DIN EN 12622:2014-02 (E)

Safety of machine tools - Hydraulic press brakes (includes Amendment A1:2013)

Contents

Page

Foreword 4

Introduction 5

1 Scope 6

2 Normative references 6

3 Terms, definitions and abbreviations 9
3.1 Terms and definitions 9
3.2 Abbreviations 12

4 List of significant hazards 12

5 Safety requirements and/or measures 15
5.1 Protection of mechanical hazards 15
5.1.1 Description of the safeguarding of access to moving parts 15
5.1.1.1 General 15
5.1.1.2 Fixed enclosing guards 15
5.1.1.3 Interlocking guards with or without guard locking 15
5.1.1.4 ESPE using AOPD 16
5.1.1.5 Laser actuated AOPD 20
5.1.1.6 Hold to run control 22
5.1.1.7 Scanner systems 22
5.1.1.8 ESPE using AOPD when used in automatic cycle as a trip device 23
5.1.2 Location of the safeguarding of access to moving parts 24
5.1.2.1 Prevention of access from the front 24
5.1.2.2 Prevention of access from the sides 25
5.1.2.3 Prevention of access from the rear 25
5.2 Control systems 26
5.2.1 General 26
5.2.2 Manual control devices 26
5.2.3 Failure of power supply 26
5.2.4 Protection against external influences 26
5.2.5 Safety functions 26
5.2.5.1 General 26
5.2.5.2 Behaviour of the control system in case of failure 33
5.2.5.3 Stop or hold to stop closing stroke of the beam 34
5.2.5.4 Stop back gauges 34
5.2.5.5 Back gauges movement limitation 34
5.2.5.6 Stop work-piece support movement 35
5.2.5.7 Slow speed 35
5.2.5.8 Muting 35
5.2.5.9 Blanking 36
5.2.5.10 Emergency stop 36
5.2.5.11 Mode selection 36
5.2.5.12 Single stroke function 37
5.2.6 Other functions 37
5.2.6.1 Start 37
5.2.6.2 Restart 37
5.2.6.3 Reset 38
5.2.6.4 Normal stop 38

5.2.7 Use of electronic components ... 38
5.2.7.1 Access to the NC program ... 38
5.2.7.2 Use of PES for safety functions ... 38
5.3 Mode of operation ... 39
5.3.1 Description of the various modes of operation ... 39
5.3.2 Setting mode ... 39
5.3.3 Production modes ... 39
5.3.3.1 Single cycle manual load and/or unload ... 39
5.3.3.2 Automatic cycle with automatic load and unload ... 40
5.4 Basic design considerations ... 40
5.4.1 Stability ... 40
5.4.1.1 Prevention of unintended gravity fall of the beam (down stroking press brakes) ... 40
5.4.1.2 Stability of the press brake ... 40
5.4.1.3 Stability of the work piece ... 40
5.4.2 Risk of break up during operation ... 40
5.4.3 Tool holder and tool design ... 41
5.4.4 Access to raised work stations or platforms ... 41
5.4.5 Slips, trips and falls ... 41
5.4.6 Release of trapped persons ... 41
5.4.7 Guarding of drives, transmission machinery and ancillary devices ... 41
5.5 Protection against non-mechanical hazard ... 42
5.5.1 Noise ... 42
5.5.2 Electrical hazards ... 43
5.5.3 Ergonomic and handling ... 43
5.5.4 Hydraulic and pneumatic systems ... 43
5.5.4.1 General ... 43
5.5.4.2 Valves ... 44
5.5.4.3 Hydraulic systems ... 44
5.5.5 Thermal hazards ... 45
5.5.6 Hazards generated by materials and substances ... 45
5.5.7 Hazards generated by lasers ... 45
5.5.8 High pressure fluid ejection hazards ... 45
5.5.9 Isolation and energy dissipation ... 45
5.5.10 Maintenance ... 45
5.5.11 Errors of fitting ... 45

6 Verification of the safety requirements and/or protective measures ... 46

7 Information for use ... 48
7.1 Marking ... 48
7.2 Instruction handbook ... 49
7.3 Commercial informations ... 50

Annex A (normative) Calculation of minimum safety distances ... 51

Annex B (normative) The overall response time of the press brake stopping performance ... 53

Annex C (informative) Example of redundant and monitored hydraulic control circuits for a down-stroking press brake ... 54

Annex D (normative) Conditions for noise measurement of press brakes ... 55

Annex E (informative) Side safeguarding for manually fed press brakes ... 56

Annex F (informative) Markings ... 57

Annex G (normative) Laser actuated AOPD system tests ... 58

Annex H (informative) Bending speed ... 59

Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42 ... 61

Bibliography ... 62