COUNCIL DIRECTIVE

of 4 November 1976

on the approximation of the laws of the Member States relating to the suppression of radio interference with regard to fluorescent lighting luminaires fitted with starters

(76/890/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament (1),

Having regard to the opinion of the Economic and Social Committee (2),

Whereas, in most Member States, fluorescent lighting luminaires fitted with starters are subject to mandatory provisions relating to the suppression of radio interference; whereas such provisions differ from one Member State to another;

Whereas the differences between such national provisions relating to the suppression of radio interference are a barrier to trade in fluorescent lighting luminaires fitted with starters and make it necessary for undertakings in the Community which manufacture them to differentiate their products according to their Member State of destination; whereas for that reason they directly affect the establishment and functioning of the common market;

Whereas it is therefore necessary to lay down at Community level the rules to be observed with regard to the permissible minimum values for insertion loss of fluorescent lighting luminaires fitted with starters covered by this Directive, together with the methods for measuring such insertion loss;

Whereas the insertion loss may vary from one luminaire to another depending on the position of the fluorescent tube,

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. The purpose of this Directive is the approximation of the laws, regulations and administrative provisions of the Member States relating to the suppression of radio interference with regard to fluorescent lighting luminaires fitted with starters, by fixing the permissible minimum values for insertion loss of such luminaires and the methods for measuring such insertion loss.

2. The scope of this Directive is specified in section 1 of the Annex.

Article 2

The equipment referred to in Article 1 may not be placed on the market unless it meets the requirements of this Directive.

Article 3

1. The conformity of fluorescent lighting luminaires fitted with starters with the requirements of this Directive shall be certified by the manufacturer, assembler or importer, on his own responsibility, in a statement to be included in the instructions for use, the guarantee certificate or on the equipment itself.

2. The statement provided for in paragraph 1 shall be unnecessary where use is made of marks or certificates issued by the bodies notified by each Member State to the other Member States and to the Commission.

3. For a period of five and a half years from the time this Directive is notified, Member States may require that compliance by equipment with the requirements of this Directive shall be attested by marks or certificates issued on behalf of the competent authorities on the basis of prior type testing.

In the light of experience gained and the results obtained within the Community, all appropriate measures shall be taken, within this period of five and a half years, in accordance with the procedure laid down in Article 8 of Council Directive 76/889/EEC of 4 November 1976 on the approximation of the laws of the Member States relating to radio interference caused by electrical household appliances, portable tools and similar equipment (3).

(1) OJ No C 37, 4. 6. 1973, p. 8.
(2) OJ No C 52, 5. 7. 1973, p. 33.

(3) See page 1 of this Official Journal.

Article 4

Member States may not prohibit or prevent the placing on the market or use of luminaires on grounds relating to the suppression of radio interference if such luminaires meet the requirements of this Directive.

Article 5

Member States shall take the necessary steps to ensure that the methods of measurement used in official tests for verifying compliance with the requirements relating to the suppression of interference are in accordance with those specified in the Annex.

Article 6

1. The requirements of this Directive shall not prevent, with regard to the use of the equipment referred to in Article 1, the application in any Member State of the following measures to protect reception:

(a) special measures, in the case of receiving stations used for public utility or safety purposes;

(b) additional suppression measures in isolated cases, where individual appliances, even though complying with the requirements of this Directive, have caused interference.

2. Member States shall inform the Commission of the special measures taken pursuant to paragraph 1 (a) and each year forward a brief summary of action taken in individual cases.

Article 7

Any amendments needed to adapt the requirements of the Annex (excluding section 1) to technical progress shall be adopted in accordance with the procedure laid down in Article 8 of Directive 76/889/EEC. However, such amendments must not result in a decrease in the quality of radioelectric communications, including sound radio and TV reception.

Article 8

1. Member States shall bring into force the measures necessary in order to comply with this Directive within 18 months of its notification and shall forthwith inform the Commission thereof.

2. Member States shall communicate to the Commission the texts of the provisions of national law which they adopt in the field covered by this Directive.

Article 9

This Directive is addressed to the Member States.

Done at Brussels, 4 November 1976.

For the Council

The President

Th. E. WESTERTERP

ANNEX

1. SCOPE

These provisions relate to fluorescent lighting luminaires fitted with starters.

The provisions of 2.2 *et seq.* shall apply to luminaires for residential areas. Unsuppressed luminaires shall be subject only to the labelling requirements of 2.1.

2. GENERAL REQUIREMENTS

2.1. **Labelling of unsuppressed luminaires**

The words 'unsuppressed luminaire for use in non-residential areas' must be printed on the luminaire. These words shall be used until the Committee on adjustment to technical progress has settled on an alternative.

Note: The definition of non-residential areas is a matter for the competent national authority.

2.2. **Minimum values of insertion loss**

The minimum values of insertion loss shall be met by at least 80 % of series-produced luminaires with 80 % confidence.

Methods of application of the minimum values of insertion loss are shown in section 4.

3. MINIMUM VALUES OF INSERTION LOSS

The minimum values of insertion loss at preferred measuring frequencies are given in Table I.

TABLE I

Minimum values of insertion loss

Frequency kHz	160	240	550	1 000	1 400
Minimum values of insertion loss (dB)	28	26	24	22	20

4. APPLICATION OF MINIMUM VALUES OF INSERTION LOSS IN TESTS FOR CONFORMITY OF LUMINAIRES IN SERIES PRODUCTION

4.1. Tests shall be made

4.1.1. either on a sample of luminaires of the type using the statistical method of evaluation set out in 4.3.

4.1.2. or, for simplicity's sake, on one luminaire only.

4.2. Subsequent tests are necessary from time to time on luminaires taken at random from the production especially in the case of 4.1.2. In the case of any dispute which could lead to a ban on sales, such a ban shall be considered only after tests have been carried out in accordance with 4.1.1.

4.3. Statistical assessment of compliance shall be made as follows:

This test should be performed on a sample of not less than five, and not more than 12 items of the type, but if in exceptional circumstances five items are not available, then a sample of three or four shall be used. Compliance is achieved when the following relationship is met:

$$\bar{x} - k\,S_n \geqslant L, \text{ where}$$

$\bar{x}$ is the arithmetic mean value of the insertion losses of n items, in the sample;

S_n^2 is the standard deviation of the sample, where:

$$S_n^2 = \frac{1}{n-1} \sum (x - \bar{x})^2$$

x is the insertion loss of an individual luminaire;

k is the factor derived from tables of the non-central t-distribution which ensures with 80 % confidence that 80 % or more of the production exceeds the minimum value of insertion loss. Values of k as a function of n are given in the table below;

L is the minimum value of insertion loss;

x, $\bar{x}$, S_n and L are expressed logarithmically (dB).

n	3	4	5	6	7	8	9	10	11	12
k	2·04	1·69	1·52	1·42	1·35	1·30	1·27	1·24	1·21	1·20

5. MEASURING APPARATUS AND METHODS

5.1. Measuring apparatus

5.1.1. *The measuring receiver*

Any good quality radio-frequency selective voltmeter shall be used.

5.1.2. *Balance/unbalance transformer*

The essential requirements of the balance/unbalance transformer are:

(a) the capacitance between the secondary and primary of the transformer must be no greater than 5 pF. The primary is connected to the metal box which encloses the device;

(b) the output impedance must be 150 $\pm$ 4·5 ohms and substantially resistive in the frequency range 150 kHz to 1 605 kHz.

Figure 1 shows an example of the circuit and construction of a suitable transformer.

5.1.3. *Artificial mains V-network*

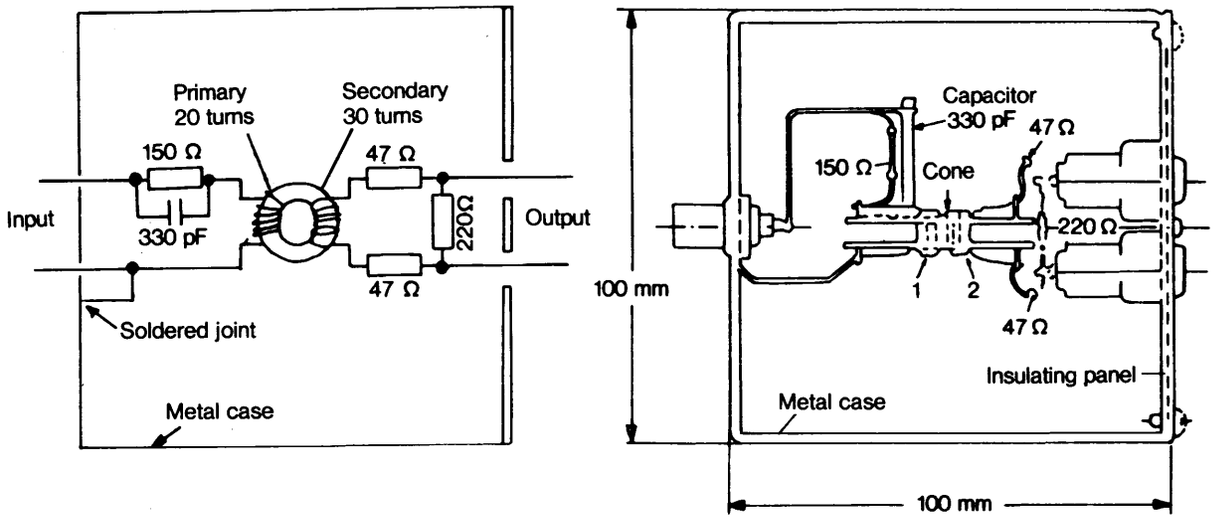
The V-network shall conform with CISPR Publication 1 (1972) paragraph 2.1 and Figure 9A.

5.1.4. *Dummy lamp* (dummy tube)

(For use in conjunction with 5.2.1 and Figure 3).

The configuration and component values of a dummy lamp are given in Figure 2.

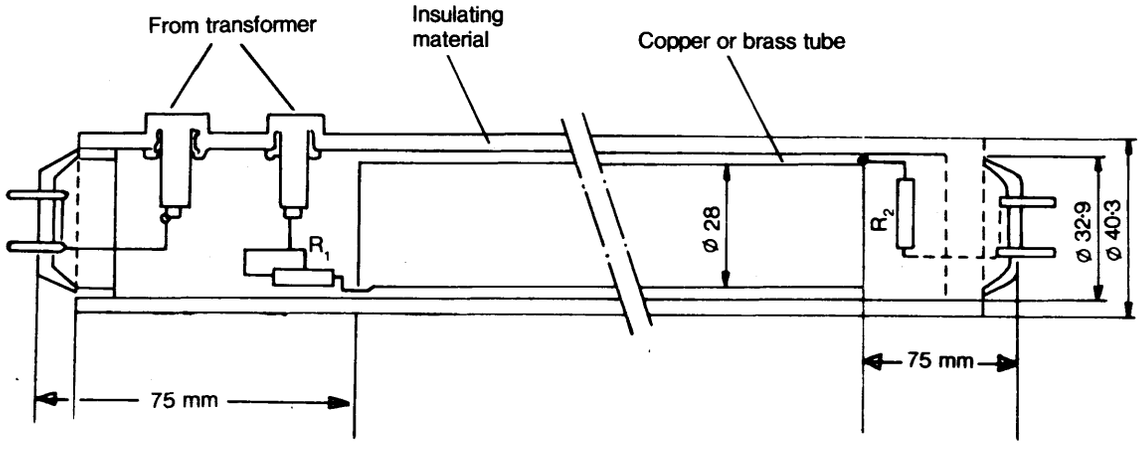
Figure 1: **Example of a balance/unbalance transformer**



1 = coil (20 turns)

2 = coil (30 turns)

Figure 2: **Configuration of a dummy lamp**



$R_1 = 68\ \Omega \quad R_2 = 220\ \Omega$

5.2. **Measurement of insertion loss of flourescent luminaires**

The insertion loss of luminaires shall be measured in accordance with the methods described in 5.2.1 and 5.2.3 or 5.2.2 and 5.2.3.

5.2.1. *Luminaires intended for use with lamps of 20 W, 40 W, 65 W, 80 W and 65/80 W of a nominal diameter of 38 mm as specified in IEC Publication 81 (1961)*

The apparatus shall be set up as shown in Figure 3 with the dummy lamp L_o conforming to the details given in Figure 2.

5.2.2. *Luminaires intended for use with lamps specified in IEC Publication 81 (1961) but having ratings other than those given in 5.2.1*

The apparatus shall be set up as shown in Figure 4, with the dummy lamp L conforming to the details given therein.

5.2.3. *Measuring method*

The insertion loss is the ratio of the voltage U_1, indicated on the measuring receiver M when the generator G is connected to the dummy mains network VN via the transformer T, to the voltage U_2 indicated on M when the generator G is connected to the network VN via the transformer T and the equipment under test.

The insertion loss shall be expressed in the form: Insertion loss = $20 \text{ Log}_{10} \frac{U_1}{U_2}$ dB.

Details of the procedures are as follows:

5.2.3.1. When a luminaire incorporates more than one lamp, each lamp shall be replaced in turn by the tube L_o or L (see 5.2.1 and 5.2.2).

5.2.3.2. If, as normal, starters having integral capacitors are used, the starter shall be removed and replaced by a capacitor of 5 000 pF $\pm$ 10 %. However, where the manufacturer fits a capacitor external to the starter and gives a warning against the use of an additional starter capacitor, the original capacitor shall be retained and no test capacitor added.

Precautions shall be taken to ensure that the test capacitor maintains its characteristics over the whole frequency range covered by the measurements.

With the exception of the possible replacement of the capacitor by the starter and the replacement of the lamps, luminaires shall be measured as manufactured.

5.2.3.3. If a luminaire has a frame of insulating material, it should be placed with its back on a metal sheet connected to the earth terminal of VN.

5.2.3.4. The connections c-c' and d-d' between the tubes L_o or L and the transformer T shall be made with unscreened leads not exceeding 10 cm in length.

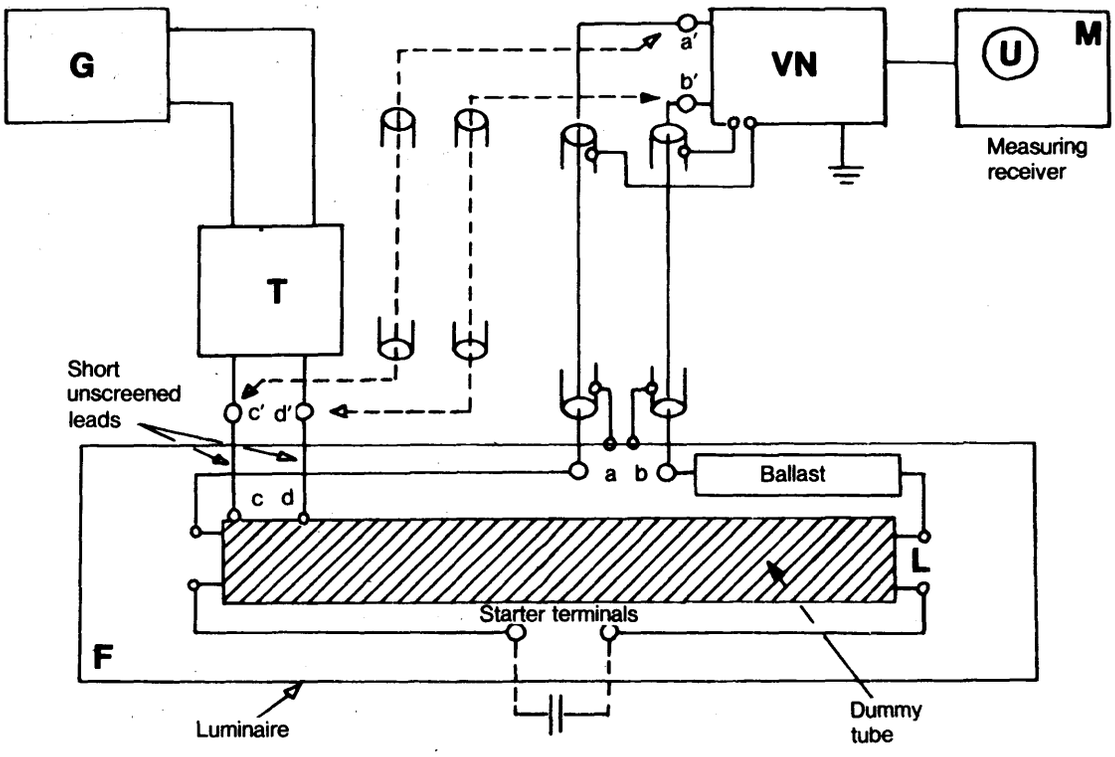
5.2.3.5. The generator output voltage shall be measured by means of the measuring receiver; for this purpose, a direct connection is made between c' and a' and between d' and b' by coaxial cables ($Z_o = 75\,\Omega$) of 1 m length with the screens connected to the earth terminal of VN; cables c-c', d-d', a-a', b-b' are removed.

5.2.3.6. U_1 is the voltage between a' and the earth terminal of VN or between b' and the earth terminal of VN. (The two voltages must be nominally the same — about 2mV.)

5.2.3.7. U_2 is the higher of the two voltages between a' and the earth terminal of VN and b' and the earth terminal of VN.

5.2.3.8. Where it is known that the insertion loss is a minimum for a given orientation of the dummy tube, measurement may be made for this orientation only. In cases where there is any doubt on this point, measurements shall be made for both orientations of the dummy tube.

Figure 3: **Method of measurement for tubes of 20 W, 40 W, 65 W, 80 W and 65/80 W rating**



G = h.f. generator

T = unbalance/balance transformer (see 5.1.2 and Figure 1)

VN = CISPR V-network

M = measuring receiver

L = dummy tube (see 5.1.4 and Figure 2)

F = luminaire

a-b = mains terminals

a'-b' = input terminals VN

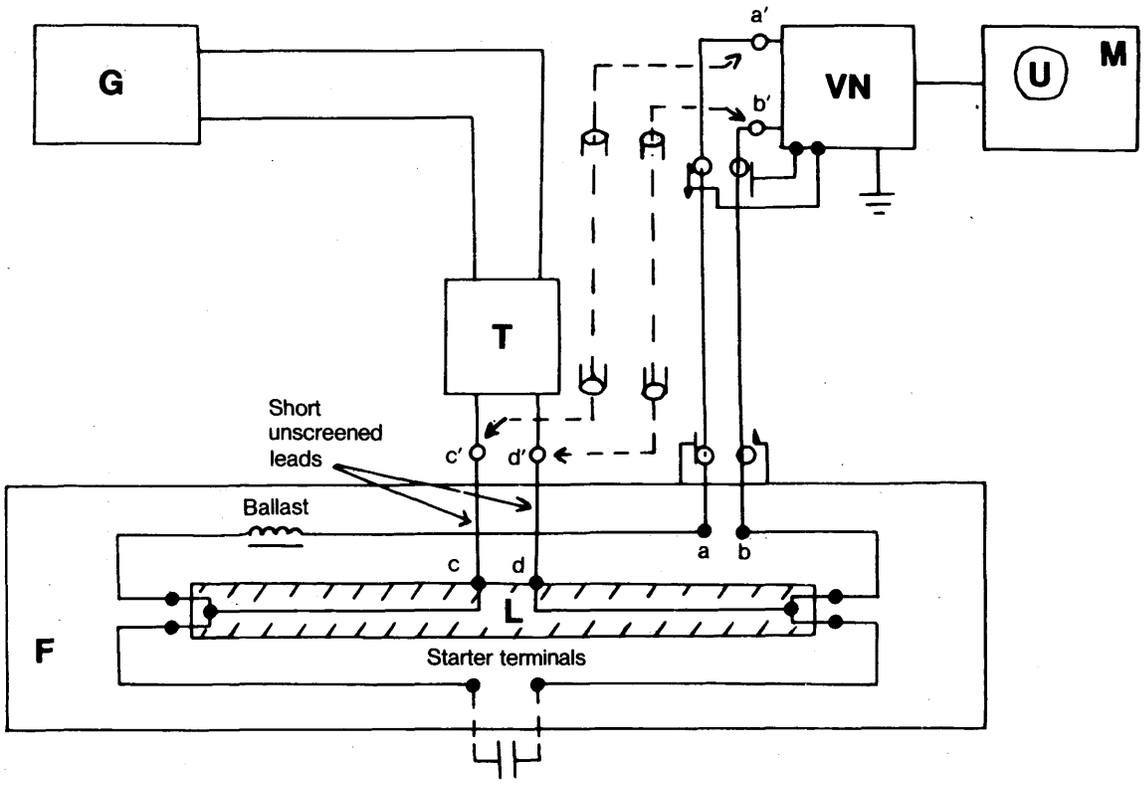
c-d = terminals at dummy tube

c'-d' = output terminals of T

a-a' and b-b' = connections by coaxial cables (Z_o = 75 Ω) with the respective ends of the screens connected to the metal-work of VN and F

c-c' and d-d' = connections by short unscreened leads

Figure 4: **Method of measurement for tubes other than 20 W, 40 W, 65 W, 80 W and 65/80 W rating**



G = h.f. generator

T = unbalance/balance transformer (see 5.1.2 and Figure 1)

VN = CISPR V-network

M = measuring receiver

L = tube of insulating material with internal connections as shown replacing the lamp

F = luminaire

a-b = mains terminals

a'-b' = input terminals VN

c-d = terminals at centre of tube L

c'-d' = output terminals of T

a-a' and b-b' = connections by coaxial cables (Z_o = 75 Ω) with the respective ends of the screens connected to the metal-work of VN and F

c-c' and d-d' = connection of the transformer to the dummy tube must be made with unscreened leads not exceeding 10 cm in length