

# Jet Fire

## Workspace: 72438-3InvioGN-11R

### Study: Invio GN a metanodotto

### Equipment Item: 11R Linea di mandata gas

72438-3InvioGN-11R\Invio GN a metanodotto\11R Linea di mandata gas

Material	<b>GAS NATURALE</b>	
East	0	m
North	0	m

### Scenario (Leak) : 81,3

72438-3InvioGN-11R\Invio GN a metanodotto\11R Linea di mandata gas\81,3

### Weather: Category 2/F

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

### Jet fire model results

#### INPUT DATA

##### Scenario

Elevation	4	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)	<b>300</b>	m/s
Rainout fraction time averaged	<b>0</b>	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	20	s
Height of interest	<b>1,7</b>	m

#### OUTPUT DATA

#### Radiation intensity

Incident radiation [kW/m <sup>2</sup> ]	Lethality [%]	View factor	Probit	Dose [(W/m <sup>2</sup> ) <sup>Probit</sup> N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m <sup>2</sup> ]
3	0	0,0106345	-1,38321	865.119	102,492	118,063	53,1678	155,66	38015
5	0,000174704	0,0177242	0,360367	1.709.491	80,1999	91,9893	52,1541	132,354	23177,2
7	0,02405	0,0248139	1,50883	2.677.313	68,1848	77,6692	51,1639	119,349	16637,4
12,5	6,52536	0,0443105	3,48789	5.800.162	51,4174	57,0617	48,564	99,9814	9217,32
37,5	98,7381	0,132931	7,23773	25.094.924	31,1698	27,0976	42,2497	73,4195	2653,47

## Radiation v Distance Results

### INPUT DATA

Maximum distance	155,66	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	<b>1,7</b>	m

### OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m <sup>2</sup> ]	Lethality level [fraction]
0	14,5648	0,161014
3,17674	17,6913	0,372014
6,35348	22,2759	0,677236
9,53022	29,8962	0,928438
12,707	50,085	0,999371
15,8837	92,5972	1
19,0604	166,163	1



22,2372	251,981	1
25,4139	282,1	1
28,5907	263,637	1
31,7674	191,39	1
34,9441	154,305	1
38,1209	130,631	1
41,2976	114,021	1
44,4744	101,593	1
47,6511	91,7876	1
50,8278	83,6574	1
54,0046	76,5555	0,999999
57,1813	70,0226	0,999994
60,3581	63,8227	0,999975
63,5348	57,3721	0,999887
66,7115	50,9405	0,999487
69,8883	44,4782	0,9976
73,065	38,181	0,989252
76,2418	32,3082	0,958103
79,4185	27,0225	0,868495
82,5952	22,4621	0,687368
85,772	19,6722	0,514251
88,9487	17,8311	0,382214
92,1255	16,1104	0,259124
95,3022	14,5366	0,159404
98,4789	13,1178	0,0889169
101,656	11,83	0,0445529
104,832	10,7102	0,0206964
108,009	9,71601	0,00884398
111,186	8,8346	0,00350173
114,363	8,05314	0,00129433
117,539	7,35965	0,000449893
120,716	6,74327	0,000148077
123,893	6,19433	4,64495E-05
127,07	5,70426	1,39655E-05
130,246	5,26585	4,04813E-06



133,423	4,87258	1,13648E-06
136,6	4,51889	3,10359E-07
139,777	4,19999	8,27643E-08
142,953	3,91172	2,16273E-08
146,13	3,65048	0
149,307	3,4132	0
152,484	3,19716	0
155,66	2,99999	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	4	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	20	s
Height of interest	<b>1,7</b>	m

#### OUTPUT DATA

##### Radiation intensity

Incident radiation [kW/m <sup>2</sup> ]	Lethality [%]	View factor	Probit	Dose [(W/m <sup>2</sup> ) <sup>Probit</sup> N.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m <sup>2</sup> ]
3	0	0,00893474	-1,38321	865.119	89,2395	119,512	57,5281	147,524	33505,7
5	0,000174704	0,0148912	0,360367	1.709.491	72,6579	93,306	56,0576	128,715	21298,2
7	0,02405	0,0208477	1,50883	2.677.313	63,9924	79,0048	54,8529	118,845	15883



12,5	6,52536	0,03722	3,487	5.800.162	52,4	58,6	52,2447	104,682	9661
		81	89		373	51			,97
37,5	98,7381	0,11168	7,237	25.094.924	36,6	30,0	46,0604	82,7052	3459
		4	73		448	471			,11

## Radiation v Distance Results

### INPUT DATA

Maximum distance	147,071	m
Observer type radiation modelling flag	Planar	
Observer direction	Variable	
Height of interest	<b>1,7</b>	m

### OUTPUT DATA

Downwind distance [m]	Maximum incident radiation [kW/m <sup>2</sup> ]	Lethality level [fraction]
0	12,7221	0,0732502
3,00144	17,0889	0,328242
6,00289	23,9447	0,760084
9,00433	35,3768	0,979265
12,0058	55,755	0,999836
15,0072	94,0967	1
18,0087	165,54	1
21,0101	277,177	1
24,0115	335,768	1
27,013	335,768	1
30,0144	335,768	1
33,0159	317,679	1
36,0173	261,558	1
39,0188	225,88	1
42,0202	199,801	1
45,0216	179,621	1
48,0231	163,432	1
51,0245	150,072	1
54,026	138,751	1





57,0274	128,859	1
60,0289	119,847	1
63,0303	111,114	1
66,0317	101,892	1
69,0332	91,2597	1
72,0346	78,3192	0,999999
75,0361	63,3402	0,999972
78,0375	47,9679	0,998958
81,039	40,0234	0,993053
84,0404	35,3481	0,979126
87,0419	30,445	0,936538
90,0433	26,0503	0,839949
93,0447	22,2338	0,674916
96,0462	19,019	0,468307
99,0476	16,3455	0,275391
102,049	14,1302	0,137046
105,051	12,292	0,0582789
108,052	10,7605	0,0215074
111,053	9,4776	0,00700743
114,055	8,39686	0,00205155
117,056	7,48053	0,000548249
120,058	6,69871	0,000135647
123,059	6,0277	3,14721E-05
126,061	5,44837	6,92132E-06
129,062	4,94539	1,45634E-06
132,063	4,5064	2,9555E-07
135,065	4,12131	5,82458E-08
138,066	3,78192	1,12125E-08
141,068	3,48147	0
144,069	3,21436	0
147,071	2,9771	0

