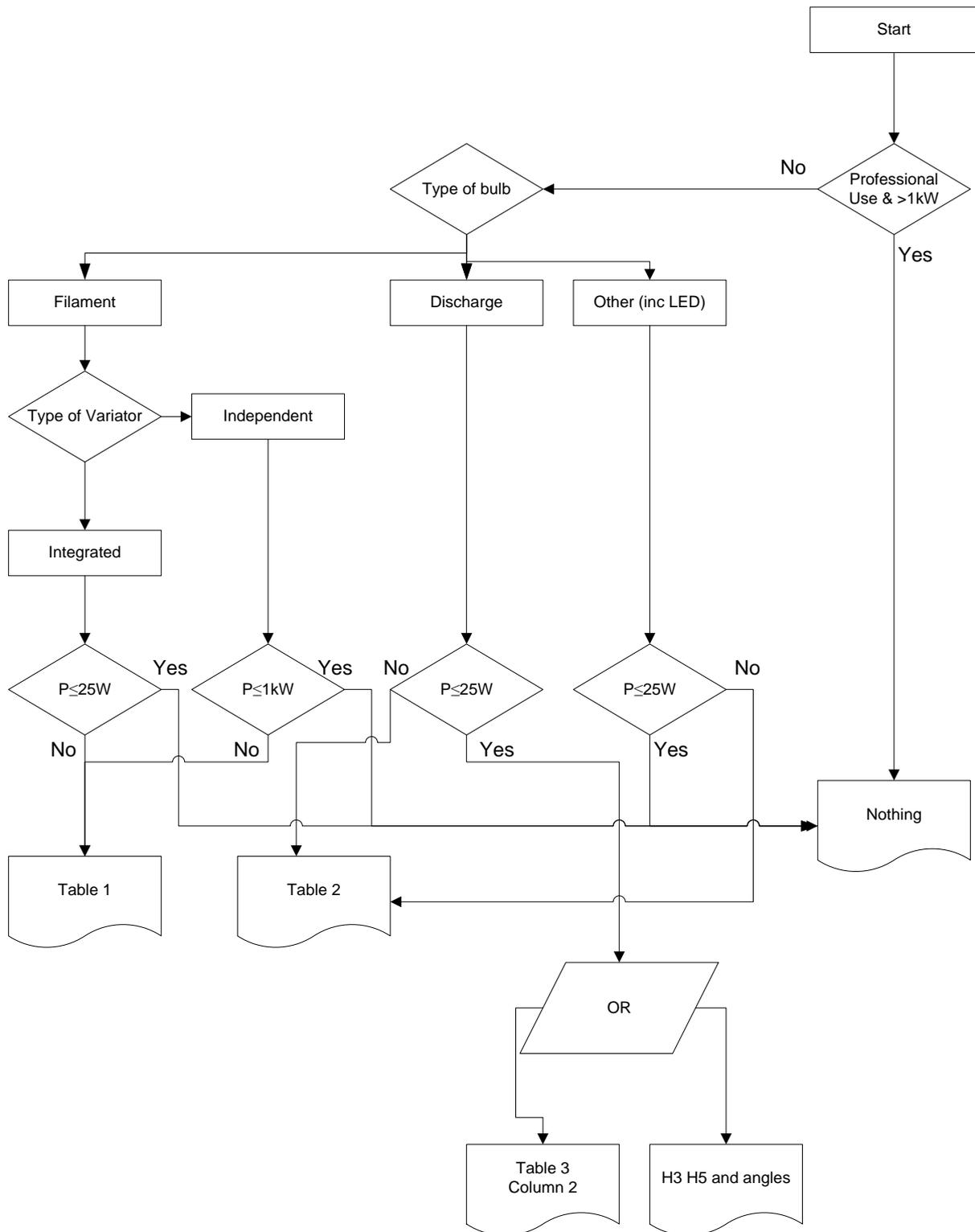
3rd case: other lamps (including LED and LED Drivers)

Under the §3.19 the luminaires, drivers and dimmers which are not for incandescent lamps are lighting equipment (6th indent of the §3.19).

Under the § 7.3 a) line 1 to 4 the apparatus are class C and the limits of table 2 apply for  $P > 25\text{W}$ .

There is no limit for  $P < 25\text{W}$ .

## Synthesis of the applicable limits according to EN 61000-3-2 (2006)



## CTL DECISION SHEET

Standard(s): IEC 61000-3-2 Ed.3	Sub clause(s): <u>Various</u>	DSH: 617
Subject: Classification of lighting chains	Key words: - Lighting chain - Dimmer - Harmonics	Decision approved by the CTL plenary meeting 2007
<p><b><u>Question:</u></b></p> <p>Lighting chains come in various configurations. Some are fed directly from the mains and some via a transformer. The light source can be either incandescent lamp or LED. Furthermore, some are equipped with a control box generating blinking light, "running" light, changing the brightness up and down and/or other functions.</p> <p>The first question is whether a lighting chain in general is classified as lighting equipment. The definition 3.19 has illuminated advertising signs and UV and IR radiation equipment as examples, implying a lighting chain would be included, even though a lighting chain is mostly used for decoration.</p> <p>The second question is if the control box generating various light sequences of a lighting chain can be considered a dimmer. In the case the control box is considered to be a dimmer, the controlled light source is of importance, since dimmers for incandescent lamps are excluded from the definition of lighting equipment.</p> <p>The third question is whether a LED is considered as a discharge lamp. This is of interest when an LED is controlled by a dimmer.</p> <p><b><u>Proposal:</u></b></p> <ol style="list-style-type: none"> <li>1. Lighting chains are in general to be classified as lighting equipment and shall comply with clause 7.3 "Limits for Class C equipment".</li> <li>2. Yes, the control box can be considered a dimmer in case the light sources are incandescent.</li> <li>3. A LED cannot be considered an incandescent lamp because the relation between current and voltage is not linear. For more clarity in clause 7.3, one can regard the LED as a discharge lamp.</li> </ol> <p>Examples of classifications and limits based on the above:</p> <ol style="list-style-type: none"> <li>A. A lighting chain with incandescent lamps or LEDs, connected directly or via a transformer to the mains and which has no light regulation. The active input power is more than 25 W. Class C, Table 2</li> <li>B. A lighting chain with LED, connected directly or via a transformer to the mains and which has no light regulation. The active input power is less than 25 W. Class C, 7.3 b. Table 3 column 2 or wave shape requirement</li> <li>C. A lighting chain with incandescent lamps where the lamps are controlled by a control box belonging to the equipment, generating e.g. blinking light. The active input power is more than 25 W. If phase control technology is used, Class A, Table 1. Other technology: Class C, Table 2</li> <li>D. A lighting chain with LED where the lamps are controlled by a control box belonging to the equipment, generating e.g. blinking light. The active input power is less than 25 W. Class C, 7.3. b Table 3 column 2 or wave shape requirement</li> </ol>		

- E. A lighting chain with LED where the lamps are controlled by a control box belonging to the equipment, generating e.g. blinking light. The active input power is more than 25 W.  
Class C, Table 2
- F. A lighting chain with incandescent lamps where the lamps are controlled by a built-in dimmer and the brightness is set manually by the user. The active input power is more than 25 W  
Class A, Table 1

**Decision:**

Question 1: The lighting chain is lighting equipment (Class C).

Question 2: A lighting chain equipped with a dimmer is a Class C product but the limits are done in table 1 of the standard.

Question 3: A LED cannot be considered as an incandescent lamp, neither as discharge lamp. The clause 7.3 b of the standard give requirements for discharge lighting equipment with active power less than 25 W and these requirements are not applicable to LED. A future standard should contain a separate clause for LED based lighting after the influence of this new technology to the mains is known and/or the relation between current and voltage should be measured first as part of the new standard.

TGN approved on June 11, 2012

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