Lightning Protection Risk Assessment

Basis of calculation: IEC 62305-2:2024 (Ed. 3.0)

Report	VB-SAMPLE-0001
Revision	1
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Project	Retail block — 3 storeys (sample)	Client	(the client you name on the project)
Site address	(the site address you enter)		
Prepared by	(your name), (your company) · Reg. no. (your registration no.)		
Checked by	(the checker you name)	Approved by	(the approver you name)
Dimensions	(where you say the dimensions came from: measured, drawings or approximate) — (the drawings or survey you name)		

Rev.	Date	Description	Prepared	Checked	Approved
1	2026-07-01	First issue	(your name)	(the checker you name)	(the approver you name)

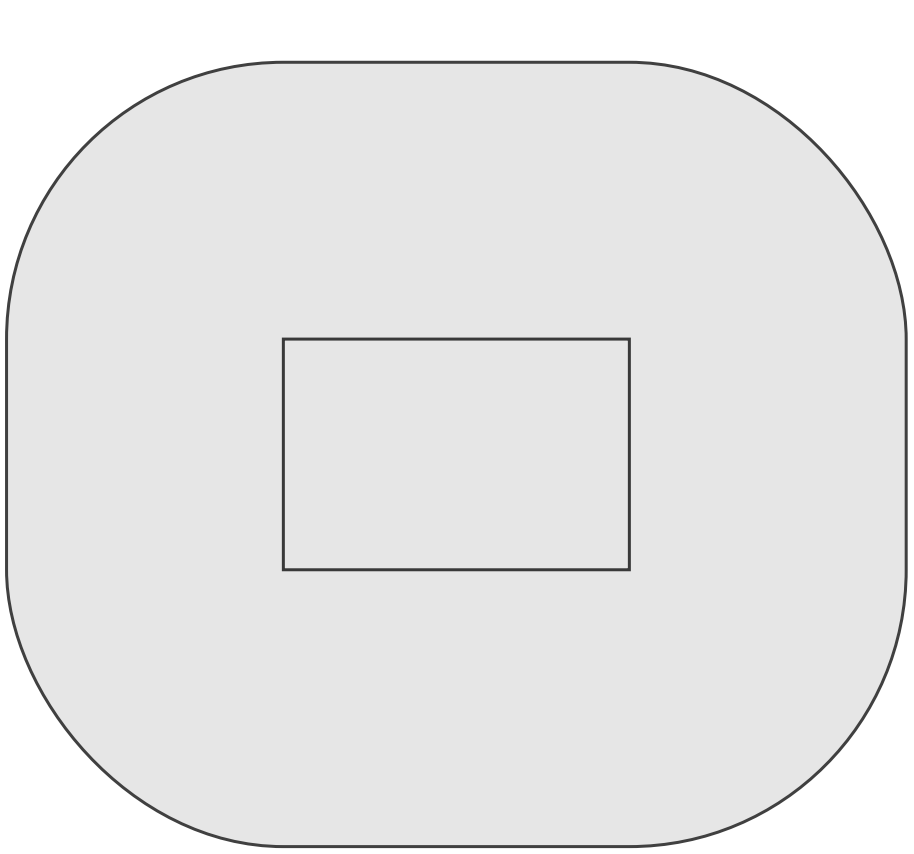
GOVERNING ZONE RISK	TOLERABLE	VERDICT
7.39e-05	1e-05	Exceeds tolerable

Assumptions for missing inputs — the engine filled in the following defaults; verify each before relying on this assessment:

- The entered lines (power, telecom) are taken as the complete set of connected services. Any further metallic service — a second power feed, a data line between buildings — adds S3/S4 risk and would need its own line entry.
- Ground resistivity was not entered, so Table A.2's installation factor C_I is used as published for the buried line(s) — a value the table derives at ρ = 400 Ω·m. Above that, Table A.2 NOTE 3 gives a larger collection area (A_L = 0,6·√ρ·L_L: ×1,4 at 800 Ω·m, ×2,7 at 3 000 Ω·m), and N_L — with R_U, R_V, R_W and R_Z behind it — is understated in proportion. Enter the site resistivity if it may exceed 400 Ω·m.
- No structure was modelled at the far end of lines 'power', 'telecom' (N_DJ = 0, §A.2.5) — each is assumed to come directly from the network. Where a line arrives from an adjacent structure (e.g. a plant building housing the transformer), flashes to that structure add dangerous events on the line.
- No zone was set for the Clause 9 assessment, so the frequency of damage F for loss of service was not evaluated and the verdict above is R against R_T only. §9.1 judges F separately from R: a structure providing a service — power, water, gas, telecommunications, transport — can satisfy R and still need protection under §9.3. Set the service criticality on any zone whose loss of service matters.

Methodology notes (Ed. 3.0:2024)

- Risk is assembled per zone (§8.5.3) and judged against R_T by the §7.3 procedure. The 2010 edition's n_z/n_t population scaling no longer exists — a zone's risk is not diluted by its share of the structure's occupants.
- Loss values follow Table C.2; the former h_z hazard factor is absorbed into its rows. Physical-damage losses (R_B2, R_V2, …) carry no time-of-presence weighting — property is at risk whether or not people are present. Results therefore differ from 2010-edition worked examples by design.
- Scope: risk R per Clause 8. The Clause 9 frequency of damage F is assessed only for zones whose service criticality is declared, and none was declared here — see the assumptions above.

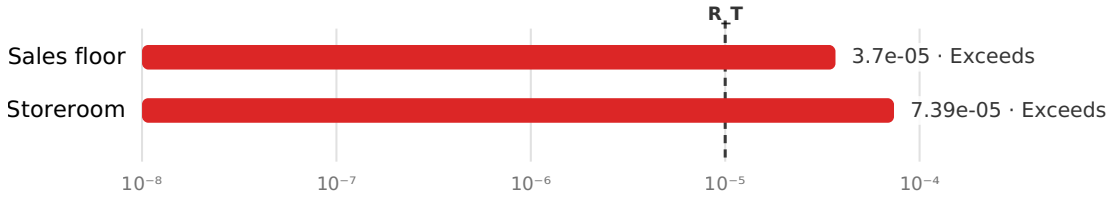


A_D = 4 810 m² (3H = 24 m) 30 × 20 m

A_D (§A.2.1.2, eq. A.3) is the ground area a flash can be attracted from: the footprint offset by 3H = 24 m, corners radiused to match. A_M (§A.3, eq. A.8) is the band out to r_M = 350/U_W = 233 m, within which a flash to ground can still damage internal systems. At 194 376 m² it is too large to draw beside the structure at a readable scale, so it is stated rather than shown. To scale, uniform on both axes.

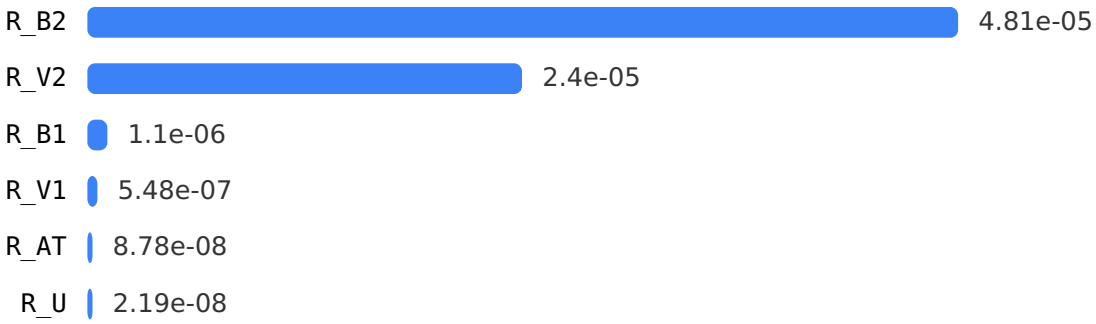
Risk zones

Risk is assessed for each risk zone and compared with the tolerable risk in that zone; protection is required unless every zone complies.



Zone	Risk R	R_{L1} (injury)	R_{L2} (damage)	Tolerable R_T	Verdict
Sales floor	3.7e-05	9.76e-06	2.72e-05	1e-05	Exceeds
Storeroom	7.39e-05	1.76e-06	7.21e-05	1e-05	Exceeds

Risk component breakdown — governing zone



Component	Value	Description
R_AT	8.78e-08	Touch and step voltages — flash to the structure (S1)
R_B1	1.1e-06	Fire or explosion — injury to persons (S1)
R_B2	4.81e-05	Fire or explosion — physical damage (S1)
R_U	2.19e-08	Touch voltage via a connected line — injury to persons (S3)
R_V1	5.48e-07	Fire or explosion via a connected line — injury to persons (S3)
R_V2	2.4e-05	Fire or explosion via a connected line — physical damage (S3)

Recommended protection measures

- Install a class II LPS on the structure, including SPDs designed for LPL II for lightning equipotential bonding at the entrance point of every connected line (IEC 62305-3; Tables B.3 and B.13)

With the recommended measures every risk zone satisfies R <= R_T (projected governing-zone risk 5.42e-06/yr).

Detailed calculation steps

The derivation chain shared by every risk zone, with the substituted values and the clause each step implements — check any step against the standard.

#	Step	Working	Result
1	**Lightning ground strike-point density** IEC 62305-2:2024, §A.1, eq. A.1	$N_{SG} = k \times N_G$ k = 2, N_G = 4 /km²/yr	**N_{SG} = 8 /km²/yr**
2	**Collection area of the structure** IEC 62305-2:2024, §A.2.1.2, eq. A.3	$A_D = L \cdot W + 2 \cdot (3H) \cdot (L+W) + \pi \cdot (3H)^2$ L = 30 m, W = 20 m, H = 8 m	**A_D = 4,809.56 m²**
3	**Flashes to the structure** IEC 62305-2:2024, §A.2.4, eq. A.5; Table A.1	$N_D = N_{SG} \cdot A_D \cdot C_D \cdot 10^{-6}$ N_{SG} = 8, A_D = 4,809.56 m², C_D = 1 (isolated)	**N_D = 0.0384765 /yr**

#	Step	Working	Result
4	**Flashes near the structure** IEC 62305-2:2024, §A.3, eqs. A.7/A.8	`r_M = 350/U_W ; A_M = 2·r_M·(L+W) + π·r_M² ; N_M = (1/k)·N_SG·A_M·10⁻⁶` U_W(min) = 1.5 kV → r_M = 233.333 m, L = 30 m, W = 20 m, A_M = 194,376 m², k = 2 (§A.1 NOTE 1 fallback — where N_SG comes from a lightning location system, k is supplied by that provider)	**N_M = 0.777502 /yr**
5	**Flashes to line 'power'** IEC 62305-2:2024, §A.4, eqs. A.9/A.10; Tables A.2–A.4	`A_L = 40 · L_L ; N_L = N_SG · A_L · C_I · C_E · C_T · 10⁻⁶` L_L = 200 m → A_L = 8,000 m²; C_I = 0.3, C_E = 0.5, C_T = 1	**N_L = 0.0096 /yr**
6	**Flashes near line 'power'** IEC 62305-2:2024, §A.5, eqs. A.11/A.12	`r_I = 2000/U_W^1.8 ; A_I = 2·r_I·L_L ; N_I = (1/k)·N_SG·A_I·C_I·C_E·C_T·10⁻⁶` U_W = 2.5 kV, L_L = 200 m → A_I = 153,744 m²; k = 2	**N_I = 0.0922464 /yr**
7	**Flashes to line 'telecom'** IEC 62305-2:2024, §A.4, eqs. A.9/A.10; Tables A.2–A.4	`A_L = 40 · L_L ; N_L = N_SG · A_L · C_I · C_E · C_T · 10⁻⁶` L_L = 500 m → A_L = 20,000 m²; C_I = 1, C_E = 0.5, C_T = 1	**N_L = 0.08 /yr**
8	**Flashes near line 'telecom'** IEC 62305-2:2024, §A.5, eqs. A.11/A.12	`r_I = 2000/U_W^1.8 ; A_I = 2·r_I·L_L ; N_I = (1/k)·N_SG·A_I·C_I·C_E·C_T·10⁻⁶` U_W = 1.5 kV, L_L = 500 m → A_I = 963,975 m²; k = 2	**N_I = 1.92795 /yr**
9	**Per-zone risk and verdict** IEC 62305-2:2024, eqs. 6–9, Table 3, §7.3	`R = R_L1 + R_L2 ; each R_X = N_X · P_X · L_X (with P_P/P_e per Table 3)` per-zone components and resolved factors in the tables below	**protection required unless R ≤ R_T = 1e-05 /yr in every zone**

Risk components — zone Sales floor

Component	Value (per year)	Source
R_AT	1.32e-07	Touch and step voltages — flash to the structure (S1)
R_B1	1.65e-06	Fire or explosion — injury to persons (S1)
R_B2	4.81e-06	Fire or explosion — physical damage (S1)
R_U	3.07e-07	Touch voltage via a connected line — injury to persons (S3)
R_V1	7.67e-06	Fire or explosion via a connected line — injury to persons (S3)
R_V2	2.24e-05	Fire or explosion via a connected line — physical damage (S3)
R	**3.7e-05**	

Risk components — zone Storeroom

Component	Value (per year)	Source
R_AT	8.78e-08	Touch and step voltages — flash to the structure (S1)
R_B1	1.1e-06	Fire or explosion — injury to persons (S1)
R_B2	4.81e-05	Fire or explosion — physical damage (S1)

Component	Value (per year)	Source
R_U	2.19e-08	Touch voltage via a connected line — injury to persons (S3)
R_V1	5.48e-07	Fire or explosion via a connected line — injury to persons (S3)
R_V2	2.4e-05	Fire or explosion via a connected line — physical damage (S3)
R	**7.39e-05**	

Resolved factors — zone Sales floor

Factor	Value	Derivation
P_P	0.342466	= t_z / 8760 (eq. B.14)
P_e	1	= 1 — time of exposure unknown (§B.12 NOTE 1)
P_am	1	Table B.1 (touch/step-voltage measures)
r_t	0.001	Table B.2 (surface of soil or floor)
r_f	0.01	Table B.6, fire load 'ordinary'
r_p	0.5	Table B.5 (fire-reducing provisions)
P_S	0.5	Table B.4 (construction material)
P_LPS	1	Table B.3 (class of LPS)
P_AT	0.001	= P_LPS · P_am · r_t · P_TWS (eq. B.2)
P_B	0.0025	= P_S · P_LPS · r_f · r_p (eq. B.4)
L_T	0.01	Table C.2 typical value
L_F1	0.05	Table C.2 typical value
L_F2	0.05	Table C.2 typical value
K_S2	1	zone shielding screen (§B.6, eq. B.9)
P_C	1	= 1 − Π(1 − P_SPD·C_LD) over internal systems (eq. 10; eq. B.5)
P_M	1	= 1 − Π(1 − P_SPD·(K_S1·K_S2·K_S3)²) (eq. 11; eqs. B.6/B.7)
C_LD (power)	1	Table B.9 (line shielding/grounding/isolation)
C_LI (power)	1	Table B.9 (line shielding/grounding/isolation)
P_EB (power)	1	Table B.13 (line-entrance bonding SPDs)
P_LD (power)	1	Tables B.11/B.12 (line shielding vs U_W)
P_U (power)	0.001	= P_am · P_EB · P_LD · P_TWS · C_LD · r_t (eq. B.10)
P_V (power)	0.005	= P_EB · P_LD · P_TWS · C_LD · r_f · r_p (eq. B.11)
P_W (power)	1	= P_SPD · P_TWS · P_LD · C_LD (eq. B.12)
P_Z (power)	1	= P_SPD · P_TWS · C_LI (eq. B.13)
C_LD (telecom)	1	Table B.9 (line shielding/grounding/isolation)
C_LI (telecom)	1	Table B.9 (line shielding/grounding/isolation)
P_EB (telecom)	1	Table B.13 (line-entrance bonding SPDs)

Factor	Value	Derivation
P_LD (telecom)	1	Tables B.11/B.12 (line shielding vs U_W)
P_U (telecom)	0.001	= P_am · P_EB · P_LD · P_TWS · C_LD · r_t (eq. B.10)
P_V (telecom)	0.005	= P_EB · P_LD · P_TWS · C_LD · r_f · r_p (eq. B.11)
P_W (telecom)	1	= P_SPD · P_TWS · P_LD · C_LD (eq. B.12)
P_Z (telecom)	1	= P_SPD · P_TWS · C_LI (eq. B.13)

R_C1, R_M1, R_W1 and R_Z1 not counted: answered that a failure of this zone's internal systems does not injure people or endanger the environment (§6.3.2; Table C.2 footnote e).

R_C2, R_M2, R_W2 and R_Z2 not counted: no risk of explosion in this zone (§6.3.2: they "mainly apply for structures with a risk of explosion").

Resolved factors — zone Storeroom

Factor	Value	Derivation
P_P	0.0228311	= t_z / 8760 (eq. B.14)
P_e	1	= 1 — time of exposure unknown (§B.12 NOTE 1)
P_am	1	Table B.1 (touch/step-voltage measures)
r_t	0.01	Table B.2 (surface of soil or floor)
r_f	0.1	Table B.6, fire load 'high'
r_p	0.5	Table B.5 (fire-reducing provisions)
P_S	0.5	Table B.4 (construction material)
P_LPS	1	Table B.3 (class of LPS)
P_AT	0.01	= P_LPS · P_am · r_t · P_TWS (eq. B.2)
P_B	0.025	= P_S · P_LPS · r_f · r_p (eq. B.4)
L_T	0.01	Table C.2 typical value
L_F1	0.05	Table C.2 typical value
L_F2	0.05	Table C.2 typical value
K_S2	1	zone shielding screen (§B.6, eq. B.9)
P_C	1	= 1 − Π(1 − P_SPD·C_LD) over internal systems (eq. 10; eq. B.5)
P_M	1	= 1 − Π(1 − P_SPD·(K_S1·K_S2·K_S3)²) (eq. 11; eqs. B.6/B.7)
C_LD (power)	1	Table B.9 (line shielding/grounding/isolation)
C_LI (power)	1	Table B.9 (line shielding/grounding/isolation)
P_EB (power)	1	Table B.13 (line-entrance bonding SPDs)
P_LD (power)	1	Tables B.11/B.12 (line shielding vs U_W)
P_U (power)	0.01	= P_am · P_EB · P_LD · P_TWS · C_LD · r_t (eq. B.10)
P_V (power)	0.05	= P_EB · P_LD · P_TWS · C_LD · r_f · r_p (eq. B.11)
P_W (power)	1	= P_SPD · P_TWS · P_LD · C_LD (eq. B.12)

Factor	Value	Derivation
P_Z (power)	1	= P_SPD · P_TWS · C_LI (eq. B.13)

R_C1, R_M1, R_W1 and R_Z1 not counted: answered that a failure of this zone's internal systems does not injure people or endanger the environment (§6.3.2; Table C.2 footnote e).

R_C2, R_M2, R_W2 and R_Z2 not counted: no risk of explosion in this zone (§6.3.2: they "mainly apply for structures with a risk of explosion").

Projected outcome with the recommended measures

The same assessment re-run with the recommended protection measures applied. The projected figures are reproducible from the post-measure factors below, exactly as the unprotected result is from the tables above.

Zone	Projected R	R_{L1} (injury)	R_{L2} (damage)	Tolerable R_T	Verdict
Sales floor	1.26e-06	3.31e-07	9.29e-07	1e-05	Pass
Storeroom	5.42e-06	1.26e-07	5.29e-06	1e-05	Pass

Resolved factors with measures applied — zone Sales floor

Factor	Value	Derivation
P_P	0.342466	= t_z / 8760 (eq. B.14)
P_e	1	= 1 — time of exposure unknown (§B.12 NOTE 1)
P_am	1	Table B.1 (touch/step-voltage measures)
r_t	0.001	Table B.2 (surface of soil or floor)
r_f	0.01	Table B.6, fire load 'ordinary'
r_p	0.5	Table B.5 (fire-reducing provisions)
P_S	1	= 1 with an LPS installed (Table B.4 NOTE 1)
P_LPS	0.05	Table B.3 (class of LPS)
P_AT	5e-05	= P_LPS · P_am · r_t · P_TWS (eq. B.2)
P_B	0.00025	= P_S · P_LPS · r_f · r_p (eq. B.4)
L_T	0.01	Table C.2 typical value
L_F1	0.05	Table C.2 typical value
L_F2	0.05	Table C.2 typical value
K_S2	1	zone shielding screen (§B.6, eq. B.9)
P_C	1	= 1 − Π(1 − P_SPD·C_LD) over internal systems (eq. 10; eq. B.5)
P_M	1	= 1 − Π(1 − P_SPD·(K_S1·K_S2·K_S3)²) (eq. 11; eqs. B.6/B.7)
C_LD (power)	1	Table B.9 (line shielding/grounding/isolation)
C_LI (power)	1	Table B.9 (line shielding/grounding/isolation)
P_EB (power)	0.02	Table B.13 (line-entrance bonding SPDs)

Factor	Value	Derivation
P_LD (power)	1	Tables B.11/B.12 (line shielding vs U_W)
P_U (power)	2e-05	= P_am · P_EB · P_LD · P_TWS · C_LD · r_t (eq. B.10)
P_V (power)	0.0001	= P_EB · P_LD · P_TWS · C_LD · r_f · r_p (eq. B.11)
P_W (power)	1	= P_SPD · P_TWS · P_LD · C_LD (eq. B.12)
P_Z (power)	1	= P_SPD · P_TWS · C_LI (eq. B.13)
C_LD (telecom)	1	Table B.9 (line shielding/grounding/isolation)
C_LI (telecom)	1	Table B.9 (line shielding/grounding/isolation)
P_EB (telecom)	0.02	Table B.13 (line-entrance bonding SPDs)
P_LD (telecom)	1	Tables B.11/B.12 (line shielding vs U_W)
P_U (telecom)	2e-05	= P_am · P_EB · P_LD · P_TWS · C_LD · r_t (eq. B.10)
P_V (telecom)	0.0001	= P_EB · P_LD · P_TWS · C_LD · r_f · r_p (eq. B.11)
P_W (telecom)	1	= P_SPD · P_TWS · P_LD · C_LD (eq. B.12)
P_Z (telecom)	1	= P_SPD · P_TWS · C_LI (eq. B.13)

R_C1, R_M1, R_W1 and R_Z1 not counted: answered that a failure of this zone's internal systems does not injure people or endanger the environment (§6.3.2; Table C.2 footnote e).

R_C2, R_M2, R_W2 and R_Z2 not counted: no risk of explosion in this zone (§6.3.2: they "mainly apply for structures with a risk of explosion").

Resolved factors with measures applied — zone Storeroom

Factor	Value	Derivation
P_P	0.0228311	= t_z / 8760 (eq. B.14)
P_e	1	= 1 — time of exposure unknown (§B.12 NOTE 1)
P_am	1	Table B.1 (touch/step-voltage measures)
r_t	0.01	Table B.2 (surface of soil or floor)
r_f	0.1	Table B.6, fire load 'high'
r_p	0.5	Table B.5 (fire-reducing provisions)
P_S	1	= 1 with an LPS installed (Table B.4 NOTE 1)
P_LPS	0.05	Table B.3 (class of LPS)
P_AT	0.0005	= P_LPS · P_am · r_t · P_TWS (eq. B.2)
P_B	0.0025	= P_S · P_LPS · r_f · r_p (eq. B.4)
L_T	0.01	Table C.2 typical value
L_F1	0.05	Table C.2 typical value
L_F2	0.05	Table C.2 typical value
K_S2	1	zone shielding screen (§B.6, eq. B.9)

Factor	Value	Derivation
P_C	1	= 1 − Π(1 − P_SPD·C_LD) over internal systems (eq. 10; eq. B.5)
P_M	1	= 1 − Π(1 − P_SPD·(K_S1·K_S2·K_S3)²) (eq. 11; eqs. B.6/B.7)
C_LD (power)	1	Table B.9 (line shielding/grounding/isolation)
C_LI (power)	1	Table B.9 (line shielding/grounding/isolation)
P_EB (power)	0.02	Table B.13 (line-entrance bonding SPDs)
P_LD (power)	1	Tables B.11/B.12 (line shielding vs U_W)
P_U (power)	0.0002	= P_am · P_EB · P_LD · P_TWS · C_LD · r_t (eq. B.10)
P_V (power)	0.001	= P_EB · P_LD · P_TWS · C_LD · r_f · r_p (eq. B.11)
P_W (power)	1	= P_SPD · P_TWS · P_LD · C_LD (eq. B.12)
P_Z (power)	1	= P_SPD · P_TWS · C_LI (eq. B.13)

R_C1, R_M1, R_W1 and R_Z1 not counted: answered that a failure of this zone's internal systems does not injure people or endanger the environment (§6.3.2; Table C.2 footnote e).

R_C2, R_M2, R_W2 and R_Z2 not counted: no risk of explosion in this zone (§6.3.2: they "mainly apply for structures with a risk of explosion").

What this assessment does not cover. Stated for every assessment, whether or not it applies to yours:

- National deviations. This assessment follows the IEC base document. The foreword of IEC 62305-2:2024 records differing practices in four places: in Germany r_p = 1 in all cases, P_TWS = 1 for R_B, R_C, R_M, R_V, R_W and R_Z, and the highest L_F1 / L_F2 of Table C.2 should be used; in Greece P_TWS = 1 in all cases; in Italy R_L1 (eq. 7) and R_L2 (eq. 8) must each be compared with the tolerable risk separately, where this assessment judges their sum R = R_L1 + R_L2 (eq. 6) — both values are printed per zone, so the Italian comparison can be made by hand; in the Netherlands and South Africa Annex D and Annex E should not be applied to usual studies, which matches what is done here. Check the national annex that applies to the site.
- Annex D — the graphical evaluation of P_SPD from the SPD's protection level and the system's withstand. P_SPD is taken from the Tables B.7/B.8 lookup on the coordination level, or as declared from a more detailed analysis (Tables B.7/B.8 NOTE 5), and Annex D's method is not offered.
- Annex E — the detailed investigation of additional losses L_E to surrounding structures and the environment. Annex E is for specific applications and E.1 says most structures need no environmental risk, but where one is needed it is not computed here.
- Lines composed of several sections (different routing, shielding or installation along their length). Each line entered is taken as uniform end to end; a composite line has to be assessed section by section.
- The lightning density used is a gridded climatology unless a value is entered directly. A national N_G map or a lightning location system to IEC 62858 is a better source wherever one is available, and N_SG drives every N term in the assessment.
- The protection measures this assessment recommends are sized elsewhere: an LPS is designed to IEC 62305-3 and a coordinated SPD system to IEC 62305-4. This tool decides whether protection is needed and to which level, not what to install.
- Economic risk. IEC 62305-2 Ed. 3.0 deleted the R4 economic-loss component and the cost-benefit annex of Ed. 2, so no cost comparison is part of this edition and none is produced here.

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