

# Focus on BIA's work

Berufsgenossenschaftliches Institut für Arbeitsschutz

## No.: 0212 Electromagnetic fields and functional safety

### ○ Problem

In recent years, electronic and programmable electronic systems have increasingly replaced the traditional safety devices, generally employing contacts, on plant and machinery. Electronic and programmable electronic systems have the advantage of greater flexibility for adaptation to changing tasks; at the same time, however, they are more sensitive to electromagnetic disturbances. In the absence of supplementary measures, noise voltage impulses on lines or magnetic or electromagnetic fields may interfere with the function of these systems. In a worst-case scenario, the safety function may be impaired by electromagnetic disturbance. The resulting hazards must be taken into consideration at an early stage during development, testing and assessment.

Safety devices employing electronic and programmable electronic systems must continue to fulfil their safety-related functions even under unusual electromagnetic conditions. A proposal is therefore to be drawn up for an enhanced immunity level for safety devices.



Illustration  
Enhanced disturbance  
level

### ○ Activities

In the German Electrotechnical Committee within DIN and VDE, a joint proposal was drawn up by representatives of German industry, the Deutsche Bahn (DB) and the BIA for an enhanced immunity level for industrial devices with safety functions. This proposal is now being discussed at international level by the International Electrotechnical Commission (IEC). A revised proposal is expected to appear in 2005 in the form of draft standard IEC 61326 Part 3.

## ○ **Results and Application**

On the basis of IEC 61508 Part 2, a higher immunity to disturbance for safety devices is required, in the form of a higher disturbance level, than that set out in the EMC generic standard (DIN EN 61000-6-2). Only the safety-related functionality need be retained at these higher levels, however, or a safe status assumed. Depending upon the disturbance phenomenon, the immunity of the safety function should be higher than the values set out in the generic EMC standard by a factor of two, i.e. by **one** level of severity. Concessions in the enhanced immunity are permitted in consideration of the field of application and the local environment. The enhanced immunity need thus be assured only for:

- electromagnetic fields at frequencies at which high field strengths may also occur (ISM frequency band, mobile telephone frequencies, etc.);
- electrostatic discharges in areas which are generally accessible (for built-in appliances, only outside the switchgear cabinet).

## ○ **Area of Application**

Manufacturers of machinery, safety devices and control systems; staff on standards committees and in test institutes

## ○ **Additional Information**

- DIN EN 61000-6-2: Electromagnetic compatibility (EMC) – Part 6-2: Generic standards: Immunity for industrial environments (08.02). Beuth, Berlin 2002
- DIN EN 61508-2: Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 2: Requirements for electrical/electronic/programmable electronic safety-related systems (12.02). Beuth, Berlin 2002
- IEC/TS 61000-1-2: Electromagnetic Compatibility (EMC) – Part 1-2: General Methodology for the achievement of functional safety of electrical and electronic equipment with regard to electromagnetic phenomena (06.01). IEC, 2001
- IEC 61000-2-5: Electromagnetic compatibility (EMC), Part 2: Environment-Section 5: Classification of electromagnetic environments (11.97). IEC, 1997

⇒ Expert assistance: BIA, Fachbereich 4: Arbeitsgestaltung – Physikalische Einwirkungen  
[BIA, Division 4: Ergonomics – Physical environmental factors]

⇒ Literature requests: BIA, Zentralbereich [BIA, Central division]

## ○ **“Focus on BIA's Work”**

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53754 Sankt Augustin  
Germany

Edited by: F. Börner

Phone: +49 2241 231-02/Fax: +49 2241 231-2234

e-mail: [bia@hvbgb.de](mailto:bia@hvbgb.de)

Internet: [www.hvbgb.de/bia](http://www.hvbgb.de/bia)