

EMC and functional safety in the field of machinery

Increased immunity as required by DIN EN 13849-1 for integration of SRP/CS

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At the end of 2015, a new generic standard, DIN EN 61000-6-7 [1], was published, dealing with immunity requirements for equipment used to perform safety functions in industrial locations. This DGUV Test information sheet is intended to provide clarity for machine manufacturers with regard to increased immunity requirements when integrating systems in accordance with DIN EN 13849-1 [2].

Scope of DIN EN ISO 13849-1 and DIN EN 61000-6-7

DIN EN ISO 13849-1 describes its scope as follows:

“This part of ISO 13849 provides safety requirements and guidance on the principles for the design and integration of safety-related parts of control systems (SRP/CS), including the design of software.”

This standard thus has two typical areas of application: development of SRP/CS (= design) and “system integration”, i.e. integration of existing SRP/CS by machine manufacturers.

The scope of DIN EN 61000-6-7 covers electrical and electronic equipment that is intended to be used in safety-related systems in industrial locations and to comply with IEC 61508 and/or other sector-specific standards concerning functional safety. The scope of the standard does not, therefore, cover the final safety-related system on the machine, as is explained in Note 1 in the scope.

[1] DIN EN 61000-6-7: Electromagnetic compatibility (EMC) - Part 6-7: Generic standards - Immunity requirements for equipment intended to perform functions in a safety-related system (functional safety) in industrial locations (Dec 2015), Beuth, Berlin 2015

[2] DIN EN ISO 13849-1: Safety of machinery –Safety-related parts of control systems – Part 1: General principles for design (June 2016), Beuth, Berlin 2016

It is therefore clear that:

Machine manufacturers are by no means required to directly consider DIN EN 61000-6-7 when integrating SRP/CS since the standard (only) concerns SRP/CS design.

EMC requirements as per DIN EN ISO 13849-1

DIN EN ISO 13849-1 specifies the following requirements for category B SRP/CS and thus for all other categories too:

“The SRP/CS shall, as a minimum, be designed, constructed, selected... in accordance with the relevant standards... to withstand... electromagnetic interference... If no product standard exists, at least the immunity requirements of IEC 61000-6-2 should be followed.”

These minimum requirements also apply to machinery manufacturers and must be considered when selecting SRP/CS for integration.

However, the integrator must determine whether its machine is intended for use in harsh electromagnetic environments with high interference levels and then choose SRP/CS that provide increased immunity. Examples of applications that may require SRP/CS with increased immunity are:

- large frequency inverters,
- large paper-processing machines,
- large woodworking machines,
- large pressing/cutting machines,
- machinery with large heating systems (e.g. for adhesion processes),
- industrial GSM modules in the control cabinet or near the machine,
- electric welding,
- naval radar near ports,
- aviation radar near airports and
- military areas.

When selecting SRP/CS, the integrator should also bear in mind that DIN EN 61000-6-7 only considers functional safety. Compliance with this standard does not guarantee the proper functioning of the machine, i.e. its operational availability when exposed to interference. If the integrator is unable to determine whether increased immunity is required, it must inform the user that its machine is only designed for “normal” immunity.

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