

DIN EN 415-2:2025-11 (E)

Safety of packaging machines - Part 2: Packaging machines for pre-formed rigid containers

Contents		Page
European foreword		6
Introduction		8
1	Scope	9
2	Normative references	11
3	Terms and definitions	13
3.1	Definitions of terms	13
3.2	Description of machines in the scope of this document	16
4	Safety requirements and protective measures	19
4.1	General requirements	19
4.1.1	General	19
4.1.2	Inherently safe design	19
4.1.3	Safeguarding	19
4.1.4	Reduction of risks from packaging material	20
4.1.5	Reduction of slip, trip or fall risks	20
4.1.6	Reduction of risks from loss of stability	20
4.1.7	Reduction of risks from pneumatic or hydraulic equipment	20
4.1.8	Reduction of electrical risks	20
4.1.9	Reduction of thermal risks	20
4.1.10	Reduction of risks from noise	21
4.1.11	Reduction of risks from radiation	21
4.1.12	Reduction of chemical risks	23
4.1.13	Reduction of biological risks	26
4.1.14	Reduction of ergonomic risks	27
4.1.15	Prevention of unexpected start-up by another person	27
4.1.16	Requirements for safety related control functions	28
4.1.17	Devices for energy isolation	28
4.2	Risk reduction on equipment	29
4.2.1	General	29
4.2.2	Conveyors	29
4.2.3	Container diversion or ejection mechanism (pusher)	31
4.2.4	Keg stopping device	32
4.2.5	Keg lift and inverting machine	32
4.2.6	Extraction or ventilation system	33
4.2.7	Closure unscrambler	34
4.2.8	Carousel type machines	35
4.2.9	Coding and marking equipment incorporated in a packaging machine	36
4.3	Plastic bottle unscrambling machine	37
4.4	Machines for applying caps or removing packaging components or materials from containers	38
4.4.1	Screw cap removing machine, screw capping machine, crown capping machine, roll- on capping machine and plugging/corking machine	38
4.4.2	Crown cork removing machine	39
4.5	Cleaning machines	41
4.5.1	Bottle washing machines	41
4.5.2	Carousel type keg cleaning, filling and combined cleaning and filling machine	48
4.5.3	In-line keg cleaning, filling and combined cleaning and filling machine	50

4.5.4	Semi-automatic keg cleaning, filling and combined cleaning and filling machine (single head machine)	50
4.5.5	Crate washing machine	51
4.5.6	Closure sanitizing machine	52
4.6	Filling machines	52
4.6.1	Carousel type rinsing/sterilizing or filling machine	52
4.6.2	In-line filling machine	55
4.7	Sealing, seaming, crimping, flanging machine	56
4.7.1	Foil sealing machine	56
4.7.2	Can filling and seaming machine	57
4.8	Closure securing machine / cork wiring machine	57
4.9	Labelling and decorating machines	57
4.9.1	Reduction of mechanical risks	57
4.9.2	Reduction of electrical risks	57
4.9.3	Reduction of thermal risks	57
4.10	Heating or cooling machine for packed product working at atmospheric pressure (pasteurizer)	57
4.10.1	Reduction of chemical risks	57
4.10.2	Reduction of biological risks	57
4.10.3	Reduction of combined risks	58
4.11	Inspection equipment	58
4.11.1	Reduction of radiation risks	58
4.11.2	Requirements for safety related functions	58
5	Verification of safety requirements and measures	59
5.1	General	59
5.2	Visual inspections with the machine stopped	59
5.2.1	Mechanical parts	59
5.2.2	Pneumatic systems	59
5.2.3	Hydraulic systems	59
5.2.4	Electrical systems	59
5.2.5	Safeguards	59
5.2.6	Design requirements	59
5.2.7	Marking and warning signs	59
5.3	Measurements with the machine stopped	59
5.3.1	Safeguards	59
5.3.2	Electrical testing	59
5.4	Visual inspections with the machine running	60
5.4.1	Safeguards	60
5.4.2	Interlocking devices	60
5.4.3	Dissipation of stored energy	60
5.5	Measurements with the machine running	60
5.5.1	Electrical testing	60
5.5.2	Measurement and declaration of noise emission	60
5.5.3	Temperature	60
5.5.4	Radiation	60
5.6	Verification procedures	60
6	Information for use	63
6.1	General	63
6.2	Marking	63
6.3	Signals and warning signs	63
6.4	Instructions	65
6.4.1	General	65
6.4.2	Ergonomic hazards	65
6.4.3	Radiation hazards	65
6.4.4	Chemical hazards	65
6.4.5	Fire or explosion hazards	66
6.4.6	Additional information for specific machines	66
Annex A (normative)	Noise test code	67

A.1	General	67
A.2	Terms and definitions	67
A.3	Determination of emission sound pressure level at the workstation	67
A.4	Determination of the sound power level	70
A.5	Alternative method for very large machines	70
A.6	Operating conditions	70
A.7	Measurement	70
A.8	Measurement uncertainty	71
A.9	Information to be recorded	71
A.10	Information to be reported	71
A.11	Declaration and verification of the noise emission values	72
Annex B (informative) List of significant hazards		73
B.1	General	73
B.2	Hazards that occur on most machines in the scope of this document	74
B.3	Components and equipment	77
B.3.1	General	77
B.3.2	Conveyors	77
B.3.3	Container diversion or ejection mechanism (pusher)	83
B.3.4	Keg stopping device	85
B.3.5	Keg lift and inverting machine	86
B.3.6	Extraction or ventilation system	87
B.3.7	Closure unscrambler	88
B.3.8	In-line mechanisms	90
B.3.9	Carousel type mechanisms	90
B.3.10	Coding and marking equipment incorporated in a packaging machine	92
B.4	Plastic bottle unscrambling machine	94
B.5	Machines for applying caps or removing packaging components or materials from containers	95
B.5.1	Screw cap removing machine, screw capping machine, crown capping machine, roll- on capping machine and plugging/corking machine	95
B.5.2	Crown cork removing machine	96
B.6	Cleaning machines	98
B.6.1	Cleaning machine for bottles and jars (bottle washing machine)	98
B.6.2	Carousel type keg cleaning, filling or combined cleaning and filling machine	103
B.6.3	In-line keg cleaning, filling and combined cleaning and filling machine	104
B.6.4	Semi-automatic keg cleaning, filling and combined cleaning and filling machine (single head machine)	107
B.6.5	Crate washing machine	110
B.6.6	Closure sanitizing machines	113
B.7	Filling machines	115
B.7.1	Carousel type rinsing/sterilizing or filling machine	115
B.7.2	In-line filling machine	117
B.8	Sealing, seaming, crimping, flanging machine	119
B.8.1	Foil sealing machine	119
B.8.2	Can filling and seaming machine	120
B.8.3	Closure securing machine / cork wiring machine	121
B.9	Labelling and decorating machines	122
B.10	Heating or cooling machine for packed product working at atmospheric pressure (Pasteurizer)	124
B.11	Inspection machines	126
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC		128
Bibliography		132