



Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 12845:2015

Fixed firefighting systems - Automatic sprinkler systems - Design, installation and maintenance

Installations fixes de lutte contre
l'incendie - Systèmes d'extinction
automatique du type sprinkleur -
Conception, installation et maintenance

Ortsfeste Brandbekämpfungsanlagen -
Automatische Sprinkleranlagen -
Planung, Installation und Instandhaltung

06/2015



National Foreword

This European Standard EN 12845:2015 was adopted as Luxembourgish Standard ILNAS-EN 12845:2015.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

<https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html>

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

EUROPEAN STANDARD ^{ILNAS-EN 12845:2015} **EN 12845**
NORME EUROPÉENNE
EUROPÄISCHE NORM

June 2015

ICS 13.220.20

Supersedes EN 12845:2004+A2:2009

English Version

**Fixed firefighting systems - Automatic sprinkler systems -
Design, installation and maintenance**

Installations fixes de lutte contre l'incendie - Systèmes
d'extinction automatique du type sprinkleur - Conception,
installation et maintenance

Ortsfeste Brandbekämpfungsanlagen - Automatische
Sprinkleranlagen - Planung, Installation und Instandhaltung

This European Standard was approved by CEN on 20 December 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	12
Introduction	13
1 Scope	15
2 Normative references	15
3 Terms and definitions	16
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	25
4.4.4 Water supply	28
5 Extent of sprinkler protection.....	30
5.1 Buildings and areas to be protected.....	30
5.1.1 General.....	30
5.1.2 Permitted exceptions within a building	30
5.1.3 Necessary exceptions	30
5.2 Storage in the open air	30
5.3 Fire resistant separation	30
5.4 Protection of concealed spaces.....	31
5.5 Height difference between the highest and lowest sprinklers.....	31
6 Classification of occupancies and fire hazards	31
6.1 General.....	31
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	36
7.1 LH, OH and HHP	36
7.2 High Hazard Storage – HHS	37
7.2.1 General.....	37
7.2.2 Ceiling or roof protection only	37
7.2.3 Intermediate level in-rack sprinklers	38
7.3 Pressure and flow requirements for pre-calculated systems	40
7.3.1 LH and OH systems	40
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	43

8.2	Maximum water pressure	43
8.3	Connections for other services	44
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	46
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.....	57
10.1	General	57
10.2	Multiple pump arrangements	57
10.3	Compartments for pumpsets	58
10.3.1	General	58
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	59
10.7	Performance characteristics	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	64
10.7.4	Pressure and water capacity of boosted town mains	65
10.7.5	Pressure switches	65
10.8	Electrically driven pumpsets.....	65
10.8.1	General	65

10.8.2	Electricity supply	65
10.8.3	Main switchboard.....	66
10.8.4	Installation between the main switchboard and the pump controller.....	67
10.8.5	Pump controller	67
10.8.6	Monitoring of pump operation.....	67
10.9	Diesel engine driven pumpsets	67
10.9.1	General.....	67
10.9.2	Engines	68
10.9.3	Cooling system	68
10.9.4	Air filtration.....	68
10.9.5	Exhaust system.....	68
10.9.6	Fuel, fuel tank and fuel feed pipes	68
10.9.7	Starting mechanism	69
10.9.8	Electric starter motor batteries	70
10.9.9	Battery chargers	70
10.9.10	Siting of batteries and chargers.....	70
10.9.11	Starter alarm indication.....	71
10.9.12	Tools and spare parts	71
10.9.13	Engine tests and exercising	71
11	Installation type and size	72
11.1	Wet pipe installations.....	72
11.1.1	General.....	72
11.1.2	Protection against freezing.....	72
11.1.3	Size of installations	72
11.2	Dry pipe installations	73
11.2.1	General.....	73
11.2.2	Size of installations	73
11.3	Alternate installations	73
11.3.1	General.....	73
11.3.2	Size of installations	74
11.4	Pre-action installations	74
11.4.1	General.....	74
11.4.2	Automatic detection system.....	74
11.4.3	Size of installations	75
11.5	Subsidiary dry pipe or alternate extension.....	75
11.5.1	General.....	75
11.5.2	Size of subsidiary extensions	75
11.6	Subsidiary water spray extension.....	75
12	Spacing and location of sprinklers	75
12.1	General.....	75
12.2	Maximum area of coverage per sprinkler.....	76
12.3	Minimum distance between sprinklers.....	77
12.4	Location of sprinklers in relation to building construction.....	78
12.5	Intermediate sprinklers in HH occupancies	84
12.5.1	General.....	84
12.5.2	Maximum vertical distance between sprinklers at intermediate levels	84
12.5.3	Horizontal position of sprinklers at intermediate levels.....	84
12.5.4	Numbers of rows of sprinklers at each level	86
12.5.5	HHS intermediate sprinklers in non-shelved racks.....	86
12.5.6	HHS intermediate sprinklers below solid or slatted shelves in racks (ST5 and ST6)	87
13	Pipe sizing and layout	88
13.1	General.....	88
13.2	Calculation of pressure losses in pipework	88
13.2.1	Pipe friction loss	88
13.2.2	Static pressure difference.....	89

13.2.3	Velocity	89
13.2.4	Pressure loss through fittings and valves	89
13.2.5	Accuracy of calculations	90
13.3	Pre-calculated systems.....	91
13.3.1	General	91
13.3.2	Location of Design Points	91
13.3.3	Light Hazard - LH.....	92
13.3.4	Ordinary Hazard - OH	93
13.3.5	High hazard - HHP and HHS (except intermediate level sprinklers)	95
13.4	Fully calculated systems	103
13.4.1	Design density	103
13.4.2	Locations of the area of operation	104
13.4.3	Shape of the area of operation.....	104
13.4.4	Minimum sprinkler discharge pressure	108
13.4.5	Minimum pipe diameters	108
14	Sprinkler design characteristics and uses	108
14.1	General	108
14.2	Sprinkler types and application	108
14.2.1	General	108
14.2.2	Ceiling, flush, recessed and concealed pattern	109
14.2.3	Sidewall pattern	109
14.2.4	Flat spray pattern	109
14.3	Flow from sprinklers	109
14.4	Sprinkler temperature ratings	110
14.5	Sprinkler thermal sensitivity	111
14.5.1	General	111
14.5.2	Interaction with other measures	111
14.6	Sprinkler guards	111
14.7	Sprinkler water shields	111
14.8	Sprinkler rosettes	112
14.9	Corrosion protection of sprinklers	112
15	Valves	112
15.1	Control valve set.....	112
15.2	Stop valves.....	112
15.3	Ring main valves	112
15.4	Drain valves	112
15.5	Test valves	113
15.5.1	Alarm and pump start test valves.....	113
15.5.2	Remote test valves	113
15.6	Flushing connections	114
15.7	Pressure gauges.....	114
15.7.1	General	114
15.7.2	Water supply connections.....	114
15.7.3	Control valve set.....	114
15.7.4	Removal.....	115
16	Alarms and alarm devices	115
16.1	Water flow alarms	115
16.1.1	General	115
16.1.2	Water motor and gong	115
16.1.3	Piping to water motor.....	115
16.2	Electrical water flow and pressure switches	115
16.2.1	General	115
16.2.2	Water flow alarm switches.....	115
16.2.3	Dry and pre-action systems	116
16.3	Fire brigade and remote central station alarm connection.....	116

17	Pipework	116
17.1	General.....	116
17.1.1	Underground piping	116
17.1.2	Above ground piping.....	116
17.1.3	Welding of steel pipe	116
17.1.4	Flexible pipes and joints	117
17.1.5	Concealment	117
17.1.6	Protection against fire and mechanical damage	117
17.1.7	Painting.....	117
17.1.8	Drainage.....	117
17.1.9	Copper pipe	118
17.2	Pipe supports	118
17.2.1	General.....	118
17.2.2	Spacing and location.....	118
17.2.3	Design	119
17.3	Pipework in concealed spaces.....	119
17.3.1	General.....	119
17.3.2	False ceilings above OH occupancies	120
17.3.3	All other cases	120
18	Signs, notices, and information	120
18.1	Block plan.....	120
18.2	Signs and notices	120
18.2.1	Location plate.....	120
18.2.2	Signs for stop valves.....	120
18.2.3	Control valve set.....	121
18.2.4	Water supply connections to other services	121
18.2.5	Suction and booster pumps	121
18.2.6	Electric switches and control panels.....	122
18.2.7	Testing and operating devices	122
19	Commissioning	122
19.1	Commissioning tests	122
19.1.1	Pipework	122
19.1.2	Equipment	123
19.1.3	Water supplies	123
19.2	Completion certificate and documents	123
20	Maintenance	123
20.1	General.....	123
20.1.1	Introduction	123
20.1.2	Programmed work	123
20.1.3	Precautions while carrying out work.....	124
20.1.4	Replacement sprinklers	124
20.2	User's programme of inspection and checking.....	124
20.2.1	General.....	124
20.2.2	Weekly routine	124
20.2.3	Monthly routine	125
20.3	Service, testing and maintenance schedule	125
20.3.1	General.....	125
20.3.2	Quarterly routine.....	125
20.3.3	Half-yearly routine	127
20.3.4	Yearly routine	127
20.3.5	3 Yearly routine	128
20.3.6	10 yearly routine	128
21	Third party inspection	128
Annex A	(normative) Classification of typical hazards	129

Annex B (normative) Methodology for categorizing stored goods	132
B.1 General	132
B.2 Material factor (M).....	132
B.2.1 General	132
B.2.2 Material Factor 1	132
B.2.3 Material factor 2	133
B.2.4 Material factor 3	134
B.2.5 Material factor 4	134
B.3 Storage configuration	134
B.3.1 Effect of storage configuration	134
B.3.2 Exposed plastic container with non-combustible content	135
B.3.3 Exposed plastic surface – unexpanded	135
B.3.4 Exposed plastic surface – expanded	135
B.3.5 Open structure	135
B.3.6 Solid block materials.....	136
B.3.7 Granular or powdered materials	136
B.3.8 No special configuration.....	136
Annex C (normative) Alphabetical listing of stored products and categories	137
Annex D (normative) Zoning of sprinkler installations	141
D.1 General	141
D.2 Zoning of installations	141
D.3 Requirements for zoned installations	141
D.3.1 Extent of zones	141
D.3.2 Zone subsidiary stop valves	141
D.3.3 Flushing Valves	141
D.3.4 Monitoring	142
D.3.5 Zone test and drainage facilities.....	142
D.3.6 Installation control valve set	142
D.3.7 Installation monitoring and alarms.....	142
D.4 Block plan.....	143
Annex E (normative) Special requirements for high rise systems	144
E.1 General	144
E.2 Design criteria.....	144
E.2.1 Hazard group	144
E.2.2 Subdivision of high rise sprinkler systems	144
E.2.3 Standing water pressures at non-return and alarm valves.....	144
E.2.4 Calculation of distribution pipework for pre-calculated systems	144
E.2.5 Water pressures	144