DIN EN ISO 80079-36:2016-12 (E)

Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic metho d and requirements (ISO 80079-36:2016)

Contents

Page

European foreword....6
FOREWORD....7
INTRODUCTION....9
1 Scope....10
2 Normative references....15
3 Terms and definitions....16
4 EPL and equipment groups....19
4.1 EPL....19
4.2 Group I....19
4.3 Group II....19
4.4 Group III....20
4.5 Equipment for specific explosive gas atmospheres....20
5 Ignition hazard assessment....20
5.1 General requirements....20
5.2 Procedure of ignition hazard assessment....21
5.2.1 Formal Ignition hazard identification and assessment....21
5.2.2 Group I equipment assessment....22
5.2.3 Group II and III equipment assessment....22
5.2.4 Assessment with malfunctions....23
5.2.5 Basic information necessary for the ignition hazard assessments....23
5.2.6 Ignition hazard assessment report....23
6 Assessment of possible ignition sources and control means....24
6.1 General....24
6.2 Hot surfaces....24
6.2.1 General....24
6.2.2 Ambient temperatures....24
6.2.3 Establishing the maximum surface temperature....24
6.2.4 Group I equipment....25
6.2.5 Group II equipment....25
6.2.6 Special cases for Group I and Group II equipment....26
6.2.7 Group III equipment....27
6.3 Flames and hot gases (including hot particles)....27
6.4 Mechanically generated sparks and hot surfaces....27
6.4.1 General....27
6.4.2 Assessment of sparks generated by single impacts....27
6.4.3 Assessment of sparks and hot surfaces generated by friction....29
6.4.4 External equipment parts containing light metals....30
6.5 Electrical ignition sources except stray current....30

6.6 Stray electric currents, cathodic corrosion protection 30
6.6.1 Internal sources 30
6.6.2 External sources 30
6.7 Static electricity 30
6.7.1 General 30
6.7.2 Connection facilities for earthing conducting parts 31
6.7.3 Prevention of highly efficient charge generating mechanisms (leading to propagating brush discharges on non-conductive layers and coatings) 31
6.7.4 Equipment group I 31
6.7.5 Equipment group II 32
6.7.6 Equipment group III 32
6.8 Adiabatic compression and shock waves 33
6.9 Exothermic reactions, including self-ignition of dusts 33
7 Additional considerations 33
7.1 Dust deposits and other material in the gap of moving parts 33
7.2 Dust deposits and other material in the flame arresters incorporated in the equipment 34
7.3 Opening times of enclosures 34
7.4 Non-metallic enclosures and non-metallic parts of the equipment 34
7.4.1 General 34
7.4.2 Specification of the materials 34
7.4.3 Thermal endurance 34
7.5 Removable parts 34
7.6 Materials used for cementing 34
7.7 Light transmitting parts 35
7.8 Stored energy 35
8 Verification and tests 35
8.1 General 35
8.2 Determination of the maximum surface temperature 35
8.2.1 General 35
8.2.2 Hot Surface Ignition Test 37
8.3 Mechanical tests 38
8.3.1 Test for resistance to impact 38
8.3.2 Drop test 38
8.3.3 Required results 38
8.4 Additional tests of non-metallic parts of the equipment relevant for explosion protection 38
8.4.1 Test temperatures 38
8.4.2 Tests for Group I equipment 38
8.4.3 Tests for Group II and III equipment 39
8.4.4 Thermal endurance to heat 39
8.4.5 Thermal endurance to cold 39
8.4.6 Resistance to chemical substances for Group I equipment 40
8.4.7 Mechanical resistance tests 40
8.4.8 Surface resistance test of non-conductive parts of the equipment relevant for explosion prevention and protection 40
8.4.9 Thermal shock test 40

9 Documentation 40
9.1 Technical documentation 40
9.2 Conformity with the documentation 41
9.3 Certificate 41
9.4 Responsibility for marking 41
10 Instructions 41
11 Marking 42
11.1 Location 42
11.2 General 42
11.3 Warning markings 43
11.4 Marking on very small equipment 44
11.5 Examples of marking 44
Annex A (informative) Methodology for confirming the EPL 45
A.1 Methodology for confirming the EPL of Group I 45
A.1.1 EPL Ma 45
A.1.2 EPL Mb 45
A.2 Methodology for confirming the EPL of Group II and III 45
A.2.1 EPL Ga and Da 45
A.2.2 EPL Gb and Db 45
A.2.3 EPL Gc and Dc 45
Annex B (informative) Explanation of the ignition hazard assessment procedure 46
B.1 Overview 46
B.1.1 General 46
B.1.2 Reporting with the help of a table 46
B.2 Assessment Procedure 46
B.3 Assessment Steps 47
B.3.1 Identification of Ignition Hazards 47
B.3.2 Determination of measures 48
B.3.3 Concluding ignition hazard estimation and categorisation 49
B.3.4 Determination of the EPL 49
Annex C (informative) Examples of ignition hazard assessment 50
C.1 General remarks 50
C.2 Examples for common cases demonstrating the use of the scheme 50
C.3 Example of an ignition hazard assessment for a pump 57
C.4 Example of an ignition hazard assessment for an agitator 61
Annex D (normative) Charging tests with non-conductive materials 72
D.1 General 72
D.2 Principle of the test 72
D.3 Samples and apparatus 73
D.4 Procedure 73
D.4.1 Conditioning 73
D.4.2 Determination of the most efficient charging method 73
Annex E (informative) Consideration of misuse which can reasonably be anticipated during ignition hazard assessment procedure 77
E.1 General 77
E.2 Identification and analysis of the ignition hazards 77
E.3 First assessment of the ignition hazards 77
E.4 Determination of safety measures 77
E.5 Final assessment of the ignition hazards 78

Annex F (informative) Development of different types of incendive electrostatic discharges 79
Annex G (normative) Protection concepts of types of protection "d", "p" and "t" acceptable for non-electrical equipment 80
Annex H (informative) Volume dependence of auto-ignition temperature 81
Annex I (informative) Relationship between Equipment protection levels (EPLs) and zones 83
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2014/34/EU 84
Annex ZB (informative) Correspondence of equipment groups 86
Annex ZC (informative) Significant changes between this European Standard and EN 13463-1:2009 87
Bibliography 90

Figure 1 – Relationship between ignition source definitions 21
Figure D.1 – Rubbing with a pure polyamide cloth 75
Figure D.2 – Discharging the charged surface of the test piece with a probe connected to earth via a 0,1 μF capacitor 75
Figure D.3 – Charging by the influence of a DC high voltage power 76
Figure F.1 – Different types of incendive electrostatic discharges 79
Figure H.1 – Volume dependence of auto-ignition temperature 82

Table 1 – Applicability of specific clauses of IEC 60079-0 11
Table 2 – Classification of maximum surface temperatures for Group II equipment 25
Table 3 – Assessment for temperature classification for small surface areas 26
Table 4 – Single impact energy limits for EPL Ga 29
Table 5 – Single impact energy limits for EPL Gb 29
Table 6 – Single impact energy limits for EPL Gc 29
Table 7 – Single impact energy limits for EPL Da, Db and Dc 29
Table 8 – Permitted maximum projected areas for non-conductive parts of equipment liable to become electrostatically charged 32
Table 9 – Thermal endurance test 39
Table 10 – Ambient temperature marking 43
Table 11 – Text of warning markings 43
Table B.1 –Table showing recommended documentation of an example of initial assessment of equipment related ignition sources 47
Table B.2 – Example for reporting of the identification of ignition hazards (step 1) and the first assessment (step 2) 48
Table B.3 – Example for reporting of the determination of protective measures (step 3) and the concluding estimation and categorisation (step 4) 49
Table C.1 – List of examples 50
Table C.2 – Common cases demonstrating the use of the scheme – Electrostatic discharge 51
Table C.3 – Common cases demonstrating the use of the scheme – Hot surface 53
Table C.4 – Common cases demonstrating the use of the scheme – Mechanical spark 55
Table C.5 – Ignition hazard assessment report for a pump 58
Table C.6 – Ignition hazard assessment report for an agitator 62
Table H.1 – AITs of combustibles taken from IEC 60079-20-1 as contained in Figure H.1. 81
Table I.1 – Relationship between Equipment protection levels (EPLs) and zones 83