

Jet Fire

Workspace: 72341-2FSRURegas

Study: FSRU in rigassificazione

Equipment Item: 7R Linee mandata pompe LNG Feed e collettore GNL

72341-2FSRURegas\FSRU in rigassificazione\7R Linee mandata pompe LNG Feed e collettore GNL

Material	GAS NATURALE	
East	0	m
North	0	m

Scenario (Leak) : 70mm

72341-2FSRURegas\FSRU in rigassificazione\7R Linee mandata pompe LNG Feed e collettore GNL\70mm

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	12,5	m
Release angle from horizontal	0	deg

Jet Fire Parameters

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

Calculated inputs

Mass flow rate	66,9133	kg/s
Temperature after atmospheric expansion	-160,955	degC
Liquid fraction	0,995238	fraction
Velocity after atmospheric expansion (input)	64,1908	m/s
Rainout fraction time averaged	0	fraction

OUTPUT DATA

Flame emissive power	99,1232	kW/m2
Fraction of emissivity	0,280677	fraction
Jet velocity	64,1908	m/s
Flame length	112,508	m
Frustum length	110,82	m
Frustum base width	2,64287	m
Frustum tip width	42,5134	m
Frustum lift-off distance	1,68762	m
Flame length in still air	101,173	m
Hole to flame angle	0	deg
Expanded diameter	0,0795223	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/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	0,0302654	-1,38321	865.119	110,681	123,486	94,0137	204,695	42938,1
5	0,000174704	0,0504423	0,360367	1.709.491	95,2578	97,8009	86,5009	181,759	29268
7	0,02405	0,0706192	1,50883	2.677.313	86,5169	83,1317	82,3782	168,895	22595,3
12,5	6,52536	0,126106	3,48789	5.800.162	73,1381	60,5938	76,6762	149,814	13922,6
37,5	98,7381	0,378317	7,23773	25.094.924	48,1185	24,5148	74,0543	122,173	3705,87

Radiation v Distance Results

INPUT DATA

Maximum distance	224,335	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	8,86502	0,00362709
4,57827	13,8791	0,12407
9,15653	19,796	0,522783
13,7348	25,0786	0,806342
18,3131	30,0664	0,931046
22,8913	34,5601	0,974948
27,4696	35,8318	0,981347

32,0479	43,1506	0,996704
36,6261	47,1902	0,998745
41,2044	51,0943	0,999505
45,7827	54,8564	0,999797
50,3609	58,5233	0,999914
54,9392	62,1055	0,999962
59,5175	65,6257	0,999983
64,0957	69,1095	0,999992
68,674	72,5954	0,999996
73,2523	75,3928	0,999998
77,8305	79,178	0,999999
82,4088	83,5276	1
86,9871	87,7573	1
91,5653	92,5847	1
96,1436	99,1232	1
100,722	99,1232	1
105,3	99,1232	1
109,878	99,1232	1
114,457	89,4856	1
119,035	46,6692	0,998579
123,613	34,5448	0,974859
128,191	27,7992	0,888012
132,77	22,9433	0,712517
137,348	19,2545	0,485035
141,926	16,3571	0,276202
146,505	13,9655	0,128456
151,083	11,9894	0,0490177
155,661	10,353	0,0155671
160,239	8,99265	0,00419257
164,818	7,85683	0,000977409
169,396	6,90355	0,000201226
173,974	6,09935	3,72924E-05
178,552	5,41702	6,32616E-06
183,131	4,83468	9,96427E-07
187,709	4,33536	1,47872E-07



192,287	3,9047	2,08905E-08
196,865	3,5313	0
201,444	3,20603	0
206,022	2,9213	0
210,6	2,67094	0
215,179	2,44984	0
219,757	2,2538	0
224,335	2,07931	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	12,5	m
Release angle from horizontal	0	deg

Jet Fire Parameters

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

Calculated inputs

Mass flow rate	66,9133	kg/s
Temperature after atmospheric expansion	-160,955	degC
Liquid fraction	0,995238	fraction
Velocity after atmospheric expansion (input)	64,1908	m/s
Rainout fraction time averaged	0	fraction

OUTPUT DATA

Flame emissive power	133,25	kW/m2
Fraction of emissivity	0,280677	fraction
Jet velocity	64,1908	m/s
Flame length	87,4556	m
Frustum length	86,1438	m

Frustum base width	3,91429	m
Frustum tip width	38,3605	m
Frustum lift-off distance	1,31183	m
Flame length in still air	101,173	m
Hole to flame angle	0	deg
Expanded diameter	0,0795223	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/m ²]	Lethality [%]	View factor	Probability	Dose [(W/m ²)^ProbN.s]	Ellipse half-length [m]	Ellipse half-width [m]	Ellipse centre downwind distance [m]	Effect downwind distance [m]	Ellipse area [m ²]
3	0	0,0225141	-1,38321	865.119	106,563	122,702	78,9476	185,511	41077,7
5	0,000174704	0,0375236	0,360367	1.709.491	89,5557	96,0146	72,4996	162,055	27013,5
7	0,02405	0,052533	1,50883	2.677.313	80,4931	82,468	68,5372	149,03	20854,2
12,5	6,52536	0,0938089	3,48789	5.800.162	67,1576	62,3731	62,8535	130,011	13159,6
37,5	98,7381	0,281427	7,23773	25.094.924	45,7423	30,0017	56,3419	102,084	4311,35

Radiation v Distance Results

INPUT DATA

Maximum distance	185,511	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	14,1807	0,139736
3,78593	23,4497	0,737375
7,57186	31,7667	0,952679
11,3578	38,845	0,990813
15,1437	45,205	0,997983
18,9297	51,1725	0,999514
22,7156	56,8802	0,999874
26,5015	62,3908	0,999965
30,2875	68,129	0,99999
34,0734	72,9434	0,999997
37,8593	78,0535	0,999999
41,6452	83,0541	1
45,4312	88,0094	1
49,2171	92,9441	1
53,003	97,9016	1
56,789	102,198	1
60,5749	108,324	1
64,3608	113,803	1
68,1468	119,761	1
71,9327	133,25	1
75,7186	133,25	1
79,5046	133,25	1
83,2905	133,25	1

87,0764	133,25	1
90,8624	55,0687	0,999807
94,6483	58,0812	0,999905
98,4342	45,3818	0,998067
102,22	37,2518	0,986622
106,006	31,0609	0,944611
109,792	26,4759	0,853041
113,578	22,7387	0,702005
117,364	19,6544	0,513021
121,15	17,0661	0,326597
124,936	14,8907	0,18016
128,722	13,057	0,0863936
132,508	11,506	0,0363319
136,294	10,1887	0,013555
140,079	9,06503	0,00454307
143,865	8,10218	0,00138551
147,651	7,27316	0,000389053
151,437	6,55578	0,000101651
155,223	5,93266	2,49892E-05
159,009	5,38868	5,82777E-06
162,795	4,91166	1,29927E-06
166,581	4,49172	2,78972E-07
170,367	4,12048	5,80259E-08
174,153	3,79102	1,17544E-08
177,939	3,49756	0
181,725	3,23525	0
185,511	3	0

