List for the safety
testing of machines
– Electrical equipment –

IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

01.07

3 Information on the test specimen and the test

Record/procedure No.:	
Type of test:	Partial test Equipment ☐ Control ☐ Electrical ☐
Applicant:	
Manufacturer:	
Test specimen: Type: Year of manufacture: Serial No./Product No.:	
Testing performed on (date): At (company):	
Testing performed by: Observed by:	

(R)=Recommendation
Edition August 2010

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4 Test result – test lists

4.1 Marking of the control equipment

Inscriptions

16.4	1. Present On rating plate of machine On/in Installation Site		☐ ☐ ☐	☐ ☐ ☐		☐
	2. Inscriptions legible and permanent, with the following information:		☐	☐		☐
	3. Manufacturer/supplier					
	4. Production No./Serial No.					☐
	5. Rated voltage, number of phases, frequency					☐
	6. Full-load current per incoming feeder					☐
	7. Short-circuit rating of the equipment					☐
	8. Main documentation No.					☐
	9. Test mark					☐

4.2 Incoming supply conductor terminations/input terminals

5.1	1. Only one incoming supply conductor termination for the machine (R) (Exception possible)	☐	☐	☐		☐
5.1	2. Supply conductor connected directly to the supply disconnecting and switching device (R)		☐			
5.1	3. Supply conductor connected to separate supply terminals		☐			
5.1	4. Insulated N terminal/connecting point, if N conductor present	☐	☐	☐		☐
5.1	5. Terminals for the incoming supply conductor connection point clearly marked (L1, L2, L3, N, PE in accordance with EN 60445)	☐	☐	☐		☐
5.2	6. Terminal for the external protective earthing system or external PE conductor located close to the terminals for each phase conductor	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

5.2	7. Terminal for the external PE conductor marked "PE"	☐	☐	☐		☐
5.2 Table 1	8. Terminal for PE adequately dimensioned	☐	☐	☐		☐
6.2.2b	9. Incoming supply conductor terminals and N terminal (upstream of supply disconnecting and switching device) protected against contact (IP 2X)	☐	☐	☐		☐
6.2.2b	10. Warning sign on terminals 	☐	☐	☐		☐
4.3	**Supply disconnecting device**					
5.3.1 5.3.2	1. Supply disconnecting device for each incoming feeder, in the form of: – Switch-disconnector (e.g. cam-operated switch) – Circuit-breaker – Disconnector with auxiliary contact – Any other switching device compliant with the IEC product standard which satisfies the requirements of EN 60947-1 and possesses a utilization category – Plug/socket or appliance coupler for a movable machine	☐	☐ ☐ ☐ ☐ ☐ ☐	☐		☐
5.3.1	2. Disconnection of the entire electrical equipment	☐	☐	☐		☐
5.3.3	3. Disconnection of all live (non-earthed) conductors	☐	☐	☐		☐
5.3.3	4. N is also disconnected When the disconnecting device consists of a plug/socket combination	☐	☐ ☐	☐		☐
4.3.1	**Excluded circuits (not switched off)**					
5.3.5	1. Lighting (for repair and maintenance purposes only)	☐	☐	☐		☐
	2. Sockets (for repair and maintenance purposes only)	☐	☐	☐		☐
	3. Undervoltage protection circuits	☐	☐	☐		☐
	4. Circuits for the maintenance of operation (Measuring device, program memory)	☐	☐	☐		☐
	5. Control circuits for interlocks	☐	☐	☐		☐
6.2.2b	6. Protection against accidental contact (shrouding) ≥ IP 2X or IP XXB with warning sign  on excluded circuits	☐	☐ ☐	☐		☐
5.3.5	7. Dedicated disconnecting device (R)	☐	☐	☐		☐

(R) = Recommendation

Edition August 2010

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

5.3.5 (13.2.4)	8. Warning sign Or separate cable routing Or coloured marking in the case of interlock circuits with external power supply (recommended: orange)	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐		☐
5.3.5	9. Reference in the maintenance handbook to non-disconnected circuits	☐	☐	☐		☐
5.3.5 16.1	10. Warning sign on the supply disconnecting device	☐	☐	☐		☐
7.2.8	11. Overcurrent protection provided for excluded (not switched off) circuits	☐	☐	☐		☐
7.2.8	12. No special overcurrent protection for the supply conductors (main conductor) Conditions: – Current-carrying capacity sufficient for the load, and – Supply conductor not longer than 3 m, and – Conductors protected against external influences by enclosure, or – By cable duct	☐	☐ ☐ ☐ ☐	☐		☐
4.3.2	**Supply disconnecting/switching capacity**					
	1. – Manufacturer: – Type: – Rated voltage: V – Rated current: A – Switching capacity (AC 23B): kW (380/400V) – Rating of the largest 3-phase motor kW – Full-load current of all loads: A – Rating/current of the remaining loads: . kW/A	}	See rating plate of the control equipment			
5.3.3	2. Breaking capacity sufficient for the largest motor in the blocked state (AC23) and sum of all currents of the remaining loads	☐	☐	☐		☐
5.3.3	The supply disconnecting and switching device is:					
5.3.3	3. Manually operable – Handle: red (only with EMERGENCY STOP function) – Handle: black – Handle: grey	☐	☐ ☐ ☐ ☐	☐		☐
5.3.3	4. Can be locked in OFF position	☐	☐	☐		☐
5.3.3	5. Marked I (On)	☐	☐	☐		☐
5.3.3	6. Marked 0 (Off)	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

5.3.3	7. Only for two switching positions (On/Off)	☐	☐	☐		☐
5.3.4	8. Handle easily accessible at a height of between 0.6 m and 1.7 m (max. 1.9 m) Input terminals of main switch:	☐	☐	☐		☐
6.2.2b	9. Protected against accidental contact (IP 2X or IP XXB)	☐	☐	☐		☐
6.2.2b	10. Warning sign on terminals ⚠	☐	☐	☐		☐
5.3.1	11. Protective interlocking present (for dangerous situation) where two main switches are fitted	☐	☐	☐		☐
4.3.3	**Plugs as supply/separating devices**					
5.3.3	Plug device with adequate switching capacity or additional switching device with adequate switching capacity	☐	☐	☐		☐
13.4.5a)	Protection-level at least IP XXB		☐	☐		☐
13.4.5b)	Leading respectively delaying earthing contact		☐	☐		☐
13.4.5c)	Adequate switching capacity; where the rated current ≥ 30 A additional switching device, connection or disconnection is only possible if the switching device is in the OFF position	☐	☐	☐		☐
13.4.5d),e)	Where the rated current > 16 A or a dangerous situation is possible: interlocking device present in order to prevent unintentional or accidental disconnection.	☐	☐	☐		☐
13.4.5f)	Sockets/coupling continue to exhibit IP 2X or IP XXB following disconnection, with observance of the creepage and clearance distances		☐	☐		☐
4.4	**Protection against electric shock**					
4.4.1	**Protection against direct accidental contact**					
6.2						
6.2.2	1. Enclosure Installation Site 1 Installation Site 2 Installation Site 3 Refer to the questions in Section 4.5, " Installation space"	☐	☐	☐		☐
6.2.3	2. The insulation of live parts be removed only by destroying Affected parts of the installation:	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

6.2.4	3. Discharge of residual voltages: see Section 4.8, "Further requirements concerning equipment in the Installation Site "	☐	☐	☐		☐
6.2.5 6.2.6	4. Protection through cover, distance or barriers Affected parts of the installation:..... ..	☐	☐	☐		☐
4.4.2 Protection against indirect accidental contact 6.3						
6.3.2.2	1. Protection by the use of Class II equipment (with protective insulation) or equivalent insulation – Complete machine – Components/parts of the installtion:	☐	☐ ☐ ☐	☐		☐
6.3.2.3	2. Protective separation for one circuit only: Affected part of the machine:	☐	☐	☐		☐
6.3.3	3. Automatic switching-off of the power supply in the event of an insulation fault – All exposed parts connected to the protective earth circuit (protective potential equalization of the exposed conductive parts) – Protective equipment for automatic switching-off Fuses Residual-current protective devices Earth-fault monitoring	☐	☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐		☐ ☐ ☐
6.3.3	4. Protective device matched to the system type, and requirements observed	☐	☐	☐		☐
4.4.3 Protection by PELV against direct and indirect accidental contact 6.4						
6.4	1. Affected parts of the installation (circuits) The following requirements of the section are met	☐	☐	☐		☐
6.4.1.a)	2. Max. rated voltage 25 V AC/60 V DC in dry rooms without contact over a large area		☐	☐		☐
6.4.1.a)	3. Max. rated voltage 6 V AC/15 V DC in all other cases		☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

6.4.1.b)	4. One side of the circuit is connected to the protective earth circuit		☐	☐		☐
6.4.1.c)	5. Electrical separation corresponds to the separation provided by the safety isolating transformer between the primary and secondary windings		☐	☐		☐
6.4.2	6. Supply for PELV by:		☐	☐		☐
	7. Safety isolating transformer to EN 61558-1 and EN 61558-2-6 Marking with  for fail-safe safety isolating transformer Marking with  for non-short-circuit-proof safety isolating transformer Marking with  for short-circuit-proof safety isolating transformer	☐	☐ ☐ ☐ ☐	☐		☐
	8. Switched-mode power supply with safety transformers to EN 61558-2-17 marked as 7.	☐	☐	☐		☐
	9. Power supply with the same level of safety as a safety isolating transformer (e.g. motor generator set with equivalent separate windings)	☐	☐	☐		☐
	10. Electrochemical power supply (e.g. battery) or other power supply (e.g. diesel-powered generator)	☐	☐	☐		☐
	11. Inscriptions on the power supply:		☐	☐		☐
	12. Marking on the circuit diagram:		☐	☐		☐
	13. Live parts are safe isolated from the other circuits (e.g. by partitions, insulation for max. voltage, see EN 60204 Part 1, Sections 6.3.2.3 and 13.1.3)		☐	☐		☐
	14. Where plug devices are fitted:	☐	☐	☐		☐
6.4.1.e)	15. Plug and socket compatible only with plug-and-socket devices for PELV circuits	☐	☐	☐		☐
	16. Where PELV is used for a control circuit: The requirements for control circuits are also met	☐	☐ ☐	☐ ☐		☐ ☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

4.5	**Installation Site (protection by enclosure)**												
16.2.1	1. Installation Site clearly recognizable If not:	☐	☐	☐		☐	☐	☐		☐	☐	☐	
	2. High-voltage flash symbol present (Black on yellow triangle)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.2.2	3. Installation Site contains no equipment (including solenoid valves) other than electrical equipment	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.5.1	**Doors/covers**												
6.2.2a	1. With locking closure		☐				☐				☐		
6.2.2a	2. With screw closure		☐				☐				☐		
6.2.2a	3. Can be opened only by means of a key or tool	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.2.2b	4. Opening without key/tool possible only following disconnection of the live parts from the system (e.g. supply disconnecting and switching device)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.2.2c	5. Opening without key/tool possible only when all live parts are reliably shrouded (test finger IP 2X or IP XXB)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.4	6. Captive closures/screws	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.4	7. Width of door/cover < 0.9 m; opening angle at least 95° (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.4	8. Vertical hinges on doors, preferably removable (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.2.1	9. Only control and signalling devices, instruments and cooling devices (fans) on doors/shrouds	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

8.2.3	10. On doors and covers to which electrical equipment is fitted: moving PE conductor connections of adequate cross-section, or structure elements with low resistance	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.4	11. Permanent and secure fitting of seals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.5.2	**Protection level**												
6.2.1	1. Minimum degree of protection of IP 2X (12 mm); for upper, freely accessible shrouds, IP 4X (1 mm) or IP XXD	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.3	2. Ventilated enclosures (e.g. only housing starting resistors): minimum protection level IP 10	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.3	3. Ventilated enclosures (other components): minimum protection level IP 32	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.3	4. Enclosures for general use exhibit appropriate protection level (IP 32, IP 43, IP 54)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.3	5. Enclosures cleaned by low-pressure water jet: IP 55	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.3	6. Where fine dust is present: IP 65	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.4	7. Enclosures containing slip ring: IP 2X	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.4	8. Penetration of apertures by water, dust, oil prevented, for instance with – Cable entries – Fixing holes – Base apertures (foundation) – Apertures to other parts of the machine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.4.6 4.4.7	9. Suitability where exposed to acids, corrosive gases, salt, radiation	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

4.5.3	**Accessibility**												
11.2.1	1. Correct mounting height and location of the terminals and device connections (≥ 0.2 m above servicing level) (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.2.1	2. Correct installation height for equipment requiring maintenance or adjustment (0.4 m–2 m)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.2.1	3. Ease of access to the control unit for operation and maintenance from the front	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11.2.1	4. Ease of identification of the devices (without moving the wiring) and facility for expansion	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	5. Plug-in devices	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	6. Plug-and-socket combinations permit unimpeded access	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	7. Test point	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.5.4	**Protection against accidental contact**												
6.2.2a	1. Control elements for the adjustment/restoration of desired functions and located in the vicinity of live parts exhibit IP 2X or IP XXB	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.2.2a	– With screw-in fuses	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.2.2a	– With timer elements	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.2.2a	– With overcurrent releases	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.2.2a	– Connectors for communications functions:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6.2.2a	2. Live components on the inside of doors matches IP 1X or IP XXA (50 mm diameter sphere)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

4.5.5	**Marking**												
16.5, 16.2.2	1. Electrical equipment and hot surfaces are marked permanently and clearly in compliance with the technical documentation; if not, affected equipment/hot surfaces:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.6	**Wiring inside the Installation Space**												
13.1.1	1. Connection points present for all conductors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.1	2. Terminals suitable for the type and cross-section of the conductors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.5.2	3. Conductors laid in suitable ducts; ducts not over-full	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.3	4. Conductors outside the ducts adequately secured	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.3	5. Modification of the wiring possible from the front, or from behind by way of doors or hinged control panels (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.3	6. Terminal blocks or plug-and-socket combinations provided for external control lines; (direct connection of main and instrumentation circuits possible)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.1	7. Terminals clearly marked	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.2	8. Cables and conductors sufficiently long for connection and disconnection (applies in particular to PE conductors)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.2	9. PE conductors routed close to the associated phase conductors (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

12.2	10. Minimum cross-sections for wiring within enclosures: – Main circuits, stationary connections: 0.75 mm^2 – Control circuits: 0.2 mm^2 – Data transmission systems: 0.08 mm^2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.3	11. Conductors in circuits at different voltages laid together (e.g. in a cable duct) – All insulated for the maximum voltage occurring, or – Separated by suitable shrouding	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.1	12. Connections soldered only in appropriate cases	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Table D.4	13. Solid single-strand conductors used only for fixed, vibration-free installation	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.2	14. Cables and conductors adequately anchored (no mechanical stresses on the conductor connections)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.2	15. All conductors from terminal to terminal (without intermediate connectors)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.1	16. Wire sleeves on the ends of stranded conductors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.1	17. Terminals not obscured by conductor cores	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.4.7	18. Reserve cores connected to reserve terminals or isolated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

5.3.5 (13.2.4)	19. Circuits which are not switched off by means of the supply disconnecting switching device: – Warning sign, or – Conductors laid separately, or – Coloured marking of the conductors	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
5.3.5	20. Reference in the maintenance handbook to circuits which are not switched off	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.1	21. In case of shielded cables fraying of strands must be prevented	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.4	22. Cables between sensor and converter of an inductive energy transfer system: – As short as practicable – Adequately protected against mechanical damage	☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
4.6.1	**Connections to equipment on doors**												
13.3 12.2; 12.6	1. Employing flexible conductors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.3 13.5.1	2. Protection against damage (tubing, spiral wrap, etc.)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.3	3. Strain relief on the fixed and moving parts	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4.6.2	**Marking of leads**												
8.2.2 13.2.2	1. PE lead: – GREEN-YELLOW over the entire lead length, or – Clearly distinguishable by its shape, arrangement, marking	☐	☐ ☐ ☐	☐	☐	☐	☐ ☐ ☐	☐	☐	☐	☐ ☐ ☐	☐	☐
13.2.3	2. N lead: LIGHT BLUE	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.2.4	3. Coloured marking of lead		☐				☐				☐		

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

13.2.4	4. Main circuits: BLACK (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.2.4	5. Control circuits (DC): BLUE (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.2.4	6. Control circuits (AC): RED (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.2.4	7. Exception: circuits to EN 60204-1 Section 5.3.5: ORANGE: (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.2.4	8. No use of GREEN or YELLOW where a risk of confusion exists with the GREEN-YELLOW colour combination	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.2.3	9. Where colour is the sole means of identification, LIGHT BLUE is used solely for N conductors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.2.1	10. Conductor connections identifiable in accordance with the technical documentation, for example by: – Colour, digits, alphanu-meric identification	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

4.7 Protective earth (PE) circuit

8.2.3 6.3.1	1. All conductive parts which may become live in the event of a fault are connected to the PE system (for exceptions, see EN 60204-1 Section 8.2.5) Separate PE connection for: – Cabinet enclosures – Mounting frames (plates) – Control panels (e.g. anodized) – Electrical equipment and components –	☐	☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐ ☐	☐	☐
8.2.1 8.2.2 5.2, Tab. 1	2. Type, cross-sections and connections of the PE conductors satisfy the requirements of the electrical and mechanical stresses; if not, affected parts: PE connection points:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	– On PE bar		☐				☐				☐		
	– On individual terminals (e.g. spring terminals)		☐				☐				☐		
13.1.1	3. One PE connection only per terminal	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13.1.1	4. PE connections secure against working loose	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

8.2.6	5. PE connection points marked with: Symbol  EN 60417 – 2 5019 – Letters "PE" – GREEN-YELLOW two-colour combination	☐	☐ ☐ ☐ ☐	☐	☐	☐	☐ ☐ ☐ ☐	☐	☐	☐	☐ ☐ ☐ ☐	☐	☐
8.2.3	6. Current-carrying capacity of PE connection and terminal points not impaired by mechanical, chemical or electrochemical influences	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8.2.6	7. PE connection points not used for additional fixing purposes (such as supporting rails)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8.2.3	8. Flexible or rigid cable ducts and metal cable sheathing are not used as PE conductors, but are connected to the PE system	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8.2.4 13.4.5	9. Where plug-and-socket combinations are employed, the PE system is interrupted by an early-make and a late-break contact	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8.2.4	10. PE system contains neither switching devices, nor overcurrent protective devices	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8.2.3	11. The PE is among to the conductors supplying the equipment (phase conductors and PE conductor in shared sleeve)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8.2.3	12. Protective circuit is not interrupted by removal of components (e.g. for maintenance work)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT	N/A	YES	NO	FAULT
Section		Installation Site 1:				Installation Site 2:				Installation Site 3:			

8.2.8	13. Where electrical equipment has an earth leakage current of > 10 mA (for example in drive control systems) in the incoming supply, one or more of the following conditions are met: – Minimum cross-section of the PE conductor: 10 mm2 Cu/16 mm2 Al – Second PE conductor, should the cross-section be lower – Automatic switching off should continuity of the PE conductor be lost – Warning sign	☐	☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐ ☐ ☐ ☐ ☐	☐	☐
8.4	14. Electrical equipment with a high leakage current is connected to a specific transformer with separate winding (R)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.8 Further requirements for electrical equipment in the Installation Site

4.2.1	1. Electrical components and equipment: – Are suitable for their intended use – Satisfy the IEC standards applicable to them – Are used in accordance with the manufacturer's instructions	☐	☐	☐		☐
4.2.2	2. The parts of the electrical equipment have been selected in accordance with EN 60439 (governing low-voltage switching devices combinations)	☐	☐	☐		☐
4.3.1	3. The electrical equipment of the machine is rated such that it works correctly under the system supply conditions (intended use)	☐	☐	☐		☐
11.2.3	4. Influencing of sub-assemblies by heat generating parts avoided	☐	☐	☐		☐
	5. Equipment possesses adequate mechanical strength and is fitted securely; adjustment devices are protected where necessary against vibration	☐	☐	☐		☐
6.1	6. Suitable protective measures for all circuits which are galvanically isolated from the system (transformer) (See Section 4.4, "Protection against electric shock")	☐	☐	☐		☐
5.1	7. Within the electric equipment (behind the power input terminals), there is no connection between the PE and neutral	☐	☐	☐		☐
5.1	8. No PEN terminals are provided within the electrical equipment	☐	☐	☐		☐
6.2.4	9. Residual voltage on live parts (such as capacitors, power converter terminals) is discharged to 60 V or less within 5 s of switching-off (if not: warning sign) Where connector pins are accessible to touch, the max. discharge time is 1 s, or protection is provided against direct accidental contact (IP 2X or IP XXB)	☐	☐	☐		☐
6.3.2	10. Manually actuated operating controls made of insulating material: (Class II), or connected to the PE conductor (See Section 4.4, "Protection against electric shock")	☐	☐	☐		☐
13.1.3	11. Conductors at different voltages and sharing the same cable duct are either: – Separated by means of suitable shrouding, or – Insulated for the maximum voltage occurring	☐	☐	☐		☐
5.1	12. Other supply voltages for certain parts of the equipment (for example for electronic equipment) are generated by equipment (such as transformers) forming part of the electrical equipment of the machine (R)	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.9 Control circuits

4.9.1 With control-power transformer 1

9.1.1	1. Marking in accordance with circuit Inscriptions: – Manufacturer Type	☐	☐	☐		☐
9.1.1	2. Control-power transformer to EN 61558-2-2 – Fail-safe control power transformer – Non-short-circuit-proof control-power transformer – Short-circuit-proof control-power transformer	☐	☐ ☐ ☐	☐		☐
	3. Safety isolating transformer to EN 61558-2-6, type:	☐	☐	☐		☐
	4. Switched-mode power supply to EN 61558-2-17, type:	☐	☐	☐		☐
	– Primary rated voltage: V – Secondary rated voltage: V – Rated current: A – Rated output: VA					
	Primary-side connection:					
	– Between two phase conductors		☐			
	– Between phase conductor and N		☐			
			☐			
9.1.1	5. Transformer has separate windings	☐	☐	☐		☐
5.3.1	6. Transformer is connected behind the supply disconnecting and switching devices	☐	☐	☐		☐
9.1.2	7. Secondary voltage does not exceed 277 V	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

9.4.3.1	**– Control circuit** according to Method a) or b)					**Transformer 1**
9.4.3.1	8. Earthed on the control-power transformer (also applicable to ELV and DC) (separable green/yellow connection to the PE system)	☐	☐	☐		☐
17.6	9. Connection to PE system shown on circuit diagram	☐	☐	☐		☐
9.1.4	10. One side of the operating coils directly on the earthed conductor, switching contacts only on the non-earthed side	☐	☐	☐		☐
	11. Other method, e.g. non-earthed with insulation monitoring	☐	☐	☐		☐
9.1.3 7.2.4 7.2.10	12. Overcurrent/short-circuit protection provided On the secondary side 1 x _____ A, marking according to circuit diagram _____ On the primary side _____ X _____ A, marking according to circuit diagram	☐	☐	☐		☐
7.2.10	13. Short-circuit protection of the contacts in the control circuit assured	☐	☐	☐		☐
7.2.9	14. Overcurrent protection provided by electronic equipment with current limiting	☐	☐	☐		☐
4.9.2	**With control-power transformer 2**					
9.1.1	1. Marking in accordance with circuit diagram _____	☐	☐	☐		☐
9.1.1	2. The secondary voltages of multiple transformers are in phase Inscriptions – Manufacturer: _____ Type: _____	☐	☐	☐		☐
	3. Control-power transformer to EN 61558-2-2 – Fail-safe control-power transformer  – Non-short-circuit-proof control-power transformer  – Short-circuit-proof control-power transformer 	☐	☐ ☐ ☐	☐		☐
	4. Safety isolating transformer to EN 61558-2-6, type: _____	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

	5. Switched-mode power supply to EN 61558-2-17, type:	☐	☐	☐		☐
	– Primary rated voltage: V – Secondary rated voltage: V – Rated current: A – Rated output: VA					
	Primary-side connection:					
	– Between two phase conductors		☐			
	– Between one phase conductor and N		☐			
			☐			
9.1.1	6. Transformer has separate windings	☐	☐	☐		☐
5.3.1	7. Transformer is connected behind the supply disconnecting and switching devices	☐	☐	☐		☐
9.1.2	8. Secondary voltage does not exceed 277 V	☐	☐	☐		☐
9.4.3.1	**– Control circuit** according to Method a) or b)					**Transformer 2**
9.4.3.1	9. Earthed on the control-power transformer (also applicable to ELV and DC) (separable green/yellow connection to the PE system)	☐	☐	☐		☐
17.6	10. Connection to PE system shown on circuit diagram	☐	☐	☐		☐
9.1.4	11. If Method b): One side of the actuating coils directly on the earthed conductor, switching contacts only on the non-earthed side	☐	☐	☐		☐
	12. Other method, e.g. non-earthed with insulation monitoring	☐	☐	☐		☐
9.1.3 7.2.4 7.2.10	13. Overcurrent/short-circuit protection provided On the secondary side 1 x A, marking according to circuit diagram On the primary side X A, marking according to circuit diagram	☐	☐	☐		☐
7.2.10	14. Short-circuit protection of the contacts in the control circuit is assured	☐	☐	☐		☐
7.2.9	15. Overcurrent protection provided by electronic equipment with current limiting	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.9.3	**Without control-power transformer** (Method c)					
9.1.1	1. One motor starter, max. 2 control devices	☐	☐	☐		☐
9.1.3 7.2.4 7.2.10	2. Overcurrent/short-circuit protection provided and protection of the contacts assured 1 x _____ A (1 phase conductor), marking according to circuit diagram _____ 2 x _____ A (2 phase conductors), marking according to circuit diagram _____	☐	☐	☐		☐
9.4.3.1	3. Two-pole control switch where connection is between two phase conductors or between a phase conductor and N, when phase reversal (e.g. with Schuko-type plug) is possible (for start and stop function and possible hazard)	☐	☐	☐		☐
4.9.4	**DC control circuits**					
9.1.1	1. Where DC control circuits are connected to the PE system, they are supplied from a separate winding of the AC control-power transformer (or a separate transformer for DC supply)	☐	☐	☐		☐
4.9.5	**Access to switching devices**					
11.5	1. Doors in aisles for access to electrical operating areas; – At least 0.7 m wide and 2 m high – Opening outwards – Can be opened from inside without keys or tools	☐	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐		☐ ☐ ☐ ☐
11.5	2. Walk-in enclosures equipped to permit flight (e.g. panic exit devices)	☐	☐	☐		☐
11.5	3. In cases where equipment is likely to be under voltage and conductive parts exposed when the enclosures are accessed, the clear width is at least 1 m 4. In cases where such parts are located on both sides of the aisle, the clear width is at least 1.5 m	☐ ☐	☐ ☐	☐ ☐		☐ ☐
4.10	**Control functions/electronic equipment**					
4.10.1	**Control equipment**					
9.1.1	1. Supply for electronic equipment (e.g. PLCs) by means of a transformer with separate windings or switched-mode power supply with transformer to EN 61558-2-17	☐	☐	☐		☐
7.5	2. Interruption and subsequent restoration of the supply does not lead to a hazardous state					

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

9.4.3.2	3. Content of memories is not lost where this would lead to a hazardous state	☐	☐	☐		☐
4.11	**Stop functions, actions in an emergency**					
4.11.1	**Stop function**					
9.2.2	1. The machine is equipped with a stop function: – Stop Category 0 (immediate switching off of the drive energy; voltage may still be present, where it is not able to give rise to movement) – Stop Category 1 (controlled stop; Stop Category 0 following stopping) – Stop Category 2 (controlled stop; drive energy to the machine drives is retained)	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐		☐ ☐ ☐
9.2.5.3	2. Stop function cancels start function	☐	☐	☐		☐
	3. Stop function Category 0 and 1 independent of the operating mode	☐	☐	☐		☐
	4. Stop Category 1 (controlled stop) for the following drives:	☐	☐	☐		☐
	5. Stop Category 2 (controlled stop, followed by position control) for the following drives:	☐	☐	☐		☐
9.2.5.3	6. Stop Categories correspond to risk assessment and functional requirements	☐	☐	☐		☐
	7. Stop command effective from any operator control station, where required by the risk assessment	☐	☐	☐		☐
9.2.5.3 9.2.5.4.1 9.2.5.4.2 EN ISO 13849-1, 5.2.2	8. Manual reset of the stop function does not re-initiate motion of the machine, but merely permits restarting	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.11.2	**Actions in an emergency**					
9.2.5.4.2 Annex E	1. EMERGENCY STOP present (where hazards are presented by machine movements)	☐	☐	☐		☐
	Protection assured against accidental direct contact, emergency switching off not required	☐	☐	☐		☐
9.2.5.4.3 Annex E	2. EMERGENCY SWITCHING OFF present (where hazards are presented by electrical energy)	☐	☐	☐		☐
	Use of emergency stop in order to halt movements presenting a hazard is not necessary	☐	☐	☐		☐
10.8.1	EMERGENCY STOP and EMERGENCY SWITCHING OFF present	☐	☐	☐		☐
	Confusion prevented by the following means (e.g. device in enclosure in break-glass arrangement):	☐	☐	☐		☐
4.11.3	**Equipment for EMERGENCY STOP and EMERGENCY SWITCHING OFF**					
9.2.5.4.2	1. EMERGENCY STOP in the form of stop Category 0 or 1 in accordance with risk analysis	☐	☐	☐		☐
10.7.1	2. In all hazard locations (workplace, control station) Hazard location 1: Stop Category: Hazard location 2: Stop Category: Hazard location 3: Stop Category: Hazard location 4: Stop Category:	☐	☐	☐		☐
	3. Devices for EMERGENCY STOP/EMERGENCY SWITCHING OFF easily accessible	☐	☐	☐		☐
EN ISO 13850, 4.4.3	4. Mechanically self-latching	☐	☐	☐		☐
10.7.4 10.8.4	5. Emergency switching off = supply disconnecting and switching device (Not with Stop Categories 1 and 2)	☐	☐	☐		☐
10.8.3	6. Red handle on yellow background	☐	☐	☐		☐
10.8.2	7. Red pushbutton actuator, palm or mushroom actuator on yellow background	☐	☐	☐		☐
10.7.2	8. Foot-operated switch without mechanical protection (for emergency stop only)	☐	☐	☐		☐
10.7.2	9. Pull-wire switch (secure against breakage, disengagement, etc.)	☐	☐	☐		☐
9.2.5.4.1	10. Switching on possible only following manual resetting of all actuated control elements	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

9.2.5.4.1	11. Resetting does not result in start-up	☐	☐	☐		☐
9.2.5.4.2	12. EMERGENCY STOP has priority in all operating modes	☐	☐	☐		☐
9.2.5.4.2 EN ISO 13850, 4.1.3	13. Switching off as rapidly as possible without the generation of further hazards	☐	☐	☐		☐
10.7.2	14. Contact members with positive opening action (EN 60947-5-1, Annex K) – Manufacturer: – Current (AC15-DC13) A at V – Max. permissible overcurrent protection according to manufacturer A – Overcurrent protection present A	☐	☐	☐		☐
7.2.9	15. Overcurrent protection of the contacts is assured	☐	☐	☐		☐
	16. No operational switching off by means of EMERGENCY STOP/EMERGENCY SWITCHING OFF	☐	☐	☐		☐
	17. Emergency switching off/emergency stop contacts act upon:	☐	☐	☐		☐
	– On contactor relays		☐			
	– On safety modules		☐			
	– On frequency converters with integral STOP/safe stop or S1/safe stopping safety function)		☐			
9.2.5.4.2	18. Only electromechanical switching devices employed for EMERGENCY SWITCHING OFF	☐	☐	☐		☐
10.7.1 EN ISO 13850, 4.1.1	19. Confusion of active and non-active EMERGENCY STOP devices in mobile operator control stations reduced to a minimum by the following means (e.g. instruction for users):	☐	☐	☐		☐
4.12	**Control functions**					
4.12.1	**Switch-off device for prevention of unexpected start-up**					
5.4	1. Present	☐	☐	☐		☐
5.4 See also ISO 14118 (EN 1037)	2. Device with disconnector function (For disassembly of the machine, work on the electrical installation, adjustment and maintenance work) In the form c	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

	3. Supply disconnection and switching devices (5.3.2)		☐			
	4. Switch-disconnectors		☐			
	5. Removable fuse elements/isolating links in locked electrical operating areas		☐			
	6.		☐			
5.4	7. Devices which do not fulfil the disconnector function (Only for brief inspections, adjustments, limited work on the electrical equipment and without electric shock hazard) In the form of:	☐	☐	☐		☐
	8. Switch, lockable		☐			
	9. Contactor, disconnected via the control circuit		☐			
	10.		☐			
4.12.2	**Operation – interlocks – monitoring – start**					
7.5	1. Not a hazardous condition by restart after power failure and recurrent	☐	☐	☐		☐
7.6 (9.3.2)	2. Overspeed protection with restart interlock present (if necessary)	☐	☐	☐		☐
7.8	3. If the phase sequence of the supply voltage is incorrect: – No hazardous state possible – No damage to the machine possible – Protective measure:	☐	☐ ☐ ☐	☐ ☐		☐
9.3.3	4. Operation of auxiliary functions is monitored	☐	☐	☐		☐
9.3.5	5. No time-dependent switching-off during reverse-current braking (risk of direction reversal)	☐	☐	☐		☐
9.3.5	6. No start-up when the motor shaft is turned	☐	☐	☐		☐
9.3.4	7. Interlock against contrary motion	☐	☐	☐		☐
9.2.5.1	8. Safety functions/protective measures (interlocks) required for safe operation are present	☐	☐	☐		☐
9.2.5.1	9. Measures have been taken to prevent commands emanating from different operator control stations from giving rise to a hazard	☐	☐	☐		☐
9.2.5.2	10. Operational start possible only when the conditions for switching on (e.g. guarding) are met	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

9.2.5.2	11. Where several operator control stations are required for initiation of starting:	☐	☐	☐		☐
	– Each control point has its own separate manual start facility	☐	☐	☐		☐
	– All start facilities are in the idle position (OFF)	☐	☐	☐		☐
	– The start-up conditions prior to the start are met	☐	☐	☐		☐
	– Simultaneous actuation (where applicable, selective by means of selector switches)	☐	☐	☐		☐
9.2.6	12. Combined start-stop devices only for functions which do not give rise to a hazardous state	☐	☐	☐		☐
9.2.1	13. Start function by energization (connecting voltage to "1")	☐	☐	☐		☐
9.3.1	14. Resetting (by dropping into the closed position) of protective devices does not give rise to a hazardous start (For guards with start function, see 5.3.2.5, EN ISO 12100-2)	☐	☐	☐		☐
	15. Start commands which give rise to a hazardous state and are not executed immediately are not stored	☐	☐	☐		☐
9.2.5.5	16. Where machine components execute hazardous movements, monitoring is provided for example by travel limiters, motor overspeed detection, detection of mechanical overload, collision protection facilities	☐	☐	☐		☐
9.2.5.5	17. Hazardous movements can be observed from control points	☐	☐	☐		☐
9.2.5.5	18. The operator assumes the task of monitoring in the case of manually guided machines	☐	☐	☐		☐
4.12.3	**Two-hand control**					
9.2.6.2	1. Present		☐	☐		
ISO 13851	2. Type 1: – Simultaneous and sustained actuation – When one control element is released: STOP Safety Performance Level: Tried-and-tested components	☐	☐	☐		☐
ISO 13851	3. Type 2: In addition to Type 1: – Both control elements must be released before a new start is possible Safety Performance Level: Single-fault tolerance	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

ISO 13851	4. Type 3: In addition to Type 1 and Type 2: – Synchronous actuation (0.5 s) Safety Performance Level: A = Category 1 (tried-and-tested components) B = Category 3 (single-fault tolerance) C = Category 4 (self-monitoring)	☐	☐ ☐ ☐ ☐	☐		☐
9.2.6.2	5. Selection of the two-hand control corresponds to the risk assessment (see also: ISO 13851, "Two-hand control devices")	☐	☐	☐		☐
4.12.4	**Enabling control**					
9.2.6.3	1. Present		☐	☐		
9.2.6.3	2. The enabling control is a manually activated interlock function of the control which:	☐	☐	☐		☐
9.2.6.3	– When **actuated**, allows operation of the machine to be initiated by a separate start control	☐	☐	☐		☐
9.2.6.3	– If not actuated, initiates a stop function and prevents initiation of machine operation	☐	☐	☐		☐
9.2.6.3	3. The enabling control must be deactivated before operation of the machine can be initiated again	☐	☐	☐		☐
9.2.6.3	4. The enabling control cannot be circumvented by simple means	☐	☐	☐		☐
10.9	*5.* Devices for the enabling control exhibit the following characteristics:		☐	☐		
10.9	6. They are designed in accordance with ergonomic principles	☐	☐	☐		☐
10.9	7. Type with 2 switch positions: – Position 1: OFF function (not actuated) – Position 2: Enabling function (actuated)	☐	☐	☐		☐
10.9	8. Type with 3 switch positions: – Position 1: OFF function (not actuated) – Position 2: Enabling function (actuated, in centre position) – Position 3: OFF function (actuated, beyond centre position) – No enabling when the switch is returned from Position 3 back to Position 2	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.12.5 Wireless controls

9.2.7.1	1. The power supply to the operator control station can be removed or interrupted easily	☐	☐	☐		☐
	2. Unauthorized use of the operator control station is prevented by the following measures:	☐	☐	☐		☐
	3. Unambiguous indication of which machine is controlled by the operator control station	☐	☐	☐		☐
9.2.7.2	4. Precautions are taken to ensure that control commands only – Act upon the relevant machine – Act upon the specified function Measure:	 ☐ ☐	 ☐ ☐	 ☐ ☐		 ☐ ☐
	5. Precautions have been taken to ensure that the machine does not respond to signals other than those emanating from the operator control station Type of precautions:	☐	☐	☐		☐
	6. Where necessary, the machine can be controlled only in predefined zones or areas Type of precautions:	☐	☐	☐		☐
9.2.7.3	7. Operator control station possesses equipment for initiation of the stop function This equipment is not marked or labelled as Emergency Stop		☐ ☐	☐ ☐		☐ ☐
	8. Safety-related signals and processing of control signals correspond to the risk assessment		☐	☐		☐
9.2.7.4	9. Where several operator control stations are used: – Precautions are taken to ensure that only one operator control station is enabled at any one time – Indication present of which operator control station controls which machine – Indication at suitable points (risk assessment) – Stop command effective from each operator control station where shown to be necessary by the risk assessment	 ☐ ☐ ☐ ☐	 ☐ ☐ ☐ ☐	 ☐ ☐ ☐ ☐		 ☐ ☐ ☐ ☐
9.2.7.5	10. A change in battery voltage does not give rise to a hazardous state Where battery-powered operator control stations may give rise to hazardous movements: warning in the event of a change in battery voltage (specified limits) Sufficient time available for the machine to be placed in a non-hazardous state	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐		☐ ☐ ☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.12.6 Operating modes						
	1. Multiple operating modes available	☐	☐			
9.2.3	2. Operating mode (during hazardous situations) can be changed by: Selector switch: – Cam switch Lockable – Key-operated switch Lockable in all positions – Access code –	☐	☐ ☐ ☐ ☐	☐		☐
9.2.3	3. Selected operating mode is unambiguously recognizable	☐	☐	☐		☐
9.2.3	4. Operating mode selector switch does not initiate machine movement; separate action required	☐	☐	☐		☐
9.2.3	5. Relevant safety functions/protective measures active for all operating modes	☐	☐	☐		☐
9.2.4 EN ISO 12100-1 4.11.9	6. Suspension of safety functions/safeguarding causes switching to: – Inching mode (dead-man's circuit) O – Enabling facility O – Two-hand control O – Portable control unit with Emergency Switching Off O – Wireless control station O – Reduced speed O V mm/s Form of speed reduction – Reduction in power O – Limitation of the range of movement O – and disablement of all other operating modes	☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐		☐
4.1	7. The design of the operating mode selector switch, form of the speed reduction, suspension/bypassing of guarding (6) – Correspond to the risk assessment (see also EN ISO 13849-1)	☐	☐	☐		☐
	8. Correspond to the requirements for this type of machine (Type C standard “ ”)	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.12.7 Control function in the event of failure 9.4						
9.4.1	1. The following Performance Level in accordance with EN ISO 13849-1 (Table 2)/SIL in accordance with EN 62061 has been identified for the control system: PL/SIL ____ for ____ (Part of the machine control) PL/SIL ____ for ____ (Part of the machine control) PL/SIL ____ for ____ (Part of the machine control) PL/SIL ____ for ____ (Part of the machine control)	☐	☐	☐		☐
	2. Identification of the necessary control level by means of: – Specified Type C standard Title. ____ – Risk assessment to EN ISO 13849-1 – Risk assessment to EN 62061 – ____	☐	☐ ☐ ☐ ☐ ☐	☐		☐
	3. The identified Performance Level (1) corresponds to the above requirements (2)	☐	☐	☐		☐
	4. The content of memories is retained by batteries – If so: does removal or failure of the batteries give rise to a safe state? ____	☐	☐	☐		☐
	5. Modification of memory content possibly only by authorized persons Protection afforded by: Key Access code Tool	☐	☐ ☐ ☐ ☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.12.8	**Measures for risk reduction in the event of failure**					
9.4.2.1	1. The measure of proven circuit techniques and components includes: – Earthed control circuit – Connection of the control devices in accordance with EN 60204-1 Section 4.3.1 – Stopping by de-energization – Switching of all live conductors to the device being controlled – Use of switching devices with positive opening – Circuit design measures which reduce the possibility of faults giving rise to undesired operating states	☐	☐	☐		☐
9.4.2.2	2. Redundancy	☐	☐	☐		☐
9.4.2.3	3. Diversity – By combination of break and make contacts, actuated by interlocking guards – Use of components of different type in the control circuit – Combination of electromechanical and electronic circuits in redundant arrangements – Combination of electrical and non-electrical (e.g. mechanical, hydraulic, pneumatic) systems	☐	☐	☐		☐
9.4.2.4	4. Function test – Automatic by the control system, at intervals of: – Manual during inspections or start-up testing, at intervals of:	☐	☐	☐		☐
	5. Fault-mode behaviour is appropriate in consideration of the risk	☐	☐	☐		☐
4.13	**Control and signal devices**					
10.1.2	1. Easily accessible (at a height of ≥ 0.6 m)	☐	☐	☐		☐
10.1.2	2. Can be operated safely	☐	☐	☐		☐
10.1.1 10.6	3. The danger of inadvertent actuation is low, particularly for start functions; mushroom-head actuators may be used for two-hand controls	☐	☐	☐		☐
10.1.3	4. Protected against external influences (corrosive fluids, vapours, gases; chips, dust, foreign objects), e.g. IP 54/IP 55; protection against accidental contact: IP XXD	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

10.1.2	5. Foot-operated pushbutton can be operated in the normal work position	☐	☐	☐		☐
4.13.1	**Pushbutton**					
10.2.1	1. Red mushroom-head button for EMERGENCY SWITCHING OFF only	☐	☐	☐		☐
10.2.2	2. Clearly marked (e.g. I or 0) (R)	☐	☐	☐		☐
16.3	3. With indication of the function (text or pictogram)	☐	☐	☐		☐
4.13.2	**Colour marking of pushbuttons**					
10.2.1	1. Stop/Off: BLACK, GREY, WHITE, (RED) Not GREEN	☐	☐	☐		☐
10.2.1	2. Start/On: WHITE, GREY, BLACK, (GREEN) Not RED	☐	☐	☐		☐
10.2.1	3. Inching mode: WHITE, GREY, BLACK Not RED, YELLOW, GREEN	☐	☐	☐		☐
10.2.1	4. Intervention in the event of an abnormal condition: YELLOW	☐	☐	☐		☐
10.2.1	5. Mandatory state (e.g. reset): BLUE	☐	☐	☐		☐
10.2.1	6. Initiation of the normal state: GREEN	☐	☐	☐		☐
9.2.6.4 10.2.1	7. Pushbutton with double command only for functions which do not lead to a hazardous state Marking: WHITE, GREY, BLACK Not RED, YELLOW, GREEN	☐	☐	☐		☐
10.2.1 Table 3	8. Where the same colours are used, for example for On/Off (WHITE/GREY, BLACK): unambiguous, additional marking by structure, shape, location	☐	☐	☐		☐
10.5	9. Rotary switches (e.g. selector switches, potentiometers) protected against rotation	☐	☐	☐		☐
	10. Switch position unambiguously recognizable	☐	☐	☐		☐
4.13.3	**Indicator lights/illuminated pushbuttons**					
10.3.1 10.3.2 Table 4	1. The following colours are used for the "**Display**" form of application (information or action following illumination):	☐	☐	☐		☐
	– RED (emergency, hazard, immediate action necessary)		☐			☐
	– YELLOW (abnormal state, intervention necessary)		☐			☐
	– GREEN (normal state, safe condition)		☐			☐
	– BLUE (mandatory action, resetting)		☐			☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

10.3.1 10.3.2 Table 4	2. The following colours are used for the "**Acknowledgement**" form of application (illumination following action):	☐	☐	☐		☐
	– White (command or state is confirmed)		☐			☐
	– Blue (command or state is confirmed)		☐			☐
	– Green (in special cases)		☐			☐
10.4	3. White is used for illuminated pushbuttons to which no obvious colour can be assigned	☐	☐	☐		☐
10.4	4. On an Emergency Switching Off control element, the red colour is not dependent upon the illumination	☐	☐	☐		☐
10.3.1	5. Lamps and screens visible from the operator's normal position	☐	☐	☐		☐
10.3.1	6. Proper operation of warning lamps can be tested	☐	☐	☐		☐
10.3.2	7. Where lamps are arranged in columns, the colours are used in the following order, from top to bottom: RED, YELLOW, BLUE, GREEN, WHITE	☐	☐	☐		☐
4.14	**Machine (frame)**					
8.2.3	1. Exposed conductive parts of the machine connected to the PE system: – Separate PE connection	☐	☐ ☐	☐		☐
	2. PE connection is:					
	– Permanent		☐	☐		☐
	– Conductive (See Section 4.7, "Protective earth circuit (PE)")		☐	☐		☐
8.2.6	– Marked		☐	☐		☐
	– Of adequate cross-section		☐	☐		☐
6.2	3. Protection against direct accidental contact with live parts in and on the machine:					
6.2.2	4. Protection by enclosure	☐	☐	☐		☐
	– Can be opened only by means of a key or tool		☐	☐		☐
	– Live parts switched off prior to opening		☐	☐		☐
	– Degree of protection at least IP 2X or IP XXB		☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

6.2.3	5. Protection by complete, permanent insulation of live parts	☐	☐	☐		☐
6.2.6	6. Protection by placing out of reach or by obstacles	☐	☐	☐		☐
6.4	7. Protection against direct accidental contact; for indirect accidental contact, protection by PELV (See Section 4.4, "Protection against electric shock")	☐	☐	☐		☐
4.15	**Electrical control devices on the machine**					
4.15.1	**Control devices (position switches, pressure switches, encoders)**					
10.1.3 13.4.1	1. Have a degree of protection (IP), including cable entries which provides adequate protection against the ingress of impurities (eg wood chips, dust, foreign body)	☐	☐	☐		☐
10.1.3	2. Are protected against the influence of corrosive fluids, vapours or gases	☐	☐	☐		☐
10.1.2	3. Are readily accessible for maintenance purposes	☐	☐	☐		☐
10.1.2	4. Are fitted such that they cannot be damaged by activity on the machine (such as the transport of material)	☐	☐	☐		☐
6.3.2	5. Possess total insulation (including cable glands), or	☐	☐	☐		☐
6.3.3 6.4	6. Are fitted with a PE connection (also applies to extra-low voltage, except PELV) If not, affected devices:	☐	☐	☐		☐
11.2.1	7. Plug-in control devices must be clearly assignable by unambiguous characteristics (such as shape, marking, designation)	☐	☐	☐		☐
4.15.2	**Position sensors (position switches, proximity switches)**					
9.3.2	1. Exceeding of an operating limit (position, end position) prevented by:	☐	☐	☐		☐
	– Mechanical facility		☐			
	– Integration of position sensors into the control system		☐			
10.1.4	2. Position sensors are arranged such that they cannot be damaged when overrun	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

10.1.4	3. Position sensors in circuits with safety-related control functions take the form of:	☐	☐	☐		☐
	– Mechanical position switches with positive opening operation in accordance with EN 60947-5-1 (VDE 0660-200, Section 3)	☐	☐	☐		☐
	– Proximity switches with a comparable level of safety in accordance with EN 60947-5-3 (VDE 0660-214)	☐	☐	☐		☐

Position sensors (position switches) for personnel protection

	Location of use	Marking according to plan	Manufacturer	Type	Positive opening operation (break contact) Category 1	Positive opening operation (break contact) Category 2	No positive operation (make contact) Category 1	EN 60947-5-1 Test mark
1.								/
2.								/
3.								/
4.								/
5.								/
6.								/
7.								/

	4. Control element is actuated by rigid mechanical parts (not springs)	☐	☐	☐		☐
BGI 575 (ZH1/153)	5. Position switches, control elements and operating elements safeguarded against changes in position (by spring washers, serrated lock washers, fixing pins)	☐	☐	☐		☐
	6. Adequate actuation stroke	☐	☐	☐		☐
	7. Switching off/stopping before access to danger zones is possible	☐	☐	☐		☐
BGI 575 (ZH1/153)	8. Mechanical position switches employed for safety purposes are selected and fitted in accordance with the requirements (see table)	☐	☐	☐		☐
	9. Position switches safeguarded against inadvertent actuation	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.16	**Leads (terminal boxes and Connectors) outside the Installation Spaces**					
	1. Wires in the form of light plastic-sheathed cable	☐	☐	☐		☐
13.4.1	2. Cable entries, cable glands, etc. do not reduce the degree of protection of the enclosure	☐	☐	☐		☐
13.4.2	3. Single-core cables and connections in cable ducts/conduits	☐	☐	☐		☐
12.3	4. Dielectric strength of the insulation at least 2000 V AC, 5 min at voltages > 50 V AC or 120 V DC = (PELV circuits laid separately: 500 V)	☐	☐	☐		☐
13.4.2	5. Integrated conductors from devices are sufficiently short and positioned/protected such that the risk of damage is reduced to a minimum	☐	☐	☐		☐
4.16.1 13.4	**Light plastic-sheathed cable**					
13.5	1. Protected against mechanical damage	☐	☐	☐		☐
13.5.1	2. No sharp edges	☐	☐	☐		☐
13.5.1	3. Protected against oil, temperature, chemical influences, etc.	☐	☐	☐		☐
4.16.2 13.5	**Single-core cables in cable ducts/trunking**					
13.5.1	1. Cable ducts exhibit suitable degree of protection	☐	☐	☐		☐
13.5.1	2. No sharp edges, rough surfaces, etc.	☐	☐	☐		☐
13.5.1	3. No mechanical damage to the duct and secure fixing	☐	☐	☐		☐
13.5.2	4. Ducts are not over-full	☐	☐	☐		☐
13.5.1	5. Cable conduits not laid with oil and water lines, or clear marking (R)	☐	☐	☐		☐
13.5.3 13.5.5	6. Cable conduits of suitable type; corrosion-resistant, e.g. galvanized steel	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.16.3	**Moveable cables**					
13.4.3	1. Are flexible, multistranded, and exhibit high bending fatigue strength	☐	☐	☐		☐
	2. Protected by:					
13.4.3	– Flexible metal tubes		☐			
13.4.3	– Plastic tubing		☐			
13.4.3	– Special cable type		☐			
13.4.3	3. No tensile or sharp bending stress (e.g. on cable glands)	☐	☐	☐		☐
13.4.3	4. Bending radius ≥ 10 x outside diameter	☐	☐	☐		☐
13.4.3	5. Distance between moving cables and moving machine parts ≥ 25 mm, or partitions	☐	☐	☐		☐
13.4.3	6. Flexible metal protective tubing not used in cases of rapid and frequent movement	☐	☐	☐		☐
	7. Flexible cables on machines protected and/or the following abuse not possible: – Being driven over by vehicles or other machinery – Contact with the body of the machine during the movement – Running into/out of cable baskets or onto/off cable drums – Acceleration forces and wind forces for cable festoon systems or overhead lines – Excessive friction caused by cable mounts – Effect of excessive radiant heat	☐	☐ ☐ ☐ ☐ ☐ ☐	☐		☐
	8. No torsional stress (deflection < 5°) during: – Winding onto and off cable drums – Entry into or exit from the cable guidance systems – Two windings remain on the cable drum – Bending radii in accordance with EN 60204-1, Table 8 are observed	☐	☐ ☐ ☐ ☐ ☐	☐		☐
4.16.4	**Connected to the PE system**					
8.2.1	1. Cable ducts/conduits/swivel arms manufactured from metal	☐	☐	☐		☐
8.2.3	2. Flexible metal tubes including entry plates	☐	☐	☐		☐
	3. Cable drag chains manufactured from metal	☐	☐	☐		☐
	4. Cable glands manufactured from metal	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.16.5	**Minimum cross-sections (see EN 60204-1, Table 5)**					
12.2	1. Outside protective enclosures					
	Permanently installed main circuits, single-core, flexible Class 5 or 6: 1.0 mm²	☐	☐	☐		☐
	Permanently installed main circuits, single-core, solid Class 1 or multi-core Class 2: 1.5 mm²	☐	☐	☐		☐
	Permanently installed main circuits, multi-core: 0.75 mm²	☐	☐	☐		☐
	Main circuit with frequent movement, single-core, flexible Class 5 or 6: 1.0 mm²	☐	☐	☐		☐
	Main circuit with frequent movement, multi-core: 0.75 mm²	☐	☐	☐		☐
	Control circuits, single-core: 1.0 mm²	☐	☐	☐		☐
	Control circuits, multi-core: 0.2 mm²	☐	☐	☐		☐
	Control circuits, two-core, not shielded: 0.5 mm²	☐	☐	☐		☐
	Data transmission cables: 0.08 mm²	☐	☐	☐		☐
	Control circuits, two-core, not shielded: 0.5 mm²	☐	☐	☐		☐
	2. Within enclosures					
	Main circuits, immobile connections: 0.75 mm²	☐	☐	☐		☐
	Control circuits: 0.2 mm²	☐	☐	☐		☐
	Data transmission cables: 0.08 mm²	☐	☐	☐		☐
	3. For aluminium conductors, cross-sectional area of at least 16 mm²	☐	☐	☐		☐
	4. Frequently moved conductors are of flexible and stranded type	☐	☐	☐		☐
4.16.6	**Terminal and junction boxes**					
13.5.8	1. Terminals in easily accessible, robust enclosures	☐	☐	☐		☐
13.5.8 13.4.1	2. Appropriate degrees of protection (e.g. IP 44), including cable entries	☐	☐	☐		☐
13.1.2	3. Cable terminations of sufficient length	☐	☐	☐		☐
13.1.2	4. Cable entries with strain relief	☐	☐	☐		☐
13.1.1	5. One terminal for each core, or specially suited terminals for multiple cores	☐	☐	☐		☐
13.1.2	6. All control lines from terminal to terminal (without intermediate connection within or outside the boxes); plug-and-socket combinations are not regarded as connectors in this context	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

13.3	7. All control lines connected by means of terminals or plug-and-socket devices (direct connection possible only on main circuits and measuring circuits)	☐	☐	☐		☐
13.4.4	8. Intermediate terminals for the control of complex machines (e.g. for position sensors/pushbuttons) present and indicated on the circuit diagram (R)	☐	☐	☐		☐
8.2.3	9. Metal enclosure, connected with good conductivity to PE	☐	☐	☐		☐
8.2.6	10. PE connections marked (⏚, green/yellow, PE)	☐	☐	☐		☐
13.1.1	11. PE connections secure against working loose	☐	☐	☐		☐
13.1.1	12. Only one PE connection on each terminal	☐	☐	☐		☐
13.2.2	13. PE: green/yellow	☐	☐	☐		☐
13.1.1	14. Terminals marked	☐	☐	☐		☐
13.1.1	15. Terminals not obscured by cables	☐	☐	☐		☐
13.4.7	16. Reserve cores connected to reserve terminals or isolated	☐	☐	☐		☐
13.1.1	17. Conductor terminations fitted with cables sleeves (exceptions possible)	☐	☐	☐		☐
13.1.3	18. Where laid together, cables are isolated for max. voltage	☐	☐	☐		☐
13.4.2	19. Cable glands suitable for the ambient conditions	☐	☐	☐		☐
13.4.2	20. No tensile stress caused by dead weight on hanging control stations	☐	☐	☐		☐
4.16.7	**Connectors, requirements do not apply to bus systems**					
13.4.5	1. Supply side on the protected sockets	☐	☐	☐		☐
13.4.5 b) + 8.2.4	2. PE connection (pin) early-make at insertion and late-break at withdrawal (exception for example for connectors to EN 60204-1 Section 15.4.5)	☐	☐	☐		☐
13.4.5 g)	3. Metal enclosure connected to PE (not on PELV)	☐	☐	☐		☐
13.4.5 a) +	4. Contact with live parts not possible during insertion or withdrawal	☐	☐	☐		☐
13.4.5 +	5. Latching connectors (in order to prevent inadvertent disconnection):					
d)	– With rated currents of over 16 A	☐	☐	☐		☐
e)	– When disconnection may give rise to a hazard	☐	☐	☐		☐
h)	– When not intended for disconnection under load; clear marking also necessary	☐	☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

13.4.5 c) +	6. Plug/socket devices which are intended for disconnection and connection under load must possess adequate load switching capacity; at 30 A and above, connection or disconnection under load must be prevented	☐	☐	☐		☐
13.4.5 i)	7. Unambiguous marking (preferably also mechanical coding) where multiple connectors are used	☐	☐	☐		☐
13.4.5 k)	8. No use of domestic connectors	☐	☐	☐		☐
13.4.5 k)	9. When using EN 60309-1 plug/socket combinations in control circuits only contacts are used, which are intended for such purposes; except for RF signals that are transmitted via a power supply line	☐	☐	☐		☐
13.4.5 f)	10. The degree of protection of parts which remain under voltage following disconnection is at least IP 2X or IP XXB; exception: PELV	☐	☐	☐		☐
13.4.5 j)	11. Plug/socket combinations in control circuits satisfy the requirements of EN 61984	☐	☐	☐		☐
7.2.5	12. Circuits for sockets with overcurrent protection in all live (non-earthed) connectors	☐	☐	☐		☐
	Note: one or more of these requirements must be met					
4.17 Sanding lines and Slip Rings						
12.7.1	1. Protection against direct accidental contact assured by: – Partial insulation of the live parts – Enclosures or shrouding with degree of protection of at least IP 2X	☐ ☐	☐ ☐	☐ ☐		☐ ☐
	2. Horizontal surfaces of shrouds or enclosures which are easily accessible have degree of protection of at least IP 4X	☐	☐	☐		☐
	3. Protection by distance in conjunction with switching-off in an emergency situation	☐	☐	☐		☐
	4. Sanding lines arranged or protected such that: – Accidental contact with conductive parts where sanding lines are unprotected is not possible – Vibrating loads are not able to cause damage	☐ ☐	☐ ☐	☐ ☐		☐ ☐
12.7.2	5. PE leads do not carry current	☐	☐	☐		☐
	6. PE leads and neutral leads have separate sanding lines and slip rings	☐	☐	☐		☐
	7. Uninterrupted connectivity to the protection earth circuit assured by the application of suitable measures (such as doubling of current collectors, monitoring of the uninterrupted connection)	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

12.7.3	8. Current collector for the PE lead not interchangeable with other collectors	☐	☐	☐		☐
12.7.4	9. Removable current collectors with switch-disconnector function have a protective earth circuit which is late-break during switching-off and restores connectivity with early-make during switching-on	☐	☐	☐		☐
12.7.5	10. Clearances correspond to Overvoltage Category III (see EN 60664-1)	☐	☐	☐		☐
12.7.6	11. Creepage distances: In exceptionally dusty, damp or corrosive environments: – Unprotected sanding lines and slip rings possess insulators with a creepage distance of at least 60 mm – Encapsulated sanding lines, insulated multipole sanding lines and insulated single pole sanding lines have creepage distances of at least 30 mm	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐		☐ ☐ ☐
	12. Manufacturers recommendations concerning gradual deterioration in the insulation values are observed	☐	☐	☐		☐
12.7.7	13. If the slip ring is arranged such that it is possible to subdivide into separate sections: The placing of adjacent sections under voltage by the current collectors is prevented	☐	☐	☐		☐
12.7.8	14. Sanding lines and slip rings arranged in separate groups for main and control circuits	☐	☐	☐		☐
	15. Sanding lines and slip rings are short-circuit proof		☐	☐		☐
	16. Where slip ring systems are located underground or underfloor: – Removable shrouding can be removed only with the aid of tools – Metal shrouds are conductively connected to each other and earthed	☐	☐ ☐	☐ ☐		☐ ☐
	17. Where sanding lines are located in common metal enclosures, enclosure sections are connected conductively to each other and earthed at multiple points	☐	☐	☐		☐
	18. Underground and underfloor sanding lines ducts are equipped with drainage facilities	☐	☐	☐		☐
	19. Covers or shrouds of metal enclosures or underground ducts are earthed	☐	☐	☐		☐
	20. Uninterrupted connectivity to the protection earth circuit where hinges are of metal	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	FAULT	N/A	YES	FAULT	N/A	YES	FAULT	N/A	YES	FAULT	N/A	YES	FAULT	N/A	YES	FAULT
Section	**Motor 1**				**Motor 2**			**Motor 3**			**Motor 4**			**Motor 5**			**Motor 6**		

4.18 Motors

14.1 (R)	1. According to VDE 0530 EN 60034	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14.2	2. Degree of protection adequate, at least IP 23. Identified degree of protection	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		IP			IP			IP			IP			IP			IP		
14.4	3. Easily accessible	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
EN 60034-1 Section 27.2 (R)	4. Direction arrows (in the case of dangerous direction reversal) are visible next to engine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14.4	5. Moving parts on motor protected	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14.4	6. Motor cooling not impaired by installation	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14.1	7. Overload/ overcurrent protection correct	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	8. PE connection present and in order	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14.5	9. Contactor adequately rated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14.1	10. Protection against over-speed correct	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

Motor table

Motor names on diagram	Motor designation	Rating	Rated current / Rated voltage	Overload protection (motor protective switch)	Overcurrent/ short-circuit protection: Max. permissible	Overcurrent/ short-circuit protection: Present
Motor 1		kW	A / V	Adjusted A / Adjustment range A	A	A
Motor 2		kW	A / V	Adjusted A / Adjustment range A	A	A
Motor 3		kW	A / V	Adjusted A / Adjustment range A	A	A
Motor 4		kW	A / V	Adjusted A / Adjustment range A	A	A

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.19 Overload, overcurrent (short-circuit) protection

4.19.1 Motors

14.1

7.3.1	1. With ratings of > 0.5 kW have overload protection, detection and interruption of all live leads except N	☐	☐	☐		☐
7.3.1	2. Where interruption is not acceptable, a warning signal is issued	☐	☐	☐		☐
7.2.9	3. Motor overload protection (bimetal motor protection switch), correctly adjusted (see motor table, Section 4.18) Type of overload protecton:	☐	☐	☐		☐
7.3.1	4. Restarting following tripping prevented (where necessary)	☐	☐	☐		☐
7.3.1	5. Overload protection by means of thermal protection or similar (possibly with additional protection for blocked rotor or single-phasing)	☐	☐	☐		☐
7.2.8	6. Short-circuit protection (back-up fuse) assured of motor protective switches, bimetal relays, MCBs (Indication on rating plate and in lists)	☐	☐	☐		☐
7.4	7. Overtemperature protection provided in heating circuits (e.g. in short-time duty)	☐	☐	☐		☐
7.2.7	8. Transformers possess suitable overcurrent protection	☐	☐	☐		☐

4.19.2 Circuits (wires) – current-carrying capacity

12.4 7.1	1. Wires rated for maximum possible continuous current; see EN 60204-1, Table 6 and Annex D	☐	☐	☐		☐
12.4 7.2 6.3.1	2. Wires adequately protected against overcurrent (short-circuit, for example in the event of an insulation fault) by suitable protective equipment; see EN 60204-1, Annex D	☐	☐	☐		☐
7.2.8	3. No overcurrent protection behind of the main wire Short-circuit hazard prevented by the following measures: – Current-carrying capacity adequate for the load, and – Power supply cable not longer than 3 m, and – Protected against external influences by enclosure or cable duct	☐	☐ ☐ ☐ ☐ ☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.20 Accessories and lighting

4.20.1 Lighting

15.2.1

	1. Incorporated into protective measures by:	☐	☐	☐		☐
	2. PE connection		☐			
	3. Protective insulation		☐			
15.2.3 15.2.2	4. Dedicated overcurrent protection in all non-earthed wires	☐	☐	☐		☐
15.2.2	5. Rated voltage below 50 V (R), max. 250 V	☐	☐	☐		☐
15.2.2	6. Supply by separate transformer with separate windings and overcurrent protection on secondary side		☐			
15.2.2	7. Supply from circuit for the machine equipment		☐			
15.2.2	8. Transformer connected: In front of supply disconnecting and switching devices ☐ Behind supply disconnecting and switching devices ☐ For other alternatives and requirements, see EN 60204-1, Section 15.2.2 ☐					
15.2.4	9. Adjustable lamps: Suitable for workshop use/ambient conditions	☐	☐	☐		☐
15.2.4	10. Lamp sockets manufactured from insulating material and protected against inadvertent contact	☐	☐	☐		☐
15.2.4	11. Reflector not held by the lamp socket	☐	☐	☐		☐
15.2.1	12. On/Off switch not in lamp socket and supply line	☐	☐	☐		☐
15.2.1	13. No stroboscopic effects caused by lighting	☐	☐	☐		☐

4.20.2 Accessories

15.1	1. Sockets if possible to EN 60309-1 up to 16 A, otherwise with indication of the voltage and current values	☐	☐	☐		☐
15.1	2. Separate overcurrent/overload protection	☐	☐	☐		☐
15.1	3. PE connection fitted for accessories	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.21 Verification

18.1 18.2 18.3 18.4 18.5 18.6	1. If the scope of the inspections is not governed by a product standard, they must always include points a), b) and f), and may include one or more of points c) to e): a) Inspection of whether the electrical equipment complies with its technical documentation b) Inspection of the conditions for protection against automatic switching off c) Insulation resistance test d) Voltage test e) Protection against residual voltage f) Function tests	☐	☐ ☐ ☐ ☐ ☐ ☐ ☐	☐		☐

4.21.1 Inspection of the conditions for protection against automatic switching off of the power supply

18.2.1	1. Verify the conditions for the automatic shutdown of power supply by the Tests 1 and 2	☐	☐	☐		☐
18.2.1	2. The machine to be inspected is intended for connection to a TN system For TT and IT systems, see IEC 60364-6 (VDE 0100-610)	☐	☐	☐		☐
18.2.3	3. Inspections at the site of erection of the machine/on the construction site must be performed in consideration of the state of completion of the machine. (Refer in this context to EN 60204-1, Table 9) – Test 1 required – Test 2 required	☐	☐ ☐ ☐	☐		☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.21.1.1 Test 1: Continuity of the protective earth system						
18.2.3	1. Test is performed for each protective earth circuit of a machine	☐	☐	☐		☐
18.2	2. Measurement of the connectivity of the protective earth system: – Between PE terminal and relevant points of the protective earth system – With a current of between at least 0.2 A and 10 A (higher currents are to be preferred, owing to the higher accuracy of the test results) – From an electrically separate supply, e.g. SELV (if possible, not PELV), with a maximum no-load voltage of 24 V AC or DC The measured resistance is within the anticipated range in consideration of the length, cross-section and material of the PE conductor(s)					

	Test point	Cross-section [mm^2]	Length [m]	Resistance [Ω]
	1. Switchboard cabinet			
	2. Mounting plate			
	3. Switchboard cabinet doors/covers with electrical equipment			
	4. Control panels (including anodized)			
	5. Motors, valves			
	6. Body of the machine			
	7. Connectors, limit switches, foot-operated switches			
	8. Metal hoses, metal cable glands			
	9. Manually operated controls (pendant pushbuttons, swivel arms)			
	10. Withdrawable units			
	11. Parts which are removed and held in the hand for the purpose of adjustment/maintenance			
	12.			
	13.			

	14. Requirements concerning the resistance of the PE conductor satisfied in all test points	☐	☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.21.1.2	**Test 2: Earth-fault loop impedance and suitability of the overcurrent protective device**					
18.2.2	1. Power supply and external PE earth securely connected (visual inspection)	☐	☐	☐		☐
18.2.2	2. Compliance with the criteria for protection by automatic switching off of the power supply is confirmed by: Testing of the earth-fault loop impedance by: – Compliance with EN 60204-1, Table 10 or – Measurement in accordance with A.4, or – Calculation Verification of the parameters and settings of the overcurrent protective devices	☐	☐	☐		☐
18.2.2 Table 10	3. Earth-fault loop impedance – EN 60204-1, Table 10: Table 10 lists examples of maximum cable/wire lengths between each protective device and its load. Requirements concerning the earth-fault loop impedance can be considered met when the maximum lengths stated in Table 10 are not exceeded and the assumptions stated there are considered. Deviation from these assumptions may necessitate complete calculation or measurement of the earth-fault loop impedance Circuits affected are:	☐	☐	☐		☐
18.2.2 Annex A.4.2	4. Earth-fault loop impedance – Measurement: Performance of measurement of the earth-fault loop impedance with measurement apparatus corresponding to EN 61557-3 (VDE 0413-3). During measurement: – The machine must be connected to a power supply corresponding to the intended installation – The measured value of the earth-fault loop impedance must satisfy the requirements of A.2: $\mathbf{Z_s \times I_a \leq U_0}$ – Consideration must be given to the increase in conductor resistance resulting from the increased temperature caused by the fault current – Test 1 must have been performed beforehand. Typical measurement arrangement for measurement of the earth-fault loop impedance on a machine as shown in EN 60204-1, Fig. A.1	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

	Measurement loop					
	5.	☐	☐	☐		☐
	6.	☐	☐	☐		☐
	7.	☐	☐	☐		☐
	8.	☐	☐	☐		☐

18.2.2 Annex A.4.1	9. Earth-fault loop impedance – Calculation: "Testing of the uninterrupted connectivity of the PE lead" (Test 1) can be substituted for measurement of the earth-fault loop connectivity if: – A calculation of the earth-fault loop impedance or of the resistance of the protective earth lead is available, and – The arrangement of the installation permits inspection of the length and cross-section of the lead. Circuits to which this applies:	☐	☐	☐		☐
18.2.2 Annex A.4.1	10. Parameters and adjustment of the overcurrent protective device: Inspection takes the form of a visual inspection: ▪ Adjustment of the rated current on power switches ▪ Rated current of fuses Devices for which the values are not correct:	☐	☐ ☐ ☐	☐		☐ ☐ ☐

(R) = Recommendation

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.21.2 Insulation resistance test						
	1. Preliminary test: Assurance that no connection exists in the main circuit between the protective earth system and the N lead	☐	☐	☐		☐
18.3	2. The use of measurement apparatus complying with the EN 61557 series of standards (VDE 0413) for testing of the insulation resistance Measurement is performed: – Between the leads of the main circuits (including N lead) and the protective earth system – With a voltage of 500 V DC – The measured insulation resistance must not be < 1 MΩ Measured value: Exception: For certain parts of the electrical equipment (e.g. busbars, Slip Rings), a lower value is permissible, but not < 50 kΩ Note: For overvoltage protective devices which are expected to react during the test, it is permissible that: – The devices concerned to be disconnected, or – The test voltage to be reduced to a value lower than the level of protection provided by the overvoltage protective apparatus, but not lower than the peak value of the supply voltage (phase to N)	☐	☐	☐		☐

Testing based on: EN 60204-1: 2006-06	Electrical equipment of machines	N/A	YES	NO		FAULT
Section						

4.21.3 Voltage test						
	1. Preliminary test: Make sure that no connection exists in the main circuit between the protective earth system and the N leads	☐	☐	☐		☐
18.4	2. Use of a test arrangement compliant with EN 61180-2 (VDE 0432-11) for the voltage test – Rated frequency of the test voltage: 50 Hz or 60 Hz – Max. test voltage: twice the value of the rated voltage for the power supply to the equipment, or 1000 V, whichever is the higher – Application of the maximum test voltage between the conductors of the main circuits (including N lead) and the protective earth system for approximately 1 s – The requirement is met when disruptive discharge does not occur Note: Assemblies and devices which are not rated to withstand this test voltage or which have already been subject to voltage testing in compliance with their product standards were disconnected prior to the test	☐	☐	☐		☐
4.22 Other tests						
18.1	1. The electrical equipment complies with the technical documentation	☐	☐	☐		☐
18.5	2. Protection against residual voltage satisfies EN 60204-1 Section 6.2.4	☐	☐	☐		☐
18.6	3. Function tests See also Section 4.11, "Stop functions" and Section 4.12, "Control functions" If applicable, observe the separate test list for control systems	☐	☐	☐		☐
18.6	4. Function test of the circuits for electrical safety (e.g. earth-fault monitoring)	☐	☐	☐		☐
5 Documentation and instruction handbook						
5.1 Instruction handbook						
Machinery Directive, Annex I, Section 1.7.4	1. Instruction handbook in the national language	☐	☐	☐		☐
	2. Original instruction handbook and translation available in the language of the country of use	☐	☐	☐		☐

	3. Maintenance handbook for skilled personnel; Community language understood by the skilled personnel	☐	☐	☐		☐
17.8	4. The instruction handbook contains instructions on adjustment, maintenance and repair, specifically for equipment and circuits with a protective function – Emergency Switching Off/Stop category – Moving guard – Set-up mode – Manual mode – ☐ – ☐	☐	☐	☐		☐
17.2	5. If applicable, information on the physical environment (lighting, shocks, atmospheric pollutants)	☐	☐	☐		☐
17.8	6. Maintenance handbook available	☐	☐	☐		☐
	7. Containing measures for: – Adjustment – Maintenance – Monitoring – Repair	☐	☐ ☐ ☐ ☐ ☐	☐		☐
5.2	**Requirements concerning all documentation**					
17.3	1. Reference to the various parts of the documentation by one of the following methods: – Cross-reference to all other documentation concerning the electrical equipment – Compilation of all documents with document number/title in a list of drawings or documents – Compilation of all documents on one level with document number/title in a parts list of the same	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐		☐ ☐ ☐
17.3	2. Documentation in accordance with EN 61082 3. References in accordance with EN 61346 4. Manuals in accordance with EN 62079 5. Parts lists in accordance with EN 62027 Class B	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐		☐ ☐ ☐ ☐
5.3	**Documentation for setup**					
17.4	1. The installation plan contains all information required for preparatory work for erection of the machine	☐	☐	☐		☐
	2. Information on the recommended location and the type and cross-section of the supply cables and wires is clearly indicated	☐	☐	☐		☐

	3. The data required for selection of the type, parameters, rated current and settings of the overcurrent protective equipment for the supply lines	☐	☐	☐		☐
	4. Dimensions, purpose and arrangement of all cable ducts to be provided by the operator in the foundation are indicated	☐	☐	☐		☐
	5. Space for extension or maintenance stated on the drawing	☐	☐	☐		☐
	6. Interconnection diagrams/-tables available	☐	☐	☐		☐
5.4	**Block diagrams**					
17.5	1. Block diagram available if applicable	☐	☐	☐		☐
5.5	**Circuit diagrams**					
17.6	1. Circuit diagrams available	☐	☐	☐		☐
	2. Plan for interface connections, if applicable combined with circuit diagram	☐	☐	☐		☐
	3. Information on load currents, peak starting currents and permissible voltage drops	☐	☐	☐		☐
	4. Symbols displayed in the switched off state	☐	☐	☐		☐
	5. With all supply equipment	☐	☐	☐		☐
	6. Parameters relating to the function of the control devices and components and which are not identifiable by their symbolic presentation are indicated on the plans close to the symbols or in a footnote	☐	☐	☐		☐
	7. Information on programming methods, program review, work process including additional safety precautions, monitoring intervals, and frequency and form of function tests	☐	☐	☐		☐
5.6	**Information to be provided, circuit diagrams, parts lists**					
17.2	1. Circuit diagrams					

	2. Parts lists/component lists For each part, the parts list contains: – Equipment identifier ☐ – Type designation ☐ – Supplier/procurement source ☐ – Characteristics ☐ – Quantity ☐
	3. Drawings
	4. Instruction/maintenance handbook