DIN EN 12845:2026-09 (E)

Fixed firefighting systems - Automatic sprinkler systems - Design, installation and maintenance (includes Amendment :2026)

Contents

Page

European foreword ... 10

Introduction ... 12

1 Scope ... 14

2 Normative references ... 14

3 Terms and definitions ... 15

4 Contract planning and documentation ... 23
4.1 General ... 23
4.2 Initial considerations ... 23
4.3 Preliminary or estimating stage ... 23
4.4 Design stage ... 24
4.4.1 General ... 24
4.4.2 Summary schedule ... 24
4.4.3 Installation layout drawings ... 24
4.4.4 Water supply ... 27

5 Extent of sprinkler protection ... 29
5.1 Buildings and areas to be protected ... 29
5.1.1 General ... 29
5.1.2 Permitted exceptions within a building ... 29
5.1.3 Necessary exceptions ... 29
5.2 Storage in the open air ... 30
5.3 Fire resistant separation ... 30
5.4 Protection of concealed spaces ... 30
5.5 Height difference between the highest and lowest sprinklers ... 30

6 Classification of occupancies and fire hazards ... 30
6.1 General ... 30
6.2 Hazard classes ... 31
6.2.1 General ... 31
6.2.2 Light Hazard – LH ... 31
6.2.3 Ordinary Hazard – OH ... 31
6.2.4 High Hazard – HH ... 32
6.3 Storage ... 33
6.3.1 General ... 33
6.3.2 Storage Configuration ... 33

7 Hydraulic design criteria ... 35
7.1 LH, OH and HHP ... 35
7.2 High Hazard Storage – HHS ... 36
7.2.1 General ... 36
7.2.2 Ceiling or roof protection only ... 36
7.2.3 Intermediate level in-rack sprinklers ... 37
7.3 Pressure and flow requirements for pre-calculated systems ... 39
7.3.1 LH and OH systems ... 39
7.3.2 HHP and HHS systems without in-rack sprinklers ... 40

8 Water supplies ... 42

8.1 General 42
8.1.1 Duration 42
8.1.2 Continuity 42
8.1.3 Frost protection 42
8.2 Maximum water pressure 42
8.3 Connections for other services 43
8.4 Housing of equipment for water supplies 44
8.5 Test facility devices 44
8.5.1 General 44
8.5.2 At pump house 45
8.5.3 At control valve sets 45
8.6 Water supply test 45
8.6.1 General 45
8.6.2 Storage tank and pressure tank supplies 45
8.6.3 Town main, booster pump, elevated private reservoir and gravity tank supplies 46

9 Type of water supply 46
9.1 General 46
9.2 Town mains 46
9.3 Storage tanks 46
9.3.1 General 46
9.3.2 Water volume 47
9.3.3 Refill rates for full capacity tanks 48
9.3.4 Reduced capacity tanks 48
9.3.5 Effective capacity of tanks and dimensions of suction chambers 50
9.3.6 Strainers 51
9.4 Inexhaustible sources – settling and suction chambers 51
9.5 Pressure tanks 54
9.5.1 General 54
9.5.2 Housing 54
9.5.3 Minimum capacity (water) 54
9.5.4 Air pressure and contents 54
9.5.5 Charging with air and water 55
9.5.6 Control and safety equipment 55
9.6 Choice of water supply 55
9.6.1 Single water supplies 55
9.6.2 Superior single water supplies 56
9.6.3 Duplicate water supplies 56
9.6.4 Combined water supplies 56
9.7 Isolation of water supply 57

10 Pumps [A2] and pump sets ⟨A2⟩ 57
10.1 General 57
10.2 Multiple pump [A2] set ⟨A2⟩ arrangements 57
10.3 Compartments for pump sets 57
10.3.1 General 57
10.3.2 Sprinkler protection 58
10.3.3 Temperature 58
10.3.4 Ventilation 58
10.4 Maximum temperature of water supply 58
10.5 Valves and accessories 58
10.6 Suction conditions 59
10.6.1 General 59
10.6.2 Suction pipe [A2] of pump set ⟨A2⟩ 59

10.7 Performance characteristics [A2] of pump sets [A2] 62
10.7.1 Pre-calculated systems – LH and OH 62
10.7.2 Pre-calculated systems – HHP and HHS with no in-rack sprinklers 63
10.7.3 Calculated systems 63
10.7.4 Pressure and water capacity of boosted town mains 63
10.7.5 Pressure switches 63
10.8 Electrically driven pump sets 64
10.8.1 General 64
10.8.2 Electricity supply 64
10.8.3 Main switchboard 65
10.8.4 Installation between the main switchboard and the [A2] electrical pump set [A2] 65
[A2] *deleted text* [A2] 65
10.8.5 Monitoring of pump [A2] set [A2] operation 65
10.9 Diesel engine driven pump sets 65
10.9.1 General 65
10.9.2 Starter alarm indication 66
10.9.3 [A2] Site commissioning test [A2] 66

11 Installation type and size 66
11.1 Wet pipe installations 66
11.1.1 General 66
11.1.2 Protection against freezing 66
11.1.3 Size of installations 67
11.2 Dry pipe installations 67
11.2.1 General 67
11.2.2 Size of installations 67
11.3 Alternate installations 68
11.3.1 General 68
11.3.2 Size of installations 68
11.4 Pre-action installations 68
11.4.1 General 68
11.4.2 Automatic detection system 69
11.4.3 Size of installations 69
11.5 Subsidiary dry pipe or alternate extension 69
11.5.1 General 69
11.5.2 Size of subsidiary extensions 69
11.6 Subsidiary water spray extension 69

12 Spacing and location of sprinklers 70
12.1 General 70
12.2 Maximum area of coverage per sprinkler 70
12.3 Minimum distance between sprinklers 72
12.4 Location of sprinklers in relation to building construction 72
12.5 Intermediate sprinklers in HH occupancies 78
12.5.1 General 78
12.5.2 Maximum vertical distance between sprinklers at intermediate levels 78
12.5.3 Horizontal position of sprinklers at intermediate levels 78
12.5.4 Numbers of rows of sprinklers at each level 80
12.5.5 HHS intermediate sprinklers in non-shelved racks 80
12.5.6 HHS intermediate sprinklers below solid or slatted shelves in racks (ST5 and ST6) 81

13 Pipe sizing and layout 82
13.1 General 82
13.2 Calculation of pressure losses in pipework 82
13.2.1 Pipe friction loss 82

13.2.2 Static pressure difference 83
13.2.3 Velocity 83
13.2.4 Pressure loss through fittings and valves 83
13.2.5 Accuracy of calculations 84
13.3 Pre-calculated systems 85
13.3.1 General 85
13.3.2 Location of Design Points 85
13.3.3 Light Hazard - LH 86
13.3.4 Ordinary Hazard - OH 88
13.3.5 High hazard - HHP and HHS (except intermediate level sprinklers) 89
13.4 Fully calculated systems 98
13.4.1 Design density 98
13.4.2 Locations of the area of operation 99
13.4.3 Shape of the area of operation 99
13.4.4 Minimum sprinkler discharge pressure 102
13.4.5 Minimum pipe diameters 102

14 Sprinkler design characteristics and uses 103
14.1 General 103
14.2 Sprinkler types and application 103
14.2.1 General 103
14.2.2 Ceiling, flush, recessed and concealed pattern 104
14.2.3 Sidewall pattern 104
14.2.4 Flat spray pattern 104
14.3 Flow from sprinklers 104
14.4 Sprinkler temperature ratings 105
14.5 Sprinkler thermal sensitivity 106
14.5.1 General 106
14.5.2 Interaction with other measures 106
14.6 Sprinkler guards 106
14.7 Sprinkler water shields 106
14.8 Sprinkler rosettes 107
14.9 Corrosion protection of sprinklers 107

15 Valves 107
15.1 Control valve set 107
15.2 Stop valves 107
15.3 Ring main valves 107
15.4 Drain valves 107
15.5 Test valves 108
15.5.1 Alarm and pump [A2⟩ set ⟨A2] start test valves 108
15.5.2 Remote test valves 109
15.6 Flushing connections 109
15.7 Pressure gauges 109
15.7.1 General 109
15.7.2 Water supply connections 109
15.7.3 Control valve set 109
15.7.4 Removal 110

16 Alarms and alarm devices 110
16.1 Water flow alarms 110
16.1.1 General 110
16.1.2 Water motor and gong 110
16.1.3 Piping to water motor 110
16.2 Electrical water flow and pressure switches 110

16.2.1 General 110
16.2.2 Water flow alarm switches 110
16.2.3 Dry and pre-action systems 111
16.3 Fire brigade and remote central station alarm connection 111

17 Pipework 111
17.1 General 111
17.1.1 Underground piping 111
17.1.2 Above ground piping 111
17.1.3 Welding of steel pipe 111
17.1.4 Flexible pipes and joints 112
17.1.5 Concealment 112
17.1.6 Protection against fire and mechanical damage 112
17.1.7 Painting 112
17.1.8 Drainage 112
17.1.9 Copper pipe 113
17.2 Pipe supports 113
17.2.1 General 113
17.2.2 Spacing and location 113
17.2.3 Design 114
17.3 Pipework in concealed spaces 114
17.3.1 General 114
17.3.2 False ceilings above OH occupancies 114
17.3.3 All other cases 115

18 Signs, notices, and information 115
18.1 Block plan 115
18.2 Signs and notices 115
18.2.1 Location plate 115
18.2.2 Signs for stop valves 115
18.2.3 Control valve set 115
18.2.4 Water supply connections to other services 116
18.2.5 Suction and booster pumps 116
18.2.6 Electric switches and control panels 116
18.2.7 Testing and operating devices 117

19 Commissioning 117
19.1 Commissioning tests 117
19.1.1 Pipework 117
19.1.2 Equipment 117
19.1.3 Water supplies 117
19.2 Completion certificate and documents 118

20 Maintenance 118
20.1 General 118
20.1.1 Introduction 118
20.1.2 Programmed work 118
20.1.3 Precautions while carrying out work 118
20.1.4 Replacement sprinklers 118
20.2 User's programme of inspection and checking 119
20.2.1 General 119
20.2.2 Weekly routine 119
20.2.3 Monthly routine 120
20.3 Service, testing and maintenance schedule 120
20.3.1 General 120

20.3.2 Quarterly routine ... **120**
20.3.3 Half-yearly routine ... **121**
20.3.4 Yearly routine ... **121**
20.3.5 3 Yearly routine ... **122**
20.3.6 10 yearly routine ... **122**
21 [A1] Periodic system inspection ... **123**
Annex A (normative) **Classification of typical hazards** ... **124**
Annex B (normative) **Methodology for categorizing stored goods** ... **127**
B.1 General ... **127**
B.2 Material factor (M) ... **127**
B.2.1 General ... **127**
B.2.2 Material Factor 1 ... **127**
B.2.3 Material factor 2 ... **128**
B.2.4 Material factor 3 ... **128**
B.2.5 Material factor 4 ... **129**
B.3 Storage configuration ... **129**
B.3.1 Effect of storage configuration ... **129**
B.3.2 Exposed plastic container with non-combustible content ... **130**
B.3.3 Exposed plastic surface – unexpanded ... **130**
B.3.4 Exposed plastic surface – expanded ... **130**
B.3.5 Open structure ... **130**
B.3.6 Solid block materials ... **131**
B.3.7 Granular or powdered materials ... **131**
B.3.8 No special configuration ... **131**
Annex C (normative) **Alphabetical listing of stored products and categories** ... **132**
Annex D (normative) **Zoning of sprinkler installations** ... **136**
D.1 General ... **136**
D.2 Zoning of installations ... **136**
D.3 Requirements for zoned installations ... **136**
D.3.1 Extent of zones ... **136**
D.3.2 Zone subsidiary stop valves ... **136**
D.3.3 Flushing Valves ... **136**
D.3.4 Monitoring ... **136**
D.3.5 Zone test and drainage facilities ... **137**
D.3.6 Installation control valve set ... **137**
D.3.7 Installation monitoring and alarms ... **137**
D.4 Block plan ... **137**
Annex E (normative) **Special requirements for high rise systems** ... **139**

E.1 General **139**
E.2 Design criteria **139**
E.2.1 Hazard group **139**
E.2.2 Subdivision of high rise sprinkler systems **139**
E.2.3 Standing water pressures at non-return and alarm valves **139**
E.2.4 Calculation of distribution pipework for pre-calculated systems **139**
E.2.5 Water pressures **139**
E.3 Water supplies **140**
E.3.1 Types of water supplies **140**
E.3.2 Pressure and flow requirements for pre-calculated installations **140**
E.3.3 Water supply characteristics for pre-calculated installations **140**
E.3.4 Pump [A2] set ⟨A2⟩ performance for pre-calculated installations **140**
Annex F (normative) **Additional measures to improve system reliability and availability** **143**
F.1 General **143**
F.2 Subdivision into zones **143**
F.3 Wet pipe installations **143**
F.4 Sprinkler type and sensitivity **143**
F.5 Control valve set **143**
F.6 Water supplies **143**
F.7 Additional measures for theatres **143**
F.8 Additional precautions for maintenance **144**
Annex G (normative) **Protection of special hazards** **145**
G.1 General **145**
G.2 Aerosols **145**
G.3 Clothes in multiple garment hanging storage **145**
G.3.1 General **145**
G.3.2 Categorization **146**
G.3.3 Sprinkler protection other than at ceiling **146**
G.3.4 Sprinklers in operation **146**
G.3.5 Ceiling sprinklers **146**
G.3.6 Automatic shutdown **146**
G.3.7 Control valve set **147**
G.4 Flammable liquid storage **147**
G.5 Idle pallets **149**
G.6 Spirit based liquors in wooden barrels **150**
G.7 Non-woven synthetic fabric **150**

G.7.1 Free standing storage ... **150**
G.7.2 Rack storage ... **151**
G.8 Polypropylene or polyethylene storage bins ... **151**
G.8.1 General ... **151**
G.8.2 Classification ... **151**
G.8.3 Palletized rack storage (ST4) ... **151**
G.8.4 All other storage ... **151**
G.8.5 Foam additive ... **152**
Annex H (normative) **Sprinkler systems monitoring** ... **153**
H.1 General ... **153**
H.2 Functions to be monitored ... **153**
H.2.1 General ... **153**
H.2.2 Stop valves controlling water flow to sprinklers ... **153**
H.2.3 Other stop valves ... **153**
H.2.4 Liquid levels ... **153**
H.2.5 Pressures ... **153**
H.2.6 Electrical power ... **154**
H.2.7 Temperature ... **154**
Annex I (normative) **Transmission of alarms** ... **155**
I.1 Functions to be monitored ... **155**
I.2 Alarm levels ... **156**
Annex J (informative) **Precautions and procedures when a system is not fully operational** ... **157**
J.1 Minimizing the effects ... **157**
J.2 Planned shut-down ... **157**
J.3 Unplanned shut-down ... **158**
J.4 Action following sprinkler operation ... **158**
J.4.1 General ... **158**
J.4.2 Installations protecting cold storage warehouses (air circulation refrigeration) ... **158**
Annex K (informative) **Twenty-five year inspection** ... **159**
Annex L (informative) **Special technology** ... **160**
Annex M (informative) **Independent certification body** ... **161**
Annex N (normative) **Control Mode Specific Application Sprinklers: CMSA** ... **162**
Annex O (informative) **Example of P&ID** ... **163**
Annex P (normative) **ESFR sprinkler protection** ... **164**
Annex Q (informative) **〈A1〉 Periodic system inspection** ... **165**
Bibliography ... **166**