Jet Fire

Workspace: 72181-Elaborati di calcolo

Study: Sergnano

Equipment Item: Trattamento

72181-Elaborati di calcolo\Sergnano\Trattamento

Material	**Gas Naturale Stogit**	
East	0	m
North	0	m

Scenario (Leak) : 25 mm

72181-Elaborati di calcolo\Sergnano\Trattamento\25 mm

Weather: Category 2/F

Wind speed [m/s]	**2**
Pasquill stability	**F stable - night with moderate clouds and light/moderate wind**
Atmospheric temperature [degC]	**25**
Relative humidity [fraction]	**0,75**
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	4,12249	kg/s
Temperature after atmospheric expansion	-33,4534	degC
Liquid fraction	0	fraction

Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	175,399	kW/m2
Fraction of emissivity	0,189636	fraction
Jet velocity	300	m/s
Flame length	24,1053	m
Frustum length	18,9841	m
Frustum base width	1,66257	m
Frustum tip width	4,97328	m
Frustum lift off distance	5,37153	m
Flame length in still air	31,1417	m
Hole to flame angle	19,8619	deg
Expanded Diameter	0,141905	m
Plane angular rotation	0	deg

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^ProbitN.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0171038	-1,38321	865.119	23,3757	29,1517	18,589	41,9647	2140,81
5	0,000174704	0,0285064	0,360367	1.709.491	19,2679	22,5708	17,8474	37,1154	1366,26
7	0,02405	0,0399089	1,50883	2.677.313	17,1465	18,9587	17,2856	34,4321	1021,25

12,5	6,52536	0,0712659	3,48789	5.800.162	14,2487	13,6822	16,2508	30,4995	612,467
37,5	98,7381	0,213798	7,23773	25.094.924	10,155	5,78335	14,1447	24,2997	184,505

Radiation v Distance Results

INPUT DATA

Maximum distance	46,4527	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	6,76449	0,000154331
0,948014	8,71684	0,00304888
1,89603	11,9885	0,048992
2,84404	18,2129	0,410074
3,79206	32,3865	0,958837
4,74007	70,9255	0,999995
5,68808	175,399	1
6,6361	175,399	1
7,58411	175,399	1
8,53212	175,399	1
9,48014	175,399	1
10,4282	175,399	1
11,3762	175,399	1
12,3242	145,174	1
13,2722	125,998	1
14,2202	112,694	1
15,1682	102,622	1
16,1162	94,8626	1
17,0642	88,5828	1
18,0123	83,2932	1

18,9603	78,5971	0,999999
19,9083	74,0855	0,999997
20,8563	69,2307	0,999993
21,8043	63,2546	0,999971
22,7523	55,2398	0,999814
23,7003	44,9129	0,997837
24,6484	33,2789	0,966385
25,5964	26,6156	0,857132
26,5444	23,5391	0,741588
27,4924	20,5367	0,572415
28,4404	17,5665	0,362905
29,3884	14,9935	0,186391
30,3364	12,8328	0,0774508
31,2845	11,039	0,0264122
32,2325	9,5533	0,00755502
33,1805	8,31993	0,00185666
34,1285	7,29157	0,000401379
35,0765	6,43111	7,82862E-05
36,0245	5,70306	1,39215E-05
36,9725	5,08504	2,30431E-06
37,9206	4,55705	3,59864E-07
38,8686	4,10348	5,37052E-08
39,8166	3,71147	7,73188E-09
40,7646	3,37077	0
41,7126	3,07319	0
42,6606	2,81195	0
43,6086	2,58154	0
44,5566	2,37743	0
45,5047	2,19587	0
46,4527	2,03374	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]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	4,12249	kg/s
Temperature after atmospheric expansion	-33,4534	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	167,078	kW/m2
Fraction of emissivity	0,181338	fraction
Jet velocity	300	m/s
Flame length	26,8021	m
Frustum length	21,5037	m
Frustum base width	1,66257	m
Frustum tip width	4,36365	m

Frustum lift off distance	5,37153	m
Flame length in still air	31,1417	m
Hole to flame angle	10,5776	deg
Expanded Diameter	0,141905	m
Plane angular rotation	0	deg

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0179557	-1,38321	865.119	21,7387	28,706	19,7948	41,5335	1960,45
5	0,000174704	0,0299262	0,360367	1.709.491	18,8064	22,1305	19,001	37,8074	1307,52
7	0,02405	0,0418966	1,50883	2.677.313	17,2709	18,4991	18,5013	35,7722	1003,72
12,5	6,52536	0,0748154	3,48789	5.800.162	15,146	13,1818	17,7057	32,8518	627,226
37,5	98,7381	0,224446	7,23773	25.094.924	12,2353	5,63908	16,4338	28,6691	216,757

Radiation v Distance Results

INPUT DATA

Maximum distance	53,0197	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	4,72979	6,86105E-07
1,08203	6,63789	0,000120143
2,16407	10,2914	0,0147888
3,2461	18,601	0,43826
4,32814	41,8646	0,995519
5,41017	167,078	1
6,49221	167,078	1
7,57424	167,078	1
8,65628	167,078	1
9,73831	167,078	1
10,8203	167,078	1
11,9024	167,078	1
12,9844	167,078	1
14,0664	167,078	1
15,1485	167,078	1
16,2305	167,078	1
17,3126	167,078	1
18,3946	158,933	1
19,4766	149,751	1
20,5587	139,468	1
21,6407	130,484	1
22,7227	123,074	1
23,8048	116,579	1
24,8868	109,699	1
25,9688	95,8952	1
27,0509	50,682	0,999454
28,1329	43,7397	0,997137
29,2149	31,7911	0,952936
30,297	23,4644	0,738071
31,379	17,6921	0,372073
32,461	13,6551	0,113056
33,5431	10,7675	0,0216217

34,6251	8,65747	0,00283913
35,7071	7,08149	0,000278617
36,7892	5,88179	2,20272E-05
37,8712	4,95218	1,48993E-06
38,9532	4,21966	9,02146E-08
40,0353	3,63383	0
41,1173	3,15892	0
42,1993	2,7692	0
43,2814	2,44618	0
44,3634	2,17511	0
45,4454	1,94589	0
46,5275	1,75045	0
47,6095	1,58252	0
48,6916	1,43729	0
49,7736	1,31086	0
50,8556	1,20016	0
51,9377	1,1027	0
53,0197	1,01648	0

Scenario (Leak) : 50 mm

72181-Elaborati di calcolo\Sergnano\Trattamento\50 mm

Weather: Category 2/F

Wind speed [m/s]	**2**
Pasquill stability	**F stable - night with moderate clouds and light/moderate wind**
Atmospheric temperature [degC]	**25**
Relative humidity [fraction]	**0,75**
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	16,49	kg/s
Temperature after atmospheric expansion	-33,4534	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	240,837	kW/m2
Fraction of emissivity	0,214475	fraction
Jet velocity	300	m/s
Flame length	40,1946	m
Frustum length	30,3156	m

Frustum base width	4,11242	m
Frustum tip width	9,35301	m
Frustum lift off distance	10,7431	m
Flame length in still air	56,835	m
Hole to flame angle	26,8467	deg
Expanded Diameter	0,283809	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^ProbitN.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0124566	-1,38321	865.119	49,8978	60,0754	30,786	80,6837	9417,33
5	0,000174704	0,0207609	0,360367	1.709.491	39,7605	46,7383	30,001	69,7614	5838,14
7	0,02405	0,0290653	1,50883	2.677.313	34,4262	39,4529	29,3014	63,7276	4266,96
12,5	6,52536	0,0519023	3,48789	5.800.162	27,1546	29,0127	27,7405	54,8951	2475,03
37,5	98,7381	0,155707	7,23773	25.094.924	17,635	13,7486	24,0582	41,6932	761,701

Radiation v Distance Results

INPUT DATA

Maximum distance	80,6837	m
Observer type radiation modelling flag	Planar	

Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	11,6178	0,0390404
1,64661	14,431	0,153438
3,29321	18,7251	0,447217
4,93982	25,8978	0,835022
6,58643	39,2857	0,991724
8,23304	76,1903	0,999998
9,87964	214,318	1
11,5262	240,837	1
13,1729	240,837	1
14,8195	240,837	1
16,4661	240,837	1
18,1127	240,837	1
19,7593	185,996	1
21,4059	155,424	1
23,0525	134,964	1
24,6991	120,29	1
26,3457	109,105	1
27,9923	100,153	1
29,6389	92,6489	1
31,2855	85,9978	1
32,9321	79,7093	0,999999
34,5787	73,1921	0,999997
36,2254	66,0821	0,999985
37,872	58,0771	0,999905
39,5186	49,2825	0,999239
41,1652	40,2899	0,99348
42,8118	31,9157	0,954234
44,4584	25,0839	0,806541

46,105	23,7037	0,74922
47,7516	21,1556	0,611745
49,3982	18,7385	0,448186
51,0448	16,5795	0,291818
52,6914	14,6724	0,167233
54,338	13,0101	0,0844747
55,9846	11,57	0,0378667
57,6312	10,3252	0,0152117
59,2779	9,24867	0,00553723
60,9245	8,31612	0,00184743
62,5711	7,50594	0,000571077
64,2177	6,79972	0,000165217
65,8643	6,18188	4,51465E-05
67,5109	5,63919	1,17438E-05
69,1575	5,16098	2,93148E-06
70,8041	4,73785	7,06419E-07
72,4507	4,36211	1,65264E-07
74,0973	4,02724	3,77202E-08
75,7439	3,72777	8,43429E-09
77,3905	3,45911	0
79,0371	3,21845	0
80,6837	3	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]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	16,49	kg/s
Temperature after atmospheric expansion	-33,4534	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	250,311	kW/m2
Fraction of emissivity	0,209592	fraction
Jet velocity	300	m/s
Flame length	43,9982	m
Frustum length	33,494	m
Frustum base width	4,11242	m
Frustum tip width	7,70032	m

Frustum lift off distance	10,7431	m
Flame length in still air	56,835	m
Hole to flame angle	13,8998	deg
Expanded Diameter	0,283809	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0119851	-1,38321	865.119	44,0599	59,9732	33,2675	77,4679	8301,39
5	0,000174704	0,0199751	0,360367	1.709.491	36,7567	46,6359	32,223	68,9797	5385,26
7	0,02405	0,0279652	1,50883	2.677.313	32,9601	39,3543	31,4704	64,4305	4075,03
12,5	6,52536	0,0499378	3,48789	5.800.162	27,8121	28,925	30,1532	57,9653	2527,3
37,5	98,7381	0,149813	7,23773	25.094.924	21,1104	14,1327	27,6069	48,7173	937,281

Radiation v Distance Results

INPUT DATA

Maximum distance	86,5124	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	8,54214	0,00246494
1,76556	11,2782	0,0312187
3,53112	15,8671	0,242598
5,29668	24,6494	0,789756
7,06224	47,4441	0,998819
8,8278	116,556	1
10,5934	250,311	1
12,3589	250,311	1
14,1245	250,311	1
15,89	250,311	1
17,6556	250,311	1
19,4212	250,311	1
21,1867	250,311	1
22,9523	250,311	1
24,7178	250,311	1
26,4834	230,565	1
28,249	203,773	1
30,0145	183,657	1
31,7801	168,199	1
33,5456	155,805	1
35,3112	145,373	1
37,0768	136,241	1
38,8423	127,302	1
40,6079	116,38	1
42,3734	98,4262	1
44,139	68,3505	0,999991
45,9046	50,7172	0,999459
47,6701	42,5635	0,996208
49,4357	34,1485	0,972456
51,2012	27,1464	0,871797
52,9668	21,7718	0,648715

54,7324	17,6841	0,371483
56,4979	14,5547	0,160439
58,2635	12,132	0,0532516
60,029	10,2326	0,0140724
61,7946	8,72441	0,0030765
63,5602	7,51178	0,000576429
65,3257	6,52574	9,55298E-05
67,0913	5,71624	1,44127E-05
68,8568	5,04252	2,00838E-06
70,6224	4,47779	2,6402E-07
72,388	4,00034	3,32122E-08
74,1535	3,59346	0
75,9191	3,24419	0
77,6846	2,94234	0
79,4502	2,67985	0
81,2158	2,45028	0
82,9813	2,24841	0
84,7469	2,07003	0
86,5124	1,91164	0

Scenario (Leak) : FB 203 mm

72181-Elaborati di calcolo\Sergnano\Trattamento\FB 203 mm

Weather: Category 2/F

Wind speed [m/s]	**2**
Pasquill stability	**F stable - night with moderate clouds and light/moderate wind**
Atmospheric temperature [degC]	**25**
Relative humidity [fraction]	**0,75**
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	438,41	kg/s
Temperature after atmospheric expansion	-33,4534	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	304,482	kW/m2
Fraction of emissivity	0,219687	fraction
Jet velocity	300	m/s
Flame length	158,418	m
Frustum length	112,448	m

Frustum base width	32,7081	m
Frustum tip width	42,7998	m
Frustum lift off distance	55,3934	m
Flame length in still air	232,223	m
Hole to flame angle	41,1297	deg
Expanded Diameter	1,46338	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^ProbitN.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0098528	-1,38321	865.119	259,314	281,999	109,911	369,225	229733
5	0,000174704	0,0164213	0,360367	1.709.491	203,451	221,088	108,324	311,774	141311
7	0,02405	0,0229899	1,50883	2.677.313	173,023	187,532	106,758	279,781	101936
12,5	6,52536	0,0410533	3,48789	5.800.162	129,881	139,22	102,608	232,488	56806,1
37,5	98,7381	0,12316	7,23773	25.094.924	76,7629	71,7164	94,9574	171,72	17295

Radiation v Distance Results

INPUT DATA

Maximum distance	369,225	m
Observer type radiation modelling flag	Planar	

Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	22,0542	0,664893
7,5352	26,9289	0,865954
15,0704	33,8062	0,970203
22,6056	43,9035	0,997247
30,1408	59,4639	0,999931
37,676	108,438	1
45,2112	194,55	1
52,7464	272,249	1
60,2816	304,482	1
67,8168	304,482	1
75,352	304,482	1
82,8872	304,482	1
90,4224	201,781	1
97,9576	159,203	1
105,493	131,8	1
113,028	112,333	1
120,563	97,526	1
128,098	85,5434	1
135,634	75,3214	0,999998
143,169	66,1769	0,999985
150,704	57,7483	0,999897
158,239	49,9082	0,999344
165,774	42,6907	0,996321
173,31	36,2034	0,982897
180,845	30,5121	0,937467
188,38	25,6468	0,826639
195,915	21,5686	0,636774
203,45	18,5176	0,43222

210,986	16,6907	0,299704
218,521	15,0729	0,191265
226,056	13,6179	0,111284
233,591	12,3193	0,0591665
241,126	11,1652	0,028878
248,662	10,1418	0,0130175
256,197	9,22868	0,00542139
263,732	8,42565	0,00212861
271,267	7,71218	0,000787668
278,802	7,07714	0,00027646
286,338	6,51071	9,25887E-05
293,873	6,00428	2,97513E-05
301,408	5,55033	9,21678E-06
308,943	5,1425	2,76624E-06
316,478	4,77511	8,07478E-07
324,014	4,4433	2,30085E-07
331,549	4,14289	6,42069E-08
339,084	3,87025	1,75988E-08
346,619	3,6222	0
354,154	3,39601	0
361,69	3,18931	0
369,225	3	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]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	438,41	kg/s
Temperature after atmospheric expansion	-33,4534	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	350	kW/m2
Fraction of emissivity	0,219687	fraction
Jet velocity	300	m/s
Flame length	163,541	m
Frustum length	110,674	m
Frustum base width	32,7081	m
Frustum tip width	32,7081	m

Frustum lift off distance	55,3934	m
Flame length in still air	232,223	m
Hole to flame angle	21,2387	deg
Expanded Diameter	1,46338	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,00857143	-1,38321	865.119	226,227	279,959	116,736	342,996	198970
5	0,000174704	0,0142857	0,360367	1.709.491	182,632	220,272	115,281	297,913	126382
7	0,02405	0,02	1,50883	2.677.313	159,346	187,601	114,044	273,39	93913,3
12,5	6,52536	0,0357143	3,48789	5.800.162	127,252	141,1	111,416	238,669	56408,2
37,5	98,7381	0,107143	7,23773	25.094.924	85,6232	77,2019	103,418	189,041	20766,8

Radiation v Distance Results

INPUT DATA

Maximum distance	342,963	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	18,9698	0,46479
6,99924	23,7418	0,750961
13,9985	31,268	0,947102
20,9977	44,2038	0,997438
27,997	65,928	0,999984
34,9962	104,258	1
41,9955	170,858	1
48,9947	261,551	1
55,9939	350	1
62,9932	350	1
69,9924	350	1
76,9917	350	1
83,9909	350	1
90,9902	350	1
97,9894	350	1
104,989	308,933	1
111,988	251,113	1
118,987	216,379	1
125,986	187,547	1
132,986	166,085	1
139,985	147,724	1
146,984	130,418	1
153,983	111,894	1
160,983	90,5478	1
167,982	67,7016	0,99999
174,981	49,5562	0,999287
181,98	43,9368	0,997269
188,98	37,5535	0,987539
195,979	31,8066	0,953099
202,978	26,8845	0,864733
209,977	22,81	0,705701

216,977	19,4757	0,500584
223,976	16,7498	0,303908
230,975	14,5126	0,158043
237,974	12,6655	0,0711605
244,974	11,1295	0,0281641
251,973	9,84266	0,00995919
258,972	8,75648	0,00319572
265,971	7,83343	0,000944367
272,97	7,04347	0,000260239
279,97	6,36301	6,76144E-05
286,969	5,77554	1,68186E-05
293,968	5,26123	3,99188E-06
300,967	4,81066	9,15907E-07
307,967	4,41395	2,04377E-07
314,966	4,06302	4,45821E-08
321,965	3,75122	9,54889E-09
328,964	3,47305	0
335,964	3,22392	0
342,963	2,99999	0

Equipment Item: Compressione-Clusters

72181-Elaborati di calcolo\Sergnano\Compressione-Clusters

Material	**Gas Naturale Stogit**	
East	0	m
North	0	m

Scenario (Leak) : 006 mm

72181-Elaborati di calcolo\Sergnano\Compressione-Clusters\006 mm

Weather: Category 2/F

Wind speed [m/s]	**2**
Pasquill stability	**F stable - night with moderate clouds and light/moderate wind**
Atmospheric temperature [degC]	**25**
Relative humidity [fraction]	**0,75**
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	0,544208	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	91,7175	kW/m2
Fraction of emissivity	0,111343	fraction
Jet velocity	300	m/s
Flame length	10,622	m
Frustum length	8,71441	m
Frustum base width	0,421599	m
Frustum tip width	1,76724	m
Frustum lift off distance	1,95164	m
Flame length in still air	12,8282	m
Hole to flame angle	13,4823	deg
Expanded Diameter	0,0473057	m
Plane angular rotation	0	deg

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0327091	-1,38321	865.119	7,46018	8,45126	7,51819	14,9784	198,071
5	0,000174704	0,0545152	0,360367	1.709.491	6,5291	6,39427	7,22835	13,7575	131,158
7	0,02405	0,0763213	1,50883	2.677.313	6,0247	5,21801	7,05679	13,0815	98,7621
12,5	6,52536	0,136288	3,48789	5.800.162	5,27809	3,4901	6,81686	12,0949	57,8715
37,5	98,7381	0,408864	7,23773	25.094.924	4,1263	1,4235	6,45059	10,5769	18,453

Radiation v Distance Results

INPUT DATA

Maximum distance	20,8518	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	2,89111	0
0,425547	3,93701	2,44825E-08
0,851094	5,78369	1,71758E-05
1,27664	9,25643	0,00558272
1,70219	14,4903	0,156779
2,12774	30,4834	0,937072
2,55328	45,2666	0,998013
2,97883	62,5698	0,999966
3,40438	91,7175	1
3,82992	91,7175	1
4,25547	91,7175	1
4,68102	91,7175	1
5,10656	91,7175	1
5,53211	91,7175	1
5,95766	91,7175	1
6,38321	91,7175	1
6,80875	91,7175	1
7,2343	91,7175	1
7,65985	91,7175	1
8,08539	83,2767	1
8,51094	72,2425	0,999996
8,93649	72,173	0,999996
9,36203	67,6766	0,999989
9,78758	4,3771	1,75807E-07
10,2131	55,4513	0,999823
10,6387	29,0737	0,914507

11,0642	25,2112	0,811244
11,4898	18,9238	0,461497
11,9153	14,0789	0,134342
12,3409	10,704	0,0205984
12,7664	8,32196	0,00186161
13,192	6,60492	0,000112396
13,6175	5,34144	5,07435E-06
14,0431	4,39144	1,86464E-07
14,4686	3,66401	0
14,8941	3,09747	0
15,3197	2,64897	0
15,7452	2,28873	0
16,1708	1,9956	0
16,5963	1,75422	0
17,0219	1,55331	0
17,4474	1,38467	0
17,873	1,24144	0
18,2985	1,11901	0
18,7241	1,0136	0
19,1496	0,922214	0
19,5752	0,842503	0
20,0007	0,772566	0
20,4263	0,710899	0
20,8518	0,65625	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]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	0,544208	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	84,1204	kW/m2
Fraction of emissivity	0,101275	fraction
Jet velocity	300	m/s
Flame length	11,7479	m
Frustum length	9,81115	m
Frustum base width	0,421599	m
Frustum tip width	1,54509	m

Frustum lift off distance	1,95164	m
Flame length in still air	12,8282	m
Hole to flame angle	7,7547	deg
Expanded Diameter	0,0473057	m
Plane angular rotation	0	deg

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0356632	-1,38321	865.119	7,43843	7,95491	7,88083	15,3193	185,895
5	0,000174704	0,0594386	0,360367	1.709.491	6,73073	5,88551	7,67254	14,4033	124,45
7	0,02405	0,083214	1,50883	2.677.313	6,33924	4,72022	7,56008	13,8993	94,0045
12,5	6,52536	0,148596	3,48789	5.800.162	5,73409	3,04925	7,43964	13,1737	54,9298
37,5	98,7381	0,445789	7,23773	25.094.924	4,99035	1,5385	7,76767	12,758	24,1201

Radiation v Distance Results

INPUT DATA

Maximum distance	23,3461	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	2,09948	0
0,476452	3,09316	0
0,952903	5,05161	2,06865E-06
1,42936	9,13237	0,00488968
1,90581	15,9807	0,250277
2,38226	30,0768	0,931203
2,85871	39,0711	0,991292
3,33516	48,8612	0,999158
3,81161	61,1882	0,999954
4,28807	77,3614	0,999999
4,76452	84,1204	1
5,24097	84,1204	1
5,71742	84,1204	1
6,19387	84,1204	1
6,67032	84,1204	1
7,14678	84,1204	1
7,62323	84,1204	1
8,09968	84,1204	1
8,57613	84,1204	1
9,05258	84,1204	1
9,52903	84,1204	1
10,0055	84,1204	1
10,4819	84,1204	1
10,9584	84,1204	1
11,4348	84,1204	1
11,9113	64,4215	0,999978
12,3877	28,438	0,902095
12,8642	16,6601	0,297533
13,3406	10,8353	0,0227538
13,8171	7,43106	0,000506005
14,2936	5,35669	5,30747E-06
14,77	4,01809	3,6128E-08

15,2465	3,11341	0
15,7229	2,47738	0
16,1994	2,01512	0
16,6758	1,66955	0
17,1523	1,40493	0
17,6287	1,19803	0
18,1052	1,0334	0
18,5816	0,900308	0
19,0581	0,791237	0
19,5345	0,700796	0
20,011	0,624929	0
20,4874	0,560704	0
20,9639	0,50586	0
21,4403	0,458653	0
21,9168	0,417744	0
22,3932	0,382056	0
22,8697	0,350738	0
23,3461	0,323105	0

Scenario (Leak) : 010 mm

72181-Elaborati di calcolo\Sergnano\Compressione-Clusters\010 mm

Weather: Category 2/F

Wind speed [m/s]	**2**
Pasquill stability	**F stable - night with moderate clouds and light/moderate wind**
Atmospheric temperature [degC]	**25**
Relative humidity [fraction]	**0,75**
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	1,51169	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	129,48	kW/m2
Fraction of emissivity	0,154975	fraction
Jet velocity	300	m/s
Flame length	16,3894	m
Frustum length	13,2394	m

Frustum base width	0,849812	m
Frustum tip width	3,05566	m
Frustum lift off distance	3,25274	m
Flame length in still air	20,0927	m
Hole to flame angle	16,1031	deg
Expanded Diameter	0,0788428	m
Plane angular rotation	0	deg

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0231697	-1,38321	865.119	13,361	16,317	12,2351	25,5961	684,904
5	0,000174704	0,0386161	0,360367	1.709.491	11,3782	12,5414	11,6777	23,0559	448,297
7	0,02405	0,0540625	1,50883	2.677.313	10,341	10,4397	11,313	21,654	339,159
12,5	6,52536	0,0965402	3,48789	5.800.162	8,89295	7,30263	10,7002	19,5932	204,021
37,5	98,7381	0,289621	7,23773	25.094.924	6,72981	2,77713	9,58911	16,3189	58,715

Radiation v Distance Results

INPUT DATA

Maximum distance	31,9454	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	

Height of interest **1,7** m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	4,40547	1,97451E-07
0,651948	5,90087	2,30995E-05
1,3039	8,59597	0,00263429
1,95584	14,2346	0,142633
2,60779	28,343	0,900107
3,25974	75,4073	0,999998
3,91169	129,48	1
4,56363	129,48	1
5,21558	129,48	1
5,86753	129,48	1
6,51948	129,48	1
7,17142	129,48	1
7,82337	129,48	1
8,47532	129,48	1
9,12727	123,338	1
9,77921	109,502	1
10,4312	98,8531	1
11,0831	90,257	1
11,7351	83,6044	1
12,387	78,2527	0,999999
13,039	73,7587	0,999997
13,6909	69,7244	0,999993
14,3428	65,614	0,999983
14,9948	60,3638	0,999944
15,6467	51,833	0,999585
16,2987	38,0371	0,988881
16,9506	26,3546	0,849404
17,6026	23,0781	0,719292
18,2545	19,1059	0,474495

18,9065	15,5159	0,219357
19,5584	12,6408	0,0702582
20,2104	10,3931	0,016091
20,8623	8,63737	0,00277079
21,5143	7,25649	0,000378165
22,1662	6,15989	4,29242E-05
22,8182	5,27994	4,22397E-06
23,4701	4,56627	3,72866E-07
24,1221	3,98141	3,03442E-08
24,774	3,49766	0
25,426	3,09373	0
26,0779	2,75412	0
26,7299	2,46523	0
27,3818	2,21822	0
28,0337	2,00556	0
28,6857	1,8213	0
29,3376	1,66072	0
29,9896	1,51999	0
30,6415	1,39603	0
31,2935	1,28633	0
31,9454	1,18881	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]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	1,51169	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	119,894	kW/m2
Fraction of emissivity	0,145411	fraction
Jet velocity	300	m/s
Flame length	18,2547	m
Frustum length	15,034	m
Frustum base width	0,849812	m
Frustum tip width	2,71104	m

Frustum lift off distance	3,25274	m
Flame length in still air	20,0927	m
Hole to flame angle	8,86793	deg
Expanded Diameter	0,0788428	m
Plane angular rotation	0	deg

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0250222	-1,38321	865.119	12,965	15,8285	12,8845	25,8495	644,703
5	0,000174704	0,0417036	0,360367	1.709.491	11,5028	12,0371	12,401	23,9038	434,985
7	0,02405	0,058385	1,50883	2.677.313	10,7233	9,89813	12,1117	22,835	333,451
12,5	6,52536	0,104259	3,48789	5.800.162	9,62288	6,75729	11,6716	21,2945	204,281
37,5	98,7381	0,312777	7,23773	25.094.924	8,03817	2,6139	11,0379	19,0761	66,008

Radiation v Distance Results

INPUT DATA

Maximum distance	36,214	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	3,10894	0
0,739061	4,5447	3,43117E-07
1,47812	7,49882	0,0005646
2,21718	14,909	0,181263
2,95624	36,1554	0,982704
3,6953	87,477	1
4,43436	119,894	1
5,17342	119,894	1
5,91249	119,894	1
6,65155	119,894	1
7,39061	119,894	1
8,12967	119,894	1
8,86873	119,894	1
9,60779	119,894	1
10,3468	119,894	1
11,0859	119,894	1
11,825	119,894	1
12,564	119,894	1
13,3031	119,894	1
14,0422	119,894	1
14,7812	119,894	1
15,5203	119,894	1
16,2593	111,738	1
16,9984	105,727	1
17,7375	97,9468	1
18,4765	52,5339	0,999648
19,2156	34,5074	0,974641
19,9546	23,1429	0,722512
20,6937	16,245	0,268406
21,4328	11,8037	0,0438437
22,1718	8,84999	0,00356472
22,9109	6,82404	0,000173111

23,6499	5,3927	5,89618E-06
24,389	4,35268	1,58931E-07
25,1281	3,57789	0
25,8671	2,98771	0
26,6062	2,52912	0
27,3452	2,16647	0
28,0843	1,87521	0
28,8234	1,63803	0
29,5624	1,44251	0
30,3015	1,27964	0
31,0405	1,14244	0
31,7796	1,02591	0
32,5187	0,926146	0
33,2577	0,840094	0
33,9968	0,765373	0
34,7359	0,700091	0
35,4749	0,642733	0
36,214	0,592073	0

Scenario (Leak) : 025 mm

72181-Elaborati di calcolo\Sergnano\Compressione-Clusters\025 mm

Weather: Category 2/F

Wind speed [m/s]	**2**
Pasquill stability	**F stable - night with moderate clouds and light/moderate wind**
Atmospheric temperature [degC]	**25**
Relative humidity [fraction]	**0,75**
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	9,44806	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	216,255	kW/m2
Fraction of emissivity	0,20767	fraction
Jet velocity	300	m/s
Flame length	32,668	m
Frustum length	25,0665	m

Frustum base width	2,86566	m
Frustum tip width	7,2646	m
Frustum lift off distance	8,13184	m
Flame length in still air	44,6555	m
Hole to flame angle	23,8907	deg
Expanded Diameter	0,197107	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^ProbitN.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0138725	-1,38321	865.119	36,9319	45,3406	25,2464	62,1783	5260,64
5	0,000174704	0,0231209	0,360367	1.709.491	29,741	35,2114	24,4691	54,2101	3289,95
7	0,02405	0,0323692	1,50883	2.677.313	25,9949	29,6825	23,8147	49,8096	2424,04
12,5	6,52536	0,0578022	3,48789	5.800.162	20,9135	21,7166	22,4513	43,3648	1426,82
37,5	98,7381	0,173407	7,23773	25.094.924	14,0734	9,92288	19,4061	33,4794	438,718

Radiation v Distance Results

INPUT DATA

Maximum distance	62,1783	m
Observer type radiation modelling flag	Planar	

Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	9,51505	0,00727431
1,26894	11,869	0,0456188
2,53789	15,5142	0,219245
3,80683	21,7349	0,646569
5,07578	33,7306	0,969682
6,34472	62,0575	0,999962
7,61367	205,221	1
8,88261	216,255	1
10,1516	216,255	1
11,4205	216,255	1
12,6894	216,255	1
13,9584	216,255	1
15,2273	195,393	1
16,4963	161,273	1
17,7652	139,233	1
19,0342	123,773	1
20,3031	112,218	1
21,5721	103,177	1
22,841	95,8164	1
24,1099	89,5678	1
25,3789	83,9782	1
26,6478	78,6287	0,999999
27,9168	73,0599	0,999997
29,1857	66,7645	0,999987
30,4547	59,2955	0,999928
31,7236	50,5541	0,999438
32,9926	41,1044	0,994629
34,2615	31,9727	0,954816

35,5304	26,5711	0,855839
36,7994	24,006	0,762788
38,0683	21,3252	0,622143
39,3373	18,7629	0,449944
40,6062	16,4911	0,285586
41,8752	14,497	0,157155
43,1441	12,7728	0,075158
44,4131	11,2918	0,0315083
45,682	10,0221	0,0117188
46,9509	8,93254	0,00391807
48,2199	7,99542	0,00119342
49,4888	7,18662	0,000335306
50,7578	6,48586	8,78986E-05
52,0267	5,87619	2,17205E-05
53,2957	5,3434	5,10373E-06
54,5646	4,87612	1,15043E-06
55,8336	4,46445	2,5039E-07
57,1025	4,10034	5,29409E-08
58,3714	3,77704	1,09313E-08
59,6404	3,4889	0
60,9093	3,23123	0
62,1783	3	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]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	9,44806	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	215,424	kW/m2
Fraction of emissivity	0,201154	fraction
Jet velocity	300	m/s
Flame length	36,0413	m
Frustum length	28,0587	m
Frustum base width	2,86566	m
Frustum tip width	6,18164	m

Frustum lift off distance	8,13184	m
Flame length in still air	44,6555	m
Hole to flame angle	12,4772	deg
Expanded Diameter	0,197107	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,013926	-1,38321	865.119	33,1497	45,0065	27,1857	60,3412	4687,1
5	0,000174704	0,02321	0,360367	1.709.491	28,032	34,9053	26,2038	54,2358	3073,94
7	0,02405	0,032494	1,50883	2.677.313	25,3731	29,3735	25,5356	50,9087	2341,41
12,5	6,52536	0,058025	3,48789	5.800.162	21,7482	21,3965	24,4192	46,1674	1461,9
37,5	98,7381	0,174075	7,23773	25.094.924	16,9325	9,98103	22,4147	39,3471	530,94

Radiation v Distance Results

INPUT DATA

Maximum distance	71,0557	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	6,78785	0,000161479
1,45012	9,16478	0,00506381
2,90023	13,3568	0,0992532
4,35035	21,8245	0,651776
5,80046	45,596	0,998163
7,25058	138,645	1
8,7007	215,424	1
10,1508	215,424	1
11,6009	215,424	1
13,051	215,424	1
14,5012	215,424	1
15,9513	215,424	1
17,4014	215,424	1
18,8515	215,424	1
20,3016	215,424	1
21,7517	215,424	1
23,2019	190,282	1
24,652	173,409	1
26,1021	159,305	1
27,5522	148,065	1
29,0023	138,891	1
30,4524	130,775	1
31,9026	125,733	1
33,3527	113,926	1
34,8028	96,8473	1
36,2529	62,1082	0,999962
37,703	48,7104	0,999127
39,1531	38,7952	0,990705
40,6032	30,0963	0,931496
42,0534	23,4063	0,735307
43,5035	18,4863	0,429953
44,9536	14,8436	0,177333

46,4037	12,1038	0,0523977
47,8538	10,0139	0,0116341
49,3039	8,3946	0,00204559
50,7541	7,1209	0,000298827
52,2042	6,10539	3,78238E-05
53,6543	5,28491	4,28767E-06
55,1044	4,6142	4,47483E-07
56,5545	4,06061	4,40867E-08
58,0046	3,59764	0
59,4548	3,20764	0
60,9049	2,87635	0
62,355	2,59277	0
63,8051	2,3483	0
65,2552	2,13618	0
66,7053	1,95102	0
68,1554	1,78848	0
69,6056	1,64511	0
71,0557	1,51801	0

Scenario (Leak) : 030 mm

72181-Elaborati di calcolo\Sergnano\Compressione-Clusters\030 mm

Weather: Category 2/F

Wind speed [m/s]	**2**
Pasquill stability	**F stable - night with moderate clouds and light/moderate wind**
Atmospheric temperature [degC]	**25**
Relative humidity [fraction]	**0,75**
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	13,6052	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	232,839	kW/m2
Fraction of emissivity	0,212556	fraction
Jet velocity	300	m/s
Flame length	37,3901	m
Frustum length	28,3637	m

Frustum base width	3,63155	m
Frustum tip width	8,56942	m
Frustum lift off distance	9,75821	m
Flame length in still air	52,2979	m
Hole to flame angle	25,8194	deg
Expanded Diameter	0,236528	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^ProbitN.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0128845	-1,38321	865.119	45,0065	54,5788	28,7459	73,7524	7717
5	0,000174704	0,0214741	0,360367	1.709.491	35,979	42,4355	27,9689	63,948	4796,54
7	0,02405	0,0300637	1,50883	2.677.313	31,2461	35,8095	27,2796	58,5258	3515,15
12,5	6,52536	0,0536852	3,48789	5.800.162	24,8048	26,2916	25,7887	50,5936	2048,82
37,5	98,7381	0,161056	7,23773	25.094.924	16,2972	12,3227	22,3273	38,6245	630,91

Radiation v Distance Results

INPUT DATA

Maximum distance	73,7524	m
Observer type radiation modelling flag	Planar	

Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	10,8829	0,0235735
1,50515	13,5373	0,107488
3,0103	17,6096	0,36605
4,51545	24,4643	0,782261
6,0206	37,4097	0,98711
7,52575	71,614	0,999996
9,03091	214,165	1
10,5361	232,839	1
12,0412	232,839	1
13,5464	232,839	1
15,0515	232,839	1
16,5567	232,839	1
18,0618	188,62	1
19,567	156,971	1
21,0721	136,251	1
22,5773	121,415	1
24,0824	110,199	1
25,5876	101,244	1
27,0927	94,2222	1
28,5979	87,3596	1
30,103	81,3334	0,999999
31,6082	75,2672	0,999998
33,1133	68,674	0,999992
34,6185	61,1558	0,999953
36,1236	52,6047	0,999654
37,6288	43,4673	0,996944
39,1339	34,5734	0,975024
40,6391	27,5981	0,883221

42,1442	24,6615	0,790238
43,6494	22,0575	0,66508
45,1545	19,5245	0,503992
46,6597	17,2466	0,339645
48,1648	15,2252	0,200756
49,67	13,4618	0,103999
51,1751	11,9361	0,0474914
52,6803	10,6202	0,0193032
54,1854	9,48562	0,00706392
55,6906	8,50578	0,00235565
57,1957	7,65721	0,000724154
58,7009	6,91984	0,000207446
60,206	6,27672	5,59245E-05
61,7112	5,71347	1,43083E-05
63,2163	5,21853	3,50429E-06
64,7215	4,78177	8,26862E-07
66,2266	4,39488	1,89105E-07
67,7318	4,0509	4,21399E-08
69,2369	3,74396	9,19025E-09
70,7421	3,4692	0
72,2472	3,22239	0
73,7524	3	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]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	13,6052	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	238,222	kW/m2
Fraction of emissivity	0,207079	fraction
Jet velocity	300	m/s
Flame length	41,0472	m
Frustum length	31,4924	m
Frustum base width	3,63155	m
Frustum tip width	7,14473	m

Frustum lift off distance	9,75821	m
Flame length in still air	52,2979	m
Hole to flame angle	13,4028	deg
Expanded Diameter	0,236528	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0125933	-1,38321	865.119	39,9354	54,374	31,0444	71,0567	6821,81
5	0,000174704	0,0209888	0,360367	1.709.491	33,4644	42,2469	30,017	63,4814	4441,48
7	0,02405	0,0293843	1,50883	2.677.313	30,0995	35,621	29,2895	59,3891	3368,34
12,5	6,52536	0,052472	3,48789	5.800.162	25,5334	26,1101	28,0391	53,5725	2094,44
37,5	98,7381	0,157416	7,23773	25.094.924	19,5582	12,5725	25,6894	45,2476	772,502

Radiation v Distance Results

INPUT DATA

Maximum distance	80,7858	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	7,90662	0,00105093
1,64869	10,5153	0,0177657
3,29738	14,963	0,184535
4,94607	23,5826	0,743625
6,59476	46,7874	0,998619
8,24345	123,096	1
9,89214	238,222	1
11,5408	238,222	1
13,1895	238,222	1
14,8382	238,222	1
16,4869	238,222	1
18,1356	238,222	1
19,7843	238,222	1
21,433	238,222	1
23,0817	238,222	1
24,7303	224,429	1
26,379	198,074	1
28,0277	179,923	1
29,6764	165	1
31,3251	153,166	1
32,9738	143,124	1
34,6225	134,416	1
36,2712	125,963	1
37,9199	115,608	1
39,5686	97,8674	1
41,2172	66,3174	0,999986
42,8659	50,1394	0,999379
44,5146	41,4155	0,995013
46,1633	32,8267	0,962742
47,812	25,895	0,834932
49,4607	20,6642	0,580687

51,1094	16,7173	0,301591
52,7581	13,7156	0,115979
54,4068	11,4035	0,0339651
56,0555	9,59817	0,00789499
57,7041	8,16904	0,0015183
59,3528	7,02365	0,000251075
61,0015	6,09418	3,68429E-05
62,6502	5,33261	4,94358E-06
64,2989	4,69983	6,15186E-07
65,9476	4,17018	7,25414E-08
67,5963	3,72295	8,22088E-09
69,245	3,34225	0
70,8937	3,01576	0
72,5424	2,73385	0
74,191	2,48889	0
75,8397	2,27479	0
77,4884	2,08664	0
79,1371	1,92048	0
80,7858	1,77303	0

Scenario (Leak) : 050 mm

72181-Elaborati di calcolo\Sergnano\Compressione-Clusters\050 mm

Weather: Category 2/F

Wind speed [m/s]	**2**
Pasquill stability	**F stable - night with moderate clouds and light/moderate wind**
Atmospheric temperature [degC]	**25**
Relative humidity [fraction]	**0,75**
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	37,7923	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	267,634	kW/m2
Fraction of emissivity	0,218779	fraction
Jet velocity	300	m/s
Flame length	55,5907	m
Frustum length	41,0295	m

Frustum base width	7,00237	m
Frustum tip width	13,7213	m
Frustum lift off distance	16,2637	m
Flame length in still air	81,2918	m
Hole to flame angle	31,1303	deg
Expanded Diameter	0,394214	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,0112093	-1,38321	865.119	76,9985	89,8516	41,6439	118,642	21734,9
5	0,000174704	0,0186822	0,360367	1.709.491	60,8104	70,0735	40,8049	101,615	13387
7	0,02405	0,0261551	1,50883	2.677.313	52,1648	59,2516	40,0244	92,1892	9710,2
12,5	6,52536	0,0467055	3,48789	5.800.162	40,2293	43,7495	38,1098	78,3391	5529,24
37,5	98,7381	0,140117	7,23773	25.094.924	25,0796	21,4214	33,4974	58,577	1687,79

Radiation v Distance Results

INPUT DATA

Maximum distance	118,642	m
Observer type radiation modelling flag	Planar	

Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	14,6843	0,167924
2,42127	18,1363	0,404492
4,84255	23,2903	0,729727
7,26382	31,6048	0,950932
9,68509	46,3136	0,998453
12,1064	90,3977	1
14,5276	215,962	1
16,9489	267,634	1
19,3702	267,634	1
21,7915	267,634	1
24,2127	267,634	1
26,634	231,015	1
29,0553	180,823	1
31,4765	151,014	1
33,8978	130,784	1
36,3191	115,974	1
38,7404	104,494	1
41,1616	95,0864	1
43,5829	86,9103	1
46,0042	80,1423	0,999999
48,4255	71,7757	0,999996
50,8467	63,9279	0,999975
53,268	55,6624	0,999832
55,6893	47,3093	0,998781
58,1105	39,0004	0,991145
60,5318	31,593	0,950802
62,9531	25,8176	0,83238
65,3744	22,8707	0,708818

67,7956	20,5274	0,571809
70,2169	18,2002	0,409151
72,6382	16,2694	0,270096
75,0595	14,5345	0,159284
77,4807	12,9987	0,084011
79,902	11,6609	0,0401218
82,3233	10,475	0,0171994
84,7445	9,44001	0,00674722
87,1658	8,53478	0,00244249
89,5871	7,74362	0,000826048
92,0084	7,04847	0,000262595
94,4296	6,43591	7,90915E-05
96,8509	5,89432	2,27263E-05
99,2722	5,41416	6,27414E-06
101,693	4,98695	1,6732E-06
104,115	4,60563	4,33223E-07
106,536	4,26419	1,09394E-07
108,957	3,95752	2,70467E-08
111,379	3,68123	0
113,8	3,43165	0
116,221	3,20554	0
118,642	3,00016	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]	25
Relative humidity [fraction]	0,75
Solar radiation flux [kW/m2]	0,5

Jet fire model results

INPUT DATA

Scenario

Elevation	1	m
Relase angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Cross wind angle	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	37,7923	kg/s
Temperature after atmospheric expansion	-70,7838	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	**300**	m/s
Rainout fraction time averaged	**0**	fraction

OUTPUT DATA

Flame emissive power	300,872	kW/m2
Fraction of emissivity	0,21642	fraction
Jet velocity	300	m/s
Flame length	60,0069	m
Frustum length	44,2056	m
Frustum base width	7,00237	m
Frustum tip width	10,5211	m

Frustum lift off distance	16,2637	m
Flame length in still air	81,2918	m
Hole to flame angle	16,0015	deg
Expanded Diameter	0,394214	m
Plane angular rotation	0	deg

Flame on ground impingement with partial truncation

Radiation Intensity Ellipse Results

INPUT DATA

For ellipses 'observer direction' refers to whether inclination is 'fixed' or 'variable'. Orientation is always variable.

Observer direction	Variable	
Exposure duration	20	s
Height of interest	**1,7**	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m2]	Lethality [%]	View factor	Probit	Dose [(W/m2)^Probit N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m2]
3	0	0,00997103	-1,38321	865.119	67,1914	90,496	44,7992	112,526	19102,6
5	0,000174704	0,0166184	0,360367	1.709.491	55,2517	70,5941	43,7063	98,958	12253,6
7	0,02405	0,0232657	1,50883	2.677.313	49,002	59,7359	42,8781	91,8801	9196
12,5	6,52536	0,041546	3,48789	5.800.162	40,5205	44,2724	41,3093	81,8299	5635,84
37,5	98,7381	0,124638	7,23773	25.094.924	29,6016	22,6703	37,8707	67,4723	2108,26

Radiation v Distance Results

INPUT DATA

Maximum distance	117,513	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	**1,7**	m

OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m2]	Lethality level [fraction]
0	11,5548	0,0374988
2,39822	14,8783	0,179413
4,79645	20,137	0,545947
7,19467	29,8275	0,927359
9,5929	51,3569	0,999535
11,9911	101,846	1
14,3893	219,97	1
16,7876	300,872	1
19,1858	300,872	1
21,584	300,872	1
23,9822	300,872	1
26,3805	300,872	1
28,7787	300,872	1
31,1769	300,872	1
33,5751	300,872	1
35,9734	260,088	1
38,3716	225,971	1
40,7698	201,221	1
43,168	182,166	1
45,5663	166,829	1
47,9645	153,974	1
50,3627	142,579	1
52,7609	131,406	1
55,1592	118,379	1
57,5574	100,175	1
59,9556	74,859	0,999998
62,3538	49,8889	0,999341
64,7521	46,183	0,998404
67,1503	38,4966	0,990024
69,5485	31,5452	0,950274
71,9467	25,8526	0,833538

74,345	21,3412	0,623118
76,7432	17,788	0,379068
79,1414	14,9784	0,185467
81,5396	12,7391	0,0738895
83,9379	10,9372	0,024536
86,3361	9,47519	0,00699051
88,7343	8,27226	0,00174369
91,1325	7,27552	0,000390615
93,5308	6,44212	8,0143E-05
95,929	5,73951	1,53181E-05
98,3272	5,14243	2,76565E-06
100,725	4,63131	4,7723E-07
103,124	4,19079	7,94764E-08
105,522	3,80872	1,28782E-08
107,92	3,4754	0
110,318	3,18303	0
112,717	2,92528	0
115,115	2,69697	0
117,513	2,49384	0