

DIN EN ISO 16089:2025-10 (E)

Machine tools - Safety - Stationary grinding machines (ISO 16089:2025)

| Contents | | Page |
|-----------------|---|-------------|
| Foreword | | v |
| Introduction | | vi |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions, types of grinding machines, and symbols | 3 |
| 3.1 | Terms and definitions | 3 |
| 3.1.1 | General terms | 3 |
| 3.1.2 | Terms related to parts of grinding machines | 5 |
| 3.1.3 | Terms related to modes of safe operation (MSO) | 6 |
| 3.1.4 | Terms related to speeds and axes speed | 7 |
| 3.2 | Types and groups of grinding machines described in this document | 8 |
| 3.2.1 | General | 8 |
| 3.2.2 | Group 1: Manually controlled grinding machine without power operated axes and without numerical control (see Figure 2) | 10 |
| 3.2.3 | Group 2: Manually controlled grinding machine with power operated axes and, if applicable, with limited numerically controlled capability (see Figure 3) | 11 |
| 3.2.4 | Group 3: Numerically controlled grinding machine (see Figures 4 and 5) | 11 |
| 3.3 | Symbols | 13 |
| 4 | List of significant hazards | 15 |
| 4.1 | General | 15 |
| 4.2 | Main hazard zones | 15 |
| 4.3 | Significant hazards and hazardous situations covered by this document | 15 |
| 5 | Safety requirements and/or measures | 19 |
| 5.1 | General requirements | 19 |
| 5.1.1 | General | 19 |
| 5.1.2 | Requirements for guards for all groups of grinding machines | 19 |
| 5.2 | Specific requirements resulting from mechanical hazards identified in Table 2 , Nos 1.1 to 1.4, 1.6 and 1.7 | 20 |
| 5.2.1 | Group 1 machines, manually controlled grinding machines without power operated axes and without numerical control | 20 |
| 5.2.2 | Group 2 machines, manually controlled grinding machines with power operated axes and, if applicable, with limited numerically controlled capability | 22 |
| 5.2.3 | Group 3 machines, numerically controlled grinding machines | 23 |
| 5.2.4 | Tool holding device | 24 |
| 5.2.5 | Workpiece holding | 25 |
| 5.2.6 | Vertical or slant axes under gravity | 25 |
| 5.2.7 | Modes of machine operation | 26 |
| 5.2.8 | Optional or additional equipment for grinding machines | 30 |
| 5.3 | Specific requirements resulting from electrical hazards | 32 |
| 5.4 | Specific requirements resulting from noise hazards | 32 |
| 5.5 | Specific requirements resulting from vibration hazards | 33 |
| 5.6 | Specific requirements resulting from radiation hazards | 33 |
| 5.7 | Specific requirements resulting from materials or substance hazards | 33 |
| 5.7.1 | General | 33 |
| 5.7.2 | Devices for the use of metalworking fluids | 34 |
| 5.7.3 | Measures against fire and explosion hazards | 35 |
| 5.8 | Specific requirements resulting from neglect of ergonomic principles hazards | 36 |
| 5.9 | Specific requirements resulting from unexpected start-up, over-run or over-speed hazards | 38 |

| | | |
|---------------------|---|------------|
| 5.10 | Specific requirements resulting from variation in the rotational speed hazards | 39 |
| 5.11 | Specific requirements resulting from failure of the power supply hazards | 40 |
| 5.12 | Specific requirements resulting from failure of the control circuit hazards | 40 |
| 5.13 | Specific requirements resulting from ejected fluids or objects hazards | 43 |
| 5.13.1 | General requirements | 43 |
| 5.13.2 | Guards to prevent ejection in the event of abrasive product breakage | 43 |
| 5.13.3 | Devices protecting against ejection of workpieces and workpiece parts | 44 |
| 5.14 | Specific requirements resulting from loss of stability hazards | 45 |
| 5.15 | Specific requirements resulting from slips, trips and fall of persons hazards | 45 |
| 6 | Verification of the safety requirements and/or protective measures | 45 |
| 7 | Information for use | 47 |
| 7.1 | Marking | 47 |
| 7.2 | Instruction for use | 47 |
| 7.2.1 | General | 47 |
| 7.2.2 | Tooling | 50 |
| 7.2.3 | Workpiece holding | 50 |
| 7.2.4 | Machine functions accessible from the NC panel | 50 |
| 7.2.5 | Restart | 50 |
| 7.2.6 | Noise | 51 |
| 7.2.7 | Vibration | 51 |
| 7.2.8 | Ancillary handling devices | 52 |
| 7.2.9 | Residual risks to be addressed by the machinery user | 52 |
| 7.2.10 | Installation instructions for the grinding machine | 53 |
| 7.2.11 | Cleaning instruction for the machine | 53 |
| Annex A | (normative) Abrasive product guards, work zone enclosures and their combinations | 54 |
| Annex B | (informative) Impact test for guards — Bursting test | 90 |
| Annex C | (informative) Impact test for guards — Projectile impact | 93 |
| Annex D | (normative) Clamping methods for abrasive products and safety requirements for tool holding devices | 97 |
| Annex E | (informative) Noise reduction | 107 |
| Annex F | (normative) Noise test code | 108 |
| Annex G | (normative) Requirements for grinding machines for the machining of materials generating flammable and explosive dusts | 113 |
| Annex H | (informative) Measures for the use of flammable metalworking fluids | 116 |
| Annex I | (informative) Examples for the integration of extraction and fire extinguishing systems when using flammable metalworking fluids | 119 |
| Annex J | (informative) Functional safety — Example for rotational speed limit monitoring of the wheel spindle | 121 |
| Annex K | (informative) MSO 3 optional special mode for manual intervention under restricted operating conditions — Examples | 124 |
| Bibliography | | 129 |