



ThunderGuard

SOLUTIONS

Lightning protection risk management calculations
To BS EN 62305-2:2012 (Edition 2)

Project summary

Project name: HS' New AD Plant, Structure #1 (Digester & Buffer Tanks Interlinked by a Gantry)
Project ref: ADH.24.031C.EE4
Client: Haworth Scouring Company Ltd (HS)
Prepared by: Dr. Andrew D. Hallgarth, Principal Process Safety Consultant, ADH Risk Ltd.
ThunderGuard Solutions (A Trading Division of ADH Risk).
Issue date: 05/09/2025

HS' New AD Plant, Structure #1 (Digester & Buffer Tanks Interlinked by a Gantry)

Project details

Project name: HS' New AD Plant, Structure #1 (Digester & Buffer Tanks Interlinked by a Gantry)
Client: Haworth Scouring Company Ltd (HS)
Standard: BS EN 62305-2:2012 (Edition 2)
Project address: Cashmere Works
Birksland Street
Bradford, West Yorkshire, ENGLAND, BD3 9SX.
Project ref: ADH.24.031C.EE4
Calculation ref:
Calculation notes:
Project author: Dr. Andrew D. Hallgarth, Principal Process Safety Consultant, ADH Risk Ltd.
Created: 02/09/2025
Modified: 04/09/2025

Case details

Case name: Unprotected
Case title: Haworth Scouring New AD Plant, Bradford, Structure 1 Only (Digester & Buffer Tanks Interconnected with a Gantry)
Case notes:

The following primary risks and their relevant tolerable risks have been taken into consideration as part of this risk management calculation

R_1 3.4543E-04 Risk of loss of human life in the structure.
The tolerable risk of 1E-05 is exceeded, therefore protection measures (in addition to any listed below) must be instigated

Protection system design parameters

Structural LPS Requirement for a structural lightning protection system (LPS) and where necessary the chosen Lightning protection level (LPL)

None

I_{SPD} Maximum peak current of SPDs for each of the 4 lines considered (based on the simple current division concept).

NOTE: The worst case surge that could be expected on a two-wire telephone or data line is 2.5kA (10/350 μ s) per line (Category D test to IEC/EN 61643-21) to earth or 5 kA (10/350 μ s) per pair.

0 kA

Line 1

Line to/from Structure 2

Service entrance SPD Requirement to protect Line 1 at its entrance to the structure with an equipotential bonding SPD (rated to I_{SPD} above) in accordance with BS EN 62305-2:2012 (Edition 2)

NOTE: Where SPDs are required but an LPS is not ($I_{SPD} = 0$), protect overhead lines with Type 1 SPDs (mains 12.5kA 10/350 μ s, data/telecom 2.5kA 10/350 μ s), protect underground lines with overvoltage or

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Type 2 SPDs (tested with an 8/20 μ s waveform)

None

Coordinated SPD set

Requirement to protect all internal systems connected to Line 1 with a coordinated set of SPDs in accordance with BS EN 62305-2:2012 (Edition 2)

None

Line 2

Line to/from Building A

Service entrance SPD

Requirement to protect Line 2 at its entrance to the structure with an equipotential bonding SPD (rated to ISPD above) in accordance with BS EN 62305-2:2012 (Edition 2)

NOTE: Where SPDs are required but an LPS is not (ISPD = 0), protect overhead lines with Type 1 SPDs (mains 12.5kA 10/350 μ s, data/telecom 2.5kA 10/350 μ s), protect underground lines with overvoltage or Type 2 SPDs (tested with an 8/20 μ s waveform)

None

Coordinated SPD set

Requirement to protect all internal systems connected to Line 2 with a coordinated set of SPDs in accordance with BS EN 62305-2:2012 (Edition 2)

None

Line 3

Line to/from Building B

Service entrance SPD

Requirement to protect Line 3 at its entrance to the structure with an equipotential bonding SPD (rated to ISPD above) in accordance with BS EN 62305-2:2012 (Edition 2)

NOTE: Where SPDs are required but an LPS is not (ISPD = 0), protect overhead lines with Type 1 SPDs (mains 12.5kA 10/350 μ s, data/telecom 2.5kA 10/350 μ s), protect underground lines with overvoltage or Type 2 SPDs (tested with an 8/20 μ s waveform)

None

Coordinated SPD set

Requirement to protect all internal systems connected to Line 3 with a coordinated set of SPDs in accordance with BS EN 62305-2:2012 (Edition 2)

None

Line 4

Line to/from Building C

Service entrance SPD

Requirement to protect Line 4 at its entrance to the structure with an equipotential bonding SPD (rated to ISPD above) in accordance with BS EN 62305-2:2012 (Edition 2)

NOTE: Where SPDs are required but an LPS is not (ISPD = 0), protect overhead lines with Type 1 SPDs (mains 12.5kA 10/350 μ s, data/telecom 2.5kA 10/350 μ s), protect underground lines with overvoltage or Type 2 SPDs (tested with an 8/20 μ s waveform)

None

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Coordinated SPD set Requirement to protect all internal systems connected to Line 4 with a coordinated set of SPDs in accordance with BS EN 62305-2:2012 (Edition 2)

None

Zone 1

Internal to Digester & Buffer Tank Structure

Fire protection system None or risk of explosion

Case details

Case name: Protected - LPS LPL II & Coordinated SPD Level II (Enhanced Voltage Protection Level)

Case title: Haworth Scouring New AD Plant, Bradford, Structure 1 Only (AD Tanks)

Case notes:

The following primary risks and their relevant tolerable risks have been taken into consideration as part of this risk management calculation

R₁ 1.0519E-06 Risk of loss of human life in the structure.
The tolerable risk of 1E-05 is not exceeded based on the application of the protection measures listed below.

Protection system design parameters

Structural LPS Requirement for a structural lightning protection system (LPS) and where necessary the chosen Lightning protection level (LPL)

Lightning protection level (LPL) II

I_{max} Maximum peak current

150 kA

Probl_{max} Probability that lightning current parameters are smaller than the maximum value defined above

98%

I_{min} Minimum peak current

5 kA

Probl_{min} Probability that lightning current parameters are greater than the minimum value defined above

97%

r Radius of rolling sphere

30 m

I_{SPD} Maximum peak current of SPDs for each of the 4 lines considered (based on the simple current division concept).

NOTE: The worst case surge that could be expected on a two-wire telephone or data line is 2.5kA (10/350 μs) per line (Category D test to IEC/EN 61643-21) to earth or 5 kA (10/350 μs) per pair.

18.75 kA

Line 1

Line to/from Structure 2

HS' New AD Plant, Structure #1 (Digester & Buffer Tanks Interlinked by a Gantry)

Service entrance SPD Requirement to protect Line 1 at its entrance to the structure with an equipotential bonding SPD (rated to ISPD above) in accordance with BS EN 62305-2:2012 (Edition 2)

NOTE: Where SPDs are required but an LPS is not (ISPD = 0), protect overhead lines with Type 1 SPDs (mains 12.5kA 10/350µs, data/telecom 2.5kA 10/350µs), protect underground lines with overvoltage or Type 2 SPDs (tested with an 8/20 µs waveform)

Lightning protection level (LPL) II* (Enhanced voltage protection level)

Coordinated SPD set Requirement to protect all internal systems connected to Line 1 with a coordinated set of SPDs in accordance with BS EN 62305-2:2012 (Edition 2)

Lightning protection level (LPL) II* (Enhanced voltage protection level)

Line 2

Line to/from Building A

Service entrance SPD Requirement to protect Line 2 at its entrance to the structure with an equipotential bonding SPD (rated to ISPD above) in accordance with BS EN 62305-2:2012 (Edition 2)

NOTE: Where SPDs are required but an LPS is not (ISPD = 0), protect overhead lines with Type 1 SPDs (mains 12.5kA 10/350µs, data/telecom 2.5kA 10/350µs), protect underground lines with overvoltage or Type 2 SPDs (tested with an 8/20 µs waveform)

Lightning protection level (LPL) II* (Enhanced voltage protection level)

Coordinated SPD set Requirement to protect all internal systems connected to Line 2 with a coordinated set of SPDs in accordance with BS EN 62305-2:2012 (Edition 2)

Lightning protection level (LPL) II* (Enhanced voltage protection level)

Line 3

Line to/from Building B

Service entrance SPD Requirement to protect Line 3 at its entrance to the structure with an equipotential bonding SPD (rated to ISPD above) in accordance with BS EN 62305-2:2012 (Edition 2)

NOTE: Where SPDs are required but an LPS is not (ISPD = 0), protect overhead lines with Type 1 SPDs (mains 12.5kA 10/350µs, data/telecom 2.5kA 10/350µs), protect underground lines with overvoltage or Type 2 SPDs (tested with an 8/20 µs waveform)

Lightning protection level (LPL) II* (Enhanced voltage protection level)

Coordinated SPD set Requirement to protect all internal systems connected to Line 3 with a coordinated set of SPDs in accordance with BS EN 62305-2:2012 (Edition 2)

Lightning protection level (LPL) II* (Enhanced voltage protection level)

Line 4

Line to/from Building C

Service entrance SPD Requirement to protect Line 4 at its entrance to the structure with an equipotential bonding SPD (rated to ISPD above) in accordance with BS EN 62305-2:2012 (Edition 2)

NOTE: Where SPDs are required but an LPS is not (ISPD = 0), protect overhead lines with Type 1 SPDs

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(mains 12.5kA 10/350µs, data/telecom 2.5kA 10/350µs), protect underground lines with overvoltage or Type 2 SPDs (tested with an 8/20 µs waveform)

Lightning protection level (LPL) II* (Enhanced voltage protection level)

Coordinated SPD set

Requirement to protect all internal systems connected to Line 4 with a coordinated set of SPDs in accordance with BS EN 62305-2:2012 (Edition 2)

Lightning protection level (LPL) II* (Enhanced voltage protection level)

Zone 1

Internal to Digester & Buffer Tank Structure

Fire protection system None or risk of explosion

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