DIN EN ISO 13856-2:2013-08 (E)

Safety of machinery - Pressure-sensitive protective devices - Part 2: General pri nciples for the design and testing of pressure-sensitive edges and pressure-sensitive bars (ISO 13856-2:2013)

Contents

Page

Foreword 4

Introduction 5

1 Scope 7

2 Normative references 7

3 Terms and definitions 8

4 Requirements for design and testing 13
4.1 Effective sensing surface 13
4.2 Actuating force for testing 15
4.3 Pre-travel 16
4.4 Working travel 16
4.5 Overtravel 16
4.6 Force travel relationships 16
4.7 Minimum operating speed 18
4.8 Number of operations 18
4.9 Sensor output 19
4.10 Response of output signal switching device to actuating force 19
4.11 Reset function 19
4.12 Environmental conditions 20
4.13 Power supply variations 21
4.14 Electrical equipment 21
4.15 Hydraulic equipment 22
4.16 Pneumatic equipment 22
4.17 Enclosure 22
4.18 Additional coverings for sensors 23
4.19 Access 23
4.20 Performance levels and categories for SRP/CSs in accordance with ISO 13849-1 23
4.21 Adjustments 24
4.22 Sensor fixing and mechanical strength 24
4.23 Recovery after deformation 24
4.24 Connections 25
4.25 Sharp corners, sharp edges and rough surfaces 25
4.26 Mechanical features 25
4.27 Inhibition and blocking 25

5 Marking 25

6 Information for selection and use 26
6.1 General 26
6.2 Essential data for the selection of suitable pressure-sensitive edge or pressure-sensitive bar 26
6.3 Information for use 27

7 Verification of requirements 29
7.1 General 29

7.2 Test samples ... 30
7.3 Test pieces ... 30
7.4 Test No. 1 -- Safety-related data for selection, installation, commissioning, operation and maintenance of suitable pressure-sensitive edges or pressure-sensitive bars ... 31
7.5 Test No. 2 -- Mounting orientations of sensors ... 31
7.6 Test No. 3 -- Actuating force ... 32
7.7 Test No. 4 -- Force travel relationship(s) ... 38
7.8 Test No. 5 -- Number of operations ... 38
7.9 Test No. 6 -- Output state of sensor and output signal switching device ... 39
7.10 Test No. 7 -- Response of output signal switching device to actuating force, reset and state of power supply ... 39
7.11 Test No. 8 -- Environmental conditions ... 39
7.12 Test No. 9 -- Power supply variation ... 41
7.13 Test No. 10 -- Electrical, hydraulic and pneumatic equipment ... 42
7.14 Test No. 11 -- Enclosure ... 42
7.15 Test No. 12 -- Additional coverings for sensors ... 42
7.16 Test No. 13 -- Access ... 42
7.17 Test No. 14 -- Performance Level (PL) according to ISO 13849-1 ... 42
7.18 Test No. 15 -- Adjustments ... 43
7.19 Test No. 16 -- Sensor fixing and mechanical strength ... 43
7.20 Test No. 17 -- Recovery after deformation ... 43
7.21 Test No. 18 -- Connections ... 43
7.22 Test No. 19 -- Sharp corners, sharp edges and rough surfaces ... 43
7.23 Test No. 20 -- Mechanical features ... 43
7.24 Test No. 21 -- Inhibition and blocking ... 44
7.25 Test No. 22 -- Marking ... 44
7.26 Test No. 23 -- Information for selection and use ... 44

Annex A (normative) Timing diagrams for pressure-sensitive edges/bars with/without reset ... 45

Annex B (informative) Operating speed, force and travel -- Explanatory remarks and recommendations ... 49

Annex C (informative) Device selection guidance for machinery manufacturer/user ... 52

Annex D (informative) Design guidance ... 54

Annex E (informative) Application guidance ... 57

Annex F (informative) Guidance on commissioning and testing after installation ... 58

Annex G (informative) General considerations for systems meeting ISO 13849-1, category 2 ... 60

Bibliography ... 61

Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC ... 62