BS EN 62305-2:2012
Part 2: Risk Management
Lightning protection standardisation
BS EN 62305-2

62305-1
General Principles

62305-2
Risk Management

62305-3
Physical damage and life hazard

62305-4
Electrical- and electronic systems
BS EN 62305 – 2 Insurance Claims

• According to the ABI figures the UK Insurance Industry pays out on average £8.65 Billion a year in Commercial & Domestic claims (2007-2015)

• Of those claims electrical and electronic damage makes up nearly 11% equivalent to £946M

• There is no reason to assume the UK differs that greatly from the EU figures so 31% of this can be ‘assumed’ to lightning & surge related

• Approximately £295M in paid claims every year

• The UK lightning protection & surge protection industry generates approximately £65m per year in turnover
Risk composition
Handling risks
Risk means suffering damage and loss

Analyse risks

Quantify risks

Total risks

Control risk

Prevent

Reduce (take protection measures)

Insure

Accept risk
Determination of the risk for a structure

Risk

Source of damage

Type of damage

Type of loss
Lightning current is the primary source of damage. The following sources are distinguished by the strike attachment point:

- **S1**: Flashes to a structure
- **S2**: Flashes near a structure
- **S3**: Flashes to a line
- **S4**: Flashes near a line
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Types of damage which may occur as a result of lightning strikes:

D1: Injury to living beings due to touch and step voltage – electric shock

D2: Physical damage (fire, explosion, mechanical destruction, release of chemicals) due to lightning effects including sparking

D3: Failure of electrical and electronic systems due to LEMP
“Each type of damage, alone or in combination with others, may produce a different consequential loss in the object to be protected. The type of loss that may appear depends on the characteristics of the object itself and its content.

The following types of loss shall be taken into account:

L1: loss of human life;
L2: loss of service to the public;
L3: loss of cultural heritage;
L4: loss of economic value (structure and its content, service and loss of activity).
Risk composition

Risk

Risk Types
The interaction of the factors previously discussed result in the following risk of damage. These have to be evaluated for a structure

- **R₁:** risk of loss of human life; $\times 10^{-5}$
- **R₂:** risk of loss of service to the public; $\times 10^{-4}$
- **R₃:** risk of loss of cultural heritage; $\times 10^{-4}$
- **R₄:** risk of loss of economic value.
Risk components
Risk components

Risk

Each risk consists of several risk components

\[ R_1 = R_A + R_B + R_C + R_M + R_U + R_V + R_W + R_Z \]
\[ R_2 = R_B + R_C + R_M + R_V + R_W + R_Z \]
\[ R_3 = R_B + R_V \]
\[ R_4 = R_A + R_B + R_C + R_M + R_U + R_V + R_W + R_Z \]
Overview of risk component $R_X$
Risk component $R_B$ - Fire
Source of damage S1

$R_B = \text{fire}$

Physical damage due to dangerous sparking inside the structure causing fire and explosion.

Possible types of loss:
- \( L_1 \): Loss of human life
- \( L_2 \): Service to the public
- \( L_3 \): Cultural heritage
- \( L_4 \): Economic loss
Risk component $R_M$ - Overvoltage (LEMP)

Source of damage S2

$R_M = \text{overvoltage (LEMP)}$

Failure of internal systems caused by LEMP. Electromagnetic effects of the lightning current.

Possible types of loss:
- L1: Loss of human life (structures with risk of explosion, hospitals)
- L2: Service to the public
- L4: Economic loss
Risk component $R_V$ - Fire
Source of damage S3

$R_V = \text{fire}$

Physical damage due to lightning current injected in supply lines entering the structure.

Possible types of loss:
- L1: Loss of human life
- L2: Service to the public
- L3: Cultural heritage
- L4: Economic loss
Risk component $R_Z$ - Overvoltage
Source of damage S4

$R_Z = \text{overvoltage}$

Failure of internal systems caused by overvoltages induced on incoming lines and transmitted to the structure.

Possible types of loss:
- L1: Loss of human life (structures with risk of explosion, hospitals)
- L2: Service to the public
- L4: Economic loss
Risk composition

Risk

Risk types

Risk components

Number of dangerous events $N_x$

Probability of damage $P_x$

Consequent loss $L_x$
Parameters affecting risk components

Risk of damage

\[ R_X = N_X \cdot P_X \cdot L_X \]

- \( N_X \): Number of dangerous events
- \( P_X \): Probability of damage
- \( L_X \): Consequent loss
Lightning Ground Flash Density ($N_G$) per square kilometre per year
Selection of protection measures for buildings

1. Identify the structure to be protected
2. Identify the types of loss relevant for the structure
3. Define and calculate the risk components for each type of loss $R_A$, $R_B$, $R_C$, $R_M$, $R_U$, $R_V$, $R_W$, $R_Z$
4. If $R > R_T$, structure protected
5. If $R_{A+B+U+V} > R_T$, install relevant type of LPS
6. If $R_{A+B+U+V} < R_T$, install other protection measures
7. If LPS installed, yes, install relevant SPM
8. If SPM installed, yes, calculate new values of risk components
9. If SPM installed, no, install other protection measures
10. If LPS installed, no, install other protection measures

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DEHNSupport Demonstration

Risk assessment calculation using DEHNSupport Toolbox