

Investigation of sprinkler wetting patterns for fire protection of exposed timber - Supplementary Material

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Stage 1:

108 identical buckets were used to capture water distribution in specific locations below the sprinkler. Water captured in each bucket (geographically located below the sprinkler) was weighed and recorded. On completion of data entry into Excel, a 180° representation of water distribution weight was produced for individual bucket locations, shown in Figure 1.

[illegible]

Figure 1: Shows data input of individual buckets (Columns 1&2, buckets 1-17) and 180° representation of individual water distribution weights (all buckets).

Stage 2:

From individual bucket weights, a full 360° representation of the water distribution was produced, applying X, Y and Z coordinates in the spreadsheet and mirroring data collected (assuming symmetry), along the black vertical line in Figure 2.

[illegible]

Figure 2: Full 360° representation of the water distribution weights for 216 buckets (108 buckets mirrored).

Stage 3:

To establish actual density delivered, weight of water was divided by duration of each test and then by the area of the bucket opening, which provided a density in $\text{mm min}^{-1} \text{m}^{-2}$. Figure 3 shows the calculation within the spreadsheet.

Calculations for mm/min/m2									
Diameter =		0.315	m					(of bucket + half the lip width)	
Area =		0.078	m2						
Collection time =		15	min						
			sec						
		=	15.00	min					

Figure 3: Calculation parameters for conversion of weight to density for each individual bucket.

Stage 4:

On conversion of weight to density within the spreadsheet, an independent 360° representation of density was produced, shown in Figure 4.

Calculated water distribution rate (mm/min/m2) in each collection area																	
	-3.75	-3.25	-2.75	-2.25	-1.75	-1.25	-0.75	-0.25	0.25	0.75	1.25	1.75	2.25	2.75	3.25	3.75	
3.75	0	0	0	0	0.01	0.03	0.04	0.02	0.02	0.04	0.03	0.01	0	0	0	0	
3.25	0	0	0	0.97	0.12	0.27	0.41	0.16	0.16	0.41	0.27	0.12	0.97	0	0	0	
2.75	0	0	0.01	0.49	0.56	0.80	0.99	0.68	0.68	0.99	0.80	0.56	0.49	0.01	0	0	
2.25	0	0.02	0.07	0.59	2.16	1.82	1.18	1.13	1.13	1.18	1.82	2.16	0.59	0.07	0.02	0	
1.75	0.01	0.09	0.27	0.65	1.97	1.43	0.98	0.88	0.88	0.98	1.43	1.97	0.65	0.27	0.09	0.01	
1.25	0.00	0.10	0.39	0.74	1.16	1.01	1.16	1.51	1.51	1.16	1.01	1.16	0.74	0.39	0.10	0.00	
0.75	0.00	0.02	0.15	0.74	0.84	0.97	1.33	7.71	7.71	1.33	0.97	0.84	0.74	0.15	0.02	0.00	
0.25	0.00	0.07	0.25	1.39	0.84	1.33	2.84	3.48	3.48	2.84	1.33	0.84	1.39	0.25	0.07	0.00	Pipe
-0.25	0.00	0.03	0.20	0.84	1.06	1.30	1.33	4.77	4.77	1.33	1.30	1.06	0.84	0.20	0.03	0.00	
-0.75	0.00	0.00	0.09	0.26	1.19	1.01	1.39	7.11	7.11	1.39	1.01	1.19	0.26	0.09	0.00	0.00	
-1.25	0.00	0.00	0.12	0.06	0.99	0.91	1.02	1.48	1.48	1.02	0.91	0.99	0.06	0.12	0.00	0.00	
-1.75	0.00	0.02	0.39	0.01	1.75	1.12	0.94	0.96	0.96	0.94	1.12	1.75	0.01	0.39	0.02	0.00	
-2.25	0	0.00	0.38	0.07	1.88	1.50	1.16	1.04	1.04	1.16	1.50	1.88	0.07	0.38	0.00	0	
-2.75	0	0	0.10	0.27	1.06	0.97	1.18	1.21	1.21	1.18	0.97	1.06	0.27	0.10	0	0	
-3.25	0	0	0	0.39	0.28	0.24	0.79	0.71	0.71	0.79	0.24	0.28	0.39	0	0	0	
-3.75	0	0	0	0	0.02	0.03	0.25	0.15	0.15	0.25	0.03	0.02	0	0	0	0	

Figure 4: Full 360° representation of density collection for individual geographical locations for 216 buckets.

Using Microsoft spreadsheet graph representation, a plan plot of water density was produced, shown in Figure 5.

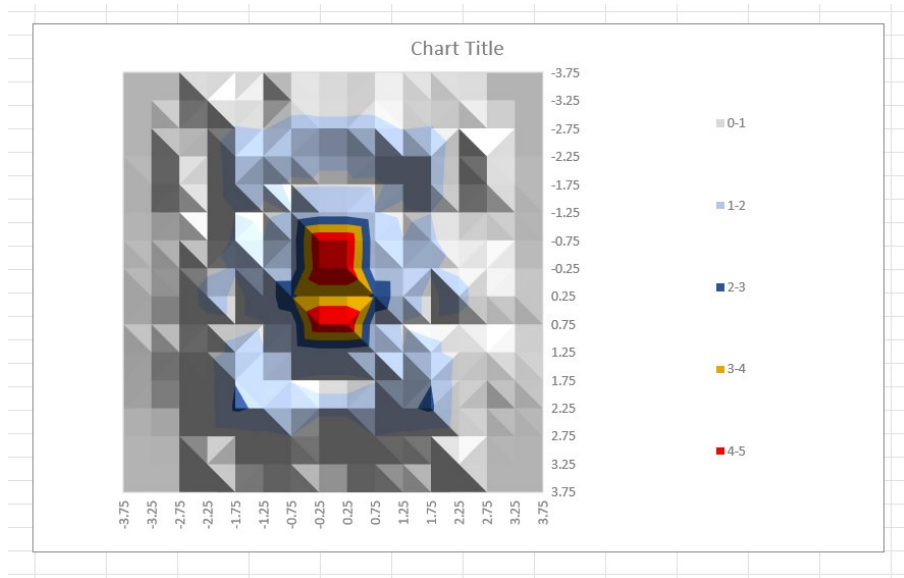


Figure 5: Microsoft Excel graphical representation of actual density delivered at floor level.

Stage 5

Using 'Microcal Origin', data from the spreadsheet was incorporated into the software based on an 8 x 16 grid. The grid was mirrored to provide a plotable matrix on 16 x 16 grid shown in Figure 6. The grid was then expanded by interpolation by a factor of 4 to give a matrix of 64 x 64 to improve presentation shown in Figure 7.

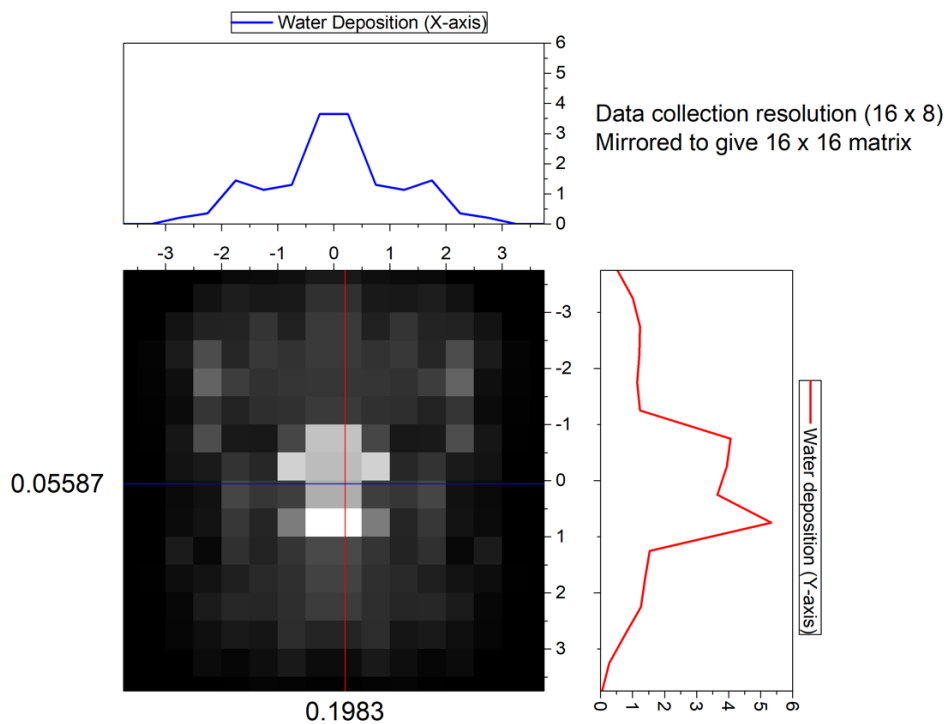


Figure 6: Shows graphical representation on a 16 x 16 grid.

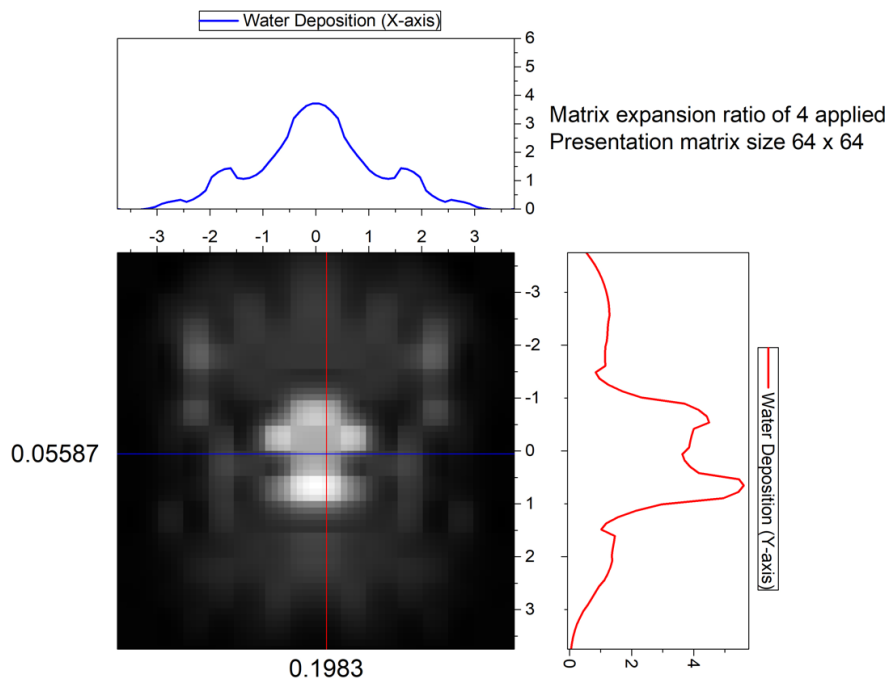


Figure 7: Shows graphical representation on a 64 x 64 grid.

Using the 64 x 64 grid, software parameters / presentation was adjusted to provide colour contour plots, shown in Figure 8 and colour plan plots at a density height of 6 mm, shown in Figure 9.

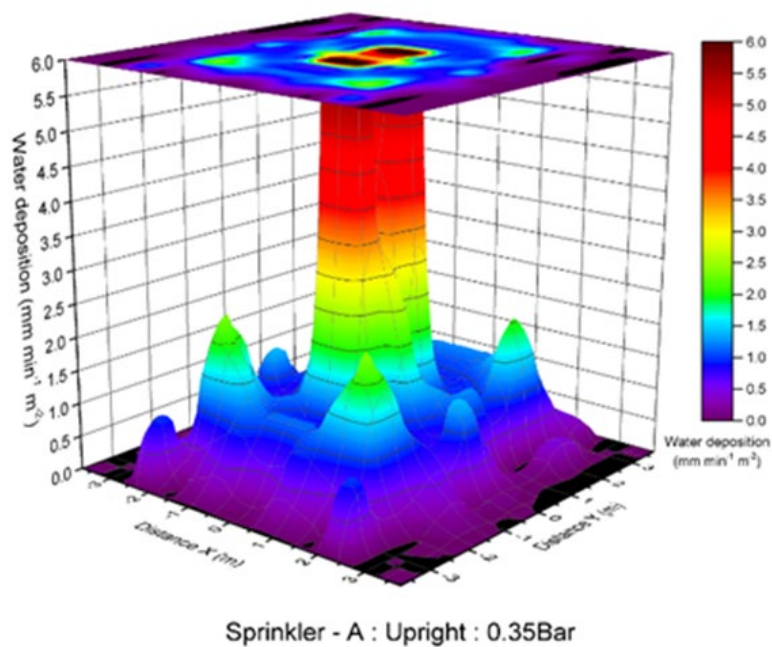


Figure 8: Isometric contour plot of density from Sprinkler A.

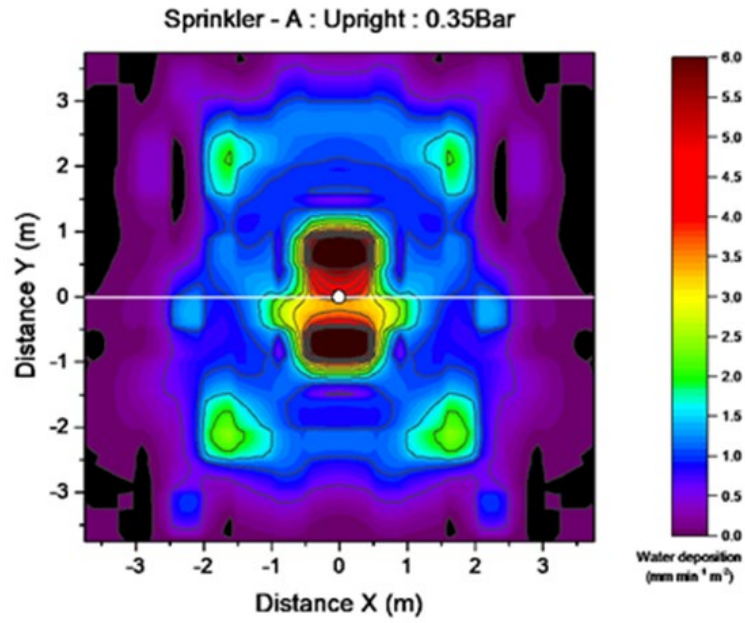
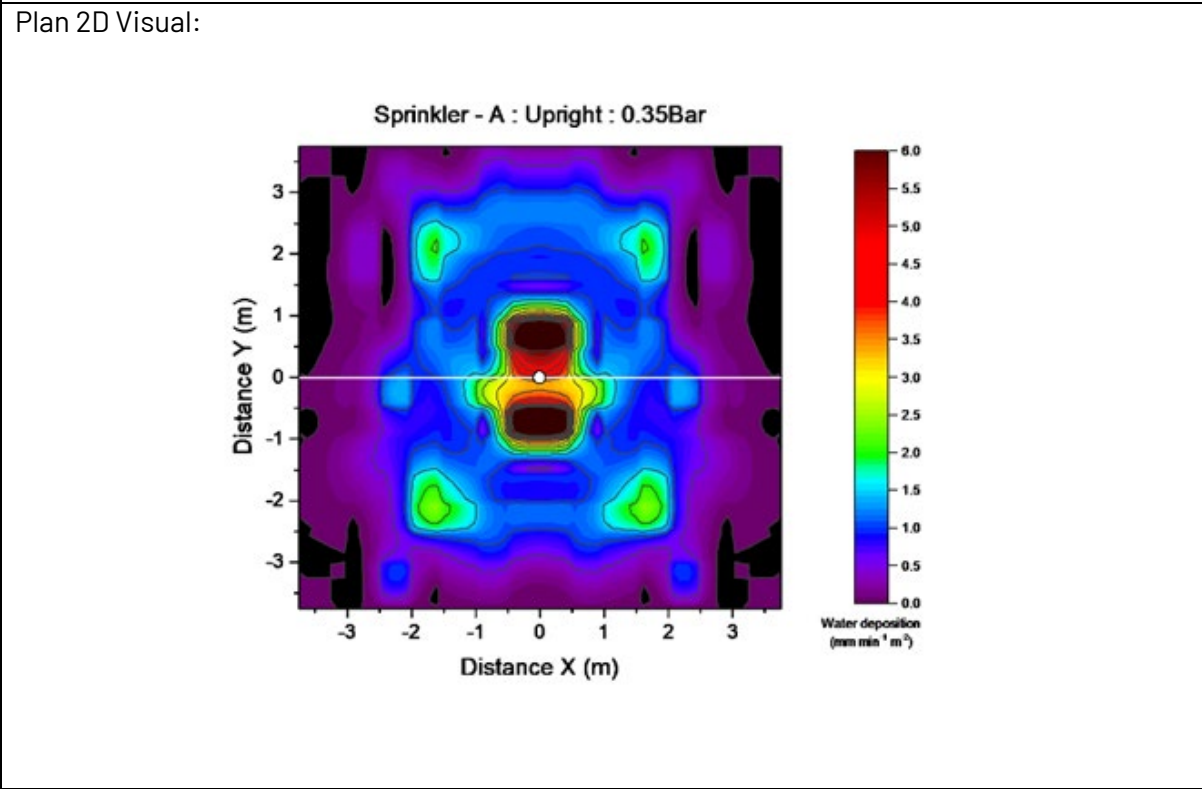
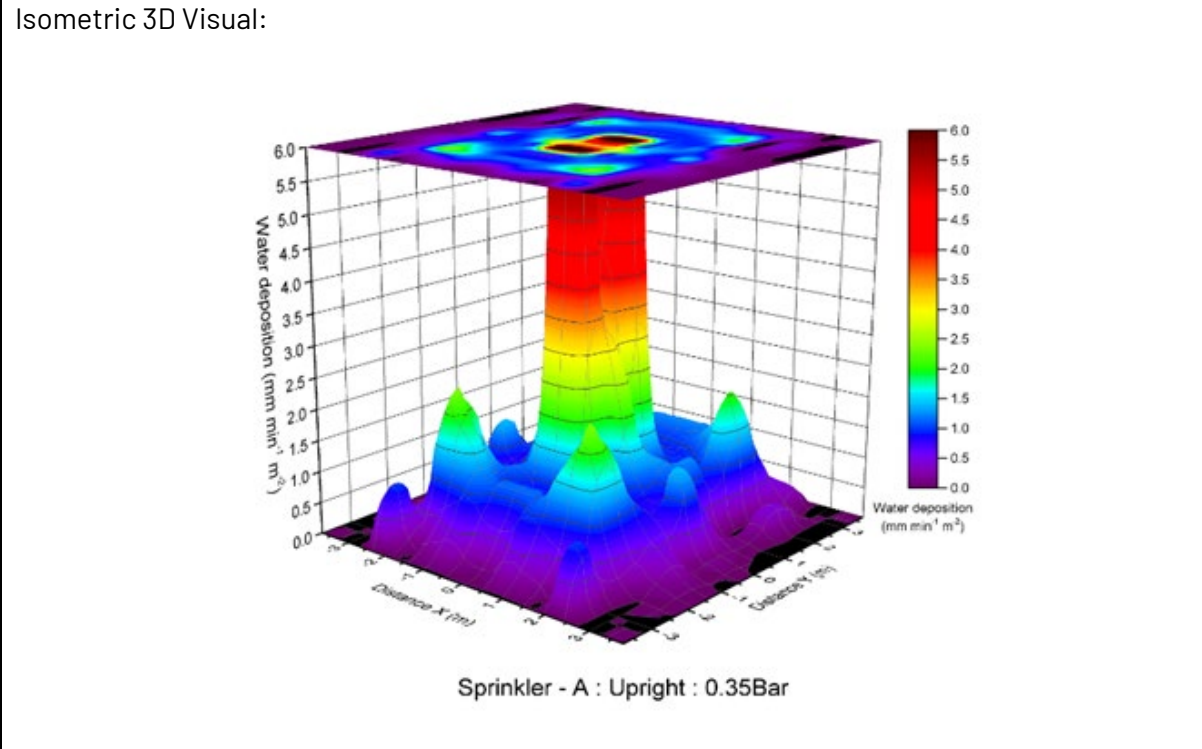


Figure 9: Plan plot of density captured from Sprinkler A at 6 mm depth.

For all sprinklers tested, Excel raw data was used within Microcal Origin to produce density plots as shown in the paper and supplementary material.

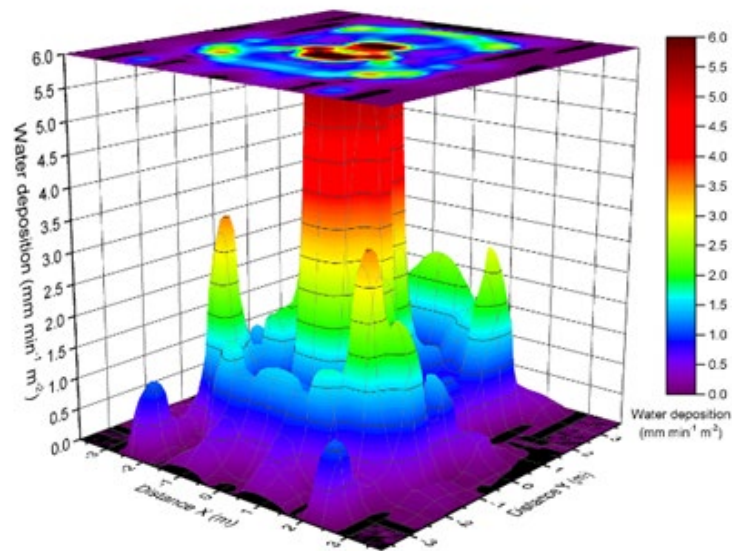
Floor Density Plot - Test Number : 01	
Date of Fire Test	17 th October 2023
Time of Fire Test	15:46
Duration of Fire Test	15 Minutes, 00 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	0.35 bar (0.35 bar average achieved)



Floor Density Plot - Test Number : 02

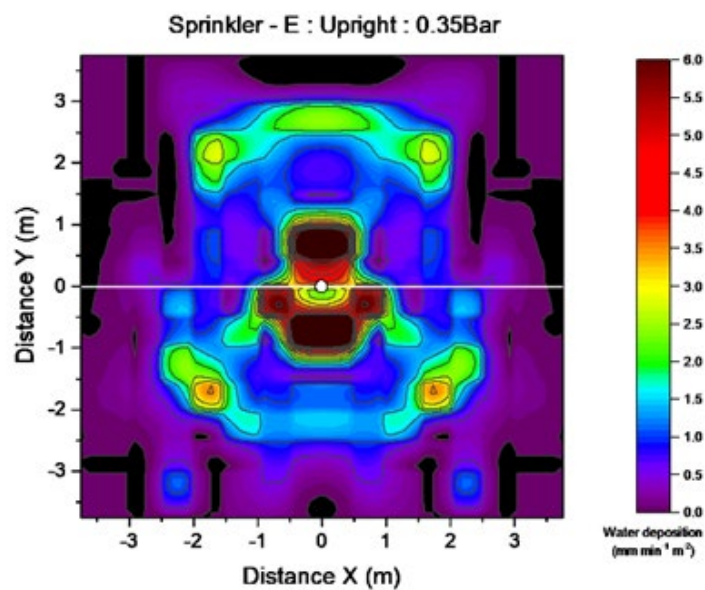
Date of Fire Test	18 th October 2023
Time of Fire Test	09:44
Duration of Fire Test	13 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Isometric 3D Visual:

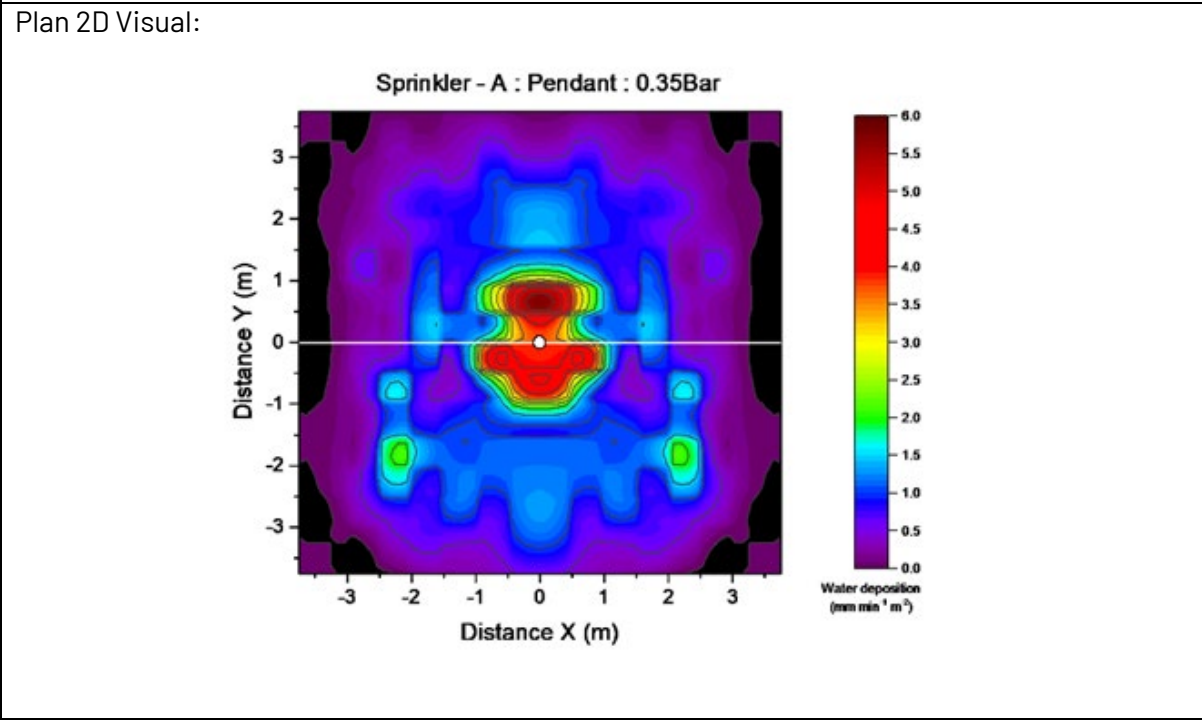
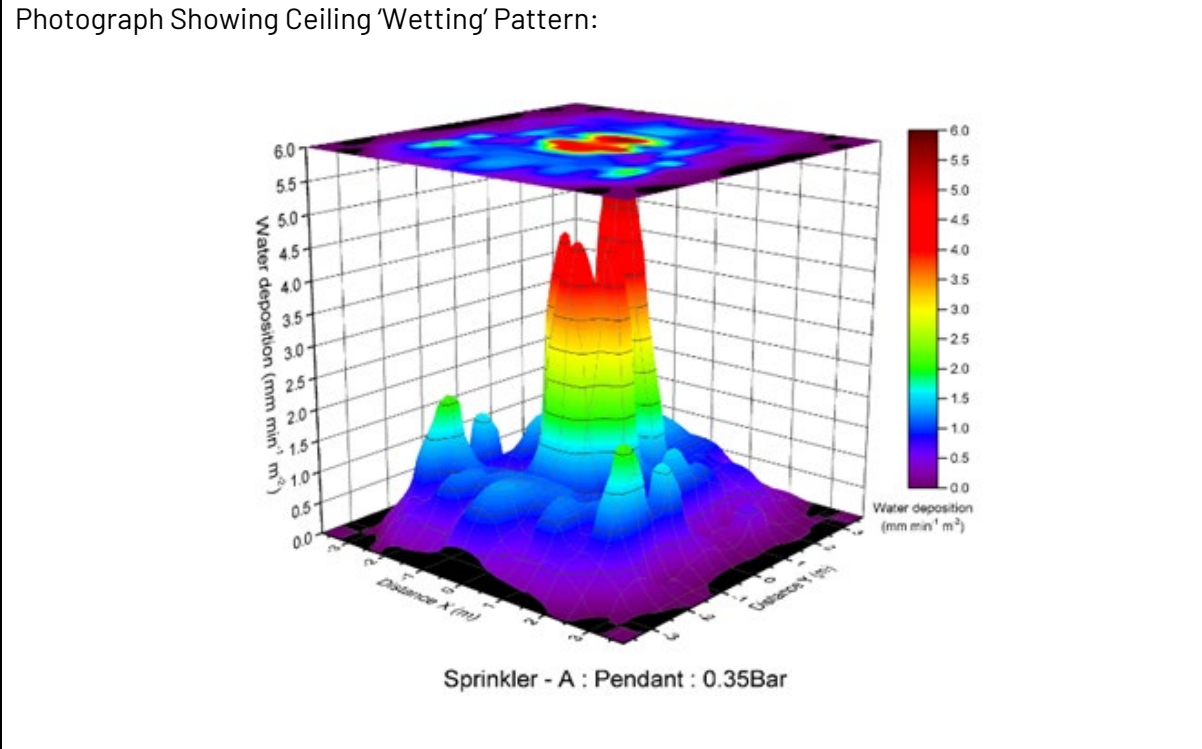


Sprinkler - E : Upright : 0.35Bar

Plan 2D Visual:



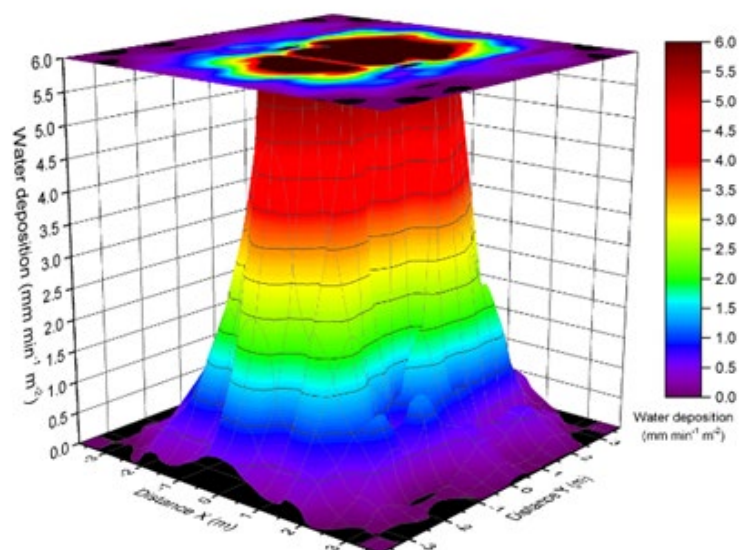
Floor Density Plot - Test Number : 03	
Date of Fire Test	18 th October 2023
Time of Fire Test	12:16
Duration of Fire Test	19 Minutes, 00 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	175 mm
Sprinkler Head Pressure	0.35 bar (0.33 bar average achieved)



Floor Density Plot - Test Number : 04

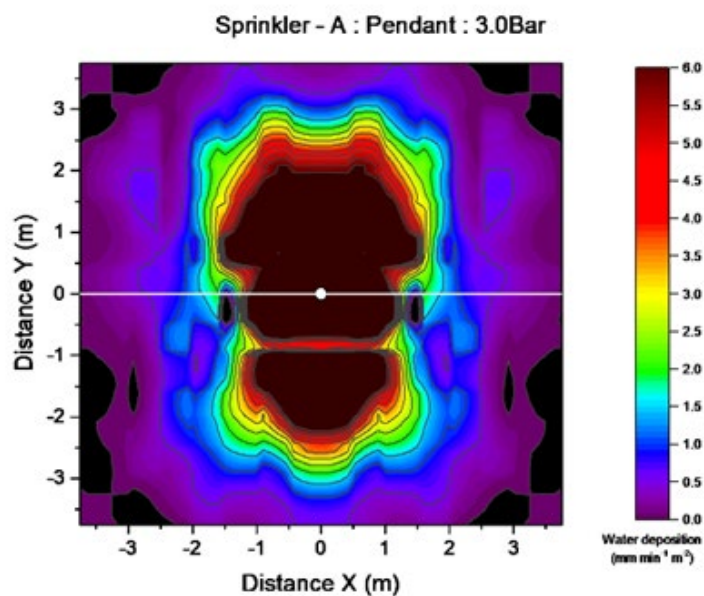
Date of Fire Test	18 th October 2023
Time of Fire Test	14:45
Duration of Fire Test	05 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	175 mm
Sprinkler Head Pressure	3.00 bar (3.02 bar average achieved)

Isometric 3D Visual:



Sprinkler - A : Pendant : 3.0Bar

Plan 2D Visual:

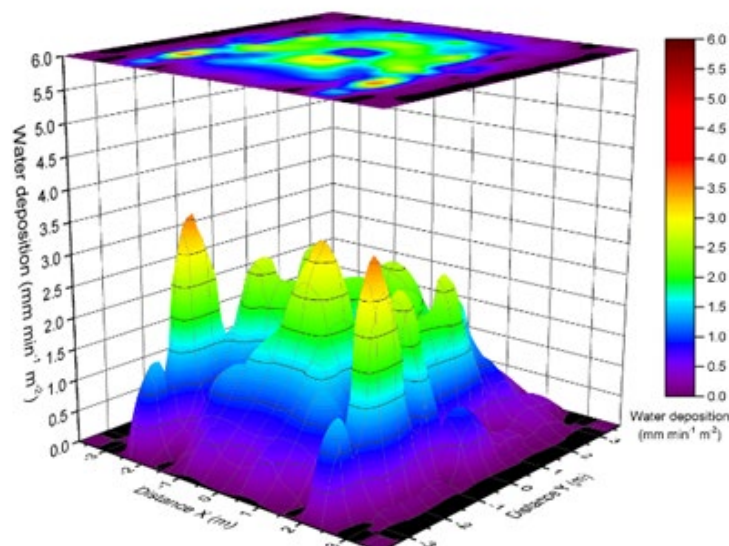


Sprinkler - A : Pendant : 3.0Bar

Floor Density Plot - Test Number : 05

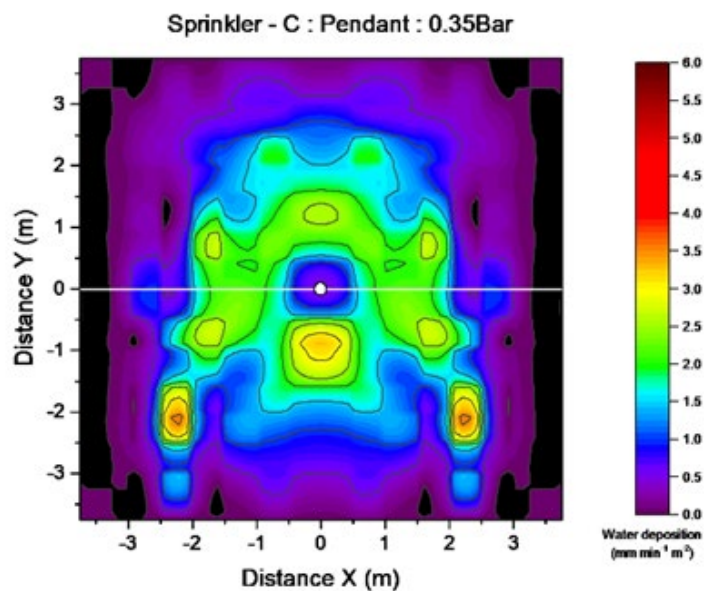
Date of Fire Test	2 nd November 2023
Time of Fire Test	10:12
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Isometric 3D Visual:



Sprinkler - C : Pendant : 0.35Bar

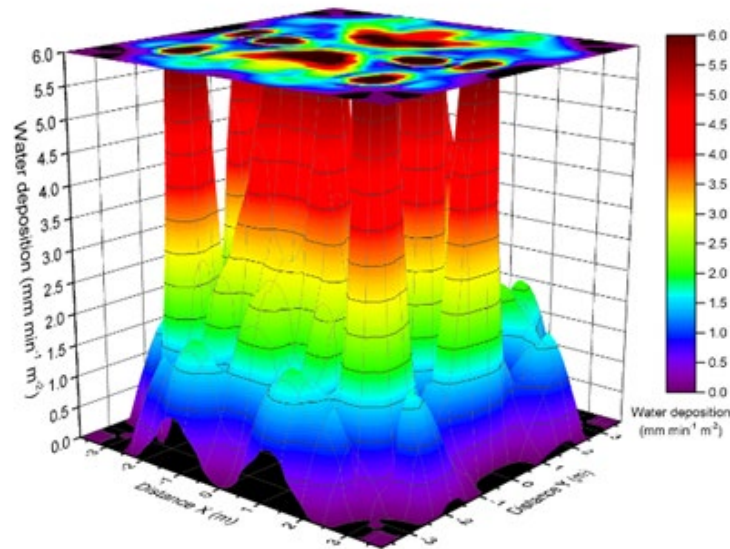
Plan 2D Visual:



Floor Density Plot - Test Number : 06

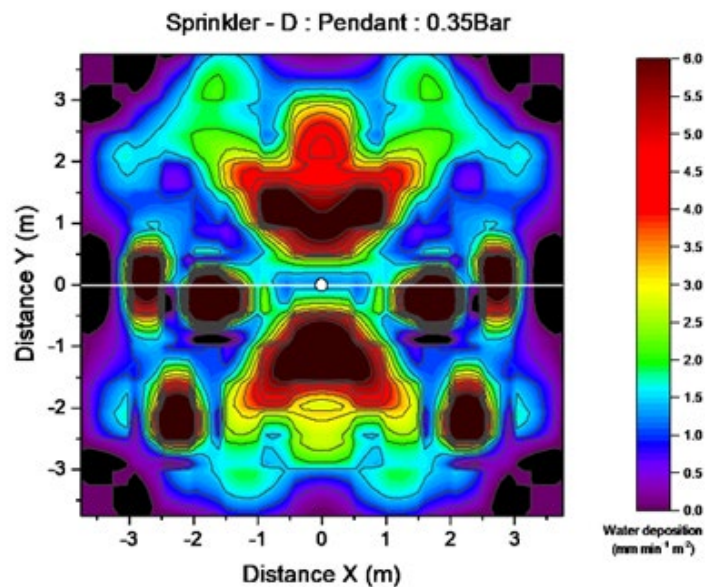
Date of Fire Test	2 nd November 2023
Time of Fire Test	12:36
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler D
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Isometric 3D Visual:



Sprinkler - D : Pendant : 0.35Bar

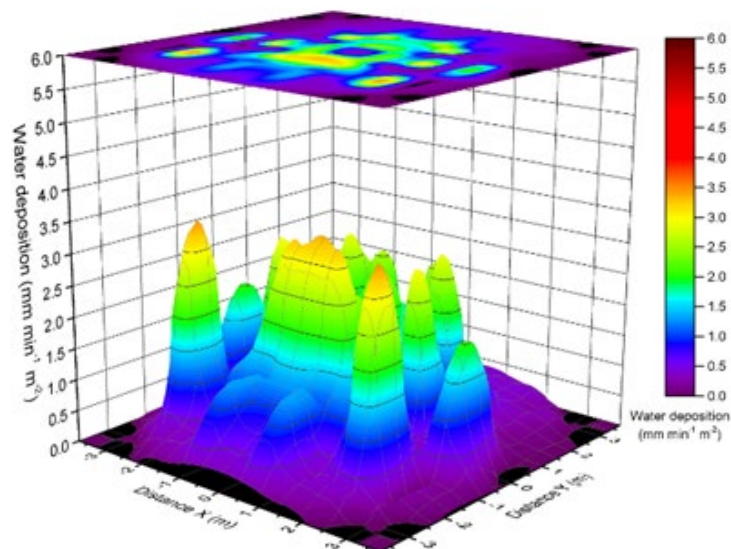
Plan 2D Visual:



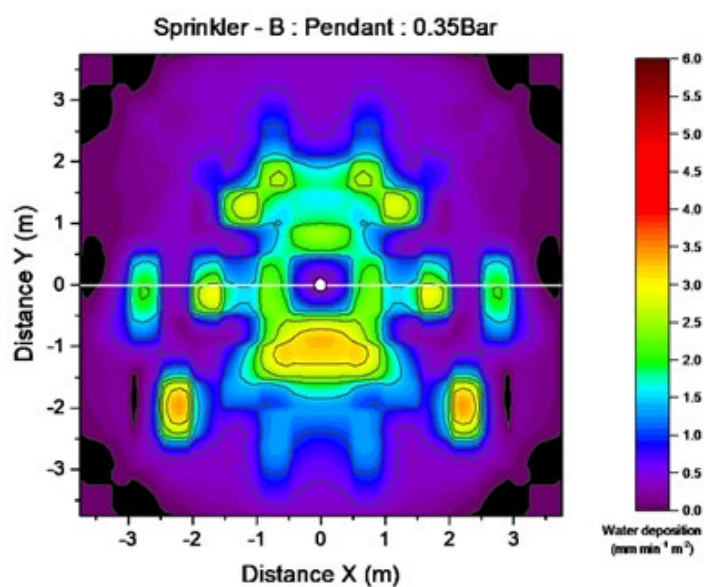
Water Distribution Spray Pattern Test Number : 07

Date of Fire Test	2 nd November 2023
Time of Fire Test	14:49
Duration of Fire Test	15 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Isometric 3D Visual:



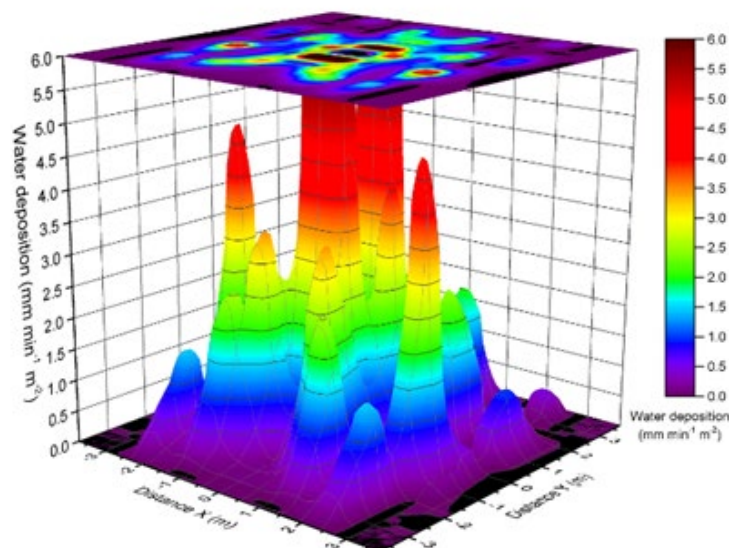
Plan 2D Visual:



Floor Density Plot - Test Number : 08

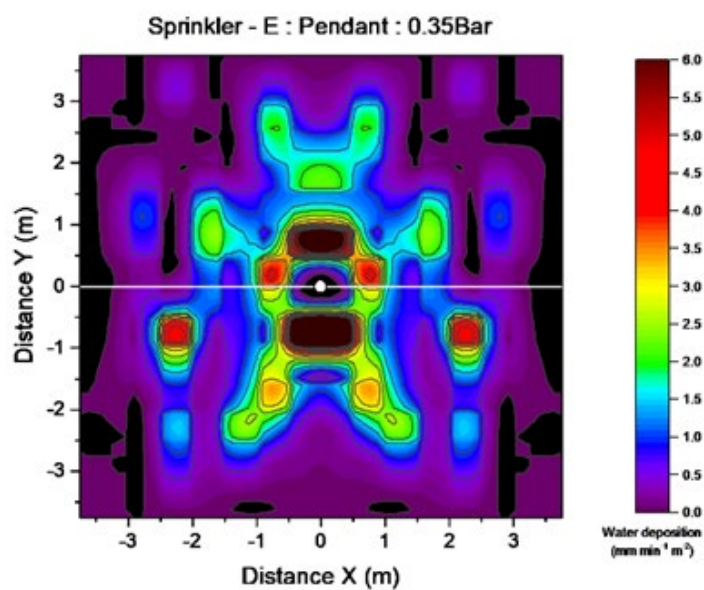
Date of Fire Test	6 th November 2023
Time of Fire Test	09:20
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Isometric 3D Visual:



Sprinkler - E : Pendant : 0.35Bar

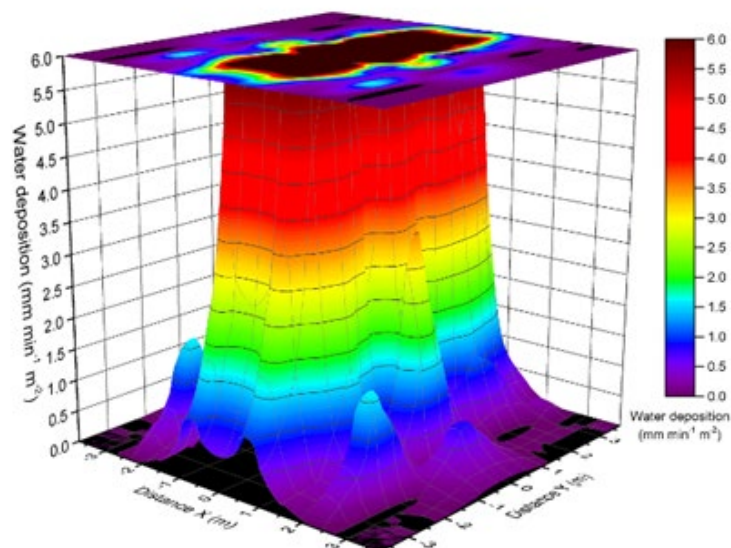
Plan 2D Visual::



Floor Density Plot - Test Number : 09

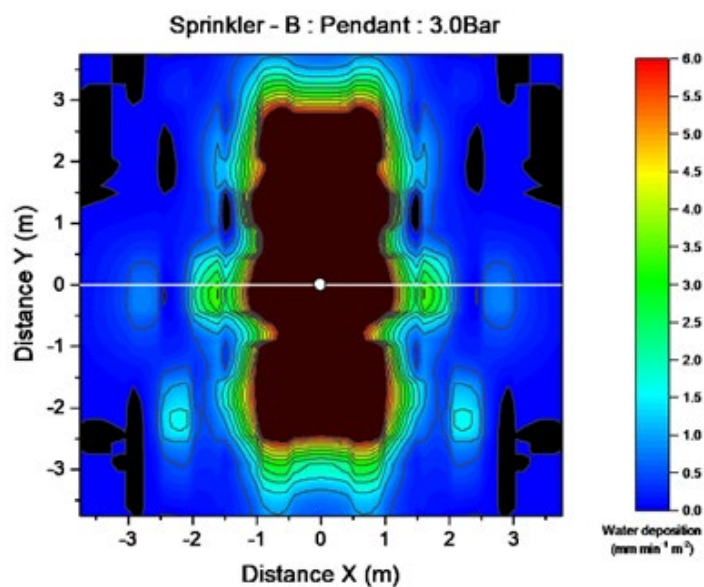
Date of Fire Test	6 th November 2023
Time of Fire Test	11:44
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	3.00 bar (3.11 bar average achieved)

Isometric 3D Visual:



Sprinkler - B : Pendant : 3.0Bar

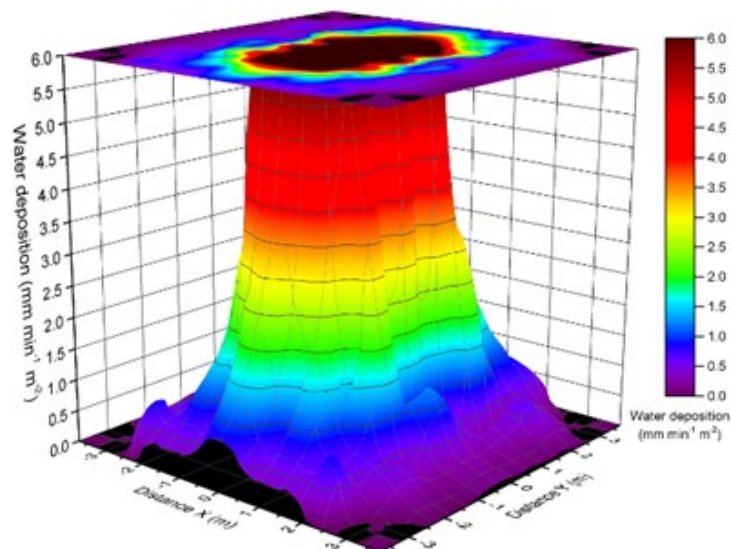
Plan 2D Visual:



Floor Density Plot - Test Number : 10

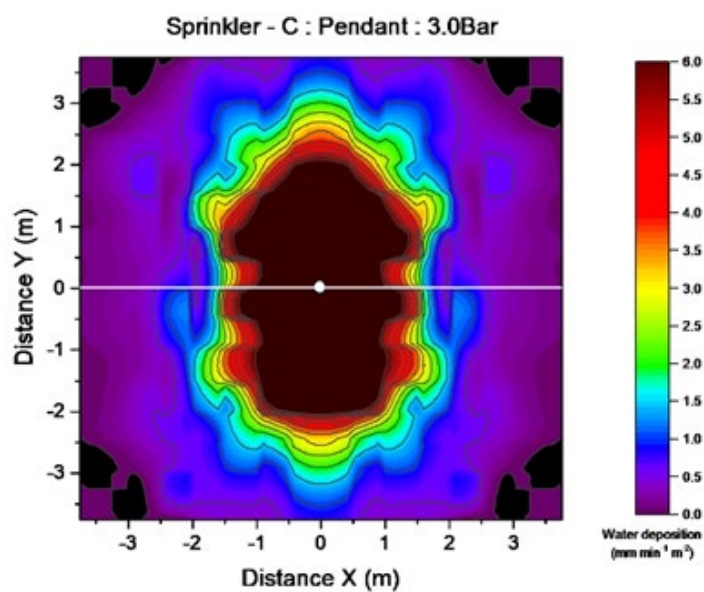
Date of Fire Test	6 th November 2023
Time of Fire Test	14:07
Duration of Fire Test	11 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Head Pressure	3.00 bar (3.10 bar average achieved)

Isometric 3D Visual:



Sprinkler - C : Pendant : 3.0Bar

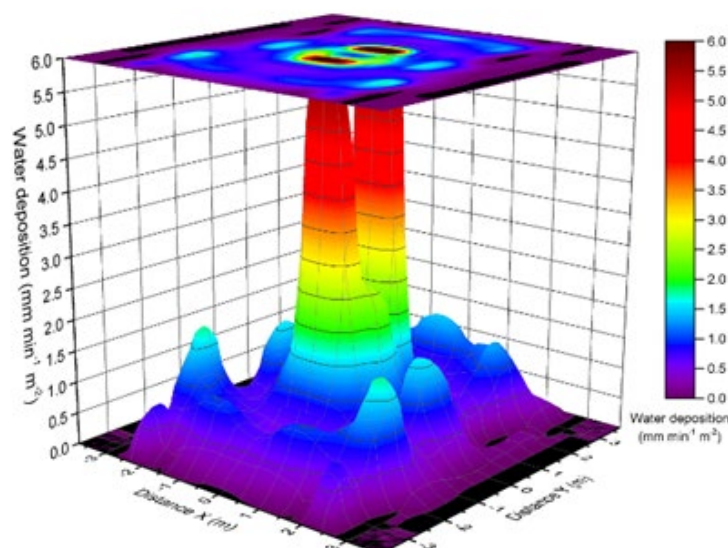
Plan 2D Visual:



Floor Density Plot - Test Number : 11

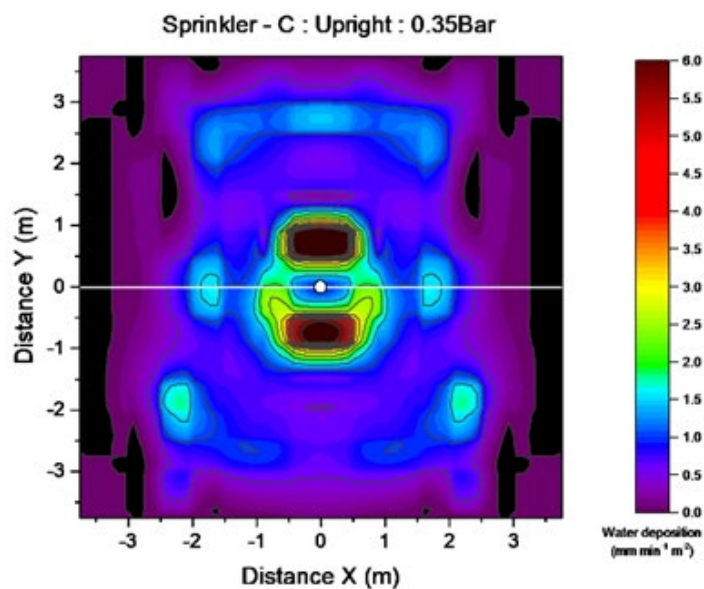
Date of Fire Test	7 th November 2023
Time of Fire Test	09:07
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.34 bar average achieved)

Isometric 3D Visual:



Sprinkler - C : Upright : 0.35Bar

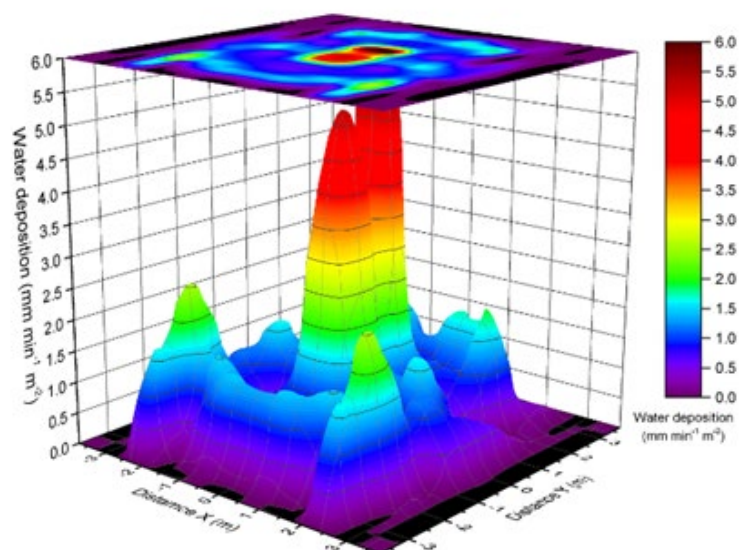
Plan 2D Visual:



Floor Density Plot - Test Number : 12

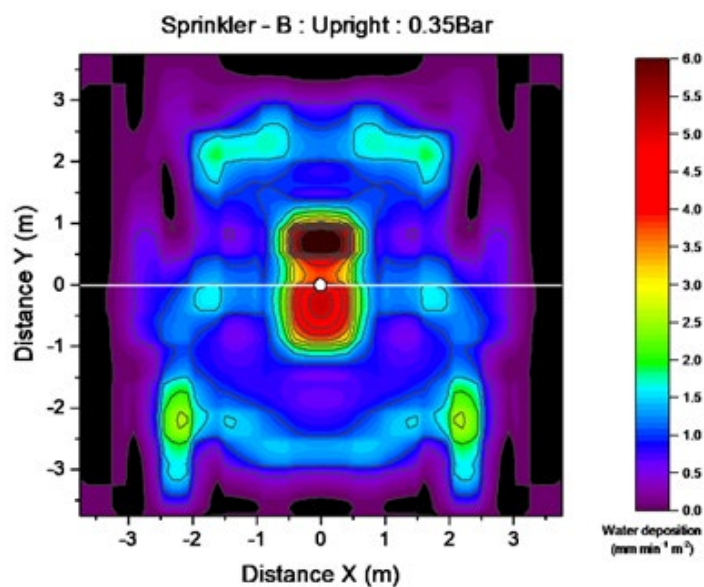
Date of Fire Test	7 th November 2023
Time of Fire Test	14:45
Duration of Fire Test	15 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Isometric 3D Visual:



Sprinkler - B : Upright : 0.35Bar

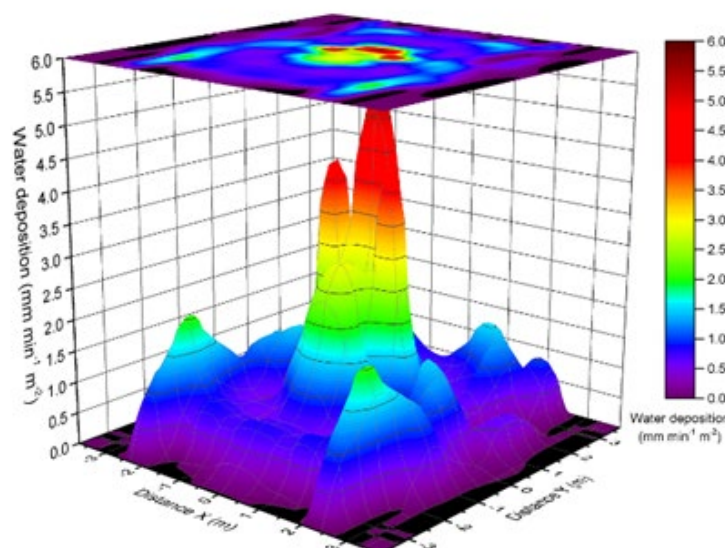
Plan 2D Visual:



Floor Density Plot - Test Number : 13

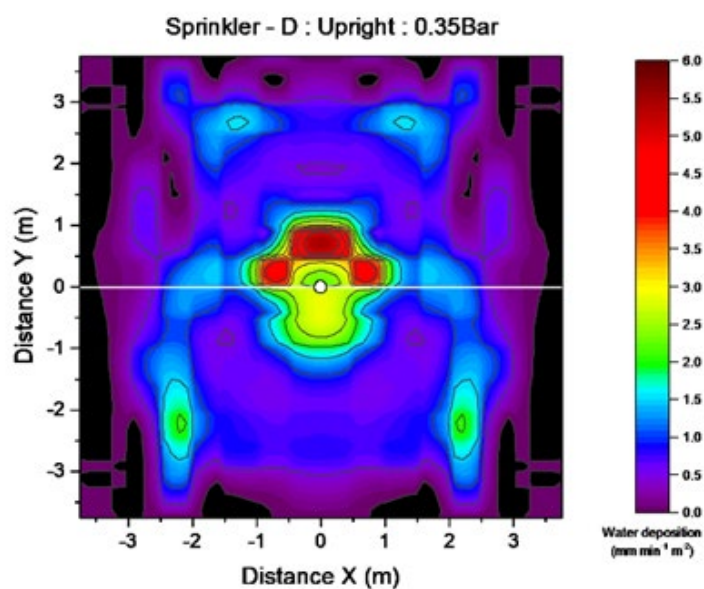
Date of Fire Test	8 th November 2023
Time of Fire Test	09:43
Duration of Fire Test	15 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler D
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.34 bar average achieved)

Isometric 3D Visual:



Sprinkler - D : Upright : 0.35Bar

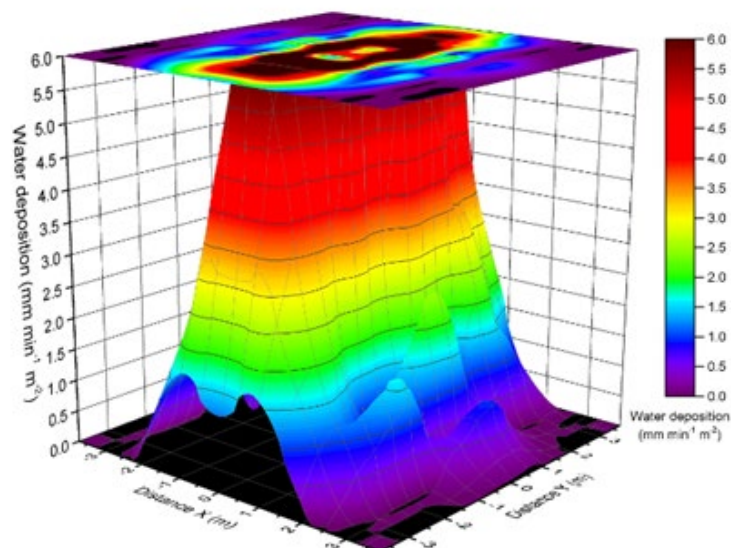
Plan 2D Visual:



Floor Density Plot - Test Number : 14

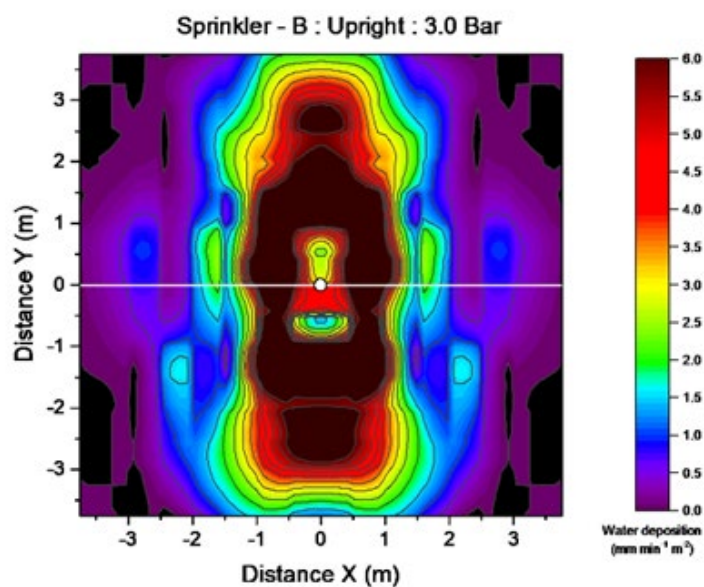
Date of Fire Test	8 th November 2023
Time of Fire Test	14:07
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.12 bar average achieved)

Isometric 3D Visual:



Sprinkler - B : Upright : 3.0 Bar

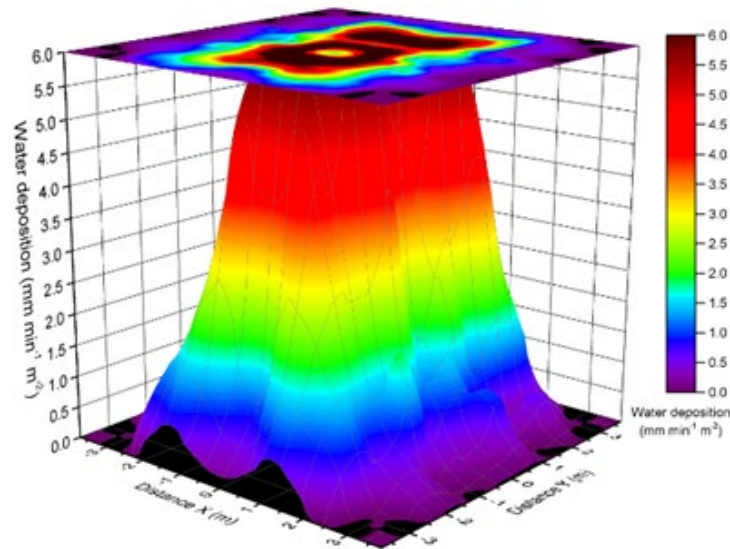
Plan 2D Visual:



Floor Density Plot - Test Number : 15

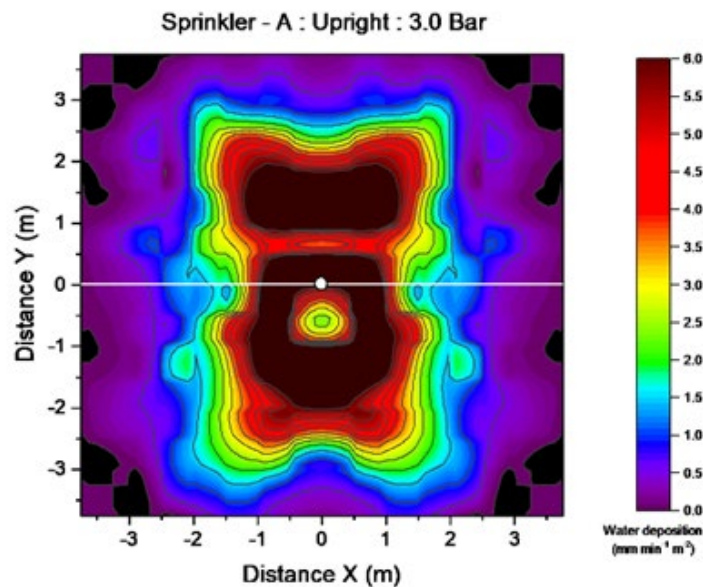
Date of Fire Test	9 th November 2023
Time of Fire Test	09:14
Duration of Fire Test	08 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.03 bar average achieved)

Isometric 3D Visual:



Sprinkler - A : Upright : 3.0 Bar

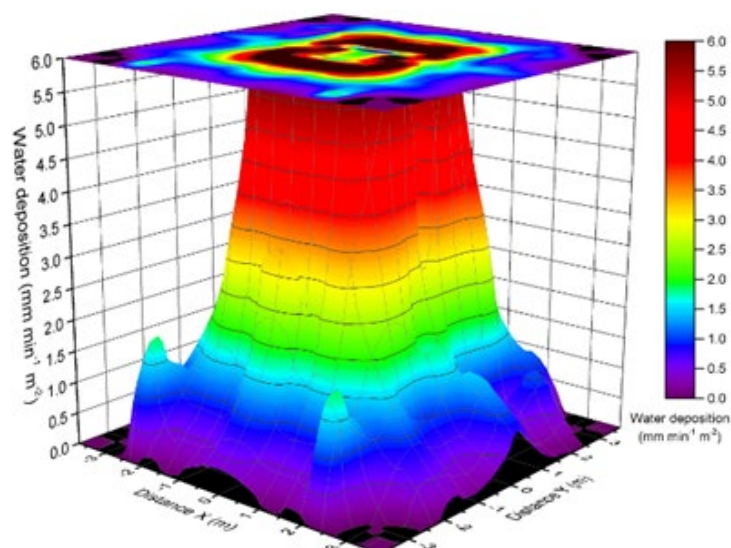
Plan 2D Visual:



Floor Density Plot - Test Number : 16

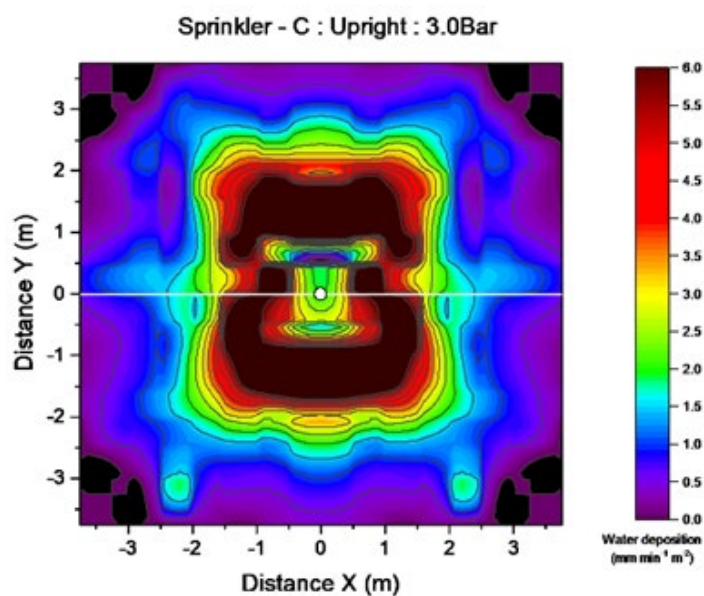
Date of Fire Test	9 th November 2023
Time of Fire Test	11:40
Duration of Fire Test	07 Minutes, 03 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.11 bar average achieved)

Isometric 3D Visual:



Sprinkler - C : Upright : 3.0Bar

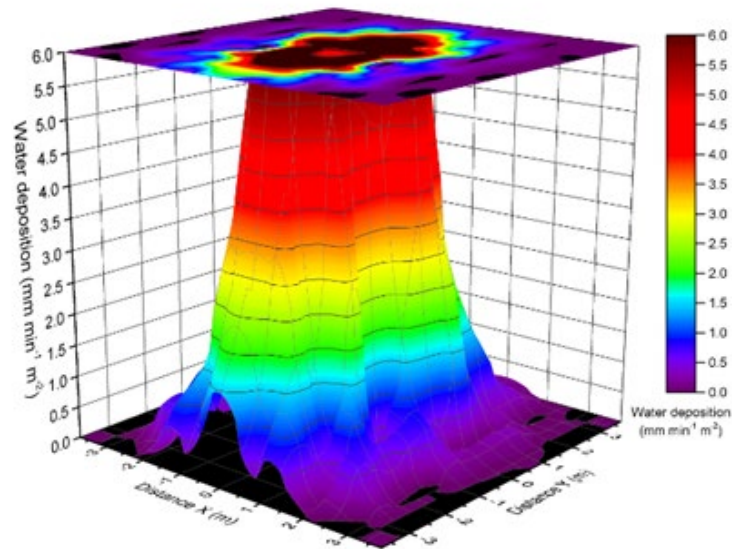
Plan 2D Visual:



Floor Density Plot - Test Number : 17

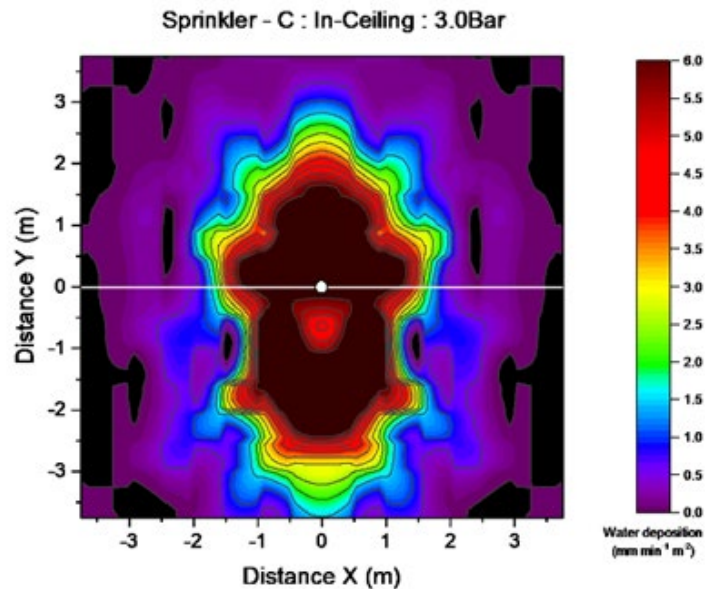
Date of Fire Test	28 th November 2023
Time of Fire Test	12:56
Duration of Fire Test	08 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant within ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Head Pressure	3.00 bar (2.85 bar average achieved)

Isometric 3D Visual:



Sprinkler - C : In-Ceiling : 3.0Bar

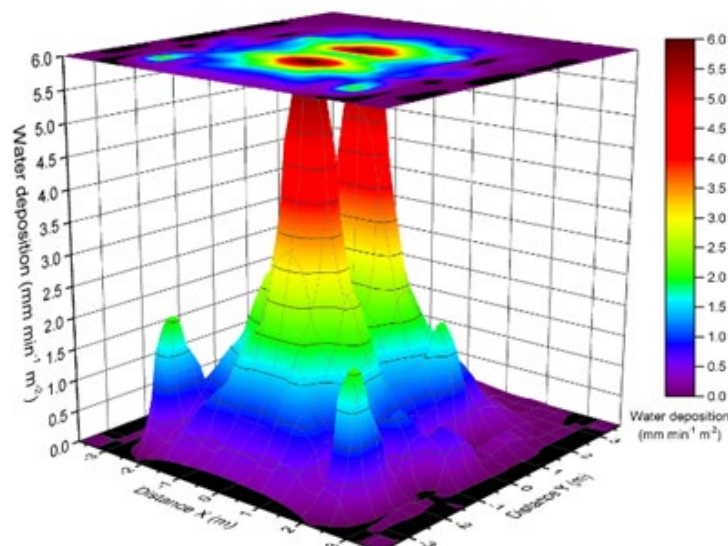
Plan 2D Visual:



Floor Density Plot - Test Number : 18

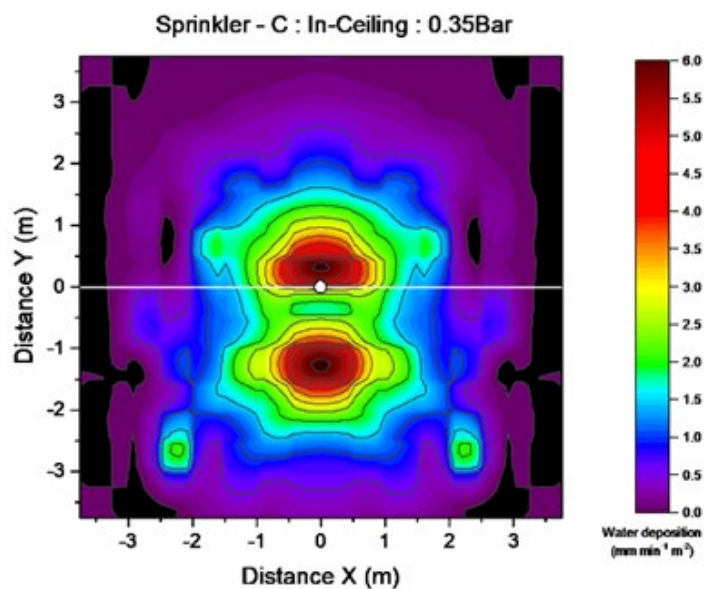
Date of Fire Test	29 th November 2023
Time of Fire Test	09:35
Duration of Fire Test	15 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant within ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Isometric 3D Visual:



Sprinkler - C : In-Ceiling : 0.35Bar

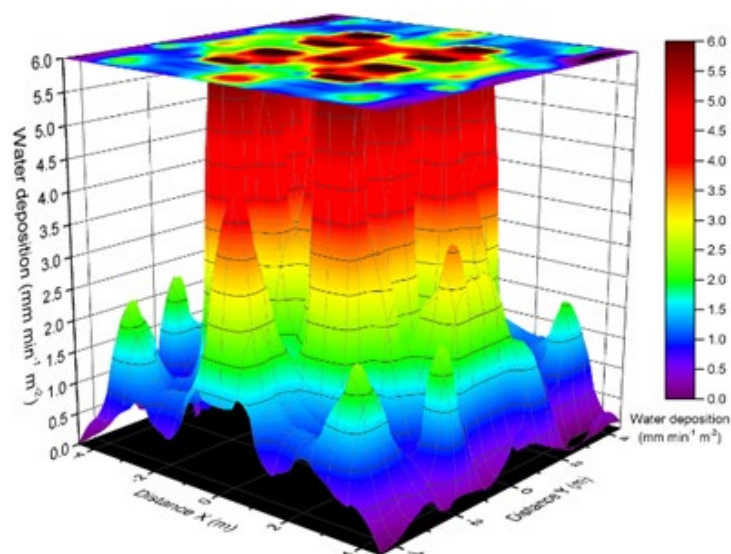
Plan 2D Visual:



Floor Density Plot - Test Number : 01

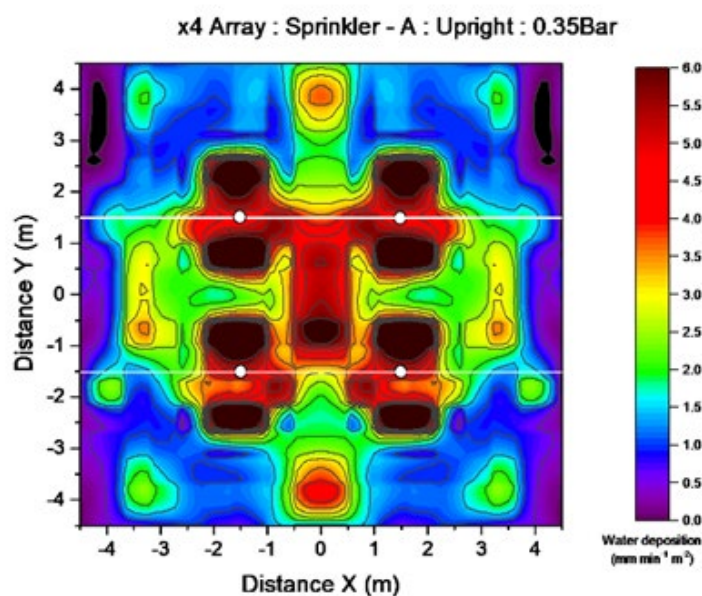
Date of Fire Test	17 th October 2023
Time of Fire Test	15:46
Duration of Fire Test	15 Minutes, 00 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	0.35 bar (0.35 bar average achieved)

Isometric 3D Visual of 4 head layout:



x4 Array : Sprinkler - A : Upright : 0.35Bar

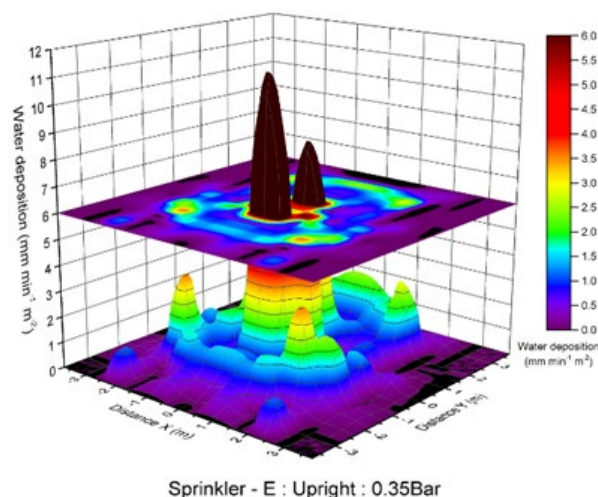
Plan 2D Visual of 4 head layout:



Floor Density Plot - Test Number : 02

Date of Fire Test	18 th October 2023
Time of Fire Test	09:44
Duration of Fire Test	13 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

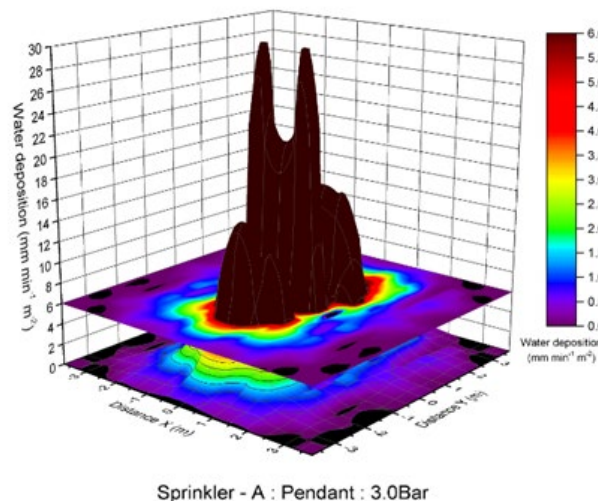
Isometric 3D Visual Unclipped:



Floor Density Plot - Test Number : 04

Date of Fire Test	18 th October 2023
Time of Fire Test	14:45
Duration of Fire Test	05 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	175 mm
Sprinkler Head Pressure	3.00 bar (3.02 bar average achieved)

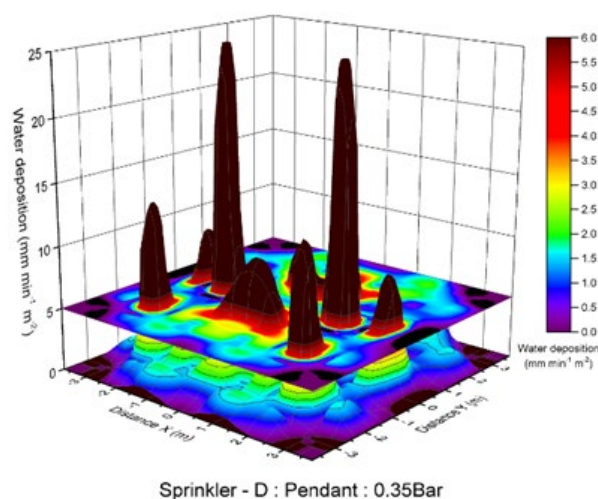
Isometric 3D Visual Unclipped:



Floor Density Plot - Test Number : 06

Date of Fire Test	2 nd November 2023
Time of Fire Test	12:36
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler D
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

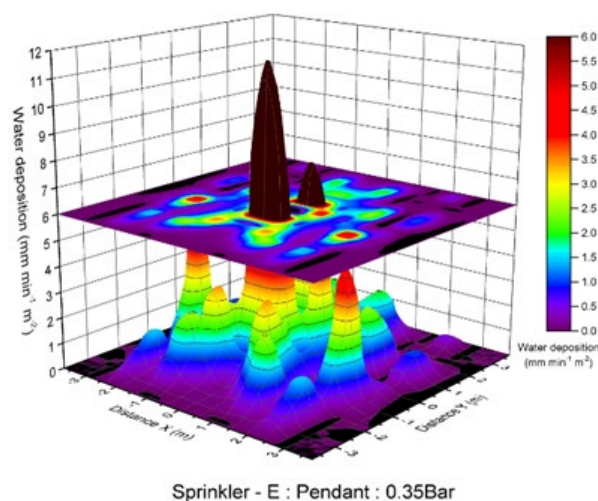
Isometric 3D Visual Unclipped:



Floor Density Plot - Test Number : 08

Date of Fire Test	6 th November 2023
Time of Fire Test	09:20
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

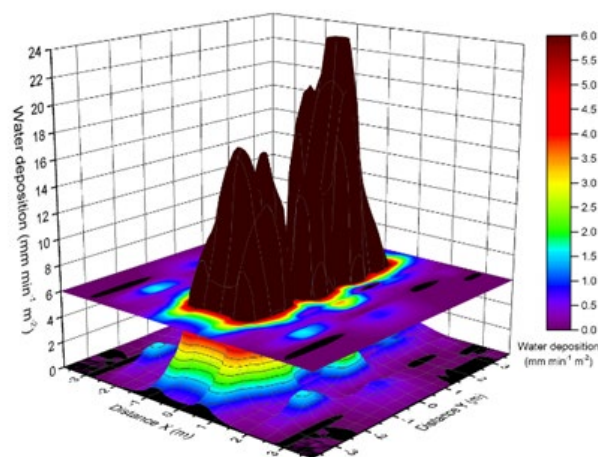
Isometric 3D Visual Unclipped:



Floor Density Plot - Test Number : 09

Date of Fire Test	6 th November 2023
Time of Fire Test	11:44
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	3.00 bar (3.11 bar average achieved)

Isometric 3D Visual Unclipped:

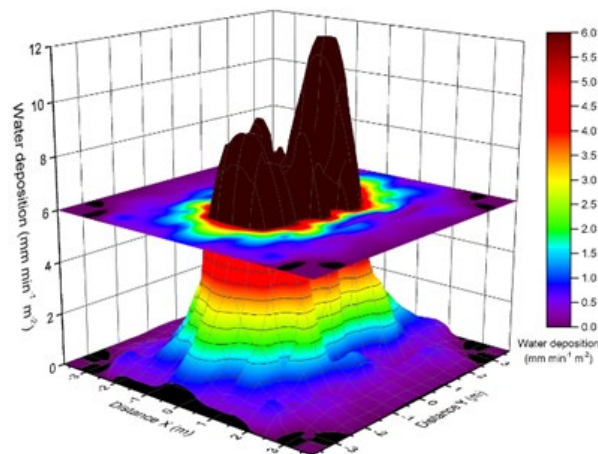


Sprinkler - B : Pendant : 3.0Bar

Floor Density Plot - Test Number : 10

Date of Fire Test	6 th November 2023
Time of Fire Test	14:07
Duration of Fire Test	11 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Head Pressure	3.00 bar (3.10 bar average achieved)

Isometric 3D Visual Unclipped:

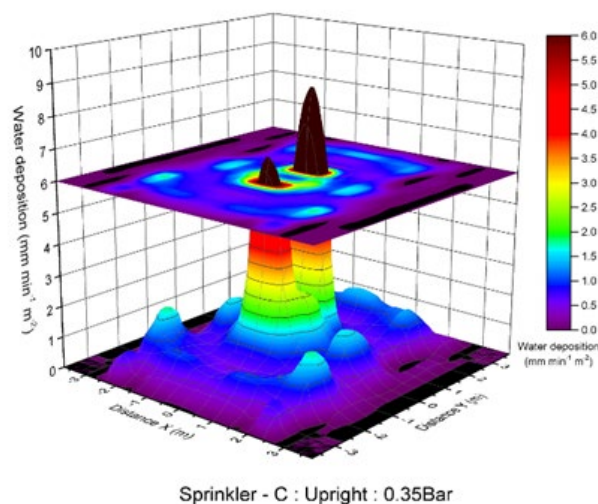


Sprinkler - C : Pendant : 3.0Bar

Floor Density Plot - Test Number : 11

Date of Fire Test	7 th November 2023
Time of Fire Test	09:07
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.34 bar average achieved)

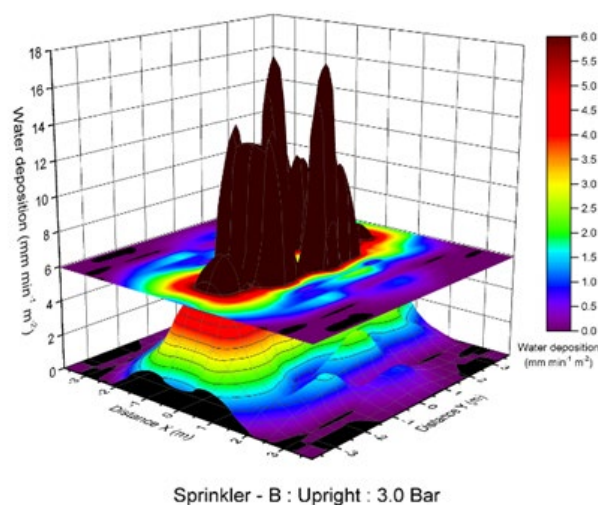
Isometric 3D Visual Unclipped:



Floor Density Plot - Test Number : 14

Date of Fire Test	8 th November 2023
Time of Fire Test	14:07
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.12 bar average achieved)

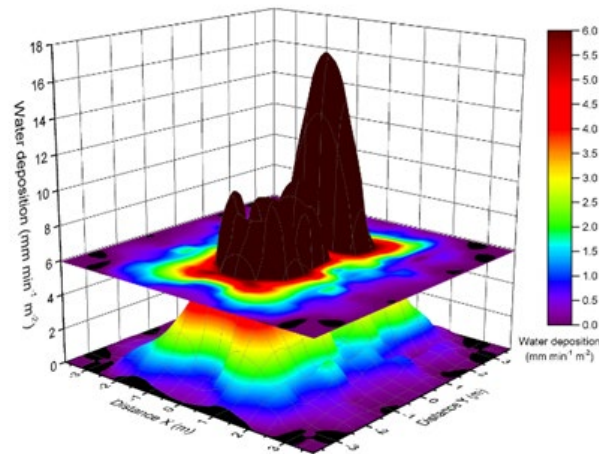
Isometric 3D Visual Unclipped:



Floor Density Plot - Test Number : 15

Date of Fire Test	9 th November 2023
Time of Fire Test	09:14
Duration of Fire Test	08 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.03 bar average achieved)

Isometric 3D Visual Unclipped:

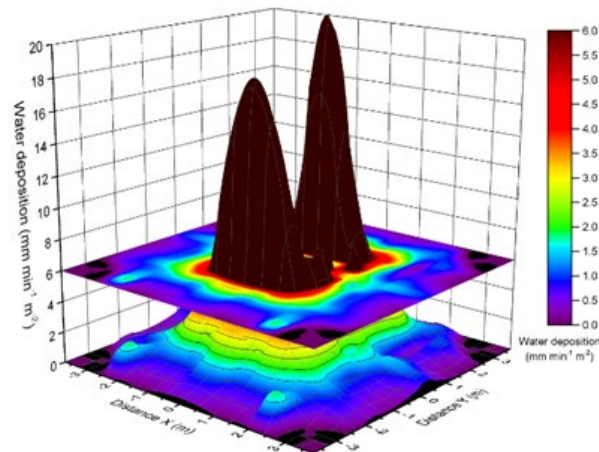


Sprinkler - A : Upright : 3.0 Bar

Floor Density Plot - Test Number : 16

Date of Fire Test	9 th November 2023
Time of Fire Test	11:40
Duration of Fire Test	07 Minutes, 03 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.11 bar average achieved)

Isometric 3D Visual Unclipped:

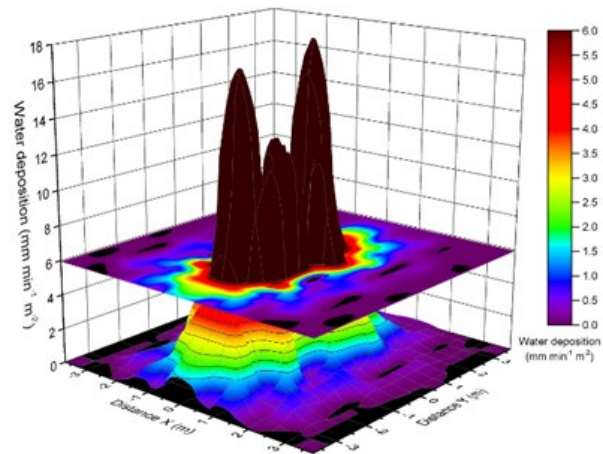


Sprinkler - C : Upright : 3.0Bar

Floor Density Plot - Test Number : 17

Date of Fire Test	28 th November 2023
Time of Fire Test	12:56
Duration of Fire Test	08 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant within ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Head Pressure	3.00 bar (2.85 bar average achieved)

Isometric 3D Visual Unclipped:



Sprinkler - C : In-Ceiling : 3.0Bar

Wall Wetting Test Number : W01

Date of Fire Test	13 th November 2023
Time of Fire Test	11:18
Duration of Fire Test	05 Minutes, 03 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	3.0 bar (3.13 bar average achieved)

Individual Density Plot:

Side Wall Test	Sprinkler C				Upright				3.0 bar			
Wall A				Wall B								
8.4	12.2	9.5	7.6	3.1	7.6	8.6	6.2					
3.3	1.8	2.9	2.2	5.0	2.8	4.7	3.6					
1.2	0.8	0.8	0.3	1.3	0.8	1.0	1.1					
0.8	0.3	0.5	0.3	0.9	0.3	0.3	0.5					
0.8	0.6	0.6	0.1	0.6	0.3	0.1	0.2					

Vertical Level	mm/min per row	
	Wall A	Wall B
Row 5	9.4	6.4
Row 4	2.5	4.0
Row 3	0.8	1.1
Row 2	0.5	0.5
Row 1	0.5	0.3

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	2.9	3.1	2.8	2.1	2.2	2.4	2.9	2.3

Mean water density per wall (mm/min)	Wall A	Wall B
	2.8	2.5

Cumulative Density Plot:

Side Wall Test		Sprinkler C		Upright		3.0 bar	
8.4	12.2	9.5	7.6	3.1	7.6	8.6	6.2
11.7	14.0	12.4	9.8	8.1	10.4	13.2	9.8
12.9	14.8	13.1	10.1	9.4	11.2	14.2	10.9
13.7	15.1	13.6	10.4	10.4	11.6	14.5	11.4
14.6	15.7	14.2	10.6	11.0	11.9	14.7	11.6

Wall A Wall B

Vertical Level	mm/min per row	
	Wall A	Wall B
Row 5	9.4	6.4
Row 4	12.0	10.4
Row 3	12.7	11.4
Row 2	13.2	12.0
Row 1	13.8	12.3

% wall wetting from sprinkler	Wall A	Wall B
	53%	47%

Wall Wetting Test Number : W02

Date of Fire Test	13 th November 2023
Time of Fire Test	12:35
Duration of Fire Test	07 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	3.0 bar (2.99 bar average achieved)

Individual Density Plot:

Side Wall Test				Sprinkler A		Upright		3.0 Bar	
6.1	6.7	5.1	6.1	4.2	2.3	2.5	3.8		
3.9	3.4	4.3	5.3	5.4	4.0	3.2	3.7		
1.4	1.0	0.9	1.8	3.2	2.5	1.1	1.5		
0.8	0.2	0.3	1.2	1.3	1.3	0.4	0.6		
0.4	0.4	0.4	0.6	0.8	0.9	0.2	0.4		
Wall A				Wall B					

Vertical Level	mm/min per row	
	Wall A	Wall B
Row 5	6.0	3.2
Row 4	4.2	4.1
Row 3	1.3	2.1
Row 2	0.6	0.9
Row 1	0.5	0.6

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	2.5	2.4	2.2	3.0	3.0	2.2	1.5	2.0

Mean water density per wall (mm/min)	mm/min per wall	
	Wall A	Wall B
	2.5	2.2

Cumulative Density Plot:

Side Wall Test				Sprinkler A		Upright		3.0 Bar		mm/min per row		
Vertical Level		Wall A		Wall B								
Row 5		6.0		3.2								
Row 4		10.2		7.3								
Row 3		11.5		9.4								
Row 2		12.1		10.3								
Row 1		12.6		10.8								

Wall A				Wall B			
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% Wall wetting from sprinkler	Wall A	Wall B
	54%	46%

Wall Wetting Test Number : W03

Date of Fire Test	13 th November 2023
Time of Fire Test	14:14
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	3.0 bar (2.98 bar average achieved)

Individual Density Plot:

Side Wall Test				Sprinkler E				Upright		3.0 Bar		mm/min per row	
Vertical Level				Wall A				Wall B		Wall A		Wall B	
Row 5				4.4				3.6					
Row 4				7.6				2.5					
Row 3				2.0				1.5					
Row 2				0.7				0.8					
Row 1				0.4				0.7					

Side Wall Test				Sprinkler E				Upright		3.0 Bar	
4.1	10.5	1.9	1.1	7.1	5.6	1.4	0.1				
9.8	7.7	7.5	5.3	4.6	2.0	0.5	3.0				
1.8	1.7	1.7	2.7	3.6	1.0	0.2	1.3				
0.8	0.4	0.4	1.1	2.0	0.7	0.1	0.5				
0.5	0.5	0.3	0.4	1.3	0.8	0.1	0.4				
Wall A				Wall B							

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	3.4	4.1	2.4	2.1	3.7	2.0	0.5	1.1

Mean water density per wall (mm/min)	Wall A	Wall B
	3.0	1.8

Cumulative Density Plot:

Side Wall Test		Sprinkler E		Upright		3.0 Bar		mm/min per row			
								Vertical Level	Wall A	Wall B	
4.1	10.5	1.9	1.1	7.1	5.6	1.4	0.1	Row 5	4.4	3.6	
13.8	18.2	9.3	6.4	11.7	7.7	2.0	3.1	Row 4	12.0	6.1	
15.6	19.9	11.1	9.2	15.3	8.6	2.2	4.4	Row 3	13.9	7.6	
16.5	20.3	11.4	10.2	17.3	9.4	2.2	4.9	Row 2	14.6	8.5	
16.9	20.7	11.8	10.6	18.7	10.1	2.3	5.4	Row 1	15.0	9.1	
Wall A				Wall B							

Wall Wetting Test Number : W04

Date of Fire Test	13 th November 2023
Time of Fire Test	15:18
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler D
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	3.0 bar (3.05 bar average achieved)

Individual Density Plot:

		Side Wall Test				Sprinkler D		Upright		3.0 Bar		mm/min per row		
												Vertical Level	Wall A	Wall B
	Row 5	8.2	9.3	4.8	5.5	3.3	3.6	8.8	9.5	6.9	6.3			
	Row 4	2.9	1.9	2.6	3.7	3.8	3.8	4.5	5.1	2.8	4.3			
	Row 3	0.8	0.0	0.5	0.5	0.8	0.5	0.9	1.7	0.4	1.0			
	Row 2	0.5	0.5	0.1	0.6	0.5	0.2	0.5	0.9	0.4	0.5			
	Row 1	0.3	0.3	0.3	0.2	0.3	0.2	0.5	0.7	0.3	0.4			
		Wall A				Wall B								

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	2.5	2.4	1.7	2.1	1.7	1.7	3.0	3.6

Mean water density per wall (mm/min)	Wall A	Wall B
	2.2	2.5

Cumulative Density Plot:

Side Wall Test		Spk D		Upright		3.0 Bar		mm/min per row		
								Vertical Level	Wall A	Wall B
8.2	9.3	4.8	5.5	3.3	3.6	8.8	9.5	Row 5	6.9	6.3
11.1	11.3	7.4	9.2	7.1	7.4	13.3	14.6	Row 4	9.7	10.6
11.8	11.3	8.0	9.7	7.9	7.9	14.2	16.3	Row 3	10.2	11.6
12.3	11.8	8.1	10.3	8.4	8.1	14.7	17.1	Row 2	10.6	12.1
12.7	12.1	8.4	10.5	8.7	8.3	15.2	17.9	Row 1	10.9	12.5
Wall A				Wall B						
								% Wall wetting from sprinkler	Wall A	Wall B
									47%	53%

Wall Wetting Test Number : W05

Date of Fire Test	13 th November 2023
Time of Fire Test	16:18
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	3.0 bar (3.09 bar average achieved)

Individual Density Plot:

Side Wall Test Sprinkler B Upright 3.0 bar

Wall A				Wall B			
7.5	10.7	8.5	6.0	0.8	0.4	1.4	1.4
8.7	6.6	8.0	9.1	3.1	1.5	2.3	3.0
1.4	1.2	0.9	0.7	1.0	1.1	1.0	0.7
0.6	0.4	0.4	0.6	1.8	0.5	0.4	0.7
0.5	0.5	0.5	0.1	0.5	0.2	0.2	0.3

mm/min per row

Vertical Level	Wall A	Wall B
Row 5	8.2	1.0
Row 4	8.1	2.5
Row 3	1.1	0.9
Row 2	0.5	0.8
Row 1	0.4	0.3

Horizontal position

	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	3.7	3.9	3.7	3.3	1.4	0.7	1.1	1.2

Mean water density per wall (mm/min)

	Wall A	Wall B
	3.7	1.1

Cumulative Density Plot:

Side Wall Test		Sprinkler B		Upright		3.0 bar	
7.5	10.7	8.5	6.0	0.8	0.4	1.4	1.4
16.2	17.3	16.5	15.1	3.9	1.9	3.7	4.4
17.5	18.5	17.5	15.8	4.9	3.0	4.7	5.1
18.2	18.9	17.9	16.3	6.7	3.5	5.1	5.7
18.7	19.4	18.4	16.5	7.2	3.7	5.3	6.1

mm/min per row

Vertical Level	Wall A	Wall B
Row 5	8.2	1.0
Row 4	16.3	3.5
Row 3	17.3	4.4
Row 2	17.8	5.3
Row 1	18.3	5.6

Wall A Wall B

% wall wetting from sprinkler	Wall A	Wall B
	77%	23%

Wall Wetting Test Number : W06

Date of Fire Test	14 th November 2023
Time of Fire Test	09:29
Duration of Fire Test	05 Minutes, 03 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	3.0 bar (3.10 bar average achieved)

Individual Density Plot:

Side Wall Test				Sprinkler B		Upright 1.1		3.0 Bar	
9.3	9.1	11.4	7.8	4.1	1.3	3.8	5.0		
11.5	8.3	9.0	11.0	10.7	3.3	4.9	4.7		
2.4	1.3	1.2	1.2	1.2	1.2	1.3	1.3		
1.1	0.2	0.6	1.0	0.6	0.5	0.3	0.3		
0.7	0.4	0.7	0.4	0.4	0.4	0.1	0.2		
Wall A				Wall B					

mm/min per row		
Vertical Level	Wall A	Wall B
Row 5	9.4	3.6
Row 4	10.0	5.9
Row 3	1.6	1.2
Row 2	0.7	0.4
Row 1	0.6	0.3

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	5.0	3.9	4.6	4.3	3.4	1.3	2.1	2.3

Mean water density per wall (mm/min)		
Wall A	Wall B	
4.4	2.3	

Cumulative Density Plot:

								mm/min per row		
Side Wall Test		Sprinkler B		Upright		3.0 Bar		Vertical Level	Wall A	Wall B
9.3	9.1	11.4	7.8	4.1	1.3	3.8	5.0	Row 5	9.4	3.6
20.8	17.4	20.5	18.7	14.9	4.6	8.8	9.7	Row 4	19.4	9.5
23.2	18.8	21.7	20.0	16.1	5.8	10.1	10.9	Row 3	20.9	10.7
24.3	19.0	22.3	21.0	16.7	6.2	10.3	11.2	Row 2	21.6	11.1
25.0	19.4	23.0	21.4	17.1	6.6	10.5	11.5	Row 1	22.2	11.4
Wall A				Wall B						
								% Wall wetting from sprinkler	Wall A	Wall B
									66%	34%

Wall Wetting Test Number : W07

Date of Fire Test	14 th November 2023
Time of Fire Test	12:23
Duration of Fire Test	10 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	0.35 bar (0.34 bar average achieved)

Individual Density Plot:

Side Wall Test				Sprinkler B		Upright		0.35 Bar	
0.5	1.0	0.2	0.2	0.2	0.1	0.8	0.2		
2.3	2.6	2.3	1.0	1.1	1.9	2.9	2.0		
1.1	1.0	1.1	1.2	1.3	0.9	0.8	2.1		
0.3	0.0	0.0	0.5	0.5	0.1	0.2	0.6		
0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.4		
Wall A				Wall B					

mm/min per row		
Vertical Level	Wall A	Wall B
Row 5	0.5	0.3
Row 4	2.1	2.0
Row 3	1.1	1.3
Row 2	0.2	0.3
Row 1	0.1	0.2

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	0.9	1.0	0.8	0.6	0.7	0.6	0.9	1.0

Mean water density per wall (mm/min)		
Wall A	Wall B	
0.8	0.8	

Cumulative Density Plot:

								mm/min per row		
Side Wall Test		Sprinkler B		Upright		0.35 Bar		Vertical Level	Wall A	Wall B
0.5	1.0	0.2	0.2	0.2	0.1	0.8	0.2	Row 5	0.5	0.3
2.8	3.6	2.6	1.2	1.3	2.0	3.7	2.2	Row 4	2.5	2.3
4.0	4.6	3.6	2.4	2.6	2.9	4.5	4.3	Row 3	3.6	3.6
4.2	4.6	3.6	2.8	3.1	3.1	4.6	4.9	Row 2	3.8	3.9
4.3	4.8	3.8	2.9	3.3	3.1	4.7	5.2	Row 1	3.9	4.1
Wall A				Wall B						
								% Wall wetting from sprinkler	Wall A	Wall B
									49%	51%

Wall Wetting Test Number : W08

Date of Fire Test	14 th November 2023
Time of Fire Test	15:08
Duration of Fire Test	10 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	0.35 bar (0.35 bar average achieved)

Individual Density Plot:

Side Wall Test				Sprinkler A				Upright				0.35 Bar																			
2.0				2.1				1.3				0.5				0.4				0.2				0.1				0.2			
2.8				2.7				2.5				1.9				1.2				0.6				0.1				0.4			
0.8				0.8				1.1				1.5				1.7				0.5				0.1				0.5			
0.2				0.0				0.1				0.8				0.9				0.3				0.2				0.6			
0.0				0.1				0.3				0.1				0.4				0.2				0.1				0.5			
Wall A								Wall B																							

		mm/min per row	
Vertical Level	Wall A	Wall B	
Row 5	1.4	0.2	
Row 4	2.5	0.6	
Row 3	1.0	0.7	
Row 2	0.3	0.5	
Row 1	0.1	0.3	

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	1.2	1.1	1.0	0.9	0.9	0.3	0.1	0.4

Mean water density per wall (mm/min)	Wall A	Wall B
	1.1	0.5

Cumulative Density Plot:

Side Wall Test				Sprinkler A		Upright		0.35 Bar		mm/min per row				
										Vertical Level	Wall A	Wall B		
2.0				2.1		1.3		0.5		0.4			0.2	
4.8				4.8		3.7		2.3		1.6			0.7	
5.6				5.6		4.8		3.8		3.4			1.2	
5.9				5.6		4.9		4.6		4.3			1.5	
5.9				5.7		5.2		4.7		4.6			1.7	
Wall A								Wall B						
</														

Wall Wetting Test Number : W09

Date of Fire Test	14 th November 2023
Time of Fire Test	15:54
Duration of Fire Test	10 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Test Head Pressure	0.35 bar (0.35 bar average achieved)

Individual Density Plot:

Side Wall Test Sprinkler C Upright 0.35 Bar

Wall A				Wall B			
1.4	1.2	1.2	0.2	0.3	0.5	0.1	0.2
1.8	1.8	1.7	1.6	1.8	1.2	0.9	1.5
0.3	0.3	0.3	0.5	0.6	0.5	1.2	1.2
0.2	0.0	0.0	0.4	0.3	0.2	0.5	0.4
0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4

mm/min per row

Vertical Level	Wall A	Wall B
Row 5	1.0	0.2
Row 4	1.7	1.3
Row 3	0.3	0.9
Row 2	0.1	0.4
Row 1	0.1	0.2

Horizontal position

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	0.7	0.7	0.6	0.6	0.6	0.5	0.6	0.7

Mean water density per wall (mm/min)

Mean water density per wall (mm/min)	Wall A	Wall B
	0.7	0.6

Cumulative Density Plot:

Side Wall Test		Sprinkler C		Upright		0.35 Bar	
1.4	1.2	1.2	0.2	0.3	0.5	0.1	0.2
3.3	3.0	2.8	1.9	2.1	1.7	0.9	1.6
3.6	3.3	3.1	2.3	2.7	2.2	2.2	2.9
3.7	3.3	3.1	2.7	3.1	2.4	2.7	3.2
3.7	3.4	3.2	2.8	3.2	2.6	3.0	3.6

mm/min per row		
Vertical Level	Wall A	Wall B
Row 5	1.0	0.2
Row 4	2.8	1.6
Row 3	3.1	2.5
Row 2	3.2	2.9
Row 1	3.3	3.1

% Wall wetting from sprinkler	Wall A	Wall B
	51%	49%

Wall Wetting Test Number : W10

Date of Fire Test	15 th November 2023
Time of Fire Test	08:43
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Test Head Pressure	3.0 bar (3.12 bar average achieved)

Individual Density Plot:

Side Wall Test	Sprinkler C	Pendant	3.0 Bar
8.9	8.7	8.5	1.6
4.9	3.2	4.7	5.2
2.5	2.6	2.3	0.5
1.2	0.8	0.9	0.7
0.5	0.6	0.7	0.2

Wall A

Pendant	3.0 Bar
4.2	3.0
3.3	1.8
2.7	1.0
2.0	0.9
1.1	0.8

Wall B

Cumulative Density Plot:

Side Wall Test				Sprinkler C				Pendant				3.0 Bar				mm/min per row			
Vertical Level		Wall A		Wall B		Vertical Level		Wall A		Wall B		Vertical Level		Wall A		Wall B			
Row 5		6.9		3.0		Row 4		11.4		4.7		Row 3		13.4		5.8			
Row 2		14.3		6.8		Row 1		14.8		7.4		% Wall wetting from sprinkler		Wall A		Wall B			
67%		33%																	
8.9		8.7		8.5		1.6		4.2		3.0		3.1		1.7					
13.8		11.9		13.3		6.8		7.5		4.8		3.9		2.6					
16.3		14.5		15.5		7.3		10.2		5.8		4.3		3.1					
17.5		15.3		16.5		8.0		12.2		6.7		4.6		3.6					
17.9		15.9		17.2		8.2		13.3		7.4		4.8		4.0					
Wall A								Wall B											

Wall Wetting Test Number : W11

Date of Fire Test	15 th November 2023
Time of Fire Test	09:32
Duration of Fire Test	06 Minutes, 002 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	175 mm
Sprinkler Test Head Pressure	3.0 bar (3.00 bar average achieved)

Individual Density Plot:

		Side Wall Test				Sprinkler A				Pendant				3.0 Bar			
		7.6		9.0		7.1		6.6		4.8		1.1		4.5		1.9	
		3.6		3.4		4.2		2.1		3.5		0.7		3.8		3.1	
		1.3		1.3		1.6		0.7		2.0		0.4		1.4		1.3	
		0.6		0.3		0.6		0.9		1.2		0.2		0.6		0.6	
		0.2		0.4		0.6		0.3		0.7		0.2		0.5		0.3	
		Wall A								Wall B							

Vertical Level	mm/min per row	
	Wall A	Wall B
Row 5	7.6	3.1
Row 4	3.3	2.8
Row 3	1.2	1.3
Row 2	0.6	0.7
Row 1	0.4	0.4

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	2.7	2.9	2.8	2.1	2.5	0.5	2.1	1.5

Mean water density per wall (mm/min)	Wall A	Wall B
	2.6	1.6

Cumulative Density Plot:

Side Wall Test		Sprinkler A		Pendant		3.0 Bar		mm/min per row		
								Vertical Level	Wall A	Wall B
7.6	9.0	7.1	6.6	4.8	1.1	4.5	1.9	Row 5	7.6	3.1
11.2	12.5	11.3	8.7	8.3	1.8	8.2	5.0	Row 4	10.9	5.8
12.5	13.8	12.9	9.3	10.4	2.2	9.6	6.3	Row 3	12.1	7.1
13.1	14.1	13.5	10.2	11.6	2.4	10.2	6.9	Row 2	12.7	7.8
13.3	14.4	14.1	10.5	12.3	2.6	10.7	7.3	Row 1	13.1	8.2
Wall A				Wall B						
								% Wall wetting from sprinkler	Wall A	Wall B
									61%	39%

Wall Wetting Test Number : W12

Date of Fire Test	15 th November 2023
Time of Fire Test	10:43
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Test Head Pressure	3.0 bar (3.02 bar average achieved)

Individual Density Plot:

Side Wall Test	Sprinkler E				Pendant			
Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Vertical Level	Wall A	Wall B
Row 5	6.1	1.7
Row 4	4.8	1.2
Row 3	3.0	0.7
Row 2	1.0	0.5
Row 1	0.7	0.4

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.1	3.7	3.7	1.0	1.7	0.6	0.3	0.9

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3</
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Cumulative Density Plot:

Side Wall Test		Sprinkler E		Pendant		3.0 Bar		mm/min per row		
								Vertical Level	Wall A	Wall B
8.2	7.1	6.6	2.5	4.4	1.6	0.3	0.4	Row 5	6.1	1.7
14.0	12.1	13.6	4.0	6.2	2.7	0.8	2.0	Row 4	10.9	2.9
18.1	16.3	17.2	4.2	7.0	3.0	1.1	3.3	Row 3	14.0	3.6
19.4	17.6	18.0	4.8	7.9	3.1	1.2	4.1	Row 2	15.0	4.1
20.4	18.4	18.6	5.1	8.7	3.2	1.3	4.6	Row 1	15.6	4.4
Wall A				Wall B						
								% Wall wetting from sprinkler	Wall A	Wall B
									78%	22%

Wall Wetting Test Number : W13

Date of Fire Test	15 th November 2023
Time of Fire Test	11:27
Duration of Fire Test	06 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Test Head Pressure	3.0 bar (3.10 bar average achieved)

Individual Density Plot:

Figure 10 displays the comparison of water density per wall (mm/min) for the 3.0 bar test. The data is presented in three main tables, with a summary table at the bottom.

Side Wall Test Data (mm/min per row):

Vertical Level	Wall A	Wall B
Row 5	9.4	0.6
Row 4	4.2	0.5
Row 3	4.1	0.2
Row 2	2.2	0.4
Row 1	2.2	0.3

Sprinkler B Data (mm/min per row):

Vertical Level	Wall A	Wall B
Row 5	11.8	0.1
Row 4	6.3	0.2
Row 3	7.1	0.1
Row 2	5.6	0.4
Row 1	4.1	0.7

Pendant Data (mm/min per row):

Vertical Level	Wall A	Wall B
Row 5	7.0	0.6
Row 4	2.5	0.4
Row 3	2.5	0.4
Row 2	3.3	0.4
Row 1	3.4	0.4

Horizontal position Data (mm/min per column):

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	4.4	7.0	3.7	0.4	0.3	0.4	1.0	0.4

Mean water density per wall (mm/min):

Mean water density per wall (mm/min)	Wall A	Wall B
	3.9	0.5

Cumulative Density Plot:

Side Wall Test		Sprinkler B		Pendant		3.0 bar		mm/min per row		
								Vertical Level	Wall A	Wall B
9.4	11.8	7.0	0.5	0.1	0.6	1.0	0.6	Row 5	7.2	0.6
13.6	18.1	9.5	0.8	0.3	1.1	2.2	1.2	Row 4	10.5	1.2
17.7	25.2	12.0	1.5	0.4	1.4	3.3	1.4	Row 3	14.1	1.6
19.8	30.8	15.3	1.5	0.8	1.8	4.3	1.8	Row 2	16.9	2.2
22.0	34.8	18.7	2.0	1.5	2.2	4.9	2.0	Row 1	19.4	2.6
Wall A				Wall B						
								% wall wetting from sprinkler	Wall A	Wall B
									88%	12%

Wall Wetting Test Number : W14

Date of Fire Test	15 th November 2023
Time of Fire Test	12:07
Duration of Fire Test	05 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler D
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Test Head Pressure	3.0 bar (3.05 bar average achieved)

Individual Density Plot:

Side Wall Test		Sprinkler D		Pendant		3.0 bar		mm/min per row			
Vertical Level	Wall A	Wall B	Wall A	Wall B	Wall A	Wall B	Wall A	Wall B	Row 5	5.2	3.2
Row 5	8.0	6.8	5.1	1.1	1.0	3.7	4.3	3.9	Row 4	2.4	1.3
Row 4	5.0	1.5	2.6	0.4	0.2	0.7	3.3	0.9	Row 3	3.0	1.8
Row 3	5.8	3.9	2.2	0.0	0.1	0.3	5.9	0.8	Row 2	2.6	3.2
Row 2	3.3	5.1	1.6	0.4	0.2	0.5	8.9	3.4	Row 1	1.6	2.8
Row 1	2.0	3.2	1.2	0.1	0.3	0.5	6.0	4.2			
Wall A				Wall B							

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4	Mean water density per wall (mm/min)	
mm/min per column	4.8	4.1	2.5	0.4	0.4	1.1	5.7	2.6	Wall A	Wall B
									3.0	2.5

Cumulative Density Plot:

Side Wall Test		Sprinkler D		Pendant		3.0 bar		mm/min per row		
								Vertical Level	Wall A	Wall B
8.0	6.8	5.1	1.1	1.0	3.7	4.3	3.9	Row 5	5.2	3.2
13.0	8.2	7.7	1.5	1.2	4.4	7.7	4.8	Row 4	7.6	4.5
18.8	12.1	9.9	1.5	1.3	4.7	13.6	5.6	Row 3	10.6	6.3
22.0	17.2	11.5	1.9	1.5	5.2	22.5	8.9	Row 2	13.2	9.5
24.0	20.4	12.7	2.0	1.8	5.7	28.5	13.1	Row 1	14.8	12.3
Wall A				Wall B						
								% wall wetting from sprinkler	Wall A	Wall B
									55%	45%

Wall Wetting Test Number : W15

Date of Fire Test	15 th November 2023
Time of Fire Test	13:46
Duration of Fire Test	10 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Test Head Pressure	0.35 bar (0.34 bar average achieved)

Individual Density Plot:

Side Wall Test

Sprinkler B

Pendant

0.35 Bar

2.0

1.9

2.1

0.4

0.1

0.2

0.8

1.0

1.1

1.3

1.0

0.4

0.2

0.7

2.6

2.2

1.1

1.4

1.0

0.1

0.1

0.9

2.8

0.8

0.9

1.2

0.6

0.9

0.2

0.3

3.1

0.5

0.2

0.4

0.6

0.7

0.2

0.3

1.5

0.2

Wall A

Wall B

mm/min per row

Vertical Level

Wall A

Wall B

Row 5

1.6

0.5

Row 4

1.0

1.4

Row 3

0.9

1.2

Row 2

0.9

1.0

Row 1

0.5

0.5

Horizontal position

Col 4

Col 3

Col 2

Col 1

Col 1

Col 2

Col 3

Col 4

mm/min per column

1.1

1.2

1.1

0.5

0.2

0.5

2.1

0.9

Mean water density per wall (mm/min)

Wall A

Wall B

1.0

0.9

Cumulative Density Plot:

								mm/min per row		
Side Wall Test		Sprinkler B		Pendant		0.35 Bar		Vertical Level	Wall A	Wall B
2.0	1.9	2.1	0.4	0.1	0.2	0.8	1.0	Row 5	1.6	0.5
3.1	3.2	3.1	0.8	0.4	0.9	3.4	3.2	Row 4	2.6	2.0
4.2	4.6	4.1	0.9	0.5	1.8	6.2	4.0	Row 3	3.4	3.1
5.2	5.8	4.6	1.8	0.7	2.2	9.3	4.4	Row 2	4.3	4.1
5.3	6.2	5.3	2.5	0.9	2.5	10.7	4.7	Row 1	4.8	4.7
Wall A				Wall B						

% Wall wetting from sprinkler	Wall A	Wall B
	51%	49%

Wall Wetting Test Number : W16

Date of Fire Test	15 th November 2023
Time of Fire Test	14:22
Duration of Fire Test	10 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	175 mm
Sprinkler Test Head Pressure	0.35 bar (0.34 bar average achieved)

Individual Density Plot:

Side Wall Test				Sprinkler A		Pendant		0.35 Bar	
1.5	1.4	1.6	0.7	0.3	0.2	0.1	0.1		
2.0	1.6	1.8	1.0	0.8	0.7	1.2	0.4		
1.2	1.1	0.9	0.5	0.4	0.5	1.3	0.5		
0.5	0.3	0.2	0.6	0.5	0.2	0.6	0.6		
0.1	0.3	0.4	0.2	0.2	0.1	0.2	0.3		
Wall A				Wall B					

mm/min per row		
Vertical Level	Wall A	Wall B
Row 5	1.3	0.2
Row 4	1.6	0.8
Row 3	0.9	0.7
Row 2	0.4	0.5
Row 1	0.2	0.2

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	1.0	1.0	1.0	0.6	0.4	0.4	0.7	0.4

Mean water density per wall (mm/min)		
Wall A	Wall B	
0.9	0.5	

Cumulative Density Plot:

								mm/min per row		
Side Wall Test		Sprinkler A		Pendant		0.35 Bar		Vertical Level	Wall A	Wall B
1.5	1.4	1.6	0.7	0.3	0.2	0.1	0.1	Row 5	1.3	0.2
3.4	3.1	3.3	1.7	1.1	1.0	1.3	0.5	Row 4	2.9	1.0
4.6	4.2	4.3	2.2	1.5	1.4	2.6	1.1	Row 3	3.8	1.6
5.1	4.5	4.4	2.8	2.0	1.7	3.2	1.6	Row 2	4.2	2.1
5.2	4.8	4.8	3.0	2.2	1.8	3.4	2.0	Row 1	4.4	2.3
Wall A				Wall B						
								% Wall wetting from sprinkler	Wall A	Wall B
									65%	35%

Wall Wetting Test Number : W17

Date of Fire Test	15 th November 2023
Time of Fire Test	15:02
Duration of Fire Test	10 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Test Head Pressure	0.35 bar (0.36 bar average achieved)

Individual Density Plot:

Side Wall Test **Sprinkler C** **Pendant** **0.35**

1.2	1.3	0.9	0.4	0.4	0.2	0.1	0.2
1.5	1.8	1.9	1.5	1.5	1.2	2.0	1.4
1.2	1.2	1.4	0.5	0.7	1.3	2.6	1.6
0.8	0.6	0.7	0.6	0.9	1.1	1.0	1.0
0.4	0.7	0.8	0.3	0.5	0.8	0.4	0.6

Wall A **Wall B**

	mm/min per row	
Vertical Level	Wall A	Wall B
Row 5	1.0	0.2
Row 4	1.7	1.5
Row 3	1.1	1.6
Row 2	0.7	1.0
Row 1	0.5	0.6

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	1.0	1.1	1.1	0.7	0.8	0.9	1.2	1.0

	mm/min per wall	
Mean water density per wall (mm/min)	Wall A	Wall B
	1.0	1.0

Cumulative Density Plot:

Side Wall Test		Sprinkler C		Pendant		0.35 Bar		mm/min per row		
								Vertical Level	Wall A	Wall B
1.2	1.3	0.9	0.4	0.4	0.2	0.1	0.2	Row 5	1.0	0.2
2.8	3.1	2.8	1.9	1.8	1.3	2.1	1.6	Row 4	2.7	1.7
4.0	4.3	4.2	2.4	2.5	2.6	4.7	3.2	Row 3	3.7	3.3
4.8	5.0	4.8	3.1	3.4	3.7	5.7	4.2	Row 2	4.4	4.3
5.2	5.6	5.6	3.3	3.9	4.6	6.2	4.8	Row 1	4.9	4.9

		% Wall wetting from sprinkler	Wall A	Wall B
			50%	50%

Wall Wetting Test Number : W18

Date of Fire Test	27 th November 2023
Time of Fire Test	15:01
Duration of Fire Test	07 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant in ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Test Head Pressure	3.0 bar (2.85 bar average achieved)

Individual Density Plot:

Side Wall Test Sprinkler C In ceiling 3.0 Bar

6.2	4.6	7.7	2.7	2.6	3.0	2.2	0.6
6.6	6.7	7.5	3.3	4.5	4.5	1.3	0.6
3.5	4.5	3.7	1.5	5.3	2.9	0.4	0.1
1.7	1.8	1.4	1.7	3.2	1.7	0.5	0.1
1.1	1.0	0.9	1.1	1.4	1.0	0.4	0.1

Wall A Wall B

Vertical Level	Wall A	Wall B
Row 5	5.3	2.1
Row 4	6.0	2.7
Row 3	3.3	2.2
Row 2	1.6	1.4
Row 1	1.0	0.7

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	3.8	3.7	4.2	2.0	3.4	2.6	0.9	0.3

Mean water density per wall (mm/min)	Wall A	Wall B
	3.4	1.8

Cumulative Density Plot:

Side Wall Test		Sprinkler C		Ceiling		3.0 Bar		mm/min per row		
								Vertical Level	Wall A	Wall B
6.2	4.6	7.7	2.7	2.6	3.0	2.2	0.6	Row 5	5.3	2.1
12.8	11.2	15.1	6.0	7.2	7.5	3.4	1.2	Row 4	11.3	4.8
16.4	15.8	18.8	7.5	12.4	10.4	3.9	1.3	Row 3	14.6	7.0
18.0	17.6	20.2	9.1	15.6	12.1	4.3	1.5	Row 2	16.2	8.4
19.1	18.6	21.1	10.2	17.0	13.1	4.7	1.6	Row 1	17.2	9.1
Wall A				Wall B						
								% Wall wetting from sprinkler	Wall A	Wall B
									65%	35%

Wall Wetting Test Number : W19

Date of Fire Test	27 th November 2023
Time of Fire Test	15:55
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant in ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Test Head Pressure	0.35 bar (0.37 bar average achieved)

Individual Density Plot:

Side Wall Test	Sprinkler C	In ceiling	0.35 Bar
1.3	1.7	1.6	0.3
1.2	1.8	1.6	0.6
0.9	1.4	1.1	0.2
0.6	0.7	0.7	0.4
0.4	0.7	0.8	0.2

Vertical Level	Wall A	Wall B
Row 5	1.2	0.04
Row 4	1.3	1.2
Row 3	0.9	1.5
Row 2	0.6	0.9
Row 1	0.5	0.5

Cumulative Density Plot:

Side Wall Test

Sprinkler C

Ceiling

0.35 Bar

1.3	1.7	1.6	0.3	0.0	0.0	0.1	0.0
2.6	3.5	3.2	0.9	0.5	1.2	2.0	1.2
3.4	4.8	4.2	1.0	1.7	3.5	3.2	2.5
4.0	5.5	4.9	1.5	3.2	4.9	3.5	3.0
4.4	6.2	5.6	1.6	3.6	5.9	3.9	3.3

Wall A

Wall B

mm/min per row		
Vertical Level	Wall A	Wall B
Row 5	1.2	0.0
Row 4	2.5	1.2
Row 3	3.4	2.7
Row 2	4.0	3.7
Row 1	4.5	4.2

% Wall wetting from sprinkler	Wall A	Wall B
	52%	48%

Wall Wetting Test Number : W20

Date of Fire Test	28 th November 2023
Time of Fire Test	09:24
Duration of Fire Test	15 Minutes, 03 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant in ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Test Head Pressure	0.35 bar (0.35 bar average achieved)

Individual Density Plot:

Figure 10 displays the comparison of water density per wall (mm/min) for the 0.35 Bar test. The data is presented in three tables.

Side Wall Test

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	1.0	1.0	0.8	0.3	0.1	0.0	0.6	0.9

Sprinkler B

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	1.0	1.0	0.8	0.3	0.1	0.0	0.6	0.9

In ceiling

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	1.0	1.0	0.8	0.3	0.1	0.0	0.6	0.9

Vertical Level

Vertical Level	Wall A	Wall B
Row 5	0.4	0.2
Row 4	1.2	0.7
Row 3	0.9	0.3
Row 2	0.6	0.5
Row 1	0.7	0.3

Cumulative Density Plot:

Side Wall Test		Sprinkler B		Ceiling		0.35 Bar		mm/min per row		
								Vertical Level	Wall A	Wall B
0.5	0.7	0.4	0.0	0.0	0.0	0.4	0.2	Row 5	0.4	0.2
2.0	2.3	1.6	0.5	0.1	0.1	1.3	1.9	Row 4	1.6	0.8
3.2	3.6	2.5	0.8	0.1	0.1	1.9	2.6	Row 3	2.5	1.2
4.0	4.3	3.1	1.4	0.3	0.1	2.5	3.6	Row 2	3.2	1.6
5.1	5.0	3.8	1.6	0.4	0.2	2.9	4.3	Row 1	3.9	2.0
Wall A				Wall B						
								% Wall wetting from sprinkler	Wall A	Wall B
									66%	34%

Wall Wetting Test Number : W21

Date of Fire Test	28 th November 2023
Time of Fire Test	10:40
Duration of Fire Test	06 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant in ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Test Head Pressure	3.0 bar (2.80 bar average achieved)

Individual Density Plot:

Side Wall Test

Sprinkler B

In ceiling

3.0 Bar

8.2	9.1	8.0	2.0	0.1	0.0	0.1	0.1
7.8	9.6	5.0	1.9	0.5	0.1	0.2	0.2
4.6	8.4	3.1	1.3	0.6	0.2	0.2	0.2
2.5	5.3	3.4	1.3	1.5	0.3	0.3	0.2
3.6	5.3	3.4	0.7	1.4	0.4	0.2	0.3

Wall A

Wall B

		mm/min per row	
Vertical Level	Wall A	Wall B	
Row 5	6.8	0.1	
Row 4	6.0	0.2	
Row 3	4.3	0.3	
Row 2	3.1	0.5	
Row 1	3.2	0.6	

Horizontal position	Col 4	Col 3	Col 2	Col 1	Col 1	Col 2	Col 3	Col 4
mm/min per column	5.3	7.5	4.6	1.4	0.8	0.2	0.2	0.2

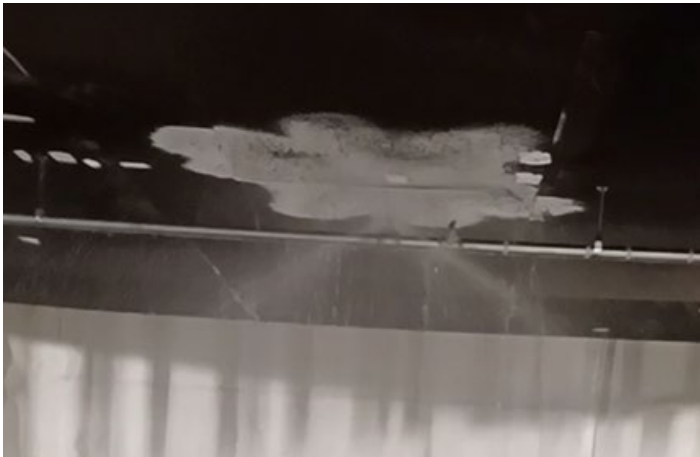
		Wall A	Wall B
Mean water density per wall (mm/min)		4.7	0.3

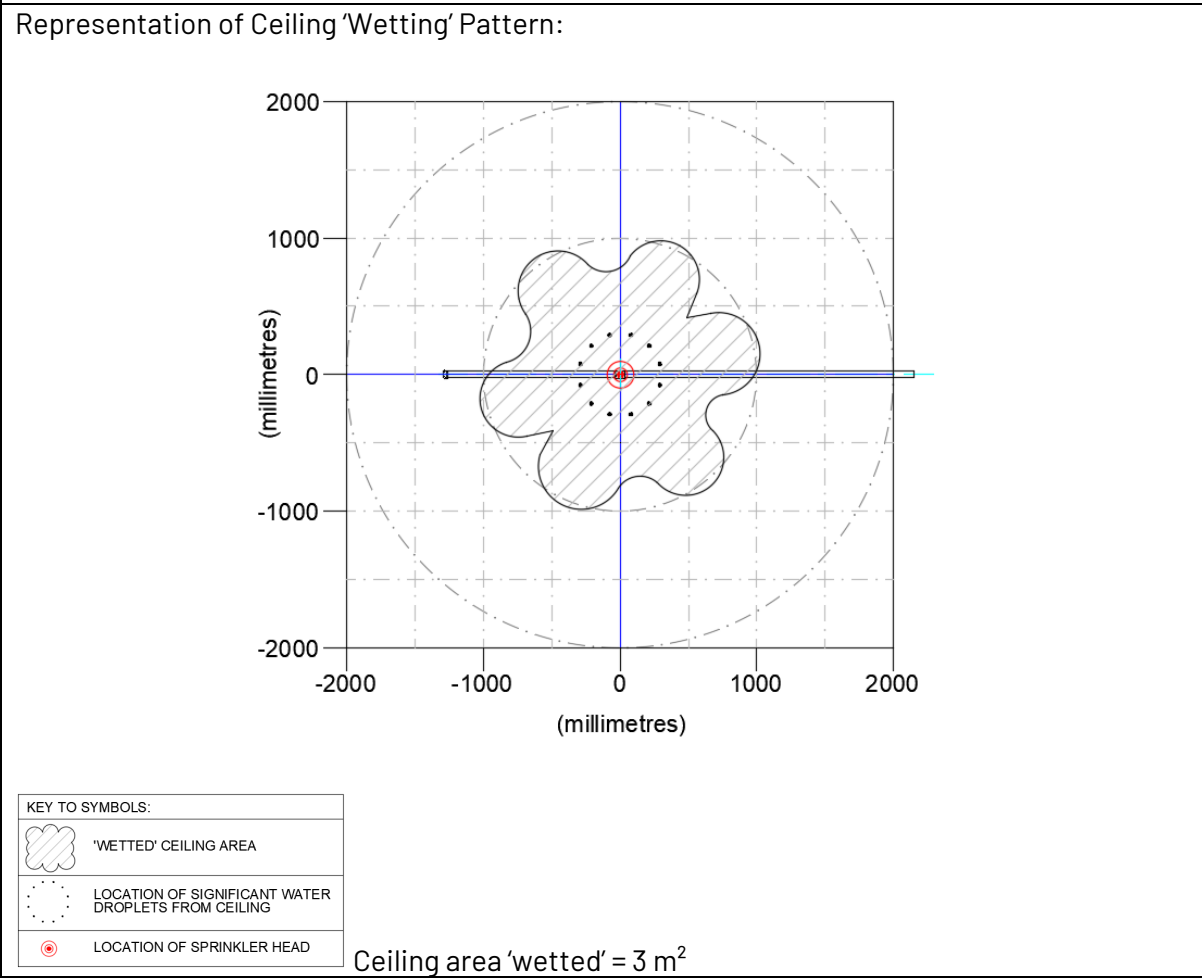
Cumulative Density Plot:

Side Wall Test		Sprinkler B		Ceiling		3.0 Bar		mm/min per row			
Vertical Level		Wall A		Wall B							
Row 5		6.8		0.1							
Row 4		12.9		0.3							
Row 3		17.2		0.6							
Row 2		20.4		1.1							
Row 1		23.6		1.7							

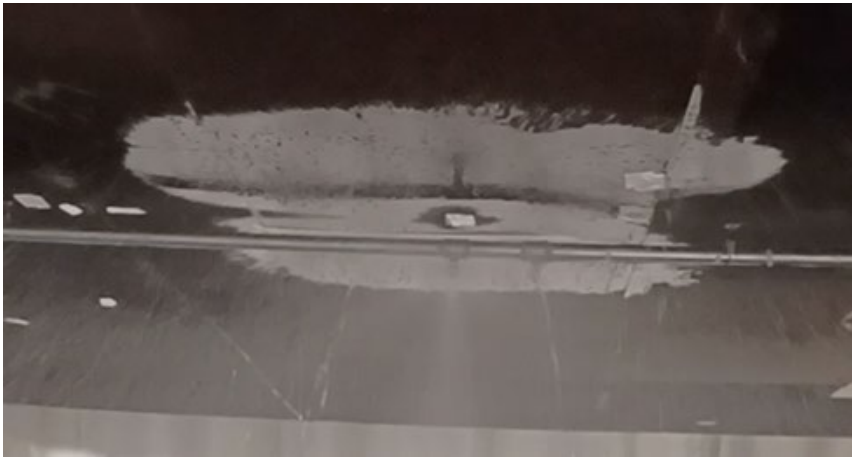
Water Distribution Spray Pattern Test Number : 01									
Date of Fire Test	17 th October 2023								
Time of Fire Test	15:46								
Duration of Fire Test	15 Minutes, 00 Seconds								
Sprinkler Head Reference	Sprinkler A								
Sprinkler Head Orientation	Upright								
Location of Deflector Below Ceiling	150 mm								
Sprinkler Test Head Pressure	0.35 bar (0.35 bar average achieved)								
Photograph Showing Ceiling 'Wetting' Pattern:									
Representation of Ceiling 'Wetting' Pattern: <table> <tr> <th colspan="2">KEY TO SYMBOLS:</th></tr> <tr> <td></td><td>'WETTED' CEILING AREA</td></tr> <tr> <td></td><td>LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING</td></tr> <tr> <td></td><td>LOCATION OF SPRINKLER HEAD</td></tr> </table> Ceiling area 'wetted' = 2 m²		KEY TO SYMBOLS:			'WETTED' CEILING AREA		LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING		LOCATION OF SPRINKLER HEAD
KEY TO SYMBOLS:									
	'WETTED' CEILING AREA								
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING								
	LOCATION OF SPRINKLER HEAD								

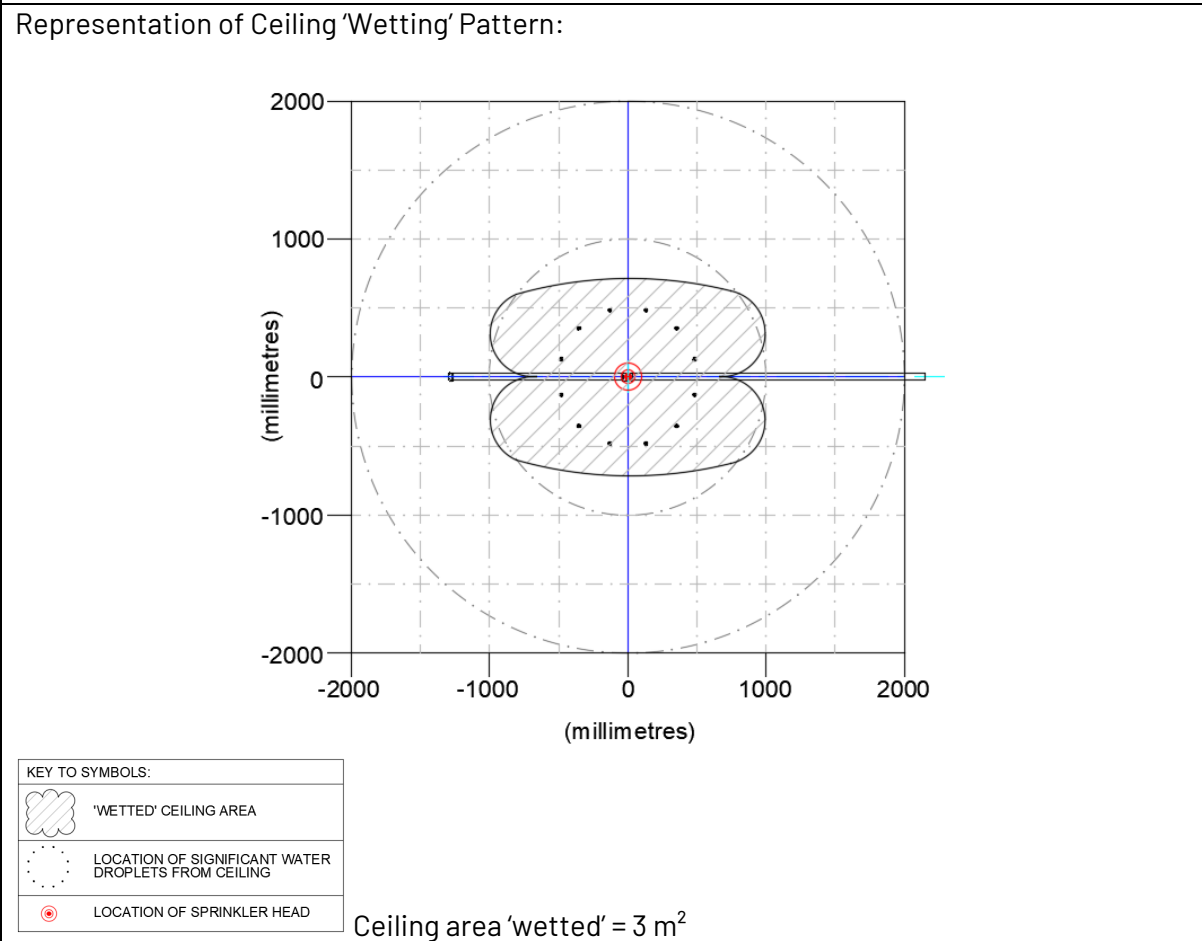
Water Distribution Spray Pattern Test Number : 02	
Date of Fire Test	18 th October 2023
Time of Fire Test	09:44
Duration of Fire Test	13 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:
 

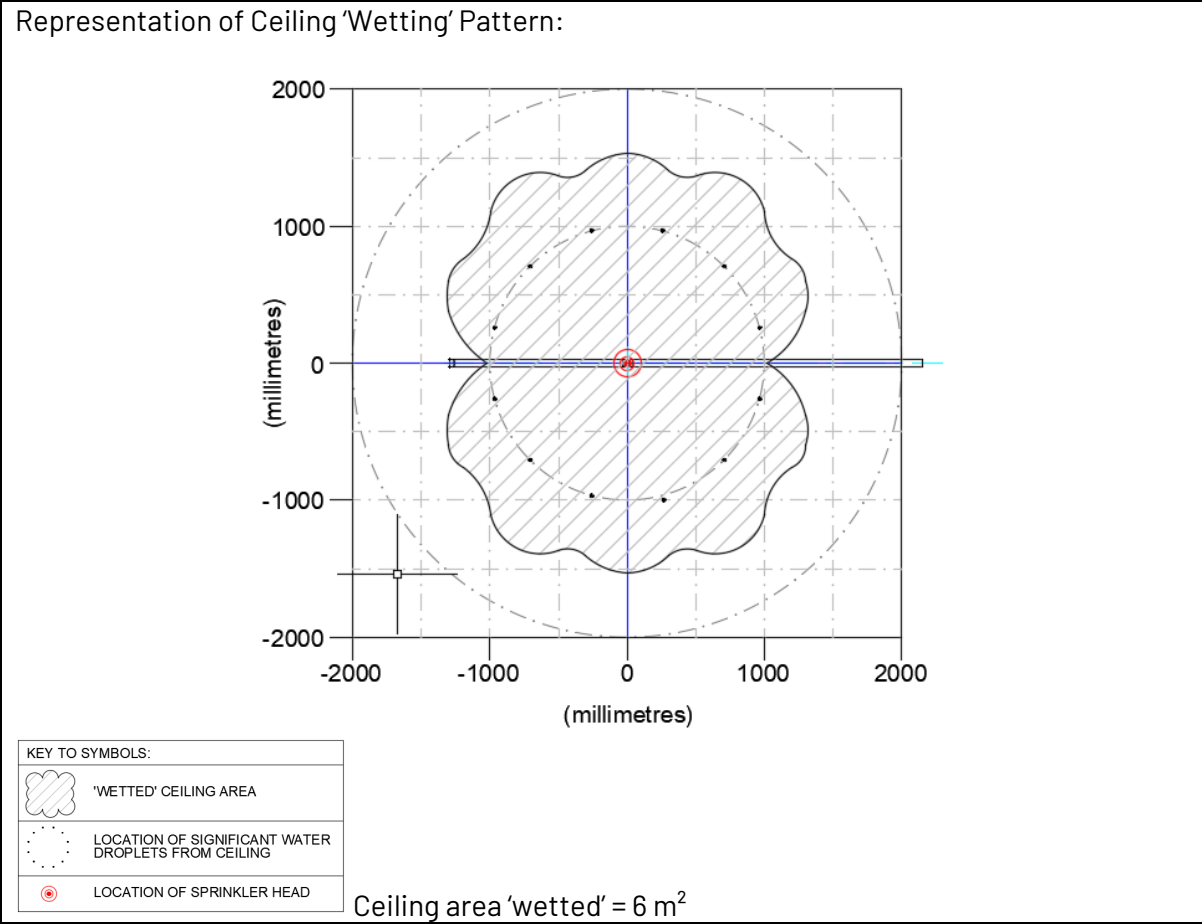


Water Distribution Spray Pattern Test Number : 03	
Date of Fire Test	18 th October 2023
Time of Fire Test	12:16
Duration of Fire Test	19 Minutes, 00 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	175 mm
Sprinkler Head Pressure	0.35 bar (0.33 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:
 



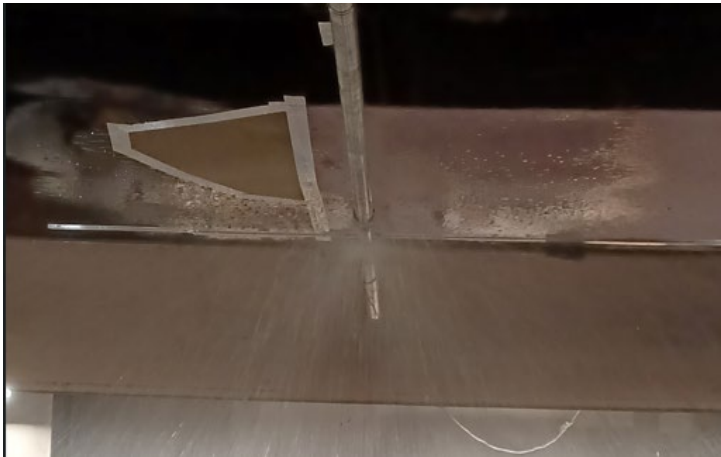
Water Distribution Spray Pattern Test Number : 04	
Date of Fire Test	18 th October 2023
Time of Fire Test	14:45
Duration of Fire Test	05 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	175 mm
Sprinkler Head Pressure	3.00 bar (3.02 bar average achieved)
Photograph Showing Ceiling 'Wetting' Pattern:	



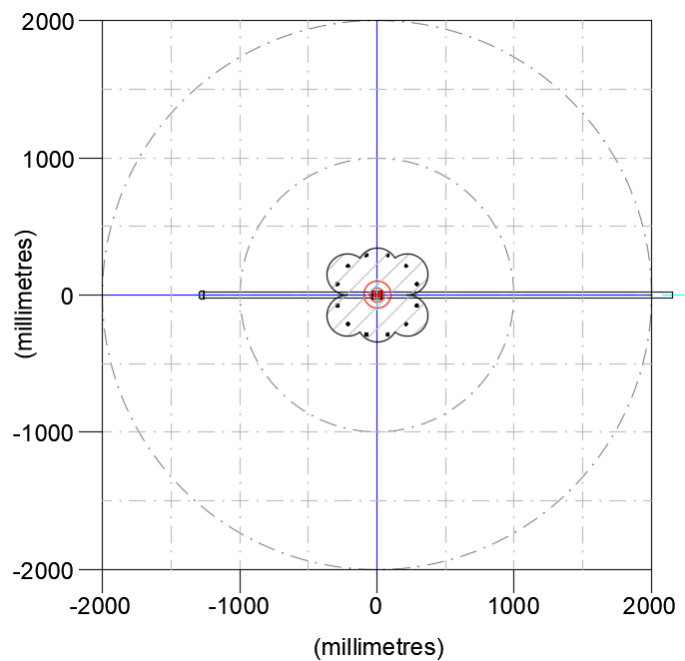
Water Distribution Spray Pattern Test Number : 05

Date of Fire Test	2 nd November 2023
Time of Fire Test	10:12
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:



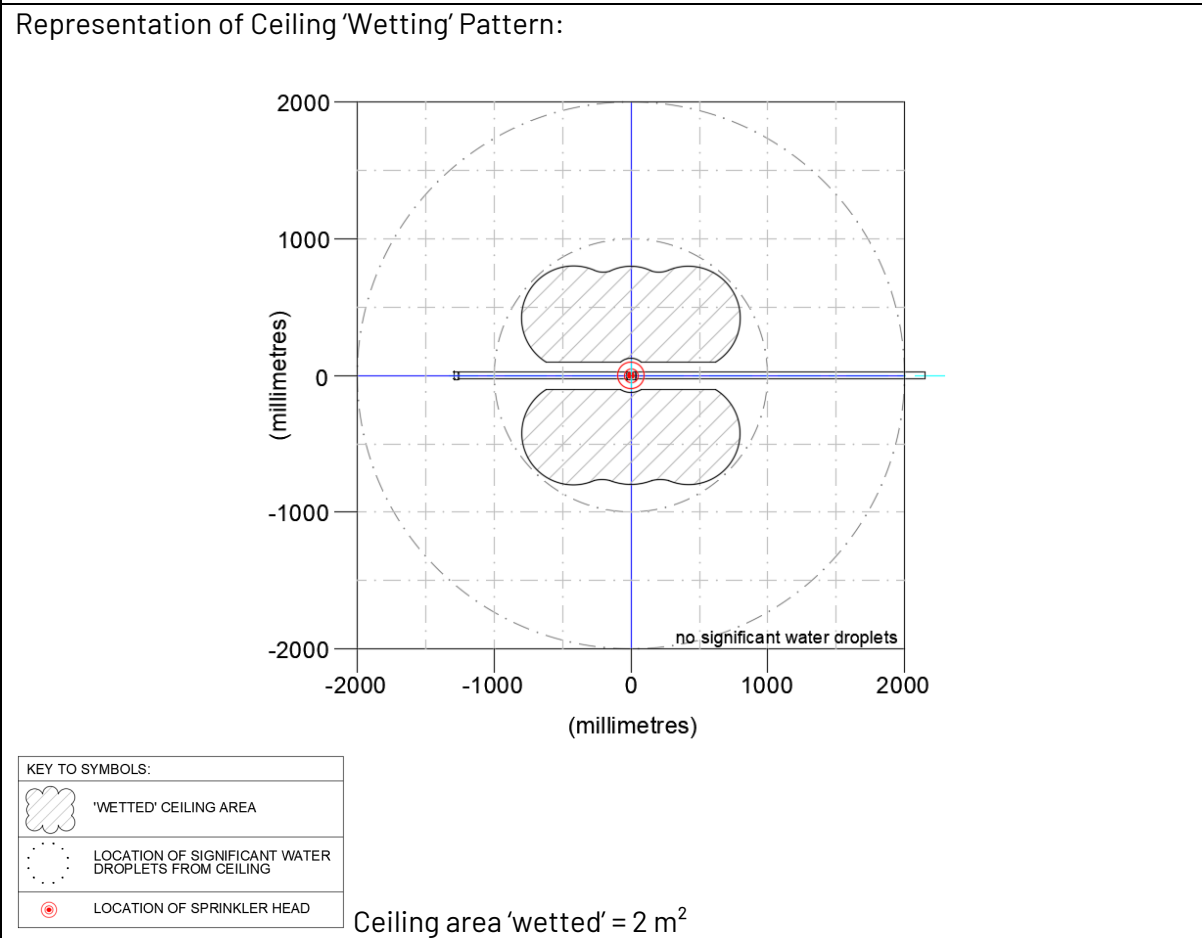
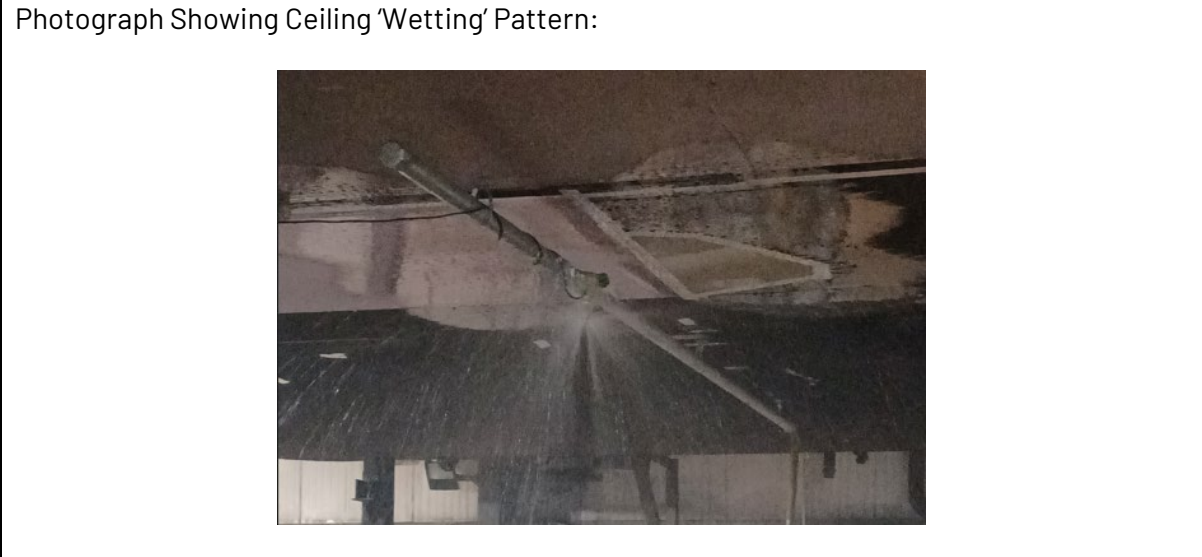
Representation of Ceiling 'Wetting' Pattern:



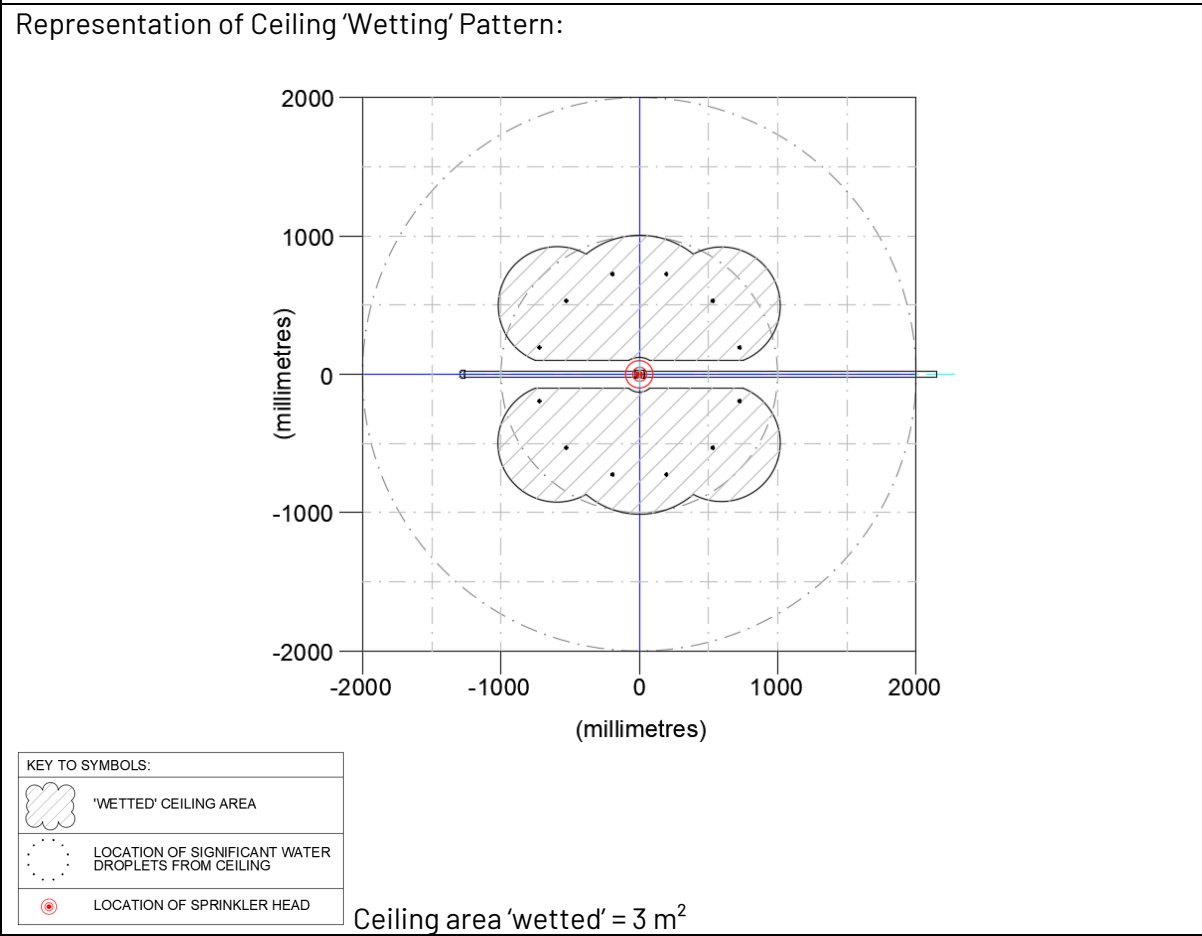
KEY TO SYMBOLS:	
	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

Ceiling area 'wetted' = <1 m²

Water Distribution Spray Pattern Test Number : 06	
Date of Fire Test	2 nd November 2023
Time of Fire Test	12:36
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler D
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

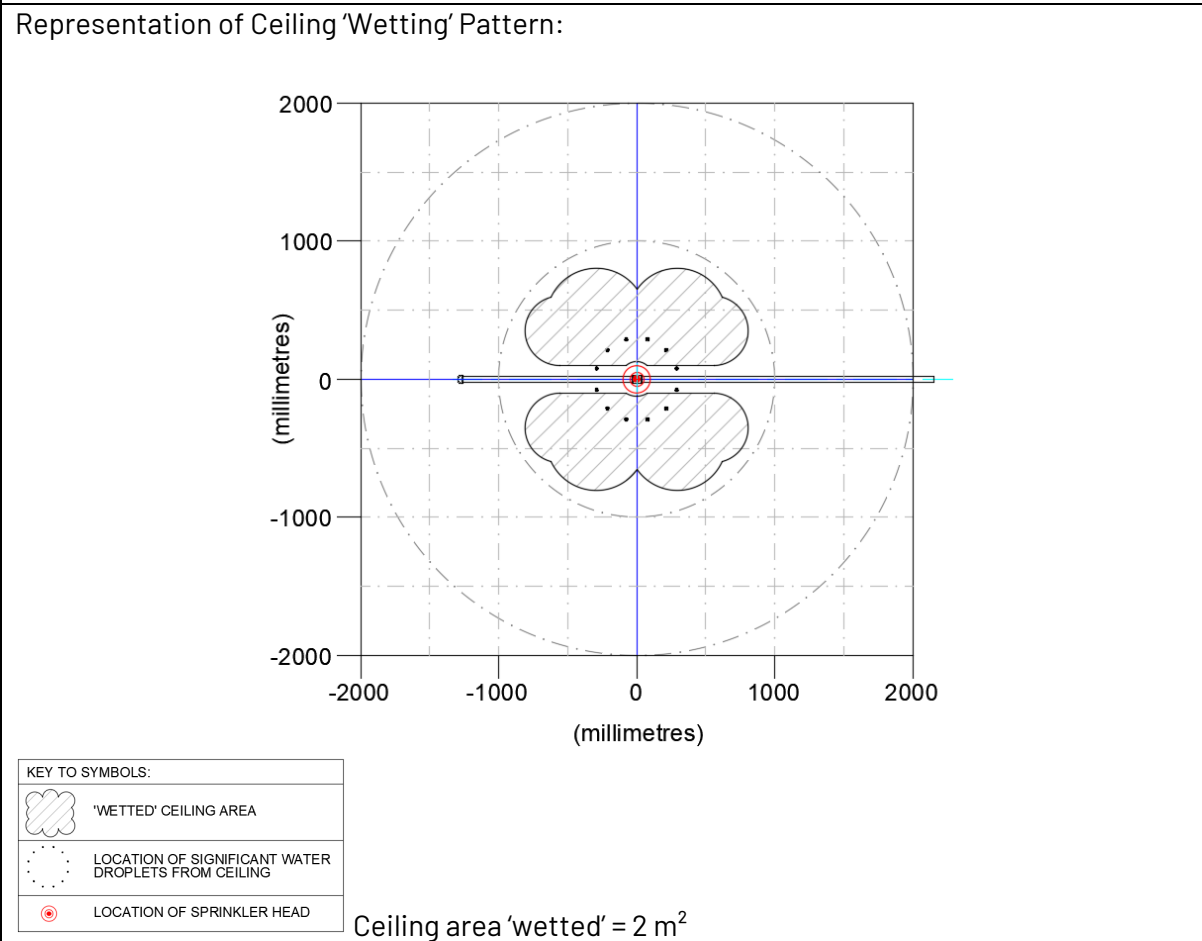


Water Distribution Spray Pattern Test Number : 07	
Date of Fire Test	2 nd November 2023
Time of Fire Test	14:49
Duration of Fire Test	15 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)
Photograph Showing Ceiling 'Wetting' Pattern: 	



Water Distribution Spray Pattern Test Number : 08	
Date of Fire Test	6 th November 2023
Time of Fire Test	09:20
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

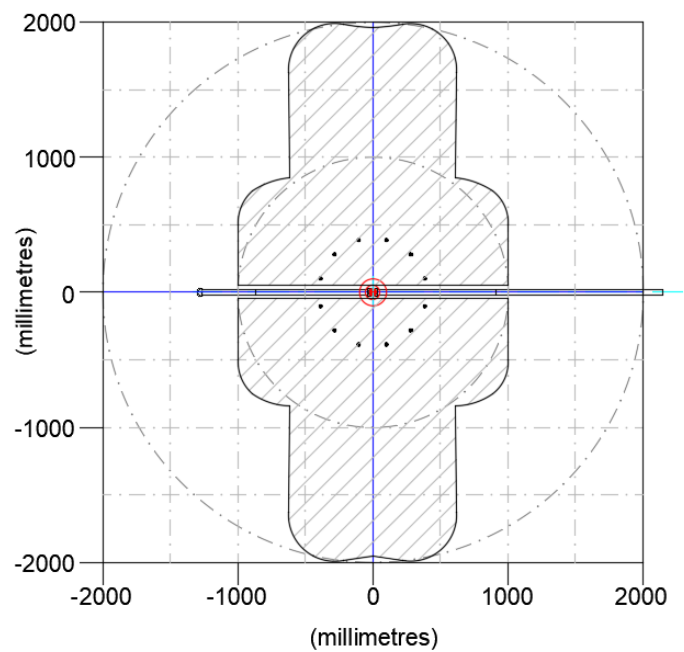
Photograph Showing Ceiling 'Wetting' Pattern:
 



Water Distribution Spray Pattern Test Number : 09	
Date of Fire Test	6 th November 2023
Time of Fire Test	11:44
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	3.00 bar (3.11 bar average achieved)
Photograph Showing Ceiling 'Wetting' Pattern:	



Representation of Ceiling 'Wetting' Pattern:



KEY TO SYMBOLS:	
	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

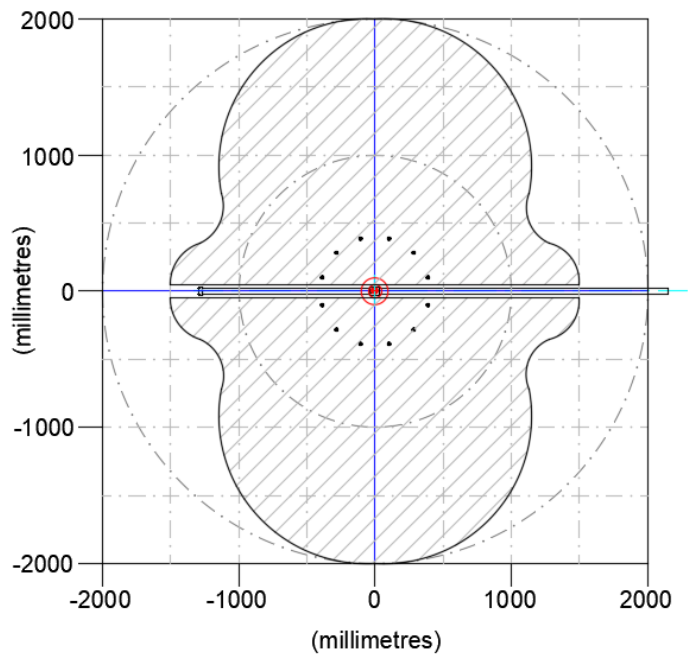
Ceiling area 'wetted' = 5 m²

Water Distribution Spray Pattern Test Number : 10	
Date of Fire Test	6 th November 2023
Time of Fire Test	14:07
Duration of Fire Test	11 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	170 mm
Sprinkler Head Pressure	3.00 bar (3.10 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:



Representation of Ceiling 'Wetting' Pattern:



KEY TO SYMBOLS:	
	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

Ceiling area 'wetted' = 8 m²

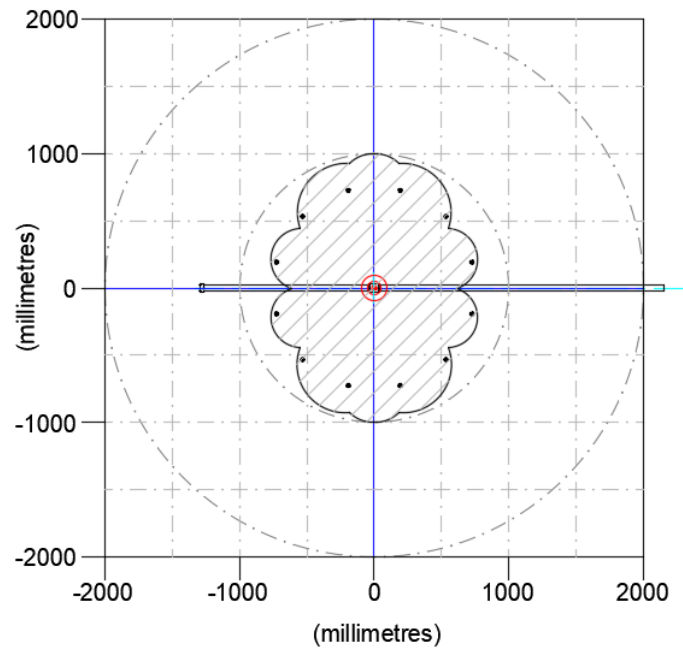
Water Distribution Spray Pattern Test Number : 11

Date of Fire Test	7 th November 2023
Time of Fire Test	09:07
Duration of Fire Test	13 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.34 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:



Representation of Ceiling 'Wetting' Pattern:



KEY TO SYMBOLS:	
	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

Ceiling area 'wetted' = 2 m²

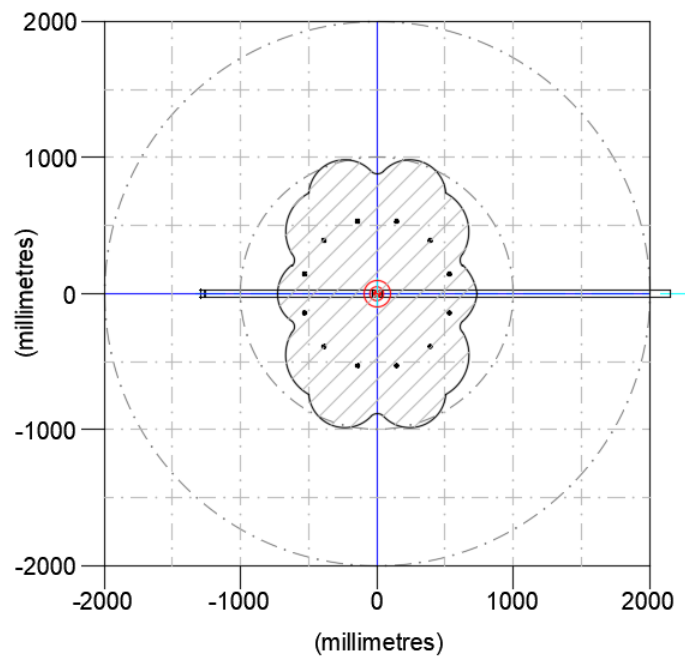
Water Distribution Spray Pattern Test Number : 12

Date of Fire Test	7 th November 2023
Time of Fire Test	14:45
Duration of Fire Test	15 Minutes, 01 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:



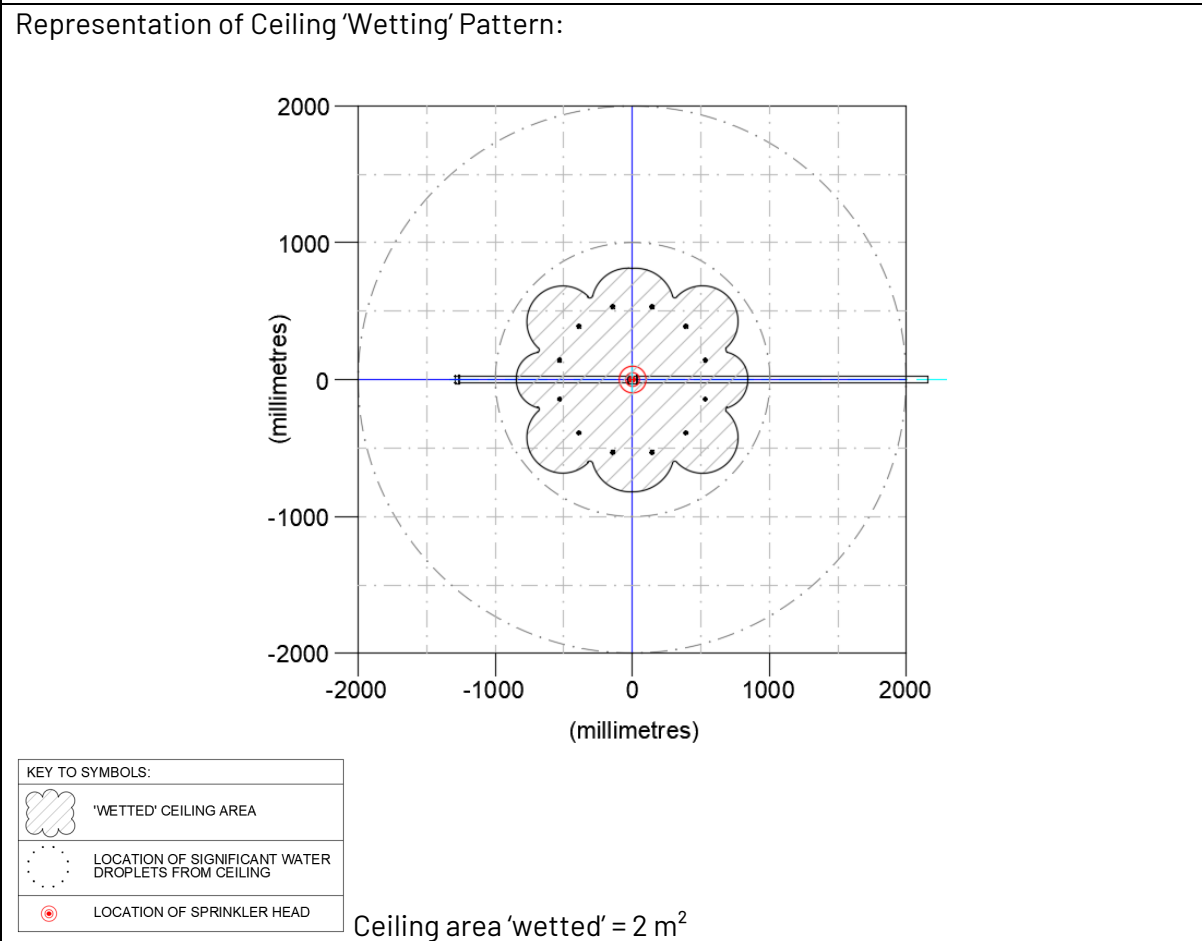
Representation of Ceiling 'Wetting' Pattern:



KEY TO SYMBOLS:	
	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

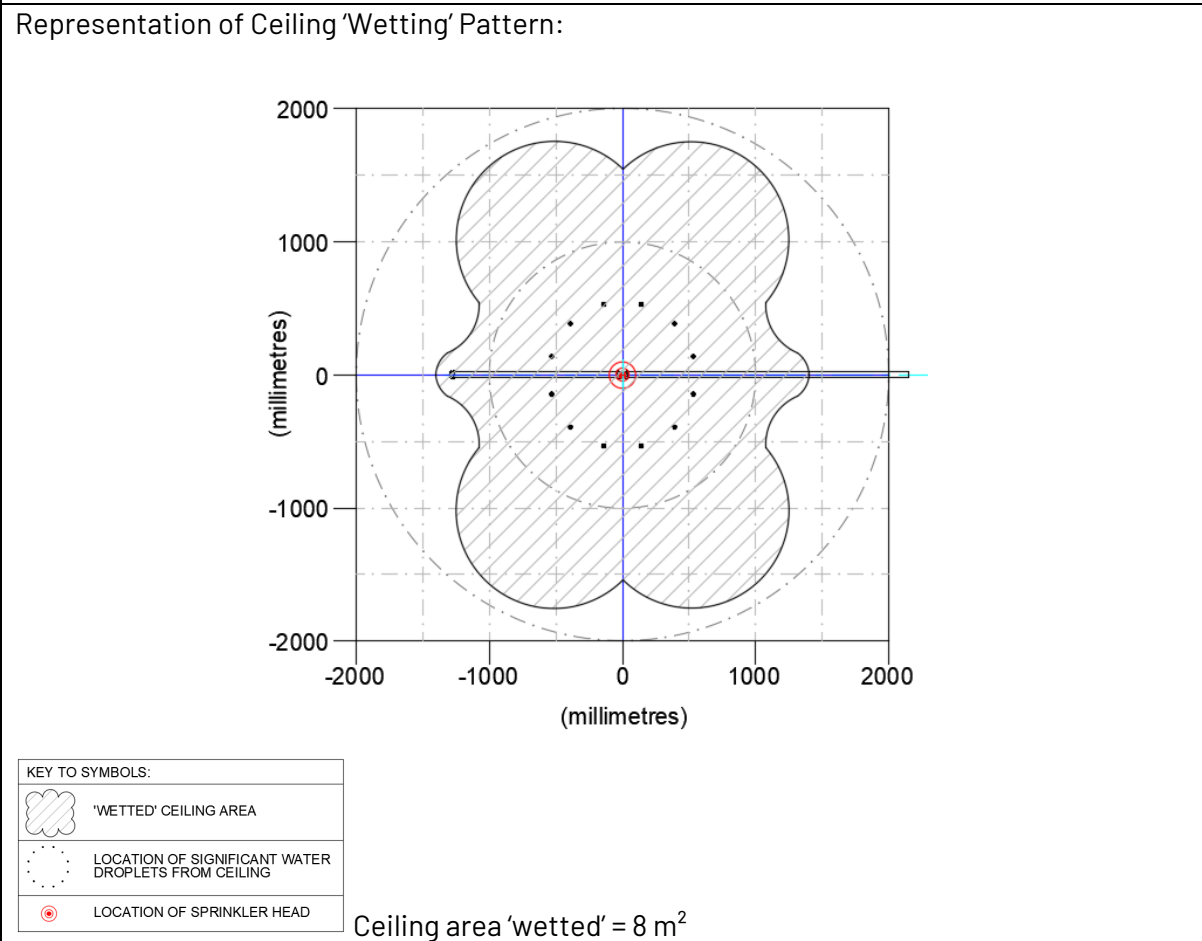
Ceiling area 'wetted' = 2 m²

Water Distribution Spray Pattern Test Number : 13	
Date of Fire Test	8 th November 2023
Time of Fire Test	09:43
Duration of Fire Test	15 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler D
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	0.35 bar (0.34 bar average achieved)



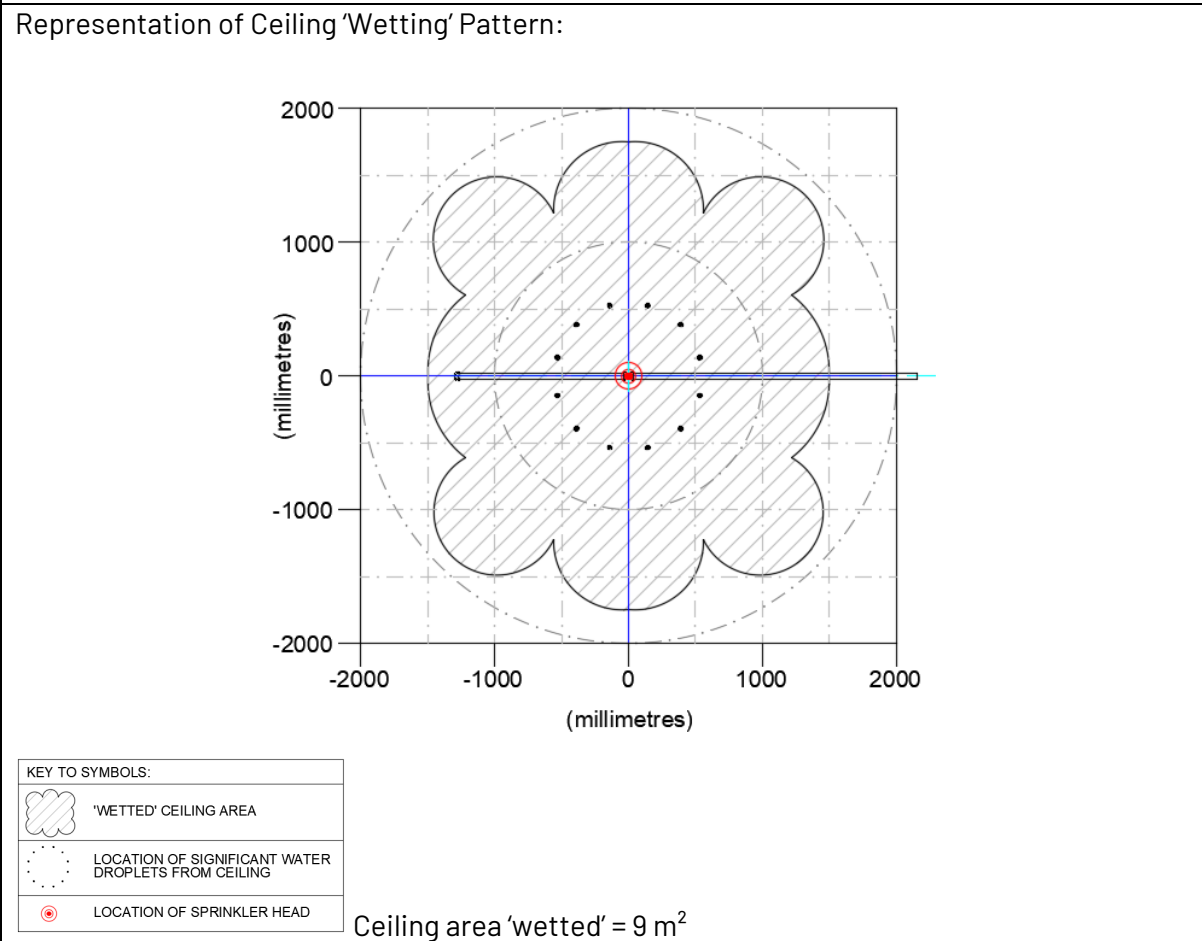
Water Distribution Spray Pattern Test Number : 14	
Date of Fire Test	8 th November 2023
Time of Fire Test	14:07
Duration of Fire Test	06 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.12 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:
 



Water Distribution Spray Pattern Test Number : 15	
Date of Fire Test	9 th November 2023
Time of Fire Test	09:14
Duration of Fire Test	08 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler A
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.03 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:
 



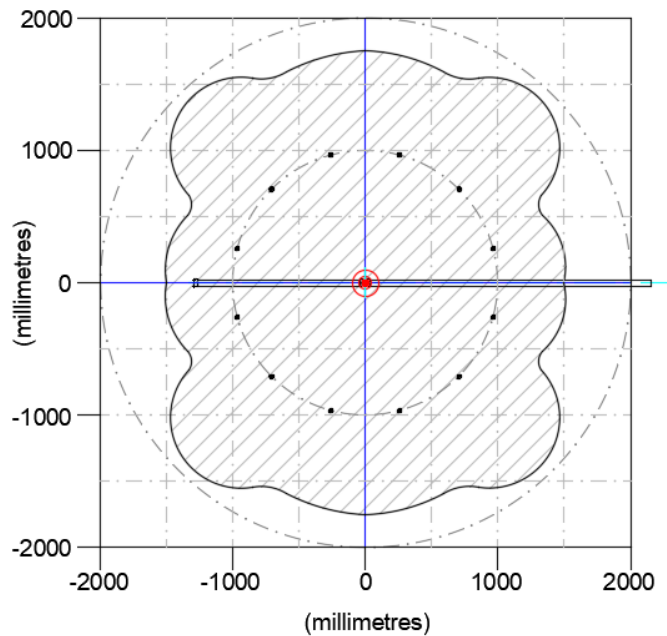
Water Distribution Spray Pattern Test Number : 16

Date of Fire Test	9 th November 2023
Time of Fire Test	11:40
Duration of Fire Test	07 Minutes, 03 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.00 bar (3.11 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:



Representation of Ceiling 'Wetting' Pattern:

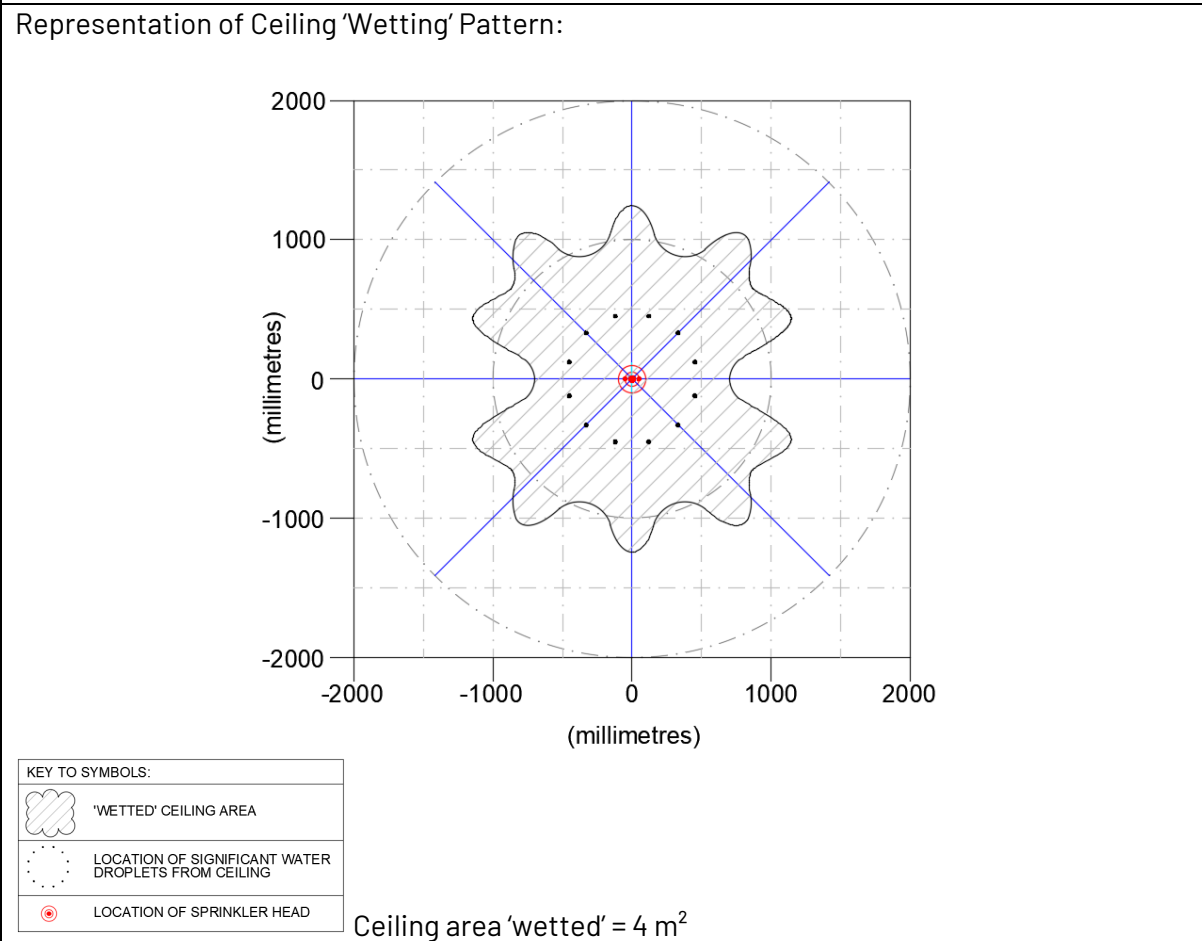


KEY TO SYMBOLS:	
	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

Ceiling area 'wetted' = 9 m²

Water Distribution Spray Pattern Test Number : 17	
Date of Fire Test	28 th November 2023
Time of Fire Test	12:56
Duration of Fire Test	08 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant within ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Head Pressure	3.00 bar (2.85 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:
 

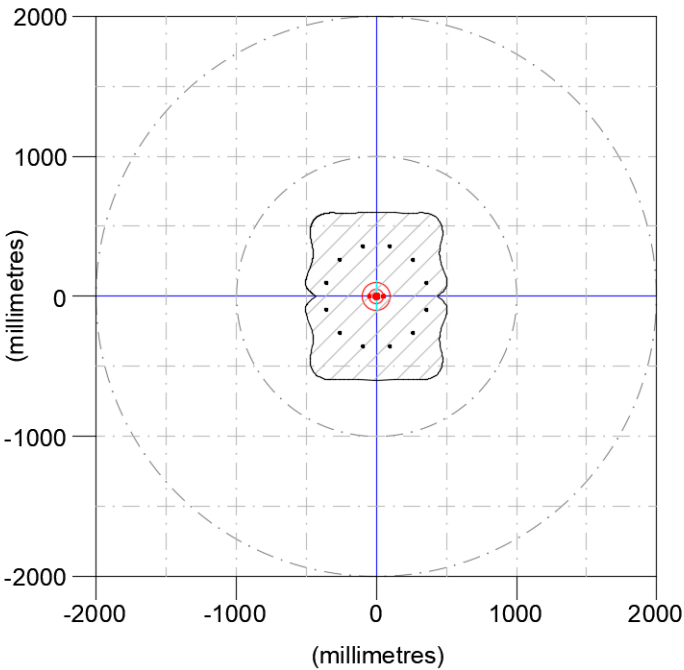


Water Distribution Spray Pattern Test Number : 18	
Date of Fire Test	29 th November 2023
Time of Fire Test	09:35
Duration of Fire Test	15 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant within ceiling
Location of Deflector Below Ceiling	45 mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:



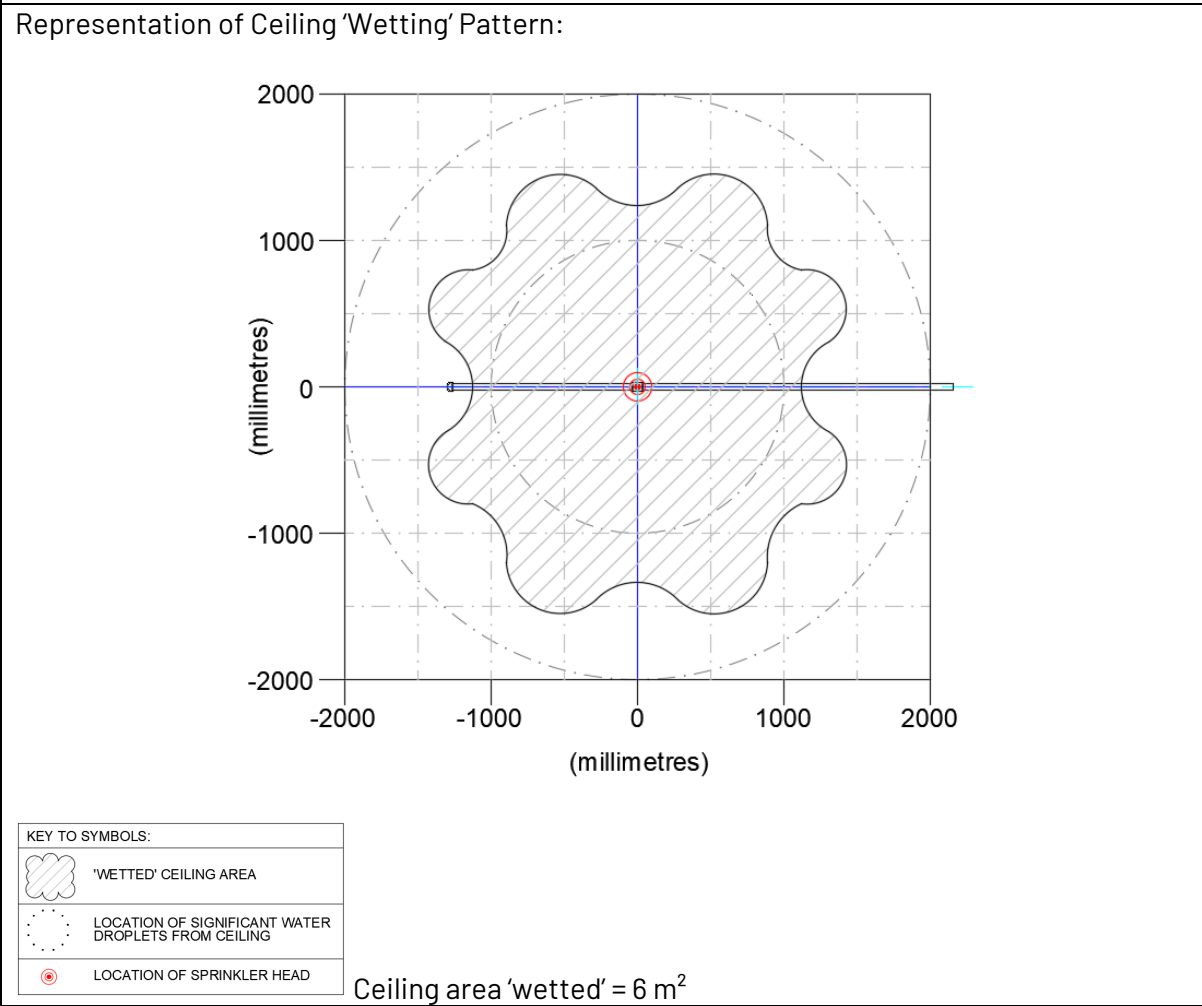
Representation of Ceiling 'Wetting' Pattern:



KEY TO SYMBOLS:	
	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

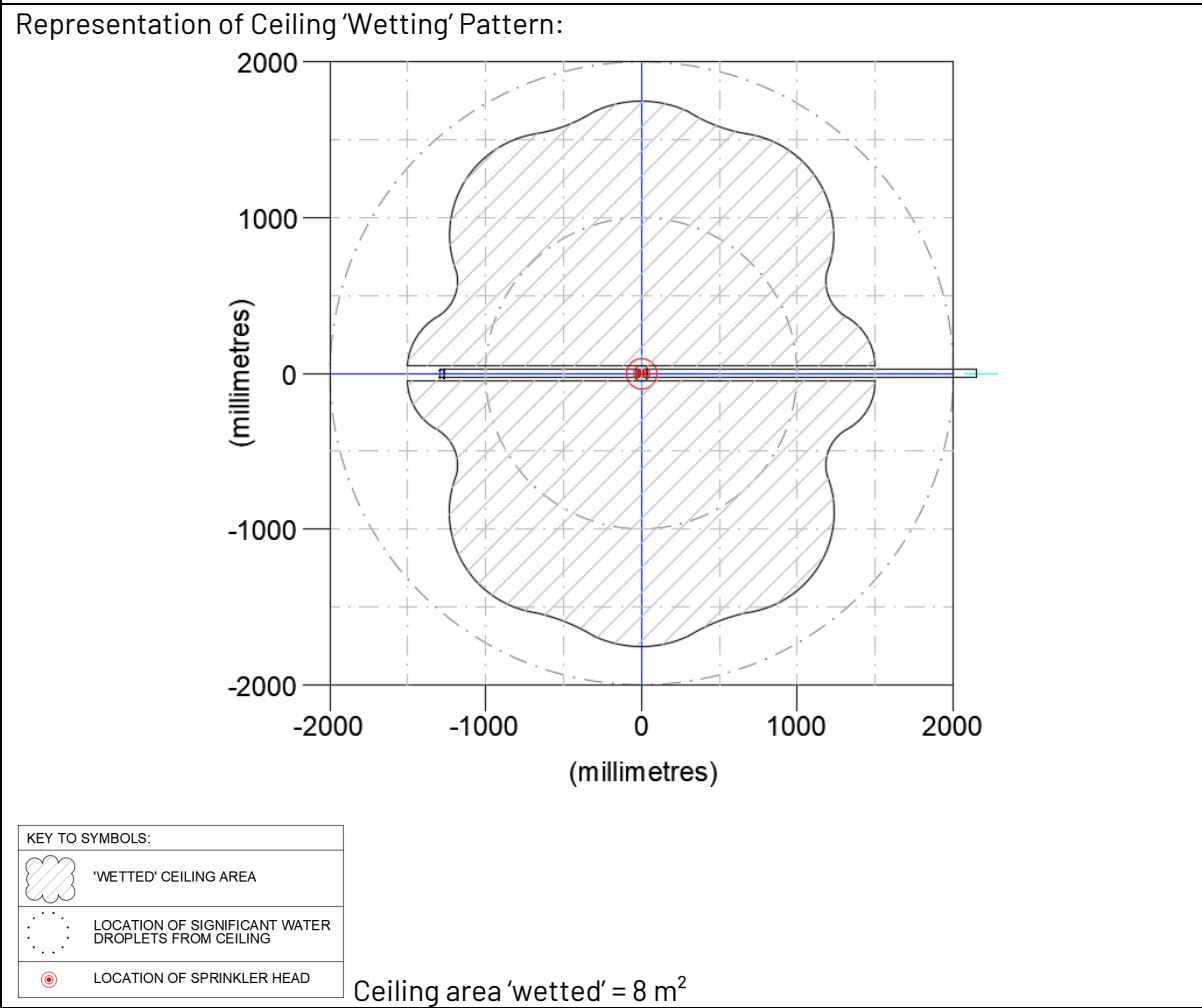
Ceiling area 'wetted' = 1 m²

Water Distribution Spray Pattern Test Number : W03	
Date of Fire Test	13 th November 2023
Time of Fire Test	14:12
Duration of Fire Test	6 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Upright
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.0 bar (2.98 bar average achieved)
Photograph Showing Ceiling 'Wetting' Pattern:	
	



Water Distribution Spray Pattern Test Number : W04									
Date of Fire Test	13 th November 2023								
Time of Fire Test	15:16								
Duration of Fire Test	6 Minutes, 02 Seconds								
Sprinkler Head Reference	Sprinkler D								
Sprinkler Head Orientation	Upright								
Location of Deflector Below Ceiling	150 mm								
Sprinkler Head Pressure	3.0 bar (3.05 bar average achieved)								
Photograph Showing Ceiling 'Wetting' Pattern:									
Representation of Ceiling 'Wetting' Pattern: <table> <tr> <th colspan="2">KEY TO SYMBOLS:</th></tr> <tr> <td></td><td>'WETTED' CEILING AREA</td></tr> <tr> <td></td><td>LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING</td></tr> <tr> <td></td><td>LOCATION OF SPRINKLER HEAD</td></tr> </table> Ceiling area 'wetted' = 7 m²		KEY TO SYMBOLS:			'WETTED' CEILING AREA		LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING		LOCATION OF SPRINKLER HEAD
KEY TO SYMBOLS:									
	'WETTED' CEILING AREA								
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING								
	LOCATION OF SPRINKLER HEAD								

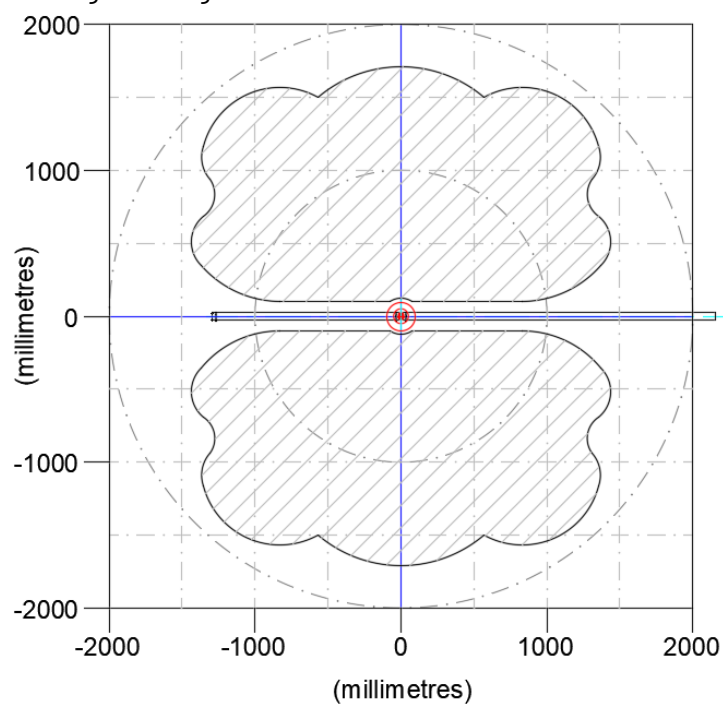
Water Distribution Spray Pattern Test Number : W12	
Date of Fire Test	15 th November 2023
Time of Fire Test	10:42
Duration of Fire Test	6 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler E
Sprinkler Head Orientation	Pendant within ceiling
Location of Deflector Below Ceiling	150 mm
Sprinkler Head Pressure	3.0 bar (3.02 bar average achieved)



Water Distribution Spray Pattern Test Number : W14	
Date of Fire Test	15 th November 2023
Time of Fire Test	12:06
Duration of Fire Test	5 Minutes, 02 Seconds
Sprinkler Head Reference	Sprinkler C
Sprinkler Head Orientation	Pendant
Location of Deflector Below Ceiling	180 mm
Sprinkler Head Pressure	3.0 bar (3.05 bar average achieved)
Photograph Showing Ceiling 'Wetting' Pattern:	



Representation of Ceiling 'Wetting' Pattern:



KEY TO SYMBOLS:

	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

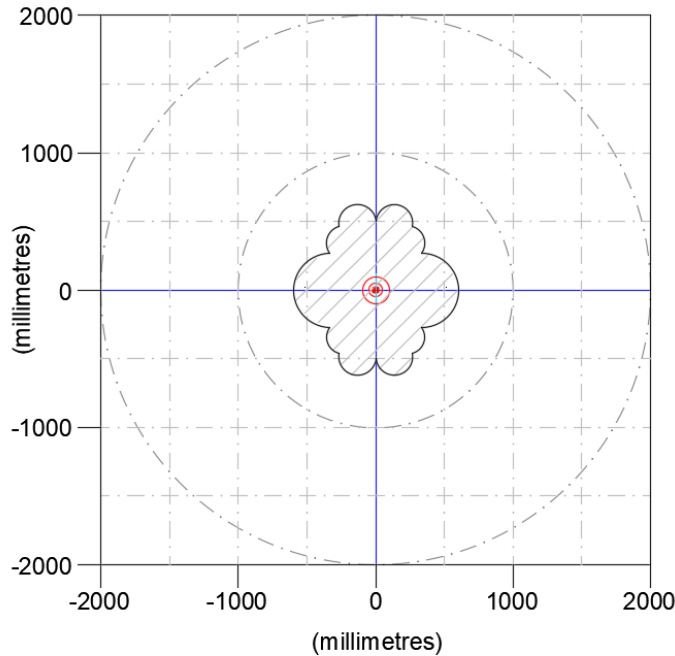
Ceiling area 'wetted' = 8 m²

Water Distribution Spray Pattern Test Number : W20	
Date of Fire Test	28 th November 2023
Time of Fire Test	09:23
Duration of Fire Test	15 Minutes, 03 Seconds
Sprinkler Head Reference	Sprinkler B
Sprinkler Head Orientation	Pendant within ceiling
Location of Deflector Below Ceiling	45mm
Sprinkler Head Pressure	0.35 bar (0.35 bar average achieved)

Photograph Showing Ceiling 'Wetting' Pattern:



Representation of Ceiling 'Wetting' Pattern:



KEY TO SYMBOLS:	
	'WETTED' CEILING AREA
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING
	LOCATION OF SPRINKLER HEAD

Ceiling area 'wetted' = 1 m²

Water Distribution Spray Pattern Test Number : W21									
Date of Fire Test	28 th November 2023								
Time of Fire Test	10:39								
Duration of Fire Test	6 Minutes, 01 Seconds								
Sprinkler Head Reference	Sprinkler B								
Sprinkler Head Orientation	Pendant within ceiling								
Location of Deflector Below Ceiling	45mm								
Sprinkler Head Pressure	3.0 bar (2.8 bar average achieved)								
Photograph Showing Ceiling 'Wetting' Pattern:									
Representation of Ceiling 'Wetting' Pattern: <table> <tr> <th colspan="2">KEY TO SYMBOLS:</th></tr> <tr> <td></td><td>'WETTED' CEILING AREA</td></tr> <tr> <td></td><td>LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING</td></tr> <tr> <td></td><td>LOCATION OF SPRINKLER HEAD</td></tr> </table> Ceiling area 'wetted' = 3 m²		KEY TO SYMBOLS:			'WETTED' CEILING AREA		LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING		LOCATION OF SPRINKLER HEAD
KEY TO SYMBOLS:									
	'WETTED' CEILING AREA								
	LOCATION OF SIGNIFICANT WATER DROPLETS FROM CEILING								
	LOCATION OF SPRINKLER HEAD								

