Master Therm tepelná čerpadla s. r. o.
Dolní Tříč
51243 Jablonec nad Jizerou
Czechia

HAZCALC
hazardous area classification

Hazardous Area Classification according to IEC 60079-10-1:2020: HP leakage , unit ON - heating

Project	AQIP
Assessment	HP leakage , unit ON - heating
Location of release	Inside
Area name	Test room - mechanical ventilated 100+5csh

Substance properties

Substance name	Propane (= Dimethyl methane) (= Propyl hydride)
CAS-number	74-98-6
Molmass	44.10 kg/kmol
Flashpoint	flammable gas
Vapour pressure @ Tmedium	flammable gas
LFL [vol/vol]	0.017 vol/vol
Relative vapour density (air = 1)	1.56
Universal Gas Constant, R	8314 (J/kmol/K)

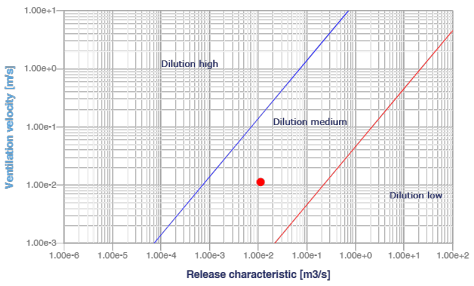
Release-assessment

Assessment according to	Edition 2020
Type of release	Pressurized
Atmospheric pressure, Pa	101325 Pa
Pressure in system, Pa	1321325 Pa
Cp	1723 J/kg/K
γ	1.12
Critical pressure, Pc	174720 Pa
Cd	0.50
Mass release rate of the gas, Wg	1.74e-4 kg/s
Volumetric gas release rate, Qg	9.47e-5 m3/s
Release characteristic	1.11e-2 m3/s
Ambient temperature, Ta	293 °K
Temperature medium, Tm	308 °K
Leak-opening, S	1.00e-7 m2
Compressibility factor, Z	1.00
Velocity of the released gas is	sonic/choked release
Density of the gas, ρg	1.83e+0 kg/m3
Used formula	B5
Safety factor	50%

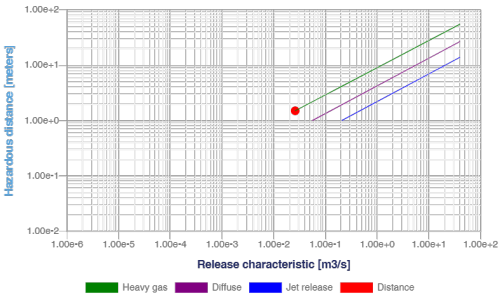
Ventilation assessment

Area length, width and height	1.33 x 1.00 x 1.94 mtr
Ventilation capacity	105 m3/h
Volume	2.58 m3
Ventilation rate	40.69 times/hr
Air velocity for dilution	1.13e-2 m/s
Dilution class	Medium dilution
Availability ventilation	Poor
Efficiency ventilation	1
Crtitical concentration, Xcrit	4.25e-3 vol/vol
Background concentration, Xb	3.23e-3 vol/vol
Result	background concentration < critical concentration, so OK
Resulting dilution class	Medium dilution

Graph assessment degree of dilution C.1 of EN 60079-10-1



Graph Hazardous Distance Chart D.1 of EN 60079-10-1



Classification of area

Type of release source	Secondary
Zone	Zone 2
Density of gas relative to air	vapour/gas is heavier than air
Type of release	Heavy gas
Radius zone area	1,5 mtr
Temperature class	T2
Gas group	IIA

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Hazardous Area Classification according to IEC 60079-10-1:2020: HP leakage , unit ON - heating

Project	AQIP
Assessment	HP leakage , unit ON - heating
Location of release	Inside
Area name	Test room - mechanical ventilated 150+5csh

Substance properties

Substance name	Propane (= Dimethyl methane) (= Propyl hydride)		
CAS-number	74-98-6		
Molmass	44.10 kg/kmol		
Flashpoint	flammable gas		
Vapour pressure @ Tmedium	flammable gas	**Relative vapour density (air = 1)**	1.56
LFL [vol/vol]	0.017 vol/vol	**Universal Gas Constant, R**	8314 (J/kmol/K)

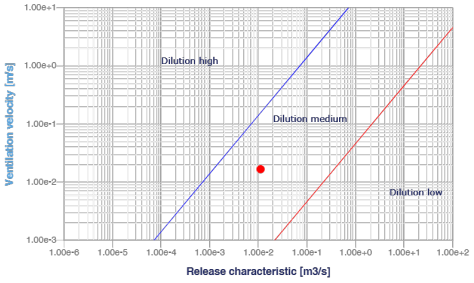
Release-assessment

Assessment according to	Edition 2020	**Release characteristic**	1.11e-2 m3/s
Type of release	Pressurized	**Ambient temperature, Ta**	293 °K
Atmospheric pressure, Pa	101325 Pa	**Temperature medium, Tm**	308 °K
Pressure in system, Pa	1321325 Pa	**Leak-opening, S**	1.00e-7 m2
Cp	1723 J/kg/K	**Compressibility factor, Z**	1.00
γ	1.12	**Velocity of the released gas is**	sonic/choked release
Critical pressure, Pc	174720 Pa	**Density of the gas, ρg**	1.83e+0 kg/m3
Cd	0.50	**Used formula**	B5
Mass release rate of the gas, Wg	1.74e-4 kg/s	**Safety factor**	50%
Volumetric gas release rate, Qg	9.47e-5 m3/s		

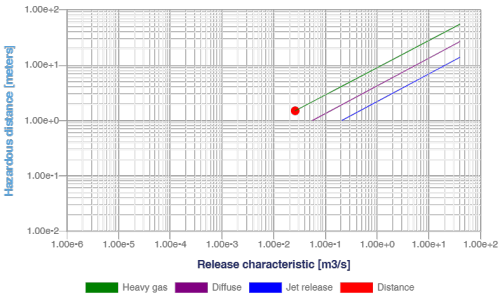
Ventilation assessment

Area length, width and height	1.33 x 1.00 x 1.94 mtr
Ventilation capacity	155 m3/h
Volume	2.58 m3
Ventilation rate	60.07 times/hr
Air velocity for dilution	1.67e-2 m/s
Dilution class	Medium dilution
Availability ventilation	Poor
Efficiency ventilation	1
Crtitical concentration, Xcrit	4.25e-3 vol/vol
Background concentration, Xb	2.19e-3 vol/vol
Result	background concentration < critical concentration, so OK
Resulting dilution class	Medium dilution

Graph assessment degree of dilution C.1 of EN 60079-10-1



Graph Hazardous Distance Chart D.1 of EN 60079-10-1



Classification of area

Type of release source	Secondary
Zone	Zone 2
Density of gas relative to air	vapour/gas is heavier than air
Type of release	Heavy gas
Radius zone area	1,5 mtr
Temperature class	T2
Gas group	IIA

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Hazardous Area Classification according to IEC 60079-10-1:2020: HP leakage , unit OFF

Project	AQIP
Assessment	HP leakage , unit OFF
Location of release	Inside
Area name	Test room without mechanical ventilation 5csh

Substance properties

Substance name	Propane (= Dimethyl methane) (= Propyl hydride)		
CAS-number	74-98-6		
Molmass	44.10 kg/kmol		
Flashpoint	flammable gas		
Vapour pressure @ Tmedium	flammable gas	**Relative vapour density (air = 1)**	1.56
LFL [vol/vol]	0.017 vol/vol	**Universal Gas Constant, R**	8314 (J/kmol/K)

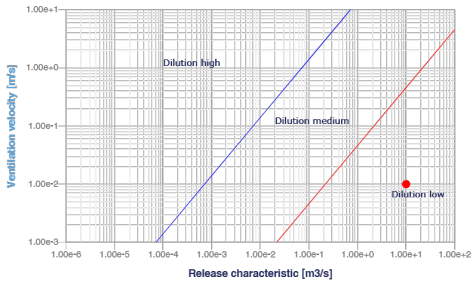
Release-assessment

Assessment according to	Edition 2020	**Release characteristic**	8.15e-3 m3/s
Type of release	Pressurized	**Ambient temperature, Ta**	293 °K
Atmospheric pressure, Pa	101325 Pa	**Temperature medium, Tm**	293 °K
Pressure in system, Pa	941325 Pa	**Leak-opening, S**	1.00e-7 m2
Cp	1649 J/kg/K	**Compressibility factor, Z**	1.00
γ	1.13	**Velocity of the released gas is**	sonic/choked release
Critical pressure, Pc	175111 Pa	**Density of the gas, ρg**	1.83e+0 kg/m3
Cd	0.50	**Used formula**	B5
Mass release rate of the gas, Wg	1.27e-4 kg/s	**Safety factor**	50%
Volumetric gas release rate, Qg	6.93e-5 m3/s		

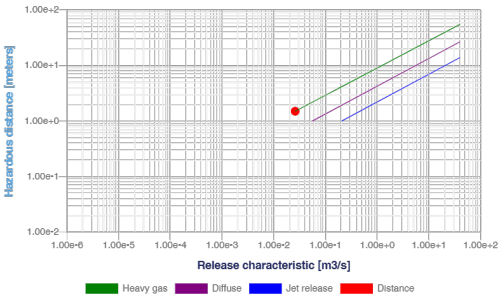
Ventilation assessment

Area length, width and height	1.33 x 1.00 x 1.94 mtr
Ventilation capacity	5 m3/h
Volume	2.58 m3
Ventilation rate	1.94 times/hr
Air velocity for dilution	5.38e-4 m/s
Dilution class	Medium dilution
Availability ventilation	Poor
Efficiency ventilation	5
Crtitical concentration, Xcrit	4.25e-3 vol/vol
Background concentration, Xb	2.38e-1 vol/vol
Result	background concentration > critical concentration, so Not OK
Resulting dilution class	Low dilution

Graph assessment degree of dilution C.1 of EN 60079-10-1



Graph Hazardous Distance Chart D.1 of EN 60079-10-1



Classification of area

Type of release source	Secondary
Zone	Zone 1 and even Zone 0
Density of gas relative to air	vapour/gas is heavier than air
Type of release	Heavy gas
Radius zone area	1,5 mtr
Temperature class	T2
Gas group	IIA

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Hazardous Area Classification according to IEC 60079-10-1:2020: HP leakage , unit ON - heating

Project	AQIP
Assessment	HP leakage , unit ON - heating
Location of release	Inside
Area name	Test room - mechanical low ventilated 65+5csh

Substance properties

Substance name	Propane (= Dimethyl methane) (= Propyl hydride)
CAS-number	74-98-6
Molmass	44.10 kg/kmol
Flashpoint	flammable gas
Vapour pressure @ Tmedium	flammable gas
LFL [vol/vol]	0.017 vol/vol
Relative vapour density (air = 1)	1.56
Universal Gas Constant, R	8314 (J/kmol/K)

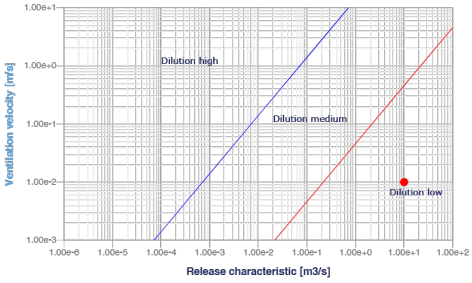
Release-assessment

Assessment according to	Edition 2020
Type of release	Pressurized
Atmospheric pressure, Pa	101325 Pa
Pressure in system, Pa	1321325 Pa
Cp	1723 J/kg/K
γ	1.12
Critical pressure, Pc	174720 Pa
Cd	0.50
Mass release rate of the gas, Wg	1.74e-4 kg/s
Volumetric gas release rate, Qg	9.47e-5 m3/s
Release characteristic	1.11e-2 m3/s
Ambient temperature, Ta	293 °K
Temperature medium, Tm	308 °K
Leak-opening, S	1.00e-7 m2
Compressibility factor, Z	1.00
Velocity of the released gas is	sonic/choked release
Density of the gas, ρg	1.83e+0 kg/m3
Used formula	B5
Safety factor	50%

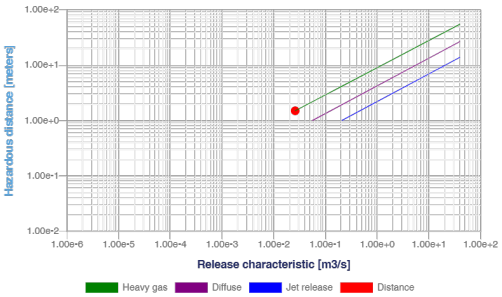
Ventilation assessment

Area length, width and height	1.33 x 1.00 x 1.94 mtr
Ventilation capacity	70 m3/h
Volume	2.58 m3
Ventilation rate	27.13 times/hr
Air velocity for dilution	7.54e-3 m/s
Dilution class	Medium dilution
Availability ventilation	Poor
Efficiency ventilation	1
Crtitical concentration, Xcrit	4.25e-3 vol/vol
Background concentration, Xb	4.84e-3 vol/vol
Result	background concentration > critical concentration, so Not OK
Resulting dilution class	Low dilution

Graph assessment degree of dilution C.1 of EN 60079-10-1



Graph Hazardous Distance Chart D.1 of EN 60079-10-1



Classification of area

Type of release source	Secondary
Zone	Zone 1 and even Zone 0
Density of gas relative to air	vapour/gas is heavier than air
Type of release	Heavy gas
Radius zone area	1,5 mtr
Temperature class	T2
Gas group	IIA