

SIMULAZIONI RILASCIO GAS INFIAMMABILE LIQUEFATTO DA CONTAINER-CISTERNA

L'ipotesi riguarda il danneggiamento di un tank-container contenente gas liquefatto infiammabile durante la movimentazione all'interno del terminal oppure durante il trasporto su strada. L'incidente comporta la rottura della parete del tank con rilascio di gas in fase liquida e successivo incendio del getto.

Ipotesi simulazioni

Sostanza pericolosa: Propano (C₃H₈)
Stato fisico: Gas liquefatto
Classificazione: Estremamente infiammabile
(ex D.L.vo 334/99 e s.m.i.)

Tipo di contenitore: tank-container
Volume: 24 m³

Tipo di rottura: rottura grave
Dimensione foro: 51mm

Condizioni meteo: 4D
(maggiormente ricorrenti)

Risultati delle simulazioni

Scenario incidentale	Raggi di danno [m]				Lunghezza fiamma [m]	Durata effetti [min]
	12,5 kW/m ²	7 kW/m ²	5 kW/m ²	3 kW/m ²		
Jet fire	68	81	90	107	60	5

Tabella 4

----- START OF SESSION 1(mYBTPDIS) -----

INPUT

Model..... : Two phase bottom discharge (TPDIS)
 (202)
 Version..... : 5.06
 Reference..... : Yellow Book (CPR-14E), 3rd edition
 1997, Chapter 2 and Modelling source
 terms for the atmospheric dispersion
 of hazardous substances, Jaakko
 Kukkonen
 Case description..... : Rilascio infiammabile - IMO 2.1 -
 Propano
 Chemical name..... : Propane
 Use which representative step..... : First 20% average (flammable)
 Type of release..... : Release through hole in vessel
 Hole diameter..... : 51 mm
 Hole rounding..... : Sharp edges
 Discharge coefficient..... : 0.62 -
 Height difference between pipe entrance and exit..... : 0 m
 Vessel volume..... : 24 m3
 Vessel type..... : Horizontal cylinder
 Length cylinder..... : 6 m
 Filling degree..... : 80 %
 Expansion type..... : Adiabatic
 Pressure inside vessel determination..... : Use vapour pressure
 Initial temperature in vessel..... : 16 °C
 Type of calculation..... : Calculate until device is empty

RESULTS

Initial mass in vessel..... : 9815.3 kg
 Initial (vapour) pressure in vessel..... : 7.5092 bar
 Time needed to empty vessel..... : 475.38 s
 Mass flow rate at time t..... : 0 kg/s
 Total mass released..... : 9759 kg
 Pressure in vessel at time t..... : 1.0151 bar
 Temperature in vessel at time t..... : -43.904 °C
 Exit vapour mass fraction at time t..... : 100 %
 Mass of liquid in vessel at time t..... : 0 kg
 Mass of vapour in vessel at time t..... : 56.362 kg
 Height of liquid at time t..... : 0 m
 Filling degree at time t..... : 0 %
 Pressure at pipe exit at time t..... : 1.0151 bar
 Temperature at pipe exit at time t..... : -43.904 °C
 Maximum mass flow rate..... : 32.715 kg/s
 Representative release rate..... : 32.508 kg/s
 Representative outflow duration..... : 300 s
 Representative temperature..... : 15.588 °C
 Representative pressure..... : 7.5014 bar
 Representative vapour mass fraction..... : 0 %

----- END OF SESSION 1 -----

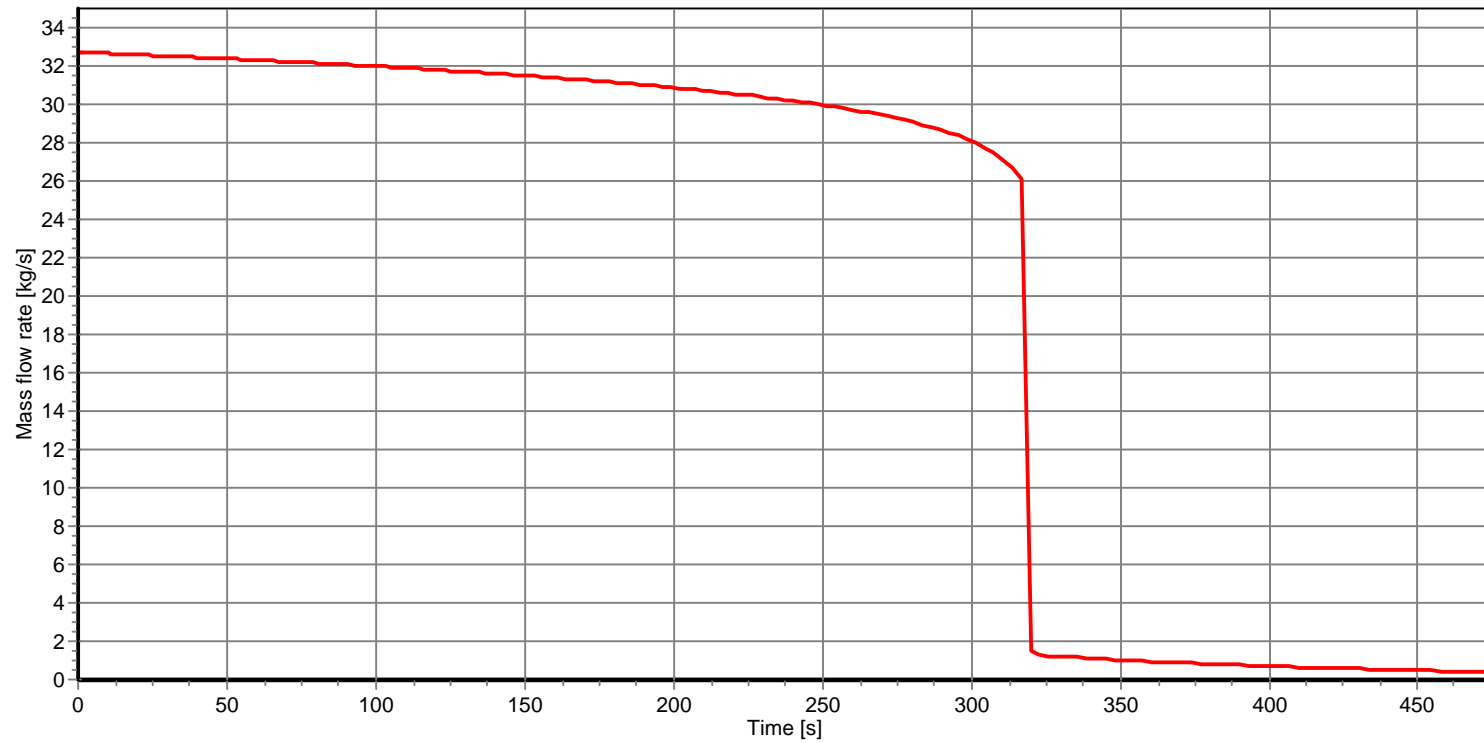
Administrative & version data:

 Main program (production date) : Effects (24 Apr 2009 03:00:37)
 Run mode (complexity level) : Expert
 Model name : Two phase bottom discharge (TPDIS) (202)
 Date of this calculation : 01 Oct 2013 19:36:53
 License owner : rachele
 Calculation performed by : rachele
 Software library version : 7.6.4.3276
 Model driver version(s) : 5.06
 Model driver last modification : 10 July 2007
 Model executable version(s) : N/A
 Session nr. : 1
 References : Yellow Book (CPR-14E), 3rd edition 1997, Chapter 2 and Modelling
 source terms for the atmospheric dispersion of hazardous
 substances, Jaakko Kukkonen
 Project file name : "Rilascio infiammabile - IMO 2.1 - Propano.alf
 Chemical database used : "Purple Book (1999).rdb" (30 ago 2013 15:58:00)
 Environment database used : "Purple Book (1999).Env" (20 mag 2008 09:53:47)
 System database used : "Purple Book (1999).SPF" (20 mag 2008 09:53:47)
 Dispersion database used : "Purple Book (1999).dpf" (20 mag 2008 09:53:47)
 Map background file used : "Rilascio infiammabile - IMO 2.1 - Propano.gbf" (01 gen 0 00:00:00)
 Project file directory : "C:\PC08_Rachele\RISP\RISP_2013\Simulazioni trasporti\IMO 2.1\Rilascio Propano 24m3
 \Rilascio propano bifase"
 Chemical database directory : "C:\Program Files (x86)\TNO\Effects 7.6\Shared data\Databases"
 Environment database directory : "C:\Program Files (x86)\TNO\Effects 7.6\Shared data\Databases"
 System database directory : "C:\Program Files (x86)\TNO\Effects 7.6\Shared data\Databases"
 Dispersion database directory : "C:\Program Files (x86)\TNO\Effects 7.6\Shared data\Databases"
 Map background directory : "C:\PC08_Rachele\RISP\RISP_2013\Simulazioni trasporti\IMO 2.1\Rilascio Propano 24m3
 \Rilascio propano bifase"

End of administrative & version data:

Effects 7.6.4.3276 Calculation: 01 Oct 2013 19:38:51
Model: Two phase bottom discharge (TPDIS) (202)
Graph: Mass flow rate vs Time

Rilascio infiammabile - IMO 2.1 - Propano



Effects 7.6.4.3276 Calculation: 01 Oct 2013 19:49:55
Model: Two-phase Jet fire (135)
Graph: Heat radiation vs. distance

Rilascio infiammabile - IMO 2.1 - Propano

