

Jet Fire

Workspace: 72438-3InvioGN-10R

Study: Invio GN a metanodotto

Equipment Item: 10R Linea di mandata gas

72438-3InvioGN-10R\Invio GN a metanodotto\10R Linea di mandata gas

Material	GAS NATURALE	
East	0	m
North	0	m

Scenario (Leak) : 81,3 mm

72438-3InvioGN-10R\Invio GN a metanodotto\10R Linea di mandata gas\81,3 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
Release angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model
Wind orientation about the z-axis (anti-clockwise from the East)	0 deg
Rotation about the z-axis (anti-clockwise from the east)	0 deg
Rate modification factor	3

Calculated inputs

Mass flow rate	67,986	kg/s
Temperature after atmospheric expansion	-56,7906	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	300	m/s
Rainout fraction time averaged	0	fraction

OUTPUT DATA

Flame emissive power	282,1	kW/m2
Fraction of emissivity	0,219523	fraction
Jet velocity	300	m/s
Flame length	70,5185	m
Frustum length	51,3465	m
Frustum base width	10,1074	m
Frustum tip width	18,0035	m
Frustum lift-off distance	21,8136	m
Flame length in still air	104,179	m
Hole to flame angle	33,8431	deg
Expanded diameter	0,530104	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	19,1658	s
Height of interest	1,7	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m ²]	Lethality [%]	View factor	Probit	Dose [(W/m ²) ^{Probit} N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m ²]
3	0	0,0106345	-1,49227	829.036	103,601	118,517	51,9492	155,55	38573,8
5	0,000102491	0,0177242	0,251303	1.638.190	81,5372	92,5716	51,0327	132,57	23712,8
7	0,0159003	0,0248139	1,39977	2.565.647	69,6788	78,3537	50,1574	119,836	17151,8
12,5	5,24906	0,0443105	3,37883	5.558.246	53,1797	57,979	47,928	101,108	9686,48
37,5	98,3359	0,132931	7,12867	24.048.254	32,4745	28,8503	42,6541	75,1286	2943,35

Radiation v Distance Results

INPUT DATA

Maximum distance	155,55	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/m ²]	Lethality level [fraction]
0	16,6579	0,260749
3,17449	20,4972	0,526662
6,34899	26,1482	0,815404
9,52348	35,0274	0,97101
12,698	50,1662	0,999102
15,8725	95,7482	1
19,047	213,141	1



22,2215	282,1	1
25,396	282,1	1
28,5704	282,1	1
31,7449	282,1	1
34,9194	235,629	1
38,0939	182,433	1
41,2684	151,17	1
44,4429	129,978	1
47,6174	114,451	1
50,7919	102,359	1
53,9664	92,3781	1
57,1409	83,5763	0,999999
60,3154	75,3365	0,999997
63,4899	67,19	0,999981
66,6644	58,9178	0,999879
69,8389	50,5866	0,999185
73,0134	42,5582	0,994775
76,1879	35,0765	0,971325
79,3624	28,6015	0,88572
82,5369	23,8513	0,720446
85,7113	21,3031	0,578682
88,8858	19,1187	0,432213
92,0603	17,1192	0,291918
95,2348	15,3213	0,177089
98,4093	13,6953	0,0951883
101,584	12,3021	0,0469046
104,758	11,0763	0,0209805
107,933	9,99991	0,00858972
111,107	9,05476	0,0032471
114,282	8,22385	0,00114327
117,456	7,49192	0,000378052
120,631	6,84558	0,000118318
123,805	6,27322	3,52948E-05
126,98	5,76478	1,00966E-05
130,154	5,31194	2,78712E-06



133,329	4,9073	7,45971E-07
136,503	4,54464	1,94458E-07
139,678	4,21864	4,95676E-08
142,852	3,92477	1,23983E-08
146,027	3,65909	0
149,201	3,4183	0
152,376	3,19948	0
155,55	3,00013	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
Release angle from horizontal	0	deg

Jet Fire Parameters

Jet fire method	Cone model	
Wind orientation about the z-axis (anti-clockwise from the East)	0	deg
Rotation about the z-axis (anti-clockwise from the east)	0	deg
Rate modification factor	3	

Calculated inputs

Mass flow rate	67,986	kg/s
Temperature after atmospheric expansion	-56,7906	degC
Liquid fraction	0	fraction
Velocity after atmospheric expansion (input)	300	m/s
Rainout fraction time averaged	0	fraction

OUTPUT DATA

Flame emissive power	335,768	kW/m2
Fraction of emissivity	0,218471	fraction

Jet velocity	300	m/s
Flame length	75,3249	m
Frustum length	54,2359	m
Frustum base width	10,1074	m
Frustum tip width	12,9909	m
Frustum lift-off distance	21,8136	m
Flame length in still air	104,179	m
Hole to flame angle	17,5137	deg
Expanded diameter	0,530104	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	19,1658	s
Height of interest	1,7	m

OUTPUT DATA

Radiation intensity

Incident radiation [kW/m ²]	Lethality [%]	View factor	Probit	Dose [(W/m ²) ^{Probit} N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m ²]
3	0	0,00893 474	- 1,492 27	829.036	90,3 189	119, 959	55,3314	146,488	3403 7,9
5	0,00010 2491	0,01489 12	0,251 303	1.638.190	73,7 455	93,7 74	54,23	127,976	2172 5,4
7	0,01590 03	0,02084 77	1,399 77	2.565.647	65,0 151	79,4 795	53,3659	118,381	1623 3,8



12,5	5,24906	0,03722	3,378	5.558.246	53,1	59,1	51,6612	104,79	9872
		81	83		284	515			,86
37,5	98,3359	0,11168	7,128	24.048.254	37,8	31,0	47,5318	85,3408	3684
		4	67		091	156			,06

Radiation v Distance Results

INPUT DATA

Maximum distance	147,071	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/m ²]	Lethality level [fraction]
0	13,8795	0,103142
3,00144	17,6172	0,32638
6,00289	23,3464	0,695369
9,00433	33,7201	0,961304
12,0058	54,4232	0,999663
15,0072	97,6715	1
18,0087	191,526	1
21,0101	317,441	1
24,0115	335,768	1
27,013	335,768	1
30,0144	335,768	1
33,0159	335,768	1
36,0173	335,768	1
39,0188	335,768	1
42,0202	335,768	1
45,0216	285,233	1
48,0231	244,41	1
51,0245	214,938	1
54,026	192,269	1

57,0274	174,213	1
60,0289	159,152	1
63,0303	145,879	1
66,0317	133,06	1
69,0332	118,831	1
72,0346	100,791	1
75,0361	77,9842	0,999998
78,0375	54,1925	0,999645
81,039	47,3981	0,998295
84,0404	40,4799	0,991568
87,0419	33,8173	0,962121
90,0433	28,1191	0,874108
93,0447	23,4682	0,701562
96,0462	19,729	0,474684
99,0476	16,7272	0,265372
102,049	14,3115	0,123178
105,051	12,3444	0,048063
108,052	10,7336	0,0161292
111,053	9,40287	0,00475762
114,055	8,29458	0,00125963
117,056	7,36365	0,00030478
120,058	6,57553	6,84602E-05
123,059	5,90347	1,44725E-05
126,061	5,32636	2,9121E-06
129,062	4,82759	5,63115E-07
132,063	4,39393	1,05494E-07
135,065	4,01475	1,92775E-08
138,066	3,68147	0
141,068	3,38711	0
144,069	3,12593	0
147,071	2,8932	0