BLEVE Blast Report

Workspace: IONIO BLEVE Rev.00.02

Study: IONIO_BLEVE

Standalone Set: Standalones

IONIO BLEVE Rev.00.02\IONIO_BLEVE\BLEVE_serbatoio\Standalones

Material	**METHANE**	
East	0	m
North	0	m

BLEVE Blast Scenario: Event Data Standalone

IONIO BLEVE Rev.00.02\IONIO_BLEVE\BLEVE_serbatoio\Standalones\BLEVE blast

Weather: Category 3/F

Wind speed [m/s]	**3**
Pasquill stability	**F stable - night with moderate clouds and light/ moderate wind**
Atmospheric temperature [degC]	9,85
Relative humidity [fraction]	0,7
Solar radiation flux [kW/ m2]	0,5

Input Data

Storage conditions

Vessel shape	**Cylindrical**	
Vessel elevation	**1**	
Vessel length	**16**	
Vessel radius	**6**	
Specified condition	**Pressure/bubble point**	
Pressure (gauge)	**7**	bar
Liquid fraction (mass)	**1**	fraction
Specify volume inventory?	**Yes**	
Volume inventory	**500**	m3

BLEVE blast parameters

Air or ground burst	Ground burst	
Ideal gas modelling	Model as real gas	
CCPS method	**First edition**	

Distances

Max. distance option	**Specify maximum distance**	
Minimum distance	0	m
Maximum distance	**1000**	m
Distance step size	10	m

Output Data

Specific internal energy at failure conditions	-795,844	kJ/kg
Specific internal energy at final conditions	-823,311	kJ/kg
Explosion energy	1,01092E+07	kJ
Final temperature	-161,484	degC

Radius at overpressure (gauge)

Overpressure [bar]	Mass [kg]	Radius [m]
0,03	184025	434,739
0,07	184025	223,027
0,14	184025	151,118
0,3	184025	93,5929
0,6	184025	62,8578

Details for Overpressure and Impulse Data

Distance [m]	Overpressure [bar]	Impulse [N.s/m2]
0	7	41811,7
10	7	9903,75
20	7	2418,51
30	4,47158	1642,62

40	2,54236	1266,46
50	0,914401	648,487
60	0,652874	550,817
70	0,494925	479,324
80	0,391764	385,897
90	0,320359	346,346
100	0,268671	314,154
110	0,229904	287,418
120	0,199978	264,847
130	0,176319	245,532
140	0,157236	228,813
150	0,14158	214,199
160	0,128544	201,315
170	0,102857	189,872
180	0,0946542	179,641
190	0,0875889	170,441
200	0,0814497	162,122
210	0,0760729	154,566
220	0,0713303	147,672
230	0,06712	141,358
240	0,0633605	135,553
250	0,0599856	130,2
260	0,056941	125,247
270	0,0541821	120,651
280	0,0516718	116,377
290	0,0493788	112,39
300	0,047277	108,664
310	0,045344	105,174
320	0,0435608	101,898
330	0,0419111	98,818
340	0,0403807	95,9162
350	0,0389576	93,1779
360	0,0376309	90,5898
370	0,0363915	88,1401

380	0,0352312	85,8179
390	0,0341427	83,6137
400	0,0331197	81,5187
410	0,0321565	79,5252
420	0,0312482	77,6259
430	0,0303902	75,8144
440	0,0295785	74,0848
450	0,0288096	72,4317
460	0,02808	70,8501
470	0,0273871	69,3356
480	0,0267279	67,884
490	0,0261003	66,4915
500	0,0255019	65,1546
510	0,0249308	63,87
520	0,0243852	62,6348
530	0,0238634	61,4462
540	0,0233639	60,3015
550	0,0228853	59,1985
560	0,0224263	58,1349
570	0,0219857	57,1086
580	0,0215625	56,1178
590	0,0211556	55,1606
600	0,0207641	54,2353
610	0,0203872	53,3404
620	0,020024	52,4745
630	0,0196738	51,6361
640	0,0193359	50,824
650	0,0190097	50,0369
660	0,0186946	49,2738
670	0,01839	48,5335
680	0,0180954	47,815
690	0,0178103	47,1174
700	0,0175342	46,4399
710	0,0172668	45,7815

720	0,0170075	45,1414
730	0,0167562	44,5189
740	0,0165123	43,9134
750	0,0162755	43,324
760	0,0160456	42,7502
770	0,0158223	42,1914
780	0,0156052	41,647
790	0,0153941	41,1164
800	0,0151888	40,5991
810	0,014989	40,0947
820	0,0147945	39,6026
830	0,014605	39,1224
840	0,0144205	38,6537
850	0,0142406	38,1961
860	0,0140653	37,7492
870	0,0138943	37,3126
880	0,0137274	36,886
890	0,0135646	36,4689
900	0,0134057	36,0612
910	0,0132505	35,6625
920	0,013099	35,2725
930	0,0129509	34,891
940	0,0128061	34,5176
950	0,0126647	34,152
960	0,0125263	33,7942
970	0,012391	33,4437
980	0,0122586	33,1004
990	0,012129	32,7641
1000	0,0120022	32,4345

Weather: Category 5/D

Wind speed [m/s]	**5**
Pasquill stability	**D neutral - little sun and high wind or overcast/windy night**
Atmospheric temperature [degC]	9,85
Relative humidity [fraction]	0,7
Solar radiation flux [kW/m2]	0,5

Input Data

Storage conditions

Vessel shape	**Cylindrical**	
Vessel elevation	**1**	
Vessel length	**16**	
Vessel radius	**6**	
Specified condition	**Pressure/bubble point**	
Pressure (gauge)	**7**	bar
Liquid fraction (mass)	**1**	fraction
Specify volume inventory?	**Yes**	
Volume inventory	**500**	m3

BLEVE blast parameters

Air or ground burst	Ground burst	
Ideal gas modelling	Model as real gas	
CCPS method	**First edition**	

Distances

Max. distance option	**Specify maximum distance**	
Minimum distance	0	m
Maximum distance	**1000**	m
Distance step size	10	m

Output Data

Specific internal energy at failure conditions	-795,844	kJ/kg
Specific internal energy at final conditions	-823,311	kJ/kg
Explosion energy	1,01092E+07	kJ
Final temperature	-161,484	degC

Radius at overpressure (gauge)

Overpressure [bar]	Mass [kg]	Radius [m]
0,03	184025	434,739
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0,14	184025	151,118
0,3	184025	93,5929
0,6	184025	62,8578

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60	0,652874	550,817
70	0,494925	479,324
80	0,391764	385,897
90	0,320359	346,346
100	0,268671	314,154
110	0,229904	287,418
120	0,199978	264,847
130	0,176319	245,532

140	0,157236	228,813
150	0,14158	214,199
160	0,128544	201,315
170	0,102857	189,872
180	0,0946542	179,641
190	0,0875889	170,441
200	0,0814497	162,122
210	0,0760729	154,566
220	0,0713303	147,672
230	0,06712	141,358
240	0,0633605	135,553
250	0,0599856	130,2
260	0,056941	125,247
270	0,0541821	120,651
280	0,0516718	116,377
290	0,0493788	112,39
300	0,047277	108,664
310	0,045344	105,174
320	0,0435608	101,898
330	0,0419111	98,818
340	0,0403807	95,9162
350	0,0389576	93,1779
360	0,0376309	90,5898
370	0,0363915	88,1401
380	0,0352312	85,8179
390	0,0341427	83,6137
400	0,0331197	81,5187
410	0,0321565	79,5252
420	0,0312482	77,6259
430	0,0303902	75,8144
440	0,0295785	74,0848
450	0,0288096	72,4317
460	0,02808	70,8501
470	0,0273871	69,3356

480	0,0267279	67,884
490	0,0261003	66,4915
500	0,0255019	65,1546
510	0,0249308	63,87
520	0,0243852	62,6348
530	0,0238634	61,4462
540	0,0233639	60,3015
550	0,0228853	59,1985
560	0,0224263	58,1349
570	0,0219857	57,1086
580	0,0215625	56,1178
590	0,0211556	55,1606
600	0,0207641	54,2353
610	0,0203872	53,3404
620	0,020024	52,4745
630	0,0196738	51,6361
640	0,0193359	50,824
650	0,0190097	50,0369
660	0,0186946	49,2738
670	0,01839	48,5335
680	0,0180954	47,815
690	0,0178103	47,1174
700	0,0175342	46,4399
710	0,0172668	45,7815
720	0,0170075	45,1414
730	0,0167562	44,5189
740	0,0165123	43,9134
750	0,0162755	43,324
760	0,0160456	42,7502
770	0,0158223	42,1914
780	0,0156052	41,647
790	0,0153941	41,1164
800	0,0151888	40,5991
810	0,014989	40,0947

820	0,0147945	39,6026
830	0,014605	39,1224
840	0,0144205	38,6537
850	0,0142406	38,1961
860	0,0140653	37,7492
870	0,0138943	37,3126
880	0,0137274	36,886
890	0,0135646	36,4689
900	0,0134057	36,0612
910	0,0132505	35,6625
920	0,013099	35,2725
930	0,0129509	34,891
940	0,0128061	34,5176
950	0,0126647	34,152
960	0,0125263	33,7942
970	0,012391	33,4437
980	0,0122586	33,1004
990	0,012129	32,7641
1000	0,0120022	32,4345

Consequence Summary Report

Workspace: IONIO BLEVE Rev.00.02

Study: IONIO_BLEVE

Summary Basis

These tables will only report global values set in the parameters. Values that are modified in the study tree will not be reported.

The report is context sensitive, and filters up to the study level. You willl need to generate multiple summary reports if you have multiple studies in your workspace.

Fireball Results

Distance downwind to defined radiation levels

The reported radiations are defined in the parameters

Path	Scenario	Weather	Fireball diameter [m]
IONIO BLEVE Rev.00.02\IONIO_BLEVE \BLEVE_serbatoio\Standalones	Fireball	Category 3/F	255,172
		Category 5/D	255,172

Bleve Blast Results

Distance downwind to defined overpressures

The reported overpressures are defined in the explosion parameters

Path	Scenario	Weather	Distance downwind to overpressure 1 (0,03 bar) [m]	Distance downwind to overpressure 2 (0,07 bar) [m]	Distance downwind to overpressure 3 (0,14 bar) [m]	Distance downwind to overpressure 4 (0,3 bar) [m]	Distance downwind to overpressure 5 (0,6 bar) [m]
IONIO BLEVE Rev.00.02 \IONIO_BLEVE \BLEVE_serbatoio \Standalones	BLEVE blast	Category 3/F	434,739	223,027	151,118	93,5929	62,8578
	BLEVE blast	Category 5/D	434,739	223,027	151,118	93,5929	62,8578

Early Explosion Results

Distance downwind to defined overpressures

The reported overpressures are defined in the explosion parameters

Fireball Report

Workspace: IONIO BLEVE Rev.00.02

Study: IONIO_BLEVE

Standalone Set: Standalones

IONIO BLEVE Rev.00.02\IONIO_BLEVE\BLEVE_serbatoio\Standalones

Material	**METHANE**	
East	0	m
North	0	m

Fireball Scenario: Fireball

IONIO BLEVE Rev.00.02\IONIO_BLEVE\BLEVE_serbatoio\Standalones\Fireball

Weather: Category 3/F

Wind speed [m/s]	**3**
Pasquill stability	**F stable - night with moderate clouds and light/ moderate wind**
Atmospheric temperature [degC]	9,85
Relative humidity [fraction]	0,7
Solar radiation flux [kW/ m2]	0,5

Input Data

Fireball

Released mass	**180000**	kg
Vapour mass fraction	**0,15**	fraction
Supply burst pressure - gauge	**No**	
Calculate flame surface emissive power	**Yes**	
Use shape correlation	**Yes**	

Fireball Parameters

Number of input radiation levels	**3**	

Intensity levels	7 11 17	kW/m2
Mass modification factor	3	
Fireball maximum exposure duration	**18**	s
Fireball model	Recommended	

Output Data

Fireball radius	127,586	m
Flame duration	16,0933	s
Flame emissive power	400	kW/m2
Fireball lift off height	255,172	m
Actual flammable mass	81000	kg

Flame Coordinates

X [m]	Z [m]	R [m]	Phi [deg]
0	127,586	0	0
0	135,28	43,6369	0
0	157,435	82,0106	0
0	191,379	110,493	0
0	233,017	125,648	0
0	277,327	125,648	0
0	318,965	110,493	0
0	352,908	82,0106	0
0	375,063	43,6369	0
0	382,758	0	0

Radiation v Distance Results

Input Data

Maximum distance	**1000**	m
Angle from wind direction	**0**	deg
Observer height	**1**	m
Observer inclination	variable	deg

Observer orientation		variable	deg

Output Data

X Coordinates [m]	Y Coordinates [m]	Z Coordinates [m]	View Factors	Incident radiation [kW/m2]	Lethality Levels [%]
0	0	1	0,175287	70,1146	99,9933
20,4082	0	1	0,174049	69,6197	99,9926
40,8163	0	1	0,170437	68,1747	99,9901
61,2245	0	1	0,164728	65,8911	99,9844
81,6327	0	1	0,157329	62,9317	99,9718
102,041	0	1	0,148711	59,4843	99,9435
122,449	0	1	0,140396	56,1585	99,8892
142,857	0	1	0,130561	52,2244	99,7537
163,265	0	1	0,120748	48,2992	99,4539
183,673	0	1	0,110536	44,2144	98,757
204,082	0	1	0,101569	40,6278	97,4697
224,49	0	1	0,0931629	37,2651	95,1536
244,898	0	1	0,0853729	34,1492	91,3382
265,306	0	1	0,0782164	31,2866	85,6121
285,714	0	1	0,071683	28,6732	77,7962
306,122	0	1	0,0657446	26,2979	68,0883
326,531	0	1	0,0603632	24,1453	57,0906
346,939	0	1	0,0554952	22,1981	45,6873
367,347	0	1	0,0510958	20,4383	34,8184
387,755	0	1	0,047121	18,8484	25,2498
408,163	0	1	0,0435286	17,4115	17,4298
428,571	0	1	0,0402798	16,1119	11,4667
448,98	0	1	0,0373387	14,9355	7,20251
469,388	0	1	0,0346728	13,8691	4,32915
489,796	0	1	0,0322531	12,9012	2,49615
510,204	0	1	0,0300535	12,0214	1,38425
530,612	0	1	0,0280507	11,2203	0,740251
551,02	0	1	0,0262241	10,4897	0,382731

571,429	0	1	0,0245554	9,82218	0,191802
591,837	0	1	0,0230284	9,21135	0,0933919
612,245	0	1	0,0216286	8,65142	0,0442853
632,653	0	1	0,0203432	8,13727	0,0204948
653,061	0	1	0,0191609	7,66437	0,00927572
673,469	0	1	0,0180717	7,22869	0,00411333
693,878	0	1	0,0170666	6,82665	0,0017904
714,286	0	1	0,0161377	6,45508	0,000766178
734,694	0	1	0,0152778	6,11113	0,000322846
755,102	0	1	0,0144806	5,79226	0,00013414
775,51	0	1	0,0137405	5,49622	5,50286E-05
795,918	0	1	0,0130524	5,22098	2,23155E-05
816,327	0	1	0,0124118	4,96472	8,95568E-06
836,735	0	1	0,0118145	4,72581	3,5605E-06
857,143	0	1	0,011257	4,50279	1,40364E-06
877,551	0	1	0,0107358	4,29433	0
897,959	0	1	0,0102481	4,09925	0
918,367	0	1	0,00979116	3,91646	0
938,776	0	1	0,0093625	3,745	0
959,184	0	1	0,00895994	3,58398	0
979,592	0	1	0,00858149	3,43259	0
1000	0	1	0,00822531	3,29012	0

Weather: Category 5/D

Wind speed [m/s]	**5**
Pasquill stability	**D neutral - little sun and high wind or overcast/windy night**
Atmospheric temperature [degC]	9,85
Relative humidity [fraction]	0,7
Solar radiation flux [kW/m2]	0,5

Input Data

Fireball

Released mass	**180000**	kg
Vapour mass fraction	**0,15**	fraction
Supply burst pressure - gauge	**No**	
Calculate flame surface emissive power	**Yes**	
Use shape correlation	**Yes**	

Fireball Parameters

Number of input radiation levels	**3**	
Intensity levels	7 11 17	kW/m2
Mass modification factor	3	
Fireball maximum exposure duration	**18**	s
Fireball model	Recommended	

Output Data

Fireball radius	127,586	m
Flame duration	16,0933	s
Flame emissive power	400	kW/m2
Fireball lift off height	255,172	m
Actual flammable mass	81000	kg

Flame Coordinates

X [m]	Z [m]	R [m]	Phi [deg]
0	127,586	0	0
0	135,28	43,6369	0
0	157,435	82,0106	0
0	191,379	110,493	0
0	233,017	125,648	0
0	277,327	125,648	0
0	318,965	110,493	0
0	352,908	82,0106	0
0	375,063	43,6369	0

0	382,758	0	0

Radiation v Distance Results

Input Data

Maximum distance	**1000**	m
Angle from wind direction	**0**	deg
Observer height	**1**	m
Observer inclination	variable	deg
Observer orientation	variable	deg

Output Data

X Coordinates [m]	Y Coordinates [m]	Z Coordinates [m]	View Factors	Incident radiation [kW/m2]	Lethality Levels [%]
0	0	1	0,175287	70,1146	99,9933
20,4082	0	1	0,174049	69,6197	99,9926
40,8163	0	1	0,170437	68,1747	99,9901
61,2245	0	1	0,164728	65,8911	99,9844
81,6327	0	1	0,157329	62,9317	99,9718
102,041	0	1	0,148711	59,4843	99,9435
122,449	0	1	0,140396	56,1585	99,8892
142,857	0	1	0,130561	52,2244	99,7537
163,265	0	1	0,120748	48,2992	99,4539
183,673	0	1	0,110536	44,2144	98,757
204,082	0	1	0,101569	40,6278	97,4697
224,49	0	1	0,0931629	37,2651	95,1536
244,898	0	1	0,0853729	34,1492	91,3382
265,306	0	1	0,0782164	31,2866	85,6121
285,714	0	1	0,071683	28,6732	77,7962
306,122	0	1	0,0657446	26,2979	68,0883
326,531	0	1	0,0603632	24,1453	57,0906
346,939	0	1	0,0554952	22,1981	45,6873
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408,163	0	1	0,0435286	17,4115	17,4298
428,571	0	1	0,0402798	16,1119	11,4667
448,98	0	1	0,0373387	14,9355	7,20251
469,388	0	1	0,0346728	13,8691	4,32915
489,796	0	1	0,0322531	12,9012	2,49615
510,204	0	1	0,0300535	12,0214	1,38425
530,612	0	1	0,0280507	11,2203	0,740251
551,02	0	1	0,0262241	10,4897	0,382731
571,429	0	1	0,0245554	9,82218	0,191802
591,837	0	1	0,0230284	9,21135	0,0933919
612,245	0	1	0,0216286	8,65142	0,0442853
632,653	0	1	0,0203432	8,13727	0,0204948
653,061	0	1	0,0191609	7,66437	0,00927572
673,469	0	1	0,0180717	7,22869	0,00411333
693,878	0	1	0,0170666	6,82665	0,0017904
714,286	0	1	0,0161377	6,45508	0,000766178
734,694	0	1	0,0152778	6,11113	0,000322846
755,102	0	1	0,0144806	5,79226	0,00013414
775,51	0	1	0,0137405	5,49622	5,50286E-05
795,918	0	1	0,0130524	5,22098	2,23155E-05
816,327	0	1	0,0124118	4,96472	8,95568E-06
836,735	0	1	0,0118145	4,72581	3,5605E-06
857,143	0	1	0,011257	4,50279	1,40364E-06
877,551	0	1	0,0107358	4,29433	0
897,959	0	1	0,0102481	4,09925	0
918,367	0	1	0,00979116	3,91646	0
938,776	0	1	0,0093625	3,745	0
959,184	0	1	0,00895994	3,58398	0
979,592	0	1	0,00858149	3,43259	0
1000	0	1	0,00822531	3,29012	0