

A photograph of two men in a server room. The man on the left is wearing a white shirt and holding a smartphone, gesturing with his hand. The man on the right is wearing a blue and white checkered shirt and glasses, holding a folder. They are standing in front of server racks with blue lighting. In the top left corner, there is a white box containing the Siemens logo and tagline.

SIEMENS

Ingenuity for life

Control Panels

Changes and updates for risk analysis and risk assessment

White Paper | September 2017

This White Paper informs about the new regulations and their consequences from the European Low Voltage Directive 2014/35/EU. It also provides practical information about how to carry out the risk analysis and risk assessment for control panels. Additional sources of information are included in the appendix.

Contents

The risk analysis and risk assessment of control panels is required by Directive 2014/35/EU. The CENELEC Guideline 32 provides assistance and contains detailed instructions for vendors, creators of standards and market supervision for the risk assessment of low-voltage products.

Low Voltage Directive 2014/35/EU	3
Contents and application areas.....	4
CENELEC Guideline 32	4
More information	5
Appendix A: Process of risk assessment and risk mitigation	6
Basic risk analysis and assessment procedure:.....	6
Step 1: Risk analysis	6
Step 2: Risk assessment	6
Step 3: Risk mitigation	6
4. Testing	6
5. Documentation	6
A. Product: Product description:	7
D. Ambient conditions.....	7
E. Risk analysis and risk assessment.....	8
F. Documentation of requirements with respect to instructions and safety-relevant information.....	10

Low Voltage Directive 2014/35/EU

European directives

As part of its "New Legislative Framework – NLF", the Commission of the European Union issued eight new directives on February 26, 2014. These substitute the existing directives. These directives are binding to be applied and adhered to since April 20, 2016 in the member states of the European Economic Area.

Among others, the new Directive 2014/35/EU has replaced the former low-voltage directive 2006/95/EC. Likewise, the new Directive 2014/30/EU replaces the former EMC Directive 2004/108/EC.

Both directives must frequently be adhered to for the construction of control panels. Even though the general scope of application of both directives has not substantially changed, the new versions still contain some changes. These affect e.g. the manufacture of switchgear and controlgear – for example in the form of a requirement to perform a risk analysis and risk assessment.

Scope of application of Low Voltage Directive 2014/35/EU

The directive shall ensure that electrical equipment provides a high level of safety for the protection of the health and safety of humans as well as of pets and farm animals. It is also designed to protect connected goods and, last but not least, guarantee the functioning of the Internal Market. This European directive applies to all electrical equipment which operate with a rated voltage of 50 to 1000 V AC or with a rated voltage of 75 to 1500 V DC.

Excepted equipment

- Electrical equipment for use in potentially explosive atmospheres
- Electro-radiological and electro-medicinal equipment
- Electrical parts of passenger and goods lifts
- Electricity meters
- Domestic plug and socket devices
- Devices for supplying power to electric fences
- Radio interference suppression

- Special electrical equipment that is designated for use on ships, airplanes or railways and conforms to the safety regulations of international institutions to which the member states belong.
- Custom and application-specific test modules which are used by experts exclusively in research and development systems for such purposes.

Requirement of risk analysis and assessment

The current directive describes in Article 6 as well as in Appendix III the requirement and the procedure with which the vendor ensures and declares the conformity of the equipment. The three essential components of this are

- Technical documentation
- EU Declaration of Conformity
- CE marking

With respect to the technical documentation, the current directive contains the requirement of a "suitable risk analysis and assessment". Many risks are already covered by relevant standards. The selection and application of and the compliance with harmonized standards alone does not mean that this risk analysis and assessment is no longer required.

Important definitions of terms

"Making available on the market": any supply for distribution, consumption or use of electrical equipment on the Union Market in the course of a commercial activity, whether in return for payment or free of charge.

"Placing on the market": The first-time provision of electrical equipment on the Union Market.

"Vendor": A vendor is any natural or legal person who manufactures electrical equipment or has electrical equipment designed or manufactured and markets that equipment under his/her name or trade mark.

CENELEC Guideline 32

Objectives

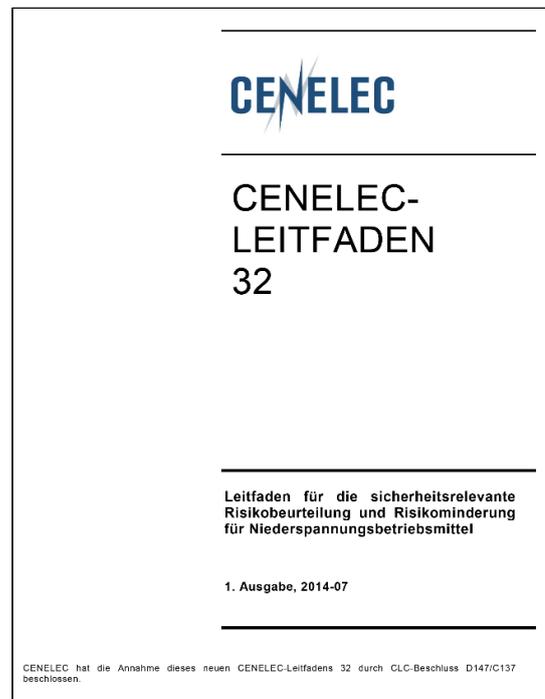
The objective is to support users in reaching a minimum level of safety in electrical equipment which is operated within the defined voltage limits. Moreover, it provides an instruction for the necessary documentation which serves as proof for the performed risk assessment.

Contents and application areas

- Contains useful guidelines for the implementation of the prescribed safety level in low-voltage equipment.
- Covers the risks during all life cycles of low-voltage equipment. This includes for example: design, manufacturing, installation, maintenance, repair and disposal.
- Applies to all electrical equipment with a rated voltage between 50 V and 1000 V AC or 75 V to 1500 V DC. Relevant for this is the rated voltage at the input or output of the equipment – not the voltage that can occur inside the equipment.
- Commences at the point of connection of the supply to the electrical equipment of the machine.
- Also applies to control panels with rated voltages up to and including 1000 V AC or up to and including 1500 V DC and is thus equivalent to the European Low Voltage Directive 2014/35/EU.
- Applies to electrical equipment that is designed for installation into other equipment and also to equipment that can be used directly without being installed into other equipment.
- Contains additional instructions for the ISO/IEC Guidelines 51 and 71 and the CENELEC Guideline 14 for the execution of a more comprehensive risk assessment with practical information.
- Does not apply to components for which a risk assessment essentially depends on the intended use and on whether this is part of an extended electrical system, an electrical facility or machine. This exclusion does not refer to components such as starters, fuses, lamps or similar items. These are considered electrical equipment and subject to the scope of application of the CENELEC Guideline 32 – even though they are often used in conjunction with other electrical equipment.

You can download the CENELEC Guideline 32 in English and German here:

www.cenelec.eu



More information

Siemens keeps you up-to-date.

Whether you are looking for reference works, web-based training courses, helpful engineering tools or useful information on panel building, you will find comprehensive information on "expert know-how", "tools and data for digitalization in engineering" and "aligned product and system portfolio" on our market portal for panel building:

usa.siemens.com/controlpanels

Still have questions or need additional support?

Siemens supports panel builders with free consulting and training on standards. Get in contact with one of our experts by sending us an email to:

controlpanelquestions.us@siemens.com

Siemens Industry, Inc.

Digital Factory Control Products
5300 Triangle Parkway NW

Norcross, GA 30092

Appendix A: Process of risk assessment and risk

Basic risk analysis and assessment procedure:

Step 1: Risk analysis

Firstly, the risk of the electrical equipment must be defined, e.g. by means of Low Voltage Directive 2014/35/EU. This applies to all equipment within the voltage limits of 50 V AC to 1000 V AC and 75 V DC to 1500 V DC. This may also apply to equipment in the form of a complete electrical switchgear and controlgear assembly.

Step 2: Risk assessment

Determine the tolerable or acceptable residual risk in accordance with the application.

Step 3: Risk mitigation

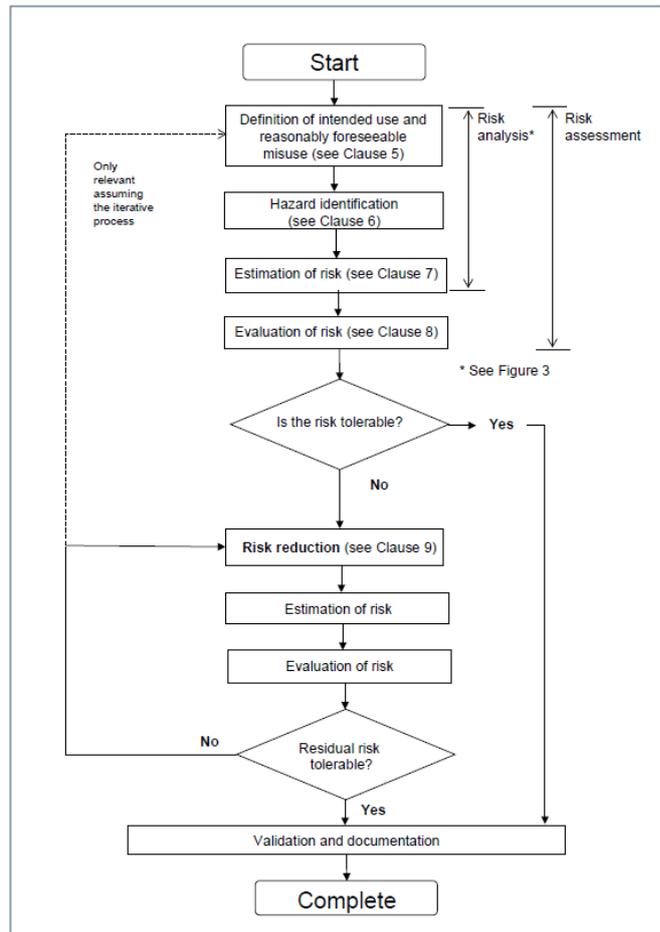
This comprises measures to reduce the currently identifiable risk (as described in Step 1) to a level below the tolerable risk level.

4. Testing

This is followed by verification to determine if the measures implemented have been successful. If it is determined that the measures have not been successful, the procedure shall be repeated as described in Step 1.

5. Documentation

After successful execution, the determined and verified measures must be suitably documented. The documentation for the Low Voltage Directive or the Machine Directive, as applicable, must be retained for later evaluation.



Source: CENELEC Guideline 32: 2014 / Figure 2 – Iterative process of risk assessment and risk mitigation

Appendix B: Example of a checklist for risk analysis and risk assessment

A. Product:
Product description:

B. Vendor:
Name:
Address:

C. General aspects for risk analysis

General aspects	Description	Yes	No
Intended operator/user	Non-technical/non-qualified personnel		
	Specialist personnel		

D. Ambient conditions

Ambient conditions		Description
Use & operation	Ambient air temperature	
	Humidity	
	Indoor/outdoor installation (IP/IK code)	
	Storage conditions	
	Vibration, shock and impact	
	Shipping conditions	
Storage	Ambient air temperature	
	Humidity	
	Indoor/outdoor installation (IP/IK code)	
	Shipping conditions	
Transportation	Ambient air temperature	
	Humidity	
	Indoor/outdoor installation (IP/IK code)	
	Shipping conditions	

E. Risk analysis and risk assessment

Essential requirements	Hazards	Risk analysis (determination of hazards)		Risk assessment (risk evaluation and risk estimation)
		Yes	No	
				(harmonized) applied standards/additional info if required, e.g. test reports, technical documentation
1. Principles of Safety Integration				
2. Requirements for the electrical and mechanical design				
2.1 Protection against electric shock and other electrical hazards	Leakage currents			
	Feed line/supply			
	Stored electric charge			
	Arcing			
	Electric shock			
	Burns			
2.2 Protection against fire hazards	External sources of ignition			
	Internal sources of ignition			
2.3 Protection against mechanical hazards	Lack of mechanical strength			
	Damage during operation			
	Falling or ejected objects			
	Inappropriate surfaces, sharp corners/edges			
	Moving parts			
	Vibration			
	Unsuitable assembly of parts			

Essential requirements	Hazards	Risk analysis (determination of hazards)		Risk assessment (risk evaluation and risk estimation)
2.4 Protection against other hazards	Explosion caused by: the equipment itself; substances generated or used by the equipment			
	Breakdown			
	Electrical, magnetic, and electromagnetic interference			
	Optical radiation			
	Excessive temperatures of the exposed materials of accessible surfaces which are not essential for operation and which are probably touched			
	Acoustic noise			
	Harmful biological and/or chemical phenomena			
	Emissions, production and/or use of hazardous substances (e.g. gases, liquids, dust, fog, vapors)			
	Hygienic conditions			
	Material aging			
	Unattended operation			
	Connection and interruption of the power supply			
	Composition of the equipment			
	2.5 Protection against hazards caused by improper functioning	Ambient conditions to be expected including electrical, magnetic, and electromagnetic interference which are requested in the product-specific or general EMC requirements.		
Logic errors in hardware or software				
Interruptions or fluctuations of the energy supply to be expected				
Unexpected system start or stop				
Start and stop errors				

