

Specifications for safety testing

Insofar as they apply to the installation/machine supplied, performance of the following tests is mandatory:

1. Initial electrical testing in accordance with VDE 0113-1 (DIN EN ISO 60204) and VDE 0100-600
 - ➔ A detailed list of the measurements to be taken is given in the annex.

2. Initial inspection and initial testing of electro-sensitive protective equipment in accordance with DIN EN 62046 / VDE 0113-211 / Provision on Operating Safety (BetrSichV)
 - ➔ Stopping performance is to be measured in accordance with DIN EN ISO 13855.

3. Checking of ESD capability in accordance with DIN EN ISO 61340-5-1
 - ➔ The discharge resistances of setting-down surfaces and the field strengths of individual insulators are to be measured

4. Testing of the closing force of power-operated guards in accordance with DIN EN ISO 14120
 - ➔ The actual closing force is to be measured.

All measurements are to be taken by a person qualified to perform the corresponding test.

Use is to be made of measuring instruments that comply with the applicable standards.

All tests are to be documented with the corresponding measured values and submitted to ebm-papst on acceptance of the installation/machine.

If the installation/machine is fully or partially disassembled for transportation, renewed testing (item 1) must be performed at the assembly location.

Annex to item 1

The measurement protocol to be supplied must list all the measurements performed (measurement points), as well as the reference point for each measurement.

The following measurements are to be performed:

1. Low-resistance measurement (protective earth resistance, equipotential bonding) in accordance with VDE 0113-1/18.2.2
Test current: min.10 A
2. Insulation resistance measurement in accordance with VDE 0113-1/18.3
Measurements are to be taken on all the conductors of the main circuit.
3. Voltage measurement (HV) in accordance with VDE 0113-1/18.4
Measurements are to be taken on all the conductors of the main circuit.
Assemblies and devices not designed to withstand this test and overvoltage protectors that would probably be triggered during measurement were disconnected before the test.
Assemblies and devices subjected to voltage testing on the basis of the applicable product standards can be disconnected during the test.
4. Leakage current measurement
Measurement method: Measurement of current difference between phase and neutral conductors.
True RMS measurement.
In the case of measured values ≥ 10 mA TRMS, a connection is to be provided for additional equipotential bonding on or in the switch cabinet.
5. Ground fault loop impedance and system impedance measurement in accordance with VDE 0100-600
Measurements are to be taken on all protected current paths of the main circuit. At the connection furthest away in each case.
The reference value of the connection point during the measurement is also to be documented.
6. Residual voltage measurement in accordance with VDE 0113-1/6.2.4
If a hazardous residual voltage still remains after the corresponding decay time, this is to be clearly marked on the switch cabinet.
7. RCD measurement in accordance with VDE 0100-600
Measurements are to be taken with the corresponding tripping currents depending on the type of RCD.

The ebm-papst Mulfingen internal test log is appended
to this document. It can be used as a specimen log.
Usage is not obligatory!

Test log for the safety testing of the electrical equipment of machines

Log number:

(Installation number_date)

Details of test object			
Machine:		Year of manufacture:	
Manufacturer:		Installation number:	
Place of testing:		Inventory number:	
Type of testing:	<input type="checkbox"/> Initial test <input type="checkbox"/> Repeat test <input type="checkbox"/> Testing following modification or repair <input type="checkbox"/> Only partial testing required	Order number:	
General remarks:			

Tests carried out:

Yes	No	Not applicable	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial electrical testing in accordance with VDE 0113 Annex 1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial inspection and testing of electro-sensitive protective equipment Annex 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Testing of ESD capability Annex 3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Testing of closing force of automatically closing guards Annex 4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Completeness of documentation Annex 5

Annex 1 Initial electrical testing and repeat testing

References to laws and standards: Provision on Operating Safety (BetrSichV), § 5 DGUV regulation 3
 VDE 0113-1 / DIN EN 60204-1 / IEC 204-1 VDE 0100-600
 VDE 0701-0702

Initial test Repeat test

Technical specifications

Nominal voltage V:		Remarks:
Nominal current A:		
Rated output VA:		
Back-up fuse A:		

This test log confirms the proper performance of all tests prescribed within the scope of the quoted standards on acceptance of the above-mentioned electrical machine / installation.

Testing was performed by a qualified person meeting the requirements as per DIN VDE 0105 Part 1/5.75, item 3.2.1.

The machine/installation tested meets the requirements of DIN VDE 0113/EN 60204-1/IEC 204-1 in every respect.

OK Not OK Not applicable

- 1.1 **Visual inspection**
- 1.1.1 General design features
- 1.1.2 Electrical equipment
- 1.1.3 Machine/installation
- 1.2 **Measurements**
- 1.2.1 Low-resistance measurement (protective earth resistance, equipotential bonding)
- 1.2.2 Ground fault loop impedance/system impedance measuring
- 1.2.3 Insulation resistance measuring
- 1.2.4 Voltage measuring (HV)
- 1.2.5 Residual voltage measuring
- 1.2.6 Leakage current measuring
- 1.2.7 RCD measuring
- 1.3 **Testing of function and functional safety**

Place	Date	Name	Signature
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Place	Date	Name	Signature
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Measuring instruments used:

No.:	1	2	3	4
Manufacturer:				
Type:				
Serial no.:	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	
Last calibration:				

Information on place of testing/measurements:

Connection location:	
System configuration:	
Sub-distribution:	
Connection point designation:	

Reference measurements:

Measuring instrument used:

		Impedance	Short-circuit current
Fault impedance measurement	L1 – PE	mΩ	A
	L2 – PE	mΩ	A
	L3 – PE	mΩ	A
System impedance measurement	L1 - L2	mΩ	A
	L2 - L3	mΩ	A
	L1 - L3	mΩ	A
	L1 – N	mΩ	A
	L2 – N	mΩ	A
	L3 – N	mΩ	A

Comments:

Visual inspection

1.1.1. General design features

OK	Not OK	Not applicable	Remarks
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Name plate affixed
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Labeling of control elements and emergency stop in local language
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Attachment/accessibility of control element
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Attachment/accessibility of main switch and emergency stop button
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Accessibility of electrical equipment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Cleanliness, general condition
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Labeling of pneumatic components
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Pneumatic diagram in document pouch

Comments:

1.1.2. Electrical equipment (switch cabinet, panel, terminal box)

OK	Not OK	Not applicable	Remarks
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipment marked
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipment installation location marked
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipment installed as per manufacturer's specifications
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Logical arrangement of equipment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Terminal strips labeled
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Terminals labeled
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wires labeled at connection point
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Warning notes / signs affixed (in local language)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plug-in lines labeled
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Line dimensioning
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wire colors (in accordance with internal standard)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Marking of non-disconnected circuits
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spatial separation of different voltage levels
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Marking of protective earth connections
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Electrically conductive parts grounded
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Additional grounding of electric drives
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Protection against direct contact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Extra-low voltage SELV / PELV
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Selectivity of overcurrent protectors
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Dimensioning of switch cabinet cooling
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Additional equipotential bonding provided and marked

Comments:

1.1.3. Machine / installation electrical equipment

OK	Not OK	Not applicable	Remarks
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipment marked
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipment fitted as per manufacturer's specifications
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cables / sheathed cables marked
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Warning notes / signs affixed (in local language)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Line dimensioning
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Selection of lines and method of laying
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Marking of protective earth terminals
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipotential bonding (item sections and doors) fitted
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Electrically conductive parts grounded
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Protection against direct contact
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plug-in connection secured against self-opening
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Equipotential bonding strip fitted and labeled

Comments:

V1.8_25.07.2022

1.2. Measuring

1.2.1. Low-resistance measuring (protective earth resistance, equipotential bonding) in accordance with VDE 0113-1/18.2.2

Measuring instrument used: 1 2 3 4

Test current: 10A AC ≥200mA AC ≥200mA DC _____

Test duration: 5 sec. _____

Measuring instrument offset: _____ mΩ

The specified limit value corresponds to values such as length, cross-section and material of the relevant protective earth. The test duration and the limit value for the permissible protective earth resistance are listed for the individual measurement points.

Number of measurements performed:					
Measurement reference point:					
No.	Measurement point	Specified limit value in mΩ	Resistance measured value in mΩ	Assessment OK	Assessment Not OK
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					

V1.8_25.07.2022

No.	Measurement point	Specified limit value in mΩ	Resistance measured value in mΩ	Assessment	
				OK	Not OK
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
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48					
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63					
64					
65					

V1.8_25.07.2022

1.2.2 Ground fault loop impedance/system impedance measurement VDE 0113-1/18.2.3

Measuring instrument used: 1 2 3 4

The connection point and its reference values are listed on Page 2 of the log. Measurement values have been measured at the farthest point of the respective protection device. With integrated RCD, ground fault loop impedance may be omitted.

Calculations:		
*1	Tripping current	$I_a = K \times I_N$
*2	Max. impedance	$\frac{2}{3} U_{L-PE} / I_a$ $\frac{2}{3} U_{L-L(N)} / I_a$
*4	Machine impedance	$*2 - *3 = *4$

Number of measurements performed:													
No	Measurement Point/terminal/circuit			Protective Device Type	Nominal Current	K-Factor	*1	*2	Measured value In mΩ Z _{SCH} / Z _i	*3	*4	Assessment	
	Designation	Pt. 1	Pt. 2				Tripping current in A	max. Impedance in mΩ		Reference measurement See p.2	Machine impedance	OK	Not OK
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
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21													
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24													
25													
26													
27													

Comments:

V1.8_25.07.2022

1.2.3 Insulation resistance measurement in accordance with 0113-1/18.3

Measuring instrument used: 1 2 3 4

Test voltage: 500V DC 250V DC _____

The phase conductors of the supply line/supply terminals and the neutral conductor were connected together for the measurement. All main circuit switching devices were actuated.
Further measurements are listed in the measured value table.

Number of measurements performed:					Assessment	
No.	Connection / terminal / circuit		Specified limit value in MΩ	Resistance measured value in MΩ	OK	Not OK
	Designation	Connection				
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Comments:

V1.8_25.07.2022

1.2.4 Voltage measurement (HV) in accordance with VDE 0113-1/18.4

Measuring instrument used: 1 2 3 4

Test voltage: 1000V AC _____

Test duration: 1 second

Assemblies and devices not designed to withstand this test and overvoltage protectors that would probably be triggered during measurement were disconnected before the test.

Assemblies and devices subjected to voltage testing on the basis of the applicable product standards can be disconnected during the test.

The phase conductors of the supply line/supply terminals and the neutral conductor were connected together for the measurement. All main circuit switching devices were actuated.

Further measurements are listed in the measured value table.

Number of measurements performed:					
No.	Connection / terminal / circuit		Measured value in mA	Assessment	
	Designation	Connection		OK	Not OK
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Comments:

V1.8_25.07.2022

1.2.5 Residual voltage measurements in accordance with VDE 0113-1/18.5 (6.2.4)

Measuring instrument used: 1 2 3 4

Safe isolation of the machine/installation from the supply following shut-off/disconnection of the supply was measured and the time taken for the voltage to decay to a value of less than 60 V was determined.

With permanently installed machines or systems, residual voltage measuring can be omitted if protection against accidental contact as per IP20 is complied with.

Limit values: 1 sec 5 sec

- 1 second → Plug-in cable, measurement taken at terminals of cable
- 5 seconds → Residual voltage in closed housing, corresponding measurement point was recorded in measured value table.

Number of measurements performed:							Assessment	
No.	Measurement point / terminal / circuit				Measured value Time until U < 60 V in s	Residual voltage after 1 s/5 s in V	OK	Not OK
	Designation	Pt. 1	Designation	Pt. 2				
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Comments:

1.2.6 Leakage current measurement

Measuring instrument used: 1 2 3 4

Measurement method: Measurement of current difference between phase and neutral conductors.
True RMS measurement.

Number of measurements performed:				
No.	Measurement point / circuit / equipment	Measured value in mA	Assessment OK	Not OK
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

- Highest measured value >3.5 mA
A warning notice is required.

- Highest measured value ≥ 10 mA,
additional equipotential bonding required.
A warning notice is required.

- Highest measured value ≥ 10 mA and cross
section of the protective earth ≥ 10mm²
 - Additional equipotential bonding **not required** with **permanently installed** supply line.
A warning notice is required!
 - Additional equipotential bonding **required** with **plug-in** supply line.
A warning notice is required!

Comments:

V1.8_25.07.2022

1.2.7 RCD measurement

Measuring instrument used: 1 2 3 4

Test current: 1) AC ramp (0.3 – 1.3 x I_{ΔN}) 4) DC ramp (0.3 – 1.3 x I_{ΔN})
 2) 1 x I_{ΔN} AC 5) 1 x I_{ΔN} DC
 3) 5 x I_{ΔN} AC

Note on measurements to be performed: RCD Type A: Test current 1) - 3)
 RCD Type B: Test current 1) - 5)

Number of measurements performed:											
No.	Equip. ID	Type	Nominal current I _N in A	Nominal fault current I _{ΔN} in mA	Test current 1) - 6)	Measured value I _a in mA	Measured value t _a in ms	Measured value R _E in Ω	Measured value U _B in V	Assessment	
										OK	Not OK
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											

Comments:

1.3 Testing of functional safety

OK	Not OK	Not applicable	Remarks
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Emergency stop function → Shut-off
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Emergency stop function of main switch (if red-yellow)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Acknowledgment required after emergency stop
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> All fixed protective devices fitted
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> All removable protective devices monitored
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> No start-up with open guard/protective device
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Electrical interlocking of guards/protective device
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Two-hand control fitted as per normative regulations
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Interruption of electro-sensitive protective equipment stops movement
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Main circuit voltages tested
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Rotating field tested
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Control circuit voltages tested (SELV/PELV)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____

Comments:

Annex 2 Initial inspection and testing of electro-sensitive protective equipment

Initial inspection and testing of electro-sensitive protective equipment
in accordance with DIN EN 62046 / VDE 0113-211 / DIN EN ISO 13855 /
Provision on Operating Safety (BetrSichV)

- Initial inspection and testing successful Initial inspection and testing not successful

The test only relates to proper functioning, fitting and incorporation of the electro-sensitive protective equipment into the control system. It is not a substitute for machine safety testing. Modifications to the electro-sensitive protective equipment or the machine/installation render this initial inspection and test invalid. The initial inspection and test must then be repeated.

Comments:

Table of contents:

2.1.	Details of the installation	19
2.2.	Details of the control system.....	19
2.3.	Assessment of protective device and hazard spot(s)	20
2.3.1.	Details and checking of the protective device.....	20
2.3.2.	Structure and assessment of hazard spots:	21
2.3.3.	Stopping performance measurement protocol.....	24
3.1.	Definition of dissipation method:	25
3.2.	Visual inspection:	25
3.3.	Measurement of discharge resistances:	26
3.4.	Measuring field strength of insulators:	27

Place	Date	Name	Signature
Place	Date	Name	Signature

2.1. Details of the installation

Machine:		Installation number:	
Manufacturer:		Inventory number:	
Cost center:		Comments:	
Site:			
Performance level PL:	<input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e		
The performance level (PL) of the downstream peripheral equipment corresponds at least to the performance level (PL) of the installation as a whole.			
<input type="checkbox"/> Yes		<input type="checkbox"/> No	

2.2. Details of the control system

Type of control:	<input type="checkbox"/> Programmable <input type="checkbox"/> Conventional	Manufacturer:	
Programmer:		Type:	
Mode of operation:	<input type="checkbox"/> Protective mode <input type="checkbox"/> Single break <input type="checkbox"/> Double-break <input type="checkbox"/> With parts monitoring <input type="checkbox"/> Manual Start <input type="checkbox"/> Other		
Restart interlock:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable		
External device monitoring:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable		
Equipment ID:			
Performance level PL:	<input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e		

2.3. Assessment of protective device and hazard spot(s)

2.3.1. Details and checking of the protective device	
Type of protective device:	
Manufacturer:	
Type:	
Serial number:	
Performance level:	<input type="checkbox"/> a <input type="checkbox"/> b <input type="checkbox"/> c <input type="checkbox"/> d <input type="checkbox"/> e
Response time:	
Detection capability:	
Equipment ID:	
Range:	
Installation position:	<input type="checkbox"/> horizontal <input type="checkbox"/> vertical <input type="checkbox"/> diagonal
Deflection mirror provided:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Does the protective device have a safety-relevant function?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Cascading:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Muting:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Blanking:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Restart interlock (internal):	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
External device monitoring (internal):	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Protective device attached as per manufacturer's specifications:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Protective device electrically wired as per manufacturer's specifications:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Protective device checked for damage:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
No reflecting surfaces near and around the protective field:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Protective device effective in all modes of operation:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Further safety measures taken with disconnectable protective device:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Test finger adapted to detection capability (incl. instructions) fitted as per manufacturer's specifications:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Connection diagram of installation/machine provided:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Protective device wired as per circuit diagram provided:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable
Technical documentation of protective device provided:	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applicable

Protective device used as:

- Protective field for orthogonal approach
- Protective field for parallel approach
- Presence-sensing device
- Access control

2.3.2. Structure and assessment of hazard spots:

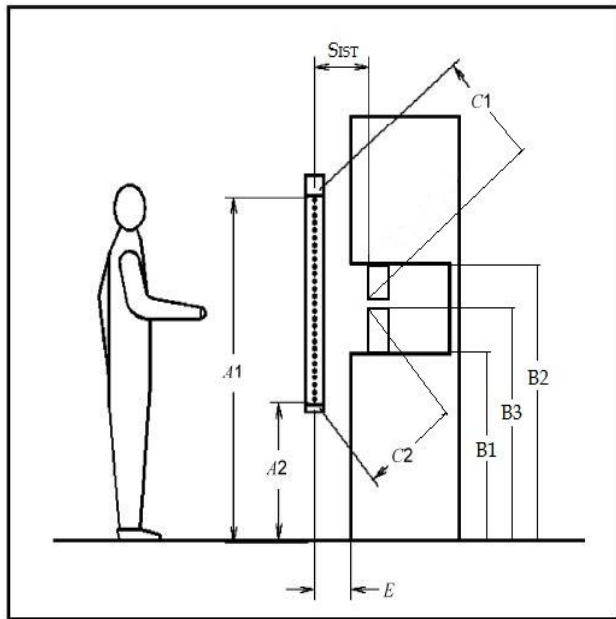


Fig 1: Use as protective field for orthogonal approach and access control

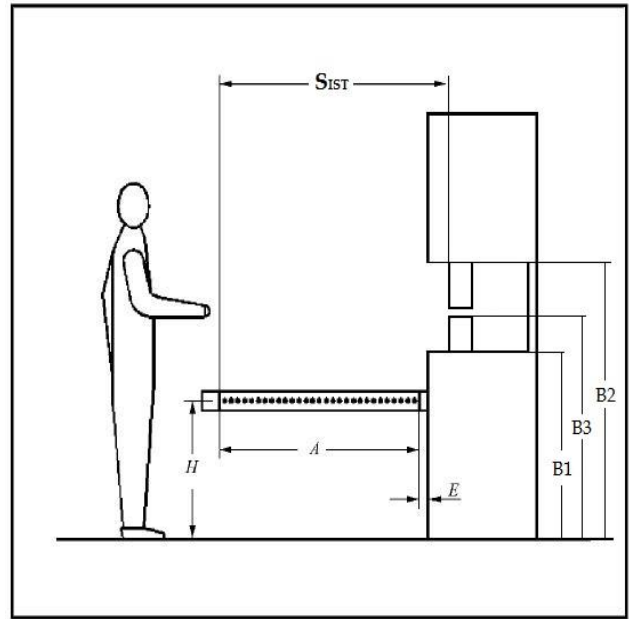


Fig 2: Use as protective field for parallel approach and presence sensing

Dimension
in mm

A	Length of protective field ($A_1 - A_2$)	<input type="checkbox"/> Not applicable
A ₁	Top edge of protective field	<input type="checkbox"/> Not applicable
A ₂	Bottom edge of protective field	<input type="checkbox"/> Not applicable
B ₁	Bottom edge of danger zone	<input type="checkbox"/> Not applicable
B ₂	Top edge of danger zone	<input type="checkbox"/> Not applicable
B ₃	Height of hazardous point above floor	<input type="checkbox"/> Not applicable
E	Distance between protective field and machine body	<input type="checkbox"/> Not applicable
S _{ist}	Protective field distance from hazardous point	<input type="checkbox"/> Not applicable
C ₁	Protective field distance on reaching over	<input type="checkbox"/> Not applicable
C ₂	Protective field distance on reaching under	<input type="checkbox"/> Not applicable
H	Height of protective field above floor	<input type="checkbox"/> Not applicable

V1.8_25.07.2022

1	Not possible to step behind protective field (dimension E ≥ 75 mm) or additional action taken to safeguard the area	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
2	Not possible to reach over protective field Dimension C1 from DIN EN ISO 13855 Table 1	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
3	Not possible to reach over protective field Dimension C1 from DIN EN ISO 13855 Table 1	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
4	Not possible to reach around protective field	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
5	Fixed guard	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
6	Guards with interlock correspond to the performance level (PL) of the machine as a whole	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
6.1	Hazardous movement is stopped after opening a protective device	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
6.2	Restart interlock active after closing the protective device	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
7	Height of danger zone above floor ≤ 750 mm or additional access protection provided	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
8	Accessible danger zone: Bottom edge of protective field (dimension B ₁) ≤ 200 mm	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
9	Accessible danger zone: Top edge of protective field (dimension B ₂) ≥ 900 mm	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
10	Resetting of restart interlock not possible from danger zone	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
11	Entire hazardous point visible from place of resetting restart interlock	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.

When “cycle operation” mode is possible, the following items must be checked:

12	Work area height ≤ 600 mm or work area depth ≤ 1000 mm	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
13	Item 1 must be assessed as being OK	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
14	Item 7 must be assessed as being OK	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
15	Detection capability of protective device ≤ 30 mm	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.

The following items must be checked in the case of a protective field for parallel approach:

16	Height of protective field above floor (dimension H) ≥ 200 mm	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
17	Height of protective field above floor (dimension H) ≤ 1000 mm	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.
18	Further safety measures taken to protect against crawling underneath (dimension H between 200 mm and 1000 mm)	<input type="checkbox"/> OK <input type="checkbox"/> Not OK <input type="checkbox"/> Not applic.

2.3.3. Stopping performance measurement protocol

Measuring instrument used:

Manufacturer:	
Type:	
Serial no.:	
Last calibration:	

Actuator:

- Wire draw encoder
- Relay box
- Friction wheel
- Not applicable
- Light barrier

Measurement direction:

- Retraction
- Counter-clockwise
- Extension
- Clockwise
- Other
- Not applicable

Protective device:

- Two-hand/door interlock
- Light curtain for orthogonal approach
- Light curtain for parallel approach
- Multi-beam electro-sensitive protective equipment (access control/3D camera system)
- Scanner/electro-sensitive protective equipment access protection/pressure-sensitive mat
- Press brake

Tool no. fitted (Designation / WZ.(tool) no.): _____

Measured Values:

SPM Point	in mm
Maximum speed	in mm/s
Stopping distance	in mm
Stopping time	in ms
Minimum safety distance S_{MIN}	in mm

The actual protective field distance S_{IST} from the hazardous point is _____ mm.

The minimum safety distance determined at least corresponds to the actual protective field distance.

- Yes
- No

Annex 3 Checking of ESD capability

Checking of ESD capability in accordance with DIN EN 61340-5-1 as well as internal guidelines

Details of test object

Machine:		Tester ①:	
Manufacturer:		ESD officer ②:	
Installation number:		Year of manufacture:	
Test date / period:	from:		to:

- Initial test following completion
 Repeat test

3.1. Definition of dissipation method:

- Charge dissipation takes place via protective grounding of the machine.
 Charge dissipation takes place via a defined equipotential bonding point.

3.2. Visual inspection:

	OK	Not OK	Not applicable
1. All setting-down surfaces made of ESD-capable material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. All surfaces likely to be used for setting-down designed to be ESD-capable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. All electrically conductive, grounded surfaces covered with dissipative mats	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. All transparent cover panels made of dissipative plastic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. ESD-capable rollers/feet fitted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Grounding point with connection notice provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Low-resistance connection point for wrist-strap provided (pushbutton)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. All permanently mounted tools (e.g. screwdrivers) grounded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. All insulators fitted at an adequate distance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Dissipative components marked (rests, cover panels)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Overall test result: **OK** **Not OK**

Place	Date	① Signature
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Place	Date	② Signature
-------	------	----------------

3.3. Measurement of discharge resistances:

Measuring instrument used:

Manufacturer:	
Type:	
Serial no.:	
Last calibration:	

Test voltage: 100 V DC

Limit value: > 1 kΩ und < 1GΩ

Ambient conditions: Temperature: °C Relative humidity: %

Number of measurement performed:				
Measurement reference point:				
No.	Measurement point	Measured value	Assessment	
			OK	Not OK
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Comments:

3.4. Measuring field strength of insulators:

Measuring instrument used:

Manufacturer:	
Type:	
Serial no.:	
Last calibration:	

Before the start of measurement, equipotential bonding (protective earth) was connected to the connection socket of the measuring instrument

Limit value: 50V for every cm from ESD-sensitive component/unit

Number of measurement performed:				Assessment	
No.	Measurement point	Distance from component in cm	Measured value in V	OK	Not OK
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Comments:

Annex 4 Power-operated guards

Testing of power-operated guards in accordance with
DIN EN ISO 14120 / DIN EN 12453

Details of test object			
Machine:		Year of manufacture:	
Manufacturer:		Installation number:	
Place of testing:		Inventory number:	
General comments:		Order number:	

4.

4.1. Visual inspection:

OK	Not OK	Not applicable	Remark	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No dangerous crushing points
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Adjusters (pressure regulator etc.) secured against manipulation

Comments:

4.2. Measuring closing force:

Protective device does **not** open automatically upon contact with a person or object.

Measuring instrument used:

Manufacturer:	
Type:	
Serial no.:	
Last calibration:	

Measured closing force (in Newton): _____ N

Assessment:

Maximum closing force as per DIN EN ISO 14120 may **not** exceed 75N.

Protective device opens automatically upon contact with a person or an object.

Measuring instrument used:

Manufacturer:	
Type:	
Serial no.:	
Last calibration:	

Measured closing force (in Newton): _____ N

- Measured existing closing force remains in force: longer
 less than 0.75 seconds
- Closing force goes down to <25N in 5 seconds: Yes
 No

Assessment:

Maximum closing force as per DIN EN ISO 12453 (see table)
 This maximum value as defined in table may only persist for max. 0.75s (= Td).
 After Td has elapsed, no force <150N is permitted.
 This force must go down to <25N after no longer than 5 seconds.

Table A.1 - Permissible impact forces

Permissible impact forces	Between both closing edges		Between level surfaces except between both closing edges > 0.1 m ² with no side length < 100 mm
	In opening widths from 50 mm to 500 mm	in opening widths > 500 mm	
Horizontally-moved door	400 N	1 400 N	1 400 N
Door turning around axis vertically to floor	400 N	1 400 N	1 400 N
Vertically-moved door	400 N	400 N	1 400 N
Door turning around an axis parallel to floor - Barriers	400 N	400 N	1 400 N

Comments:

4.3. Functional test with purely pneumatic systems:

OK	Not OK	Not applicable	Comment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Testing dual-channel nature of system/device

Comments:

Overall test results: OK Not OK

Place Date Name (Constructor) Signature

Place Date Name (Tester) Signature

Annex 5 Documentation

OK	Not OK	Not available	Not applicable	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Description of machine/installation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Information on installation and assembly
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Operating instructions
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Servicing and maintenance plan
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Connection diagram
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Control programs (PC)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Setting instructions for equipment used
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Settings for equipment used
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Parts list/spare parts list
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CE Declaration of Conformity
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test log: Initial electrical testing in accordance with VDE 0113-1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test log: Initial inspection and testing of electro-sensitive protective equipment in accordance with Provision on Operating Safety (BetrSichV)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test log: Stopping performance measurement
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test log: ESD suitability
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test log: Force measurement - Protective devices
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Description of procedure in the case of faults/repair
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Information on transportation
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Information on disposal
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Documentation in electronic form

Comments: