



## EMI Test Accessories CISPR 15

Emissions from Luminaries and Ancillary Devices



Triple-Loop Antenna, Artificial Lamps,  
LISN, Transformer, Test Fixture

Data Sheet

# CISPR 15 Test Accessories

## Overview

Most lighting equipment is covered by the scope of CISPR 15, that applies to the emission of radio frequency disturbances from:

- all lighting equipment with a primary function of generating and/or distributing light intended for illumination purposes, and intended either for connection to the low voltage electricity supply or for battery operation;
- the lighting part of multi-function equipment where one of the primary functions of this is illumination;
- independent auxiliaries exclusively for use with lighting equipment;
- UV and IR radiation equipment;
- neon advertising signs;
- street/flood lighting intended for outdoor use;
- transport lighting (installed in buses and trains).

Excluded from the scope of this standard are:

- lighting equipment which utilize ISM frequencies for their operation (covered by CISPR 11);
- lighting equipment for aircraft and airports (covered by Civil Authority requirements)
- lighting which is not primarily intended for illumination purposes (such as photocopiers or slide projectors which are covered by CISPR 14 and display or indicator back lighting which are covered by the relevant product standard).

### **CISPR 15 specifies the following tests:**

#### *Insertion loss*

Applicable to fluorescent lamp luminaries with switch type starter circuits. Measurement are made over the frequency range 150kHz to 1.605MHz using dummy lamps fitted in place of the fluorescent tubes.

#### *Disturbance Voltage (mains and control terminals)*

These tests are applicable to all other luminaries in the 9kHz÷30MHz frequency range. Conducted Emission back down the mains lead is measured preferably with a LISN (Line Impedance Stabilization Network).

#### *Radiated Disturbance*

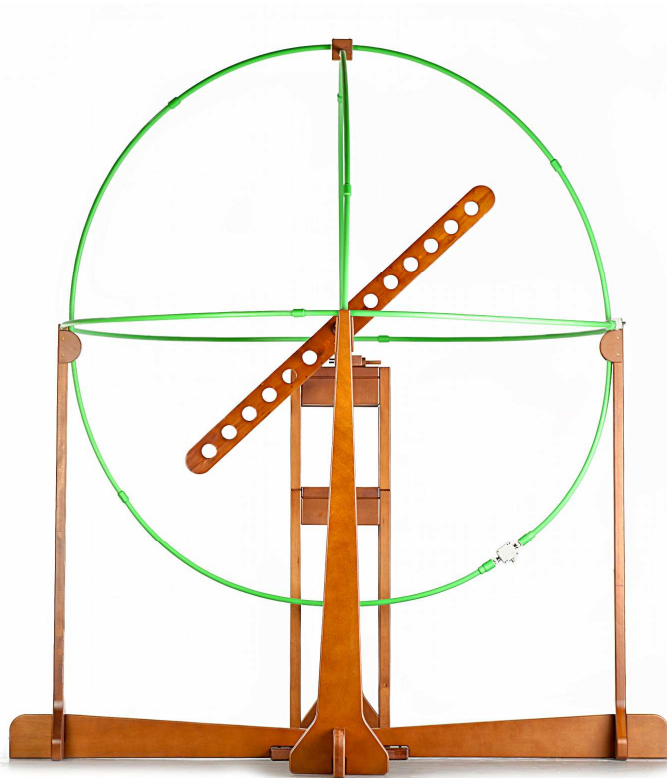
This test is applicable to any luminaries which requires disturbance voltage tests and supplies the lamps at frequencies in excess of 100Hz. The test is performed within an enclosed loop antenna of 2m loop diameter. Antennas of this type are known as a Van Veen Loop and consist of three orthogonal loops enclosing a platform where the EUT is positioned. Frequency range of measurement is 9kHz÷30MHz.

The signals from the loop antenna, LISN are analyzed by through CISPR16-1 EMI receiver.

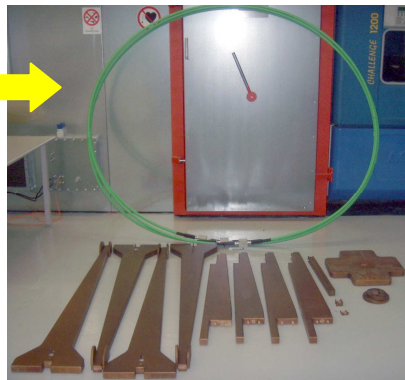
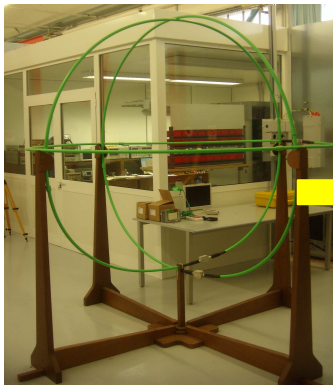
# AFJ VVL 1530

CISPR 15 radiated electromagnetic disturbances measurement in the frequency range from 9kHz to 30MHz are applicable to any luminaries which requires disturbance voltage tests and supplies the lamps at frequencies in excess of 100Hz. The test is performed within an enclosed loop antenna of 2m loop diameter. Antennas of this type are known as a Van Veen Loop as defined on CISPR 16-1-4 and consist of three orthogonal loops enclosing a platform where the EUT is positioned.

VVL 1530 is a calibrated 2-metre large Van Veen Loop antenna designed and manufactured to comply with CISPR 15 and CISPR 16-1-4 requirements. The current probe around the inner conductor of the coaxial antenna-cable has a sensitivity of 1V/A over the frequency range from 9kHz to 30MHz, so no antenna factor is needed to use during measuring. The calibrated frequency range is 9kHz to 30MHz and each antenna can be used with any CISPR 16-1-1 EMI receiver or spectrum analyzer. Optional available accessories are the calibration kit and the EUT support.



VVL 1530 is a complete 3-axis antenna with a manual switching unit to select each loop in turn. The loops are 2m in diameter with the lowest point 0.5m above ground and are fitted with specially designed current transducers in fully screened housings. Ambient interference is strongly suppressed in open area measurements. VVL 1530 is designed to be collapse down to subunit of convenient size, easy to store. Assembly and disassembly is very fast, no screws necessary.



- VVL 1530
- Calibration Kit (Optional)
- EUT Support (Optional)

- Full compliance to CISPR 15 and CISPR 16-1-4 requirements
- Current probe with sensitivity of 1V/A over the frequency range from 9kHz to 30MHz, no antenna factor is needed
- Triple independent 2m diameter loops
- Manual switching unit for loop selection
- Fully calibrated
- Can be used with any CISPR 16-1-1 EMI receiver or spectrum analyzer
- Ten minutes to assembly and disassembly
- No screws
- Easy to store
- Calibration kit available (optional)
- EUT support available (optional)

### Technical Specification

Design:	Fully compliance with CISPR 15 and CISPR 16-1-4 standards
Frequency range:	9kHz÷30MHz
Loops:	Triple independent 2m diameter loops, switchable among X, Y, Z
Selector:	Loop selection by manual switching unit
Output:	50 Ohm, N connector
Dimensions:	2,6 x 2,1 x 2,1 m (height Z / width X / width Y)

# LISN - artificial main network

## Conducted Emission Measurement

Conducted emission, use a CISPR 16-1-2 artificial main network, as transducer between the main ports of the EUT and the measuring receiver. LISN shall provide:

- defined RF impedances between EUT terminals;
- a  $50\Omega$  input impedance RF connector, to which the CISPR 16-1 measuring equipment shall be connected;
- a reference ground connecting point.

### General

The AFJ LISNs have been developed for measurement of line-bound interference's according to standards. It corresponds to CISPR 16-1-2 directives. The construction uses air coils in the current path in order to avoid saturation effects with high current strengths. Concerning the construction the LISN is a V-network because the position of the vectors of the interference voltage.

The continuous high current load-bearing capacity is ensured by the use of large wire cross-sections for the coils. For a short period (10 minutes), twice as high currents are admissible. The design of the stabilization network is continuously low-impedance for minimum losses.

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The design of the stabilization network is continuously low-impedance for minimum losses.

The compact form of construction, despite the high current-bearing capacity, makes easy use of the AFJ LISNs for the measurement of high currents directly at the piece of use of the consumer possible

In this way, measurements of mains-borne interference's can be carried out under conditions corresponding to practice.

AFJ LISNs also include current variation counter (power meter) for EN55014-1 switching operation measurement;

### Models

- **LS 16/C**: 16A single phase,  $f=9\text{kHz}\div 30\text{MHz}$ ;
- **LT 32/C**: 32A single/three phase,  $f=9\text{kHz}\div 30\text{MHz}$  Available also in single phase model.



# Insertion loss measurement

## dummy lamps

Sets of dummy lamps, which are used in the circuits of Insertion loss measurement. Dummy lamps simulate the RF properties of the fluorescent lamps:

- Linear & Single Capped Version
- U Type & Circular Version



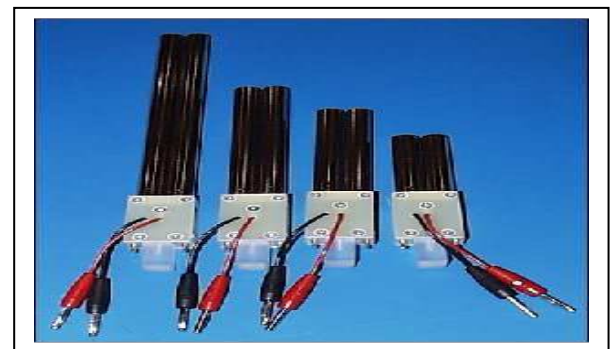
### Linear Dummy Lamps

Linear Version	Watt	Length
Dummy Lamp with 38 mm Diameter	58 W	(1500 mm)
Dummy Lamp with 38 mm Diameter	36 W	(1200 mm)
Dummy Lamp with 38 mm Diameter	30 W	(895 mm)
Dummy Lamp with 38 mm Diameter	18 W	(590 mm)
Dummy Lamp with 25 mm Diameter	58 W	(1500 mm)
Dummy Lamp with 25 mm Diameter	36 W	(1200 mm)
Dummy Lamp with 25 mm Diameter	36 W	(970 mm)
Dummy Lamp with 25 mm Diameter	30 W	(895 mm)
Dummy Lamp with 25 mm Diameter	18 W	(590 mm)



### Single Capped Dummy Lamps (diameter 15 mm) socket 2G7

Socket 2 G 7	Watt	Length
Dummy Lamp with 15 mm Diameter	11 W	(215 mm)
Dummy Lamp with 15 mm Diameter	9 W	(145 mm)
Dummy Lamp with 15 mm Diameter	7 W	(115 mm)
Dummy Lamp with 15 mm Diameter	5 W	(85 mm)



**U Version Dummy Lamps**

U Version	Watt	Length
Dummy Lamp with 38 mm Diameter	65 W	(765 mm)
Dummy Lamp with 38 mm Diameter	40 W	(607 mm)
Dummy Lamp with 38 mm Diameter	20 W	(310 mm)



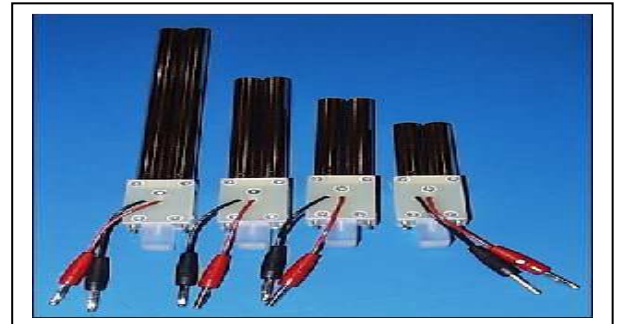
**Circular Version Dummy Lamps**

Circular Version	Watt	Length
Dummy Lamp with 38 mm Diameter	40 W	(413 mm)
Dummy Lamp with 38 mm Diameter	32 W	(311 mm)
Dummy Lamp with 38 mm Diameter	22 W	(216 mm)



**Single Capped Dummy Lamps (diameter 12 mm), socket G 23**

Socket G 23	Watt	Length
Dummy Lamp with 12 mm Diameter	11 W	(214 mm)
Dummy Lamp with 12 mm Diameter	9 W	(144 mm)
Dummy Lamp with 12 mm Diameter	7 W	(114 mm)
Dummy Lamp with 12 mm Diameter	5 W	(85 mm)



**Single capped artificial lamps (diameter 12 mm) quad version**

Socket G 24	Watt	Length
Dummy Lamp with 12 mm Diameter	26 W	(193 mm)
Dummy Lamp with 12 mm Diameter	18 W	(153 mm)
Dummy Lamp with 12 mm Diameter	13 W	(138 mm)
Dummy Lamp with 12 mm Diameter	10 W	(110 mm)



Insertion loss is applicable to fluorescent lamp luminaries with switch type starter circuits. Measurement are made over the frequency range 150kHz to 1.605MHz using:

- dummy lamps fitted in place of the fluorescent tube;
- balance-to-unbalance transformer to obtain a symmetrical voltage from the RF generator;

## Transformer

The low-capacitance balance-to-unbalance transformer is used to obtain a symmetrical voltage from the RF generator.

The output impedance of the transformer, when the input is terminated by  $50\Omega$ , is  $150\Omega \pm 10\%$ , with angle phase less than  $10^\circ$ .

The insulation of the transformer is checked as CISPR 15 requirement, in the  $f=150\text{kHz}\div 1605\text{kHz}$  frequency range. The transfer characteristic is flat,  $\pm 0.5\text{dB}$ .

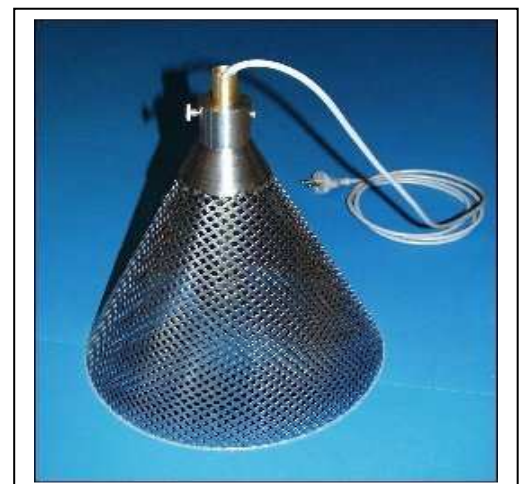
The transformer is mounted in a metal box and the side where the output terminal are fixed, is constructed of insulating material.



## Metal Housing

For the measurement of disturbance voltage, the self-ballasted lamps shall be adjusted to the highest position of the conical metal housing.

Conical Metal Housing for self-ballasted fluorescent Lamps		Type
Test Fixture	Socket	E 27
Test Fixture	Socket	E 14
Test Fixture	Socket	Bajonet



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