ZVEI:
Die Elektroindustrie

Explanatory Leaflet

Role of CE Marking in the Placing on the Market of Power Capacitors

March 2017

German Electrical and Electronic Manufacturers' Association

CE Marking of Components

Within the European Single Market, the placing of products on the market is governed in many areas by directives or regulations following the so called "*New Approach*" and the "New Legislative Framework" (NLF). These legislative instruments require manufacturers to apply the CE mark to their products when they fall within the scope of such a legislative instrument. At the same time and in particular in conjunction with EU Regulation 765/2008/EC [8], the same instruments prohibit the affixing of the CE mark to products for which no relevant directive exists.

The presence of a CE mark on a product is intended to indicate that the latter is covered by such a harmonizing EU directive or regulation, that it satisfies the statutory requirements set out in the directive or regulation, and that its free movement within the European Economic Area may not therefore be obstructed by state authorities. The CE mark does not constitute a safety or quality mark, however.

Since, depending not least upon their design and purpose, power capacitors may ultimately either be employed as components within products or constitute stand-alone „equipment" which in turn falls within the scope of a legal instrument making provision for mandatory CE marking, uncertainty often exists regarding whether such capacitors are themselves subject to mandatory CE marking.

Legal Background

Over 30 directives requiring CE marking exist at the present time; in some cases, the scope of the product groups and aspects governed by them overlaps. Compulsory CE marking and the associated obligation for the manufacturer to perform and conformity assessment and to issue a corresponding declaration always relate to the product which is defined within the scope of the relevant legislation. As a general rule, the requirements of a legislative instrument including that of compulsory marking apply to components only when the latter are covered *directly* by the legal instrument concerned.

In many cases however, only ready-for-use final products are subject to legislation. In order for the statutory requirements applicable to these final products to be observed, the necessary specifications of purchased components are assured by agreements reached solely under private law; CE marking is irrelevant in this case.

At present, the following legislative instruments are repeatedly cited as being relevant to power capacitors:

- The Low Voltage Directive, 2014/35/EU [1]
- The EMC Directive, 2014/30/EU [2]
- The Machinery Directive, 2006/42/EC [3]
- The Medical Devices Directive, 93/42/EC [4]
- The RoHS Directive, 2011/65/EC [5]

These directives will be considered individually below in relation to power capacitors.

Low Voltage Directive, 2014/35/EU

According to Article 1 of the Low Voltage Directive itself, the directive governs the safety of "electrical equipment" where operated within a range from 50 to 1000 V AC or 75 to 1500 V DC. The operating voltages of extra-low-voltage and high-voltage capacitors lie outside these ranges and application of the Low Voltage Directive to them can be ruled out from the outset.

Where the operating voltage lies within the limits stated in the Low Voltage Directive, it must be established whether the capacitor constitutes "electrical equipment" within the meaning of the directive. Components of final products may in principle also constitute such equipment. However, the definition of "equipment" in the directive does not provide a clear distinction. § 7 of the Commission's guidelines on the application of the directive [7], however, clearly states that such "basic components" do not constitute electrical equipment and do not therefore fall within the scope of the directive when their safety

"can only, to a very large extent, be assessed taking into account how they are incorporated", and "a risk assessment cannot be undertaken" (for these basic components).

Footnote 11 of the guidelines lists various examples of electromechanical and electronic components (including capacitors) which are typically found on circuit boards. It is assumed here that the safety cannot be assessed on the product itself.

Conversely, where clear product-specific safety requirements (such as a harmonized standard) exist for the component and their observance can be verified on the product itself, it may generally be assumed that the product concerned constitutes equipment in the sense of the Low Voltage Directive. This is the case with some forms of power capacitor. The declaration of conformity applies in this case only to the safety aspects that can be assessed directly on the capacitor itself in conjunction with reference to manufacturer's specifications for its installation.

The voltage limits set out in the Low Voltage Directive are to be applied to the maximum operating voltage stated by the manufacturer. Where both a DC and an AC voltage are stated for a product, only one of the two voltage types need lie within the relevant limits in order for the Low Voltage Directive to apply.

The AC voltage limits stated in the Low Voltage Directive are to be regarded as RMS values. For capacitors to EN 61071:2007 however, the maximum permissible rated AC voltage UN is stated in terms of its peak value (maximum operating peak recurrent voltage). Owing to the differences in possible curve forms, a meaningful fixed relationship to an RMS value cannot be stated in this case. The Low Voltage Directive does not clearly resolve the resulting uncertainty of classification. However, it can be assumed that the legislative objective of the Directive is attained when its DC voltage limits are substituted as the criterion in such cases. Accordingly, the capacitor may be considered to lie within the scope of the Low Voltage Directive when the following applies for the peak value of the rated AC voltage U_N: 75 V < U_N < 1500 V.

EMC Directive, 2014/30/EU

Article 1 of the EMC Directive governs the electromagnetic compatibility of "equipment". According to Article 3 of the directive, this equipment is "apparatus" or "fixed installations".

Section (1) defines "apparatus" as follows:

"*... any finished appliance or combination thereof made commercially available as a single functional unit, intended for the end user and liable to generate electromagnetic disturbance, or the performance of which is liable to be affected by such disturbance;*"

Power capacitors are occasionally used for EMC purposes; nevertheless, they are purely passive components the function of which cannot be disturbed by electromagnetic influences and which do not themselves generate disturbance. They therefore lie outside the definition of "apparatus" of the EMC Directive. Conformity assessment and CE marking in accordance with this directive are not therefore possible.

Machinery Directive, 2006/42/EC

The Machinery Directive governs the safety of complete machines. In two exceptions, it also contains provisions governing parts of machines: "partly completed machinery" and "safety components".

Article 2 (g) describes partly completed machinery as "*an assembly which is almost machinery*". This is not the case for a capacitor.

In principle, electrical components may also constitute safety components. However, before a component can be defined as a safety component and thus fall within the scope of the Machinery Directive, it must be assigned an explicit purpose by its manufacturer for fulfilment of a safety function in the sense of the Machinery Directive, rather than merely being required for the machine's functionality. This condition is not generally met by power capacitors. That being the case, conformity assessment and CE marking is not possible in accordance with this directive.

Medical Devices Directive, 93/42/EEC

The Medical Devices Directive applies solely to complete final products (and their ready-for-use accessories) the intended use of which is the "diagnosis, prevention, monitoring, treatment or alleviation of disease; diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap". The directive does not therefore apply to power capacitors which are fitted into such products as components. Accordingly, CE marking and declaration of conformity under the Medical Devices Directive is not possible for them.

RoHS Directive, 2011/65/EC

The RoHS Directive restricts the use of certain substances in "electrical and electronic equipment". In contrast to the previous version, the recast, in force since 13 January 2013, also specifies CE marking for the products within its scope. The scope of this directive is limited in the first instance to "equipment" and not directly to its components, such as the capacitors in luminaires. The latter are covered only indirectly in that an equipment manufacturer is obliged to procure components that enable him to satisfy the requirements

of the RoHS in the final product. He will reach an agreement to this effect under private law with his component supplier. CE marking for which provision is made under public law does not apply to this situation.

Power capacitors may constitute "electrical and electronic equipment" in their own right in the sense of the RoHS Directive when they are not fitted as a component into another item of equipment, but are installed independently of such equipment, for example in an industrial power supply installation. In this case, they fall within Category 11, "Other electrical and electronic equipment not covered by any of the categories above", for which the directive is obligatory to be applied from 22 July 2019 onwards. Such installations are however likely to be "large-scale fixed installations", the component parts of which are expressly excluded from the scope of the RoHS Directive.

Scope of Manufacturer's Responsibility for Components

In some cases, certain statutory requirements for mandatory CE marking also directly extend to components which are incorporated into final products by an equipment manufacturer. For certain components, this also includes the Low Voltage Directive (see above). In these cases, the capacitor as a component bears the CE mark, which symbolizes the safety of the product in this case. It must be noted here however that the conformity assessment upon which the CE marking is based and the associated responsibility of the capacitor manufacturer relate solely to the safety of the capacitor itself, and not to its correct and proper installation by an equipment manufacturer. The safety of the final item of equipment is and remains the subject of the conformity assessment and the responsibility of its manufacturer.

Annex

Overview of Power Capacitor Types

Relevant directives

Product Type (Product standard)	Low Voltage Directive 2014/35/EU	EMC Directive 2014/30/EU	Machinery Directive 2006/42/EC	Medical Devices Directive 93/42/EC	RoHS Directive 2011/65/EC
Motor capacitors (EN 60252)	+	–	–	–	•
Capacitors for use in fluorescent lamps (EN 61048/EN 61049)	+	–	–	–	•
Capacitors for power electronics (EN 61071)					
Up to U_N = 1500 V	+	–	–	–	•
Over U_N = 1500 V	–	–	–	–	•
Power capacitors up to 1000 V (EN 60831/EN 60931)	+	–	–	–	••
Power capacitors Over 1000 V (EN 60871 – over 1000 V)	–	–	–	–	–
Control systems, filters for low voltage	+	–	–	–	••
Control systems, filters for high voltage	–	–	–	–	–
Furnace capacitors EN 60110					
Up to 1000 V	+	–	–	–	•
Over 1000 V	–	–	–	–	•

Key:
+ Directive applies
– Directive does not apply
• Directive does not directly apply to the capacitor, but may apply to the final product in which it is installed. In this case, the capacitor must satisfy the restrictions on substances (without CE marking) by way of agreements reached under private law.
•• Product falls within Category 11, which takes effect as of 22 July 2019. Depending upon their use, the products may continue to be excluded in the future where they form part of a large-scale fixed installation.

Sources

[1] Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.

[2] Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

[3] Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC.

[4] Directive 93/42/EEC of 14 June 1993 concerning medical devices (consolidated text).

[5] Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

[6] Regulation 765/2008/EC of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Council Regulation 339/93/EEC.

[7] European Commission (eds.): Low Voltage Directive 2014/35/EU – Guidelines. Electrical equipment designed for use within certain voltage limits (November 2016).

ZVEI:
Die Elektroindustrie

Role of CE Marking in the Placing of Power Capacitors on the Market

ZVEI - Zentralverband Elektrotechnik- und Elektronikindustrie e. V.
Fachverband Starkstromkondensatoren
German Electrical and Electronic Manufacturers' Association
Power Capacitors Division
Lyoner Strasse 9
60528 Frankfurt am Main, Germany

Contact:
Dr. Marcus Dietrich
Telephone: +49 69 6302-462
E-mail: dietrich@zvei.org

www.zvei.org

March 2017