

# DIN EN 15193-1:2021-11 (E)

## Energy performance of buildings - Energy requirements for lighting - Part 1: Specifications, Module M9 (includes Amendment A1:2021)

---

<b>Contents</b>		<b>Page</b>
European foreword .....		5
Introduction .....		6
1	Scope .....	9
2	Normative references .....	11
3	Terms and definitions .....	11
4	Symbols and abbreviations .....	12
4.1	Symbols and units .....	12
4.2	Subscripts .....	18
4.3	Abbreviations .....	18
5	Brief description of the method(s) and routing .....	18
5.1	Output of the method 1 - Comprehensive method .....	18
5.2	Optional methods .....	19
5.2.1	Method 2 - Quick calculation method .....	19
5.2.2	Method 3 - Direct metering method .....	19
5.3	Selection criteria between the methods .....	19
6	Method 1 - Calculation of the energy required for lighting .....	20
6.1	Output data .....	20
6.2	Calculation time interval and calculation period .....	20
6.3	Input data .....	21
6.3.1	Lighting system data .....	21
6.3.2	Product data .....	21
6.3.3	System design data .....	22
6.3.4	Operating conditions .....	23
6.3.5	Constants and physical data .....	23
6.4	Calculation procedure .....	23
6.4.1	Applicable time step .....	23
6.4.2	Operating conditions calculation .....	23
6.4.3	Energy for lighting calculation .....	23
6.5	Expenditure factors for lighting systems .....	27
7	Method 2 - Quick calculation of the energy required for lighting .....	30
7.1	Output data .....	30
7.2	Calculation time steps .....	30
7.3	Input data .....	30
7.3.1	Lighting system data .....	30
7.3.2	Luminaire data .....	31
7.3.3	System design data .....	31
7.3.4	Operating conditions .....	31
7.3.5	Constants and physical data .....	31
7.4	Calculation procedure .....	31
7.4.1	Applicable time step .....	31
7.4.2	Operating conditions calculation .....	31
7.4.3	Energy calculation .....	31
7.5	Expenditure factors for lighting systems .....	34

8	Method 3 - Metered energy used for lighting .....	34
8.1	Output data .....	34
8.2	Calculation time steps .....	35
8.3	Input data .....	35
8.4	Calculation procedure of annual energy .....	35
9	Quality control .....	36
9.1	Method 1 .....	36
9.2	Method 2 .....	36
9.3	Method 3 .....	36
10	Compliance check .....	36
10.1	General .....	36
10.2	Method 1 .....	36
10.3	Method 2 .....	37
10.4	Method 3 .....	37
Annex A (normative) Input and method selection data sheet -- Template .....		38
A.1	General .....	38
A.2	System design data .....	38
A.2.1	General .....	38
A.2.2	Standby energy density .....	39
A.2.3	Annual operating hours .....	39
A.2.4	Daylight supply factor for vertical façades .....	39
A.2.5	Daylight supply factor for roof lights .....	39
A.2.6	Absence factor (FA) for rooms in building types .....	39
A.2.7	Example constant illuminance dependency factors (FC) .....	40
A.2.8	Installed power for residential buildings .....	40
A.2.9	Useful areas in residential buildings .....	41
Annex B (informative) Input and method selection data sheet -- Default choices .....		42
B.1	General .....	42
B.2	Method 1 .....	42
B.2.1	Luminaire description data .....	42
B.2.2	Luminaire technical data tables .....	42
B.2.3	System design data .....	43
B.3	Method 2 .....	43
B.3.1	Luminaire description data .....	43
B.3.2	Luminaire technical data tables .....	43
B.3.3	System design data .....	43
B.4	Method 3 .....	49
Annex C (normative) Simplified Method for Installed Power Estimation .....		50
C.1	General .....	50
C.2	Installed power assessment for non-residential buildings .....	50
C.3	Installed power assessment for residential buildings .....	52
Annex D (normative) Assessment of the installed power for lighting systems in existing buildings .		53
Annex E (normative) Occupancy estimation .....		54
Annex F (normative) Daylight availability .....		59
F.1	General .....	59
F.2	Building segmentation: Spaces benefiting from daylight .....	61
F.3	Daylight supply factor for vertical façades .....	63
F.3.1	Daylight factor classification .....	63
F.3.2	Daylight supply factor .....	69

<b>F.4</b>	<b>Daylight supply factor for roof lights</b> .....	<b>81</b>
<b>F.4.1</b>	<b>General</b> .....	<b>81</b>
<b>F.4.2</b>	<b>Daylight availability factor</b> .....	<b>81</b>
<b>F.4.3</b>	<b>Daylight supply factor</b> .....	<b>86</b>
<b>F.4.4</b>	<b>Relative times, shading activated/ not activated for roof lights</b> .....	<b>87</b>
<b>F.4.5</b>	<b>Daylight supply factors as function of the daylight availability classification</b> .....	<b>89</b>
<b>F.5</b>	<b>"Daylight supply factor for windows in sloped roofs"</b> .....	<b>93</b>
<b>F.6</b>	<b>Daylight Responsive Control Systems</b> .....	<b>95</b>
<b>F.7</b>	<b>Monthly evaluation method</b> .....	<b>97</b>
<b>F.8</b>	<b>Determination of daytime and night time hours</b> .....	<b>98</b>
<b>F.9</b>	<b>Comprehensive calculation</b> .....	<b>101</b>
<b>F.10</b>	<b>Collection of input data required for daylight calculations</b> .....	<b>102</b>
<b>Annex G (normative) Constant illuminance</b> .....		<b>103</b>
<b>G.1</b>	<b>General</b> .....	<b>103</b>
<b>G.2</b>	<b>Constant illuminance factor (Fc)</b> .....	<b>103</b>
<b>G.3</b>	<b>Constant lumen output system (CLO)</b> .....	<b>104</b>
<b>Annex H (normative) Standby system energy requirements</b> .....		<b>105</b>
<b>H.1</b>	<b>Emergency lighting luminaire standby charging power (Pem)</b> .....	<b>105</b>
<b>H.2</b>	<b>Lighting controls standby power (Ppc)</b> .....	<b>105</b>
<b>Bibliography</b> .....		<b>106</b>