

Anexo C - Resultados das Simulações PHAST

PHAST SUMMARY RAMAL

SUMMARY REPORT

Unique Audit Number: 23.597



Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Gasoduto do Pará - Phast

Eventos Iniciais

Fissura 45

Base Case

CASE Name: Data

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura 45

User-Defined Data

Material

Material Identifier	METHANE
Type of Vessel	Pressurized Gas
Pressure Specification	Pressure specified
Discharge Pressure - gauge	100 bar
Discharge Temperature	15 degC
Mass Inventory of material to discharge	1E8 kg

Scenario

Type of Event	Leak
Phase	Vapor
HoleDiameter	17,78 mm
Building Wake Option	None

Location

[Release elevation	1 m]
Use ERPG averaging time	ERPG not selected
Use IDLH averaging time	IDLH not selected
Use STEL averaging time	STEL not selected
Supply a user defined averaging time	Not supplied

Bund

Status of Bund	No bund present
[Surface type	Concrete]
[Height	0 m]
[Modelling of bund failure	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Angle	45 deg
Outdoor Release Direction	Angled from Horizontal

Flammable

Method to use for explosions	Multi-Energy
Jet Fire Method	Cone Model

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	1E8 kg

Fireball Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
[Mass modification factor	3]

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Phast 6.54

[Calculation method for fireball DNV Recommended]
[TNO model flame temperature 1727 degC]

Pool Fire Parameters

Reporting Level 1 (Radiation Intensity) 5 kW/m2

Toxic Parameters

[Indoor calculations Unselected]
[Ventilation specification Case Specified]
[Building exchange rate 4 /hr]
[Tail time 1800 s]
[Method of setting time Use a fixed averaging time]
[Cut-off fraction of toxic load 0,05 fraction]
[Cut-off concentration 0 fraction]

Multi Energy Explosion

Use Unconfined Volumes No
Use Fractions No
Source 1 (Source in Use) No
Source 2 (Source in Use) No
Source 3 (Source in Use) No
Source 4 (Source in Use) No
Source 5 (Source in Use) No
Source 6 (Source in Use) No
Source 7 (Source in Use) No

Geometry

Geometry shape Point
Coordinates Absolute
East(1) 0 m
North(1) 0 m

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura 45

Discharge Data

User-Defined Quantities

Material METHANE
Temperature 15,00 degC
Pressure 101,01 bar
Inventory 100.000.000,00 kg
Scenario Leak
Fixed Duration n/a s

Calculated Quantities

Weather: Eventos Iniciais\Dia

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction 0,00 fraction
FinalTemperature -96,18 degC

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Final Velocity	500,00 m/s
Droplet Diameter	0,00 um
Continuous Release Data:	
Mass Flowrate	4.27784E+000 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,05 m

Weather: Eventos Iniciadores\Noite

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um
Continuous Release Data:	
Mass Flowrate	4.27784E+000 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,05 m



Consequence Results

Distance to Concentration Results

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura 45

The height for user defined concentrations is the user defined height 0 m
 All toxic results are reported at the toxic effect height 0 m
 All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time		Dia	Noite	Distance (m)
UFL (165000)	18,75	s	3,01256	3,09591	
LFL (44000)	18,75	s	9,8097	11,5851	
LFL Frac (22000)	18,75	s	15,8249	18,426	

Concentration(ppm)	Averaging Time		Dia	Noite	Heights (m) for above distances
UFL (165000)	18,75	s	3,90942	4,02399	
LFL (44000)	18,75	s	9,63708	11,3874	
LFL Frac (22000)	18,75	s	13,7844	16,4702	

Jet Fire Hazard

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura 45

Jet fire method used: DNV recommended

	Dia	Noite
Jet Fire Status	Hazard	Hazard
Flame Direction	Angled	Angled

Radiation Effects: Jet Fire Ellipse

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura 45

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

			Dia	Noite	Distance (m)
Radiation Level	4	kW/m2	30,6937	31,3776	
Radiation Level	12,5	kW/m2	14,3398	Not Reached	
Radiation Level	37,5	kW/m2	Not Reached	Not Reached	
Radiation Level	3	kW/m2	34,6161	34,9956	

Radiation Effects: Jet Fire Distance

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura 45

	Dia	Noite	Radiation Level (kW/m2)

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Phast 6.54

Flash Fire Envelope

Path: \Gasoduto do Pará - Phast\Eventos Iniciadores\Ramal\Fissura 45

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Dia	Noite
Furthest Extent	22000	ppm		15,8249	18,426
Furthest Extent	44000	ppm		9,8097	11,5851
				Heights (m) for above distances	
				Dia	Noite
Furthest Extent	22000	ppm		13,7844	16,4702
Furthest Extent	44000	ppm		9,63708	11,3874

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Explosion Effects: Late Ignition

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura 45

Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Front (LFL Fraction)

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Dia	Noite
Overpressure	0,1	bar	No Hazard	No Hazard
Overpressure	0,3	bar	No Hazard	No Hazard
Overpressure	0,5	bar	No Hazard	No Hazard
Overpressure	0,05	bar	No Hazard	No Hazard
			Supplementary Data at 0,1 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,3 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,5 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,05 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Fissura vert

Base Case

CASE Name: Data

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura vert

User-Defined Data

Material

Material Identifier	METHANE
Type of Vessel	Pressurized Gas
Pressure Specification	Pressure specified
Discharge Pressure - gauge	100 bar
Discharge Temperature	15 degC
Mass Inventory of material to discharge	1E8 kg

Scenario

Type of Event	Leak
Phase	Vapor
HoleDiameter	17,78 mm
Building Wake Option	None

Location

[Release elevation	1 m]
Use ERPG averaging time	ERPG not selected
Use IDLH averaging time	IDLH not selected
Use STEL averaging time	STEL not selected
Supply a user defined averaging time	Not supplied

Bund

Status of Bund	No bund present
[Surface type	Concrete]
[Height	0 m]
[Modelling of bund failure	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Direction	Vertical

Flammable

Method to use for explosions	Multi-Energy
Jet Fire Method	Cone Model

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	1E8 kg

Fireball Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
[Mass modification factor	3]
[Calculation method for fireball	DNV Recommended]
[TNO model flame temperature	1727 degC]

Pool Fire Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
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Phast 6.54

Toxic Parameters

[Indoor calculations	Unselected]
[Ventilation specification	Case Specified]
[Building exchange rate	4 /hr]
[Tail time	1800 s]
[Method of setting time	Use a fixed averaging time]
[Cut-off fraction of toxic load	0,05 fraction]
[Cut-off concentration	0 fraction]

Multi Energy Explosion

Use Unconfined Volumes	No
Use Fractions	No
Source 1 (Source in Use)	No
Source 2 (Source in Use)	No
Source 3 (Source in Use)	No
Source 4 (Source in Use)	No
Source 5 (Source in Use)	No
Source 6 (Source in Use)	No
Source 7 (Source in Use)	No

Geometry

Geometry shape	Point
Coordinates	Absolute
East(1)	0 m
North(1)	0 m

Path: \Gasoduto do Pará - Phast\Eventos Iniciaidores\Ramal\Fissura vert

Discharge Data

User-Defined Quantities

Material	METHANE
Temperature	15,00 degC
Pressure	101,01 bar
Inventory	100.000.000,00 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Eventos Iniciaidores\Dia

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	4.27784E+000 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s

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Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,05 m

Weather: Eventos Iniciais\Noite

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	4.27784E+000 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,05 m



Consequence Results

Distance to Concentration Results

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura vert

The height for user defined concentrations is the user defined height 0 m
 All toxic results are reported at the toxic effect height 0 m
 All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time			Distance (m)	
				Dia	Noite
UFL (165000)	18,75	s		0,10587	0,0742667
LFL (44000)	18,75	s		1,04403	1,22386
LFL Frac (22000)	18,75	s		2,8711	2,51591

Concentration(ppm)	Averaging Time			Heights (m) for above distances	
				Dia	Noite
UFL (165000)	18,75	s		4,98613	5,1865
LFL (44000)	18,75	s		11,9974	14,6262
LFL Frac (22000)	18,75	s		17,1747	20,6043

Jet Fire Hazard

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura vert

Jet fire method used: DNV recommended

	Dia	Noite
Jet Fire Status	Hazard	Hazard
Flame Direction	Vertical	Vertical

Radiation Effects: Jet Fire Ellipse

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura vert

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

				Distance (m)	
				Dia	Noite
Radiation Level	4	kW/m2		19,6393	16,6675
Radiation Level	12,5	kW/m2		Not Reached	Not Reached
Radiation Level	37,5	kW/m2		Not Reached	Not Reached
Radiation Level	3	kW/m2		24,4764	22,0526

Radiation Effects: Jet Fire Distance

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura vert

	Dia	Radiation Level (kW/m2)
		Noite

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Phast 6.54

Flash Fire Envelope

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura vert

All flammable results are reported at the cloud centreline height

				Distance (m)	
				Dia	Noite
Furthest Extent	22000	ppm		2,8711	2,51591
Furthest Extent	44000	ppm		1,04403	1,22386
				Heights (m) for above distances	
				Dia	Noite
Furthest Extent	22000	ppm		17,1747	20,6043
Furthest Extent	44000	ppm		11,9974	14,6262

Weather Conditions

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Fissura vert

			Dia	Noite
Wind Speed	m/s		2,8	1,9
Pasquill Stability			C	C
Surface Roughness Length	mm		100	100
Surface Roughness Parameter			0,0868589	0,0868589
Atmospheric Temperature	degC		25	24
Surface Temperature	degC		30	29
Relative Humidity	fraction		0,8	0,8

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Furo 45

Base Case

CASE Name: Data

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo 45

User-Defined Data

Material

Material Identifier	METHANE
Type of Vessel	Pressurized Gas
Pressure Specification	Pressure specified
Discharge Pressure - gauge	100 bar
Discharge Temperature	15 degC
Mass Inventory of material to discharge	1E8 kg

Scenario

Type of Event	Leak
Phase	Vapor
HoleDiameter	71,12 mm
Building Wake Option	None

Location

[Release elevation	1 m]
Use ERPG averaging time	ERPG not selected
Use IDLH averaging time	IDLH not selected
Use STEL averaging time	STEL not selected
Supply a user defined averaging time	Not supplied

Bund

Status of Bund	No bund present
[Surface type	Concrete]
[Height	0 m]
[Modelling of bund failure	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Angle	45 deg
Outdoor Release Direction	Angled from Horizontal

Flammable

Method to use for explosions	Multi-Energy
Jet Fire Method	Cone Model

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	1E8 kg

Fireball Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
[Mass modification factor	3]
[Calculation method for fireball	DNV Recommended]
[TNO model flame temperature	1727 degC]

Pool Fire Parameters

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Reporting Level 1 (Radiation Intensity) 5 kW/m2

Toxic Parameters

[Indoor calculations	Unselected]
[Ventilation specification	Case Specified]
[Building exchange rate	4 /hr]
[Tail time	1800 s]
[Method of setting time	Use a fixed averaging time]
[Cut-off fraction of toxic load	0,05 fraction]
[Cut-off concentration	0 fraction]

Multi Energy Explosion

Use Unconfined Volumes	No
Use Fractions	No
Source 1 (Source in Use)	No
Source 2 (Source in Use)	No
Source 3 (Source in Use)	No
Source 4 (Source in Use)	No
Source 5 (Source in Use)	No
Source 6 (Source in Use)	No
Source 7 (Source in Use)	No

Geometry

Geometry shape	Point
Coordinates	Absolute
East(1)	0 m
North(1)	0 m

Path: \Gasoduto do Pará - Phast\Events Iniciais\Ramal\Furo 45

Discharge Data

User-Defined Quantities

Material	METHANE
Temperature	15,00 degC
Pressure	101,01 bar
Inventory	100.000.000,00 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Eventos Iniciais\Dia

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
Final Temperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um
Continuous Release Data:	
Mass Flowrate	6.84454E+001 kg/s

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,20 m

Weather: Eventos Iniciadores\Noite

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	6.84454E+001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,20 m



Consequence Results

Distance to Concentration Results

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo 45

The height for user defined concentrations is the user defined height 0 m
 All toxic results are reported at the toxic effect height 0 m
 All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time		Distance (m)	
			Dia	Noite
UFL (165000)	18,75	s	11,9062	12,2786
LFL (44000)	18,75	s	37,8609	44,9563
LFL Frac (22000)	18,75	s	61,2414	69,4465

Concentration(ppm)	Averaging Time		Heights (m) for above distances	
			Dia	Noite
UFL (165000)	18,75	s	12,447	12,958
LFL (44000)	18,75	s	33,8672	40,7823
LFL Frac (22000)	18,75	s	49,1486	58,6379

Jet Fire Hazard

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo 45

Jet fire method used: DNV recommended

	Dia	Noite
Jet Fire Status	Hazard	Hazard
Flame Direction	Angled	Angled

Radiation Effects: Jet Fire Ellipse

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo 45

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

Radiation Level			Distance (m)	
			Dia	Noite
4	kW/m2		111,984	114,448
12,5	kW/m2		67,4981	59,5519
37,5	kW/m2		Not Reached	Not Reached
3	kW/m2		127,142	128,078

Radiation Effects: Jet Fire Distance

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo 45

	Radiation Level (kW/m2)
Dia	Noite

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Flash Fire Envelope

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All flammable results are reported at the cloud centreline height

			Distance (m)	
			Dia	Noite
Furthest Extent	22000	ppm	61,2414	69,4465
Furthest Extent	44000	ppm	37,8609	44,9563
			Heights (m) for above distances	
			Dia	Noite
Furthest Extent	22000	ppm	49,1486	58,6379
Furthest Extent	44000	ppm	33,8672	40,7823

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Explosion Effects: Late Ignition

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Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Front (LFL Fraction)

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Dia	Noite
Overpressure	0,1	bar	No Hazard	No Hazard
Overpressure	0,3	bar	No Hazard	No Hazard
Overpressure	0,5	bar	No Hazard	No Hazard
Overpressure	0,05	bar	No Hazard	No Hazard
			Supplementary Data at 0,1 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,3 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,5 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,05 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

- Explosion Centre m 0 0

Weather Conditions

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo 45

		Dia	Noite
Wind Speed	m/s	2,8	1,9
Pasquill Stability		C	C
Surface Roughness Length	mm	100	100
Surface Roughness Parameter		0,0868589	0,0868589
Atmospheric Temperature	degC	25	24
Surface Temperature	degC	30	29
Relative Humidity	fraction	0,8	0,8

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Furo vert

Base Case

CASE Name: Data

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo vert

User-Defined Data

Material

Material Identifier	METHANE
Type of Vessel	Pressurized Gas
Pressure Specification	Pressure specified
Discharge Pressure - gauge	100 bar
Discharge Temperature	15 degC
Mass Inventory of material to discharge	1E8 kg

Scenario

Type of Event	Leak
Phase	Vapor
HoleDiameter	71,12 mm
Building Wake Option	None

Location

[Release elevation	1 m]
Use ERPG averaging time	ERPG not selected
Use IDLH averaging time	IDLH not selected
Use STEL averaging time	STEL not selected
Supply a user defined averaging time	Not supplied

Bund

Status of Bund	No bund present
[Surface type	Concrete]
[Height	0 m]
[Modelling of bund failure	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Direction	Vertical

Flammable

Method to use for explosions	Multi-Energy
Jet Fire Method	Cone Model

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	1E8 kg

Fireball Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
[Mass modification factor	3]
[Calculation method for fireball	DNV Recommended]
[TNO model flame temperature	1727 degC]

Pool Fire Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
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SUMMARY REPORT

Unique Audit Number: 23.597



Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Toxic Parameters

[Indoor calculations	Unselected]
[Ventilation specification	Case Specified]
[Building exchange rate	4 /hr]
[Tail time	1800 s]
[Method of setting time	Use a fixed averaging time]
[Cut-off fraction of toxic load	0,05 fraction]
[Cut-off concentration	0 fraction]

Multi Energy Explosion

Use Unconfined Volumes	No
Use Fractions	No
Source 1 (Source in Use)	No
Source 2 (Source in Use)	No
Source 3 (Source in Use)	No
Source 4 (Source in Use)	No
Source 5 (Source in Use)	No
Source 6 (Source in Use)	No
Source 7 (Source in Use)	No

Geometry

Geometry shape	Point
Coordinates	Absolute
East(1)	0 m
North(1)	0 m

Path: \Gasoduto do Pará - Phast\Eventos Iniciaidores\Ramal\Furo vert

Discharge Data

User-Defined Quantities

Material	METHANE
Temperature	15,00 degC
Pressure	101,01 bar
Inventory	100.000.000,00 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Eventos Iniciaidores\Dia

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	6.84454E+001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,20 m

Weather: Eventos Iniciais\Noite

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	6.84454E+001 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,20 m



Consequence Results

Distance to Concentration Results

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo vert

The height for user defined concentrations is the user defined height 0 m
 All toxic results are reported at the toxic effect height 0 m
 All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time			Distance (m)	
				Dia	Noite
UFL (165000)	18,75	s		0,479427	0,338881
LFL (44000)	18,75	s		3,93117	5,19983
LFL Frac (22000)	18,75	s		11,1171	11,8724
Concentration(ppm)	Averaging Time			Heights (m) for above distances	
				Dia	Noite
UFL (165000)	18,75	s		16,6116	17,5029
LFL (44000)	18,75	s		41,6661	52,1341
LFL Frac (22000)	18,75	s		60,3476	76,1452

Jet Fire Hazard

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo vert

Jet fire method used: DNV recommended

	Dia	Noite
Jet Fire Status	Hazard	Hazard
Flame Direction	Vertical	Vertical

Radiation Effects: Jet Fire Ellipse

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo vert

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

				Distance (m)	
				Dia	Noite
Radiation Level	4	kW/m2		78,2282	71,0516
Radiation Level	12,5	kW/m2		19,7296	Not Reached
Radiation Level	37,5	kW/m2		Not Reached	Not Reached
Radiation Level	3	kW/m2		94,1126	88,5959

Radiation Effects: Jet Fire Distance

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo vert

	Dia	Radiation Level (kW/m2)
		Noite

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Flash Fire Envelope

Path: \Gasoduto do Pará - Phast\Eventos Iniciadores\Ramal\Furo vert

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Dia	Noite
Furthest Extent	22000	ppm	11,1171	11,8724
Furthest Extent	44000	ppm	3,93117	5,19983
			Heights (m) for above distances	
			Dia	Noite
Furthest Extent	22000	ppm	60,3476	76,1452
Furthest Extent	44000	ppm	41,6661	52,1341

SUMMARY REPORT

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Explosion Effects: Late Ignition

Path: \Gasoduto do Pará - Phast\Eventos Iniciadores\Ramal\Furo vert

Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Front (LFL Fraction)

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Dia	Noite
Overpressure	0,1	bar	No Hazard	No Hazard
Overpressure	0,3	bar	No Hazard	No Hazard
Overpressure	0,5	bar	No Hazard	No Hazard
Overpressure	0,05	bar	No Hazard	No Hazard
			Supplementary Data at 0,1 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,3 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,5 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,05 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

- Explosion Centre m 0 0

Weather Conditions

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Furo vert

		Dia	Noite
Wind Speed	m/s	2,8	1,9
Pasquill Stability		C	C
Surface Roughness Length	mm	100	100
Surface Roughness Parameter		0,0868589	0,0868589
Atmospheric Temperature	degC	25	24
Surface Temperature	degC	30	29
Relative Humidity	fraction	0,8	0,8

SUMMARY REPORT

Unique Audit Number: 23.597



Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Ruptura 45

Base Case

CASE Name: Data

Path: \Gasoduto do Pará - Phast\Eventos Iniciadores\Ramal\Ruptura 45

User-Defined Data

Material

Material Identifier	METHANE
Type of Vessel	Pressurized Gas
Pressure Specification	Pressure specified
Discharge Pressure - gauge	100 bar
Discharge Temperature	15 degC
Mass Inventory of material to discharge	1E8 kg

Scenario

Type of Event	Leak
Phase	Vapor
HoleDiameter	355,6 mm
Building Wake Option	None

Location

[Release elevation	1 m]
Use ERPG averaging time	ERPG not selected
Use IDLH averaging time	IDLH not selected
Use STEL averaging time	STEL not selected
Supply a user defined averaging time	Not supplied

Bund

Status of Bund	No bund present
[Surface type	Concrete]
[Height	0 m]
[Modelling of bund failure	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Angle	45 deg
Outdoor Release Direction	Angled from Horizontal

Flammable

Method to use for explosions	Multi-Energy
Jet Fire Method	Cone Model

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	1E8 kg

Fireball Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
[Mass modification factor	3]
[Calculation method for fireball	DNV Recommended]
[TNO model flame temperature	1727 degC]

Pool Fire Parameters

SUMMARY REPORT

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Reporting Level 1 (Radiation Intensity) 5 kW/m2

Toxic Parameters

[Indoor calculations	Unselected]
[Ventilation specification	Case Specified]
[Building exchange rate	4 /hr]
[Tail time	1800 s]
[Method of setting time	Use a fixed averaging time]
[Cut-off fraction of toxic load	0,05 fraction]
[Cut-off concentration	0 fraction]

Multi Energy Explosion

Use Unconfined Volumes	No
Use Fractions	No
Source 1 (Source in Use)	No
Source 2 (Source in Use)	No
Source 3 (Source in Use)	No
Source 4 (Source in Use)	No
Source 5 (Source in Use)	No
Source 6 (Source in Use)	No
Source 7 (Source in Use)	No

Geometry

Geometry shape	Point
Coordinates	Absolute
East(1)	0 m
North(1)	0 m

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura 45

Discharge Data

User-Defined Quantities

Material	METHANE
Temperature	15,00 degC
Pressure	101,01 bar
Inventory	100.000.000,00 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Eventos Iniciais\Dia

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
Final Temperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um
Continuous Release Data:	
Mass Flowrate	1.71114E+003 kg/s

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,99 m

Weather: Eventos Iniciadores\Noite

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	1.71114E+003 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,99 m



Consequence Results

Distance to Concentration Results

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura 45

The height for user defined concentrations is the user defined height 0 m
 All toxic results are reported at the toxic effect height 0 m
 All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time		Distance (m)	
			Dia	Noite
UFL (165000)	18,75	s	55,2385	56,7116
LFL (44000)	18,75	s	173,995	187,585
LFL Frac (22000)	18,75	s	279,989	313,224

Concentration(ppm)	Averaging Time		Heights (m) for above distances	
			Dia	Noite
UFL (165000)	18,75	s	54,077	56,2459
LFL (44000)	18,75	s	151,736	171,437
LFL Frac (22000)	18,75	s	218,074	261,749

Jet Fire Hazard

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura 45

Jet fire method used: DNV recommended

	Dia	Noite
Jet Fire Status	Hazard	Hazard
Flame Direction	Angled	Angled

Radiation Effects: Jet Fire Ellipse

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura 45

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

Radiation Level		kW/m2	Distance (m)	
			Dia	Noite
4		kW/m2	494,981	502,244
12,5		kW/m2	315,302	309,866
37,5		kW/m2	Not Reached	Not Reached
3		kW/m2	558,231	567,507

Radiation Effects: Jet Fire Distance

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura 45

	Radiation Level (kW/m2)
Dia	Noite

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Flash Fire Envelope

Path: \Gasoduto do Pará - Phast\Eventos Iniciadores\Ramal\Ruptura 45

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Dia	Noite
Furthest Extent	22000	ppm	279,989	313,224
Furthest Extent	44000	ppm	173,995	187,585
			Heights (m) for above distances	
			Dia	Noite
Furthest Extent	22000	ppm	218,074	261,749
Furthest Extent	44000	ppm	151,736	171,437

SUMMARY REPORT

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Explosion Effects: Late Ignition

Path: \Gasoduto do Pará - Phast\Eventos Iniciadores\Ramal\Ruptura 45

Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Front (LFL Fraction)

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Dia	Noite
Overpressure	0,1	bar	No Hazard	No Hazard
Overpressure	0,3	bar	No Hazard	No Hazard
Overpressure	0,5	bar	No Hazard	No Hazard
Overpressure	0,05	bar	No Hazard	No Hazard
			Supplementary Data at 0,1 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,3 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,5 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,05 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

- Explosion Centre m 0 0

Weather Conditions

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura 45

		Dia	Noite
Wind Speed	m/s	2,8	1,9
Pasquill Stability		C	C
Surface Roughness Length	mm	100	100
Surface Roughness Parameter		0,0868589	0,0868589
Atmospheric Temperature	degC	25	24
Surface Temperature	degC	30	29
Relative Humidity	fraction	0,8	0,8

SUMMARY REPORT

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Ruptura vert

Base Case

CASE Name: Data

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura vert

User-Defined Data

Material

Material Identifier	METHANE
Type of Vessel	Pressurized Gas
Pressure Specification	Pressure specified
Discharge Pressure - gauge	100 bar
Discharge Temperature	15 degC
Mass Inventory of material to discharge	1E8 kg

Scenario

Type of Event	Leak
Phase	Vapor
HoleDiameter	355,6 mm
Building Wake Option	None

Location

[Release elevation	1 m]
Use ERPG averaging time	ERPG not selected
Use IDLH averaging time	IDLH not selected
Use STEL averaging time	STEL not selected
Supply a user defined averaging time	Not supplied

Bund

Status of Bund	No bund present
[Surface type	Concrete]
[Height	0 m]
[Modelling of bund failure	Bund cannot fail]

Indoor/Outdoor

Location of release	Open air release
Outdoor Release Direction	Vertical

Flammable

Method to use for explosions	Multi-Energy
Jet Fire Method	Cone Model

Dispersion

Late Ignition Location	No ignition location
Mass Inventory of material to Disperse	1E8 kg

Fireball Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
[Mass modification factor	3]
[Calculation method for fireball	DNV Recommended]
[TNO model flame temperature	1727 degC]

Pool Fire Parameters

Reporting Level 1 (Radiation Intensity)	5 kW/m2
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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Toxic Parameters

[Indoor calculations	Unselected]
[Ventilation specification	Case Specified]
[Building exchange rate	4 /hr]
[Tail time	1800 s]
[Method of setting time	Use a fixed averaging time]
[Cut-off fraction of toxic load	0,05 fraction]
[Cut-off concentration	0 fraction]

Multi Energy Explosion

Use Unconfined Volumes	No
Use Fractions	No
Source 1 (Source in Use)	No
Source 2 (Source in Use)	No
Source 3 (Source in Use)	No
Source 4 (Source in Use)	No
Source 5 (Source in Use)	No
Source 6 (Source in Use)	No
Source 7 (Source in Use)	No

Geometry

Geometry shape	Point
Coordinates	Absolute
East(1)	0 m
North(1)	0 m

Path: \Gasoduto do Pará - Phast\Eventos Iniciaidores\Ramal\Ruptura vert

Discharge Data

User-Defined Quantities

Material	METHANE
Temperature	15,00 degC
Pressure	101,01 bar
Inventory	100.000.000,00 kg
Scenario	Leak
Fixed Duration	n/a s

Calculated Quantities

Weather: Eventos Iniciaidores\Dia

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	1.71114E+003 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,99 m

Weather: Eventos Iniciais\Noite

Mass Flow of Air (Vent from Vapor Space Only) n/a

Average Values for Segment Number 1

Liquid Fraction	0,00 fraction
FinalTemperature	-96,18 degC
Final Velocity	500,00 m/s
Droplet Diameter	0,00 um

Continuous Release Data:

Mass Flowrate	1.71114E+003 kg/s
Release Duration	3.600,00 s
Orifice Velocity	382,13 m/s
Exit Pressure	52,88 bar
Exit Temperature	-30,74 degC
Discharge Coefficient	0,86
Expanded Radius	0,99 m



Consequence Results

Distance to Concentration Results

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura vert

The height for user defined concentrations is the user defined height 0 m
 All toxic results are reported at the toxic effect height 0 m
 All flammable results are reported at the cloud centreline height

Concentration(ppm)	Averaging Time			Distance (m)	
				Dia	Noite
UFL (165000)	18,75	s		2,39953	1,66008
LFL (44000)	18,75	s		23,5706	19,4799
LFL Frac (22000)	18,75	s		58,8732	53,2997
Concentration(ppm)	Averaging Time			Heights (m) for above distances	
				Dia	Noite
UFL (165000)	18,75	s		73,8561	77,5243
LFL (44000)	18,75	s		192,81	222,278
LFL Frac (22000)	18,75	s		268,903	327,488

Jet Fire Hazard

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura vert

Jet fire method used: DNV recommended

	Dia	Noite
Jet Fire Status	Hazard	Hazard
Flame Direction	Vertical	Vertical

Radiation Effects: Jet Fire Ellipse

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura vert

This table gives the distances to the specified radiation levels for each jet fire listed in the above hazard table

				Distance (m)	
				Dia	Noite
Radiation Level	4	kW/m2		361,283	341,474
Radiation Level	12,5	kW/m2		139,562	107,462
Radiation Level	37,5	kW/m2		Not Reached	Not Reached
Radiation Level	3	kW/m2		426,361	410,937

Radiation Effects: Jet Fire Distance

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura vert

	Dia	Radiation Level (kW/m2)
		Noite

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Flash Fire Envelope

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura vert

All flammable results are reported at the cloud centreline height

			Distance (m)	
			Dia	Noite
Furthest Extent	22000	ppm	58,8732	53,2997
Furthest Extent	44000	ppm	23,5706	19,4799
			Heights (m) for above distances	
			Dia	Noite
Furthest Extent	22000	ppm	268,903	327,488
Furthest Extent	44000	ppm	192,81	222,278

SUMMARY REPORT

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

Explosion Effects: Late Ignition

Path: \Gasoduto do Pará - Phast\Eventos Iniciadores\Ramal\Ruptura vert

Explosion Model Used : Multi Energy

Explosion Location Criterion: Cloud Front (LFL Fraction)

All distances are measured from the Source

All flammable results are reported at the cloud centreline height

			Maximum Distance (m) at Overpressure Level	
			Dia	Noite
Overpressure	0,1	bar	No Hazard	No Hazard
Overpressure	0,3	bar	No Hazard	No Hazard
Overpressure	0,5	bar	No Hazard	No Hazard
Overpressure	0,05	bar	No Hazard	No Hazard
			Supplementary Data at 0,1 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,3 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,5 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard
- Explosion Centre		m	0	0
			Supplementary Data at 0,05 bar	
			Dia	Noite
Supplied Flammable Mass		kg	No Hazard	No Hazard
Used Flammable Mass				
Overpressure Radius		m	0	0
Distance to:				
- Ignition Source		m	No Hazard	No Hazard
- Cloud Front/Centre		m	No Hazard	No Hazard

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Study Folder: Gasoduto do Pará - Phast

Phast 6.54

- Explosion Centre m 0 0

Weather Conditions

Path: \Gasoduto do Pará - Phast\Eventos Iniciais\Ramal\Ruptura vert

		Dia	Noite
Wind Speed	m/s	2,8	1,9
Pasquill Stability		C	C
Surface Roughness Length	mm	100	100
Surface Roughness Parameter		0,0868589	0,0868589
Atmospheric Temperature	degC	25	24
Surface Temperature	degC	30	29
Relative Humidity	fraction	0,8	0,8