GMR Isolators in IEC 61010-1 Edition 3 Systems

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Introduction

IEC 61010-1 specifies safety requirements for electrical systems to minimize hazards to operators, equipment and the surrounding environment. The first and second editions, published in 1990 and 2001 respectively, specified external clearance and creepage requirements based on line voltage, pollution degree, material group and altitude. Interior clearance and creepage requirements were specifically excluded.

Section 6.7 in Edition 2

This section explicitly stated: “There are no clearance or creepage distance requirements for the interior of void-free moulded parts, including the inner layers of multilayer printed circuit boards.”

Thus, digital isolators satisfying the requirements of Edition 2 were granted standard compliance by international certification agencies, VDE (Verband der Elektrotechnik), TÜV, (Technischer Überwachungsverein), and CSA (Canadian Standards Association).

Section 6.7 in Edition 3

In 2010 however, section 6.7 of Edition 3 had been completely rewritten, now basing insulation requirements on an isolator’s interior construction. Two subsections in particular are targeting digital isolators: 6.7.2.2.2 for molded and potted parts, and 6.7.2.2.4 for thin-film insulation.

Subsection 6.7.2.2.2 requires that for basic, supplementary, and reinforced insulation, conductors located on an interface between the same two layers moulded together shall be separated by at least 0.4mm after the moulding is completed.

Subsection 6.7.2.2.4 states that for systems with mains voltages up to and including 300V (RMS or DC), conductors located on the same layer shall be separated by the applicable clearance and creepage distances in Table 1.

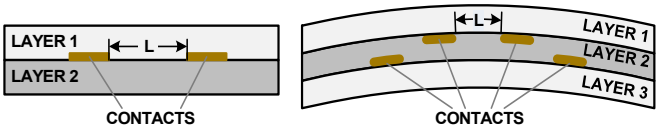

FIGURE 1. REQUIREMENTS FOR DISTANCES BETWEEN CONTACTS FOR MOLDED AND POTTED PARTS (LEFT) AND THIN-FILM INSULATION (RIGHT)

Section 14 in Edition 3

This section deals with components used within the overall system to be certified. It allows for a component to be used if it complies with an equivalent non-IEC safety standard, such as VDE V 0884-10.

Conclusion

Most GMR digital isolators are certified to the VDE V 0884-10 component level standard and therefore can be used in equipment requiring compliance with IEC 61010-1 Edition 3.

TABLE 1. INTERNAL CREEPAGE AND CLEARANCE DISTANCE REQUIREMENTS FOR THIN-FILM INSULATION

VOLTAGE LINE TO NEUTRAL AC OR DC (V)	CLEARANCE (mm)	CREEPAGE (mm)								
		PRINTED WIRING BOARD		OTHER INSULATING MATERIAL						
		POLLUTION DEGREE 1	POLLUTION DEGREE 2	POLLUTION DEGREE 1	POLLUTION DEGREE 2			POLLUTION DEGREE 3		
		ALL MATERIAL GROUPS	MATERIAL GROUPS I, II, IIIA	ALL MATERIAL GROUPS	MATERIAL GROUP I	MATERIAL GROUP II	MATERIAL GROUP III	MATERIAL GROUP I	MATERIAL GROUP II	MATERIAL GROUP III
<150	0.5	0.5	0.5	0.5	0.8	1.1	1.6	2.0	2.2	2.5
>150 <300	1.5	1.5	1.5	1.5	1.5	2.1	3.0	3.8	4.1	4.7

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