

# DIN EN 869:2009-12 (E)

## Safety of machinery - Safety requirements for pressure metal diecasting units (includes Amendment A1:2009)

---

<b>Contents</b>		<b>Page</b>
Foreword .....		5
Introduction .....		6
<b>1</b>	<b>Scope .....</b>	<b>6</b>
<b>2</b>	<b>Normative references .....</b>	<b>7</b>
<b>3</b>	<b>Terms and definitions .....</b>	<b>8</b>
<b>4</b>	<b>List of significant hazards .....</b>	<b>12</b>
4.1	General .....	12
4.2	Mechanical hazards .....	12
4.3	Electrical hazards/control system .....	12
4.4	Thermal hazards .....	13
4.5	Fire hazards .....	13
4.6	Noise hazards .....	13
4.7	Hazards caused by gases, vapours, fumes and dusts .....	13
4.8	Hazards generated by neglecting ergonomic principles in machinery design .....	14
4.9	Setting-up the diecasting machine .....	14
4.10	Falls from heights .....	14
4.11	Particular hazards with regard to cold-chamber diecasting machines .....	14
4.11.1	Bursting of slugs .....	14
4.11.2	Injection drive area .....	14
4.12	Particular hazards of diecasting machines with vertical closing movement .....	14
4.13	Particular hazards with regard to hot-chamber diecasting machines .....	15
4.13.1	Nozzle .....	15
4.13.2	Initiation of the casting process due to a fault in the control system .....	15
4.14	Hydraulics and pneumatics .....	15
<b>5</b>	<b>Safety requirements and/or protective measures .....</b>	<b>15</b>
5.1	General .....	15
5.2	Mechanical .....	15
5.2.1	General .....	15
5.2.2	Guards and protective devices for die area (see also 5.4.1) .....	16
5.2.3	Guards for the die closing mechanism area .....	17
5.2.4	Additional requirements for movable guards and access doors .....	18
5.2.5	Diecasting units .....	19
5.3	Electric equipment and control systems .....	19
5.3.1	Electric equipment .....	19
5.3.2	Safety related parts of the control system: General .....	19
5.3.3	Emergency stop functions .....	19
5.3.4	Safety related control system of the dangerous movements of the die .....	19
5.3.5	Safety related control system of the dangerous movements with closing safety device ....	19
5.3.6	Control of ancillary equipment .....	20
5.4	Measures against thermal hazards .....	21
5.4.1	Spurting of molten metal .....	21
5.4.2	Contact with hot surfaces .....	21
5.5	Hydraulics, pneumatics, combustible fluids .....	21
5.5.1	Hydraulics, pneumatics .....	21
5.5.2	Pressure fluids .....	21

5.5.3	Spray systems for release agents .....	21
5.5.4	Heat exchanger media .....	21
5.6	Noise .....	21
5.6.1	Noise sources .....	21
5.6.2	Noise reduction as a safety requirement .....	22
5.6.3	Noise emission measurement and declaration .....	22
5.7	Gases, vapours, fumes and dusts .....	22
5.8	Ergonomic aspects .....	22
5.9	Protective measures when setting-up diecasting machines, inserting and removal appliances, tie bar pulling devices, and other ancillary equipment .....	23
5.9.1	Setting-up without protective devices for the die area .....	23
5.9.2	Movement of core pullers and ejectors .....	23
5.9.3	Movement of tie bar pulling devices .....	23
5.9.4	Movement of the plunger of cold chamber machines .....	23
5.10	Elevated working places .....	23
5.11	Additional protective measures for cold-chamber diecasting machines .....	23
5.11.1	Bursting and removal of slugs .....	23
5.11.2	Guards for the plunger area with vertical shot sleeve .....	24
5.11.3	Guards for the plunger area with horizontal shot sleeve .....	24
5.12	Additional protective measures for diecasting machines with vertical closing movement .....	24
5.13	Additional protective measures for hot-chamber diecasting machines .....	24
5.13.1	Metal spraying between nozzle and die .....	24
5.13.2	Movement of the injection piston .....	24
6	Verification of the safety requirements and/or protective measures .....	24
7	Information for use .....	26
7.1	General .....	26
7.2	Warning devices and safety signs .....	26
7.3	Accompanying documents .....	27
7.3.1	Instruction handbook .....	27
7.4	Marking .....	29
Annex A (informative) Examples .....		31
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC .....		43
Annex ZB (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC .....		44
Bibliography .....		45
Figures Figure A.1 -- Example of a hot chamber diecasting machine (can be manufactured with a horizontal or a vertical die closing system) .....		31
Figure A.2 -- Example of a horizontal cold-chamber diecasting machine (can be manufactured with a horizontal or a vertical die closing system) .....		31
Figure A.3 -- Example of a vertical cold-chamber diecasting machine with vertical shot-end (can be manufactured with a horizontal or a vertical die closing system) .....		32
Figure A.4 -- Examples of mechanical hazards and danger zones .....		32
Figure A.5 -- Examples of danger zones for metal spraying at horizontal cold-chamber machines ...		33
Figure A.6 -- Examples of danger zones for metal spraying at vertical cold-chamber machines with vertical shot-end .....		33
Figure A.7 -- Examples of danger zones for metal spraying at hot-chamber machines .....		34
Figure A.8 -- Distance between the guard and machine frame according to 5.2.2.1 .....		34

<b>Figure A.9 -- Example of guarding the hazardous area of a diecasting cell .....</b>	<b>35</b>
<b>Figure A.10 -- Example for a closing safety device with positively actuated hydraulic valve, see 5.3.5.1 a) .....</b>	<b>36</b>
<b>Figure A.11 -- Example for a closing safety device with positively actuated pilot valve, see 5.3.5.1 b) .....</b>	<b>37</b>
<b>Figure A.12 -- Example for a closing safety device with positively actuated limit switch which drives the shut- off valve, see 5.3.5.1 c) .....</b>	<b>38</b>
<b>Figure A.13 -- Example for a closing safety device with positively actuated limit switch which drives a pilot valve, see 5.3.5.1 c) .....</b>	<b>39</b>
<b>Figure A.14 -- Example of safety related control system with closing safety device for closing units, see 5.3.5.1 d) .....</b>	<b>40</b>
<b>Figure A.15 -- Example of safety related control system with closing safety device for closing units, see 5.3.5.1 d) .....</b>	<b>41</b>
<b>Figure A.16 -- Example of additional requirements on the hydraulic control of machines with vertical closing movement against pressure peaks and gravity (for electrical interlocking and monitoring, see Figures A.10 to A.15 .....</b>	<b>42</b>
<b>Tables Table 1 -- Methods of verification .....</b>	<b>25</b>
<b>Table 1 (continued) .....</b>	<b>26</b>