

Hazardous Area Classification according to IEC 60079-10-1:2020: Example 1: Gas cylinder connection point @ 200 bar

Company Demo Example : Hazard Ltd.
Assessment Example 1: Gas cylinder connection point @ 200 bar
Location of release Inside
Area name Example 1: Gas cylinder manifold - 250 m3/hr



Substance properties

Substance name Methane
CAS-number 74-82-8
Molmass 16.04 kg/kmol
Flashpoint flammable gas
Vapour pressure @ Tmedium flammable gas
LFL [vol/vol] 0.044 vol/vol

Relative vapour density (air = 1) 0.56
Universal Gas Constant, R 8314 (J/kmol/K)

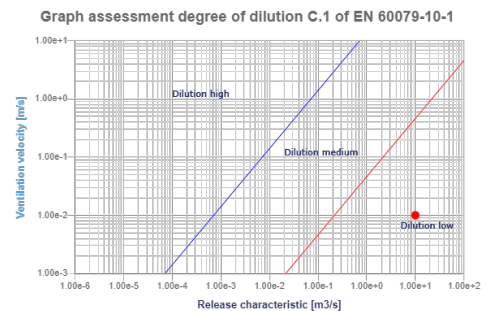
Release-assessment

Assessment according to Edition 2020
Type of release Pressurized
Atmospheric pressure, Pa 101325 Pa (1.00 bara)
Pressure in system, Pa 20101325 Pa (200.00 barg)
Cp 2210 J/kg/K
γ 1.31
Critical pressure, Pc 186063 Pa
Cd 0.99
Mass release rate of the gas, Wg 8.53e-4 kg/s
Volumetric gas release rate, Qg 1.28e-3 m3/s

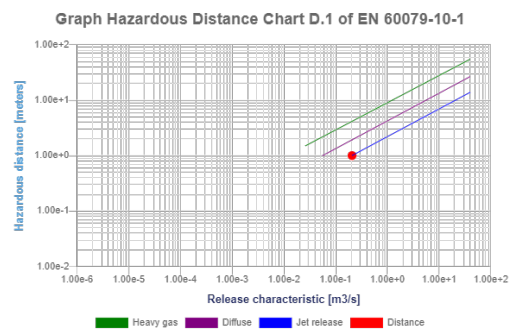
Release characteristic 2.91e-2 m3/s
Ambient temperature, Ta 293 °K
Temperature medium, Tm 293 °K
Leak-opening, S 2.50e-8 m2
Compressibility factor, Z 1.00
Velocity of the released gas is sonic/choked release
Density of the gas, ρg 6.67e-1 kg/m3
Used formula B4

Ventilation assessment

Area length, width and height 3.00 x 4.00 x 2.50 mtr
Ventilation capacity 250 m3/h
Volume 30.00 m3
Ventilation rate 8.33 times/hr
Air velocity for dilution 1.00e-2 m/s
Dilution class Medium dilution
Availability ventilation Poor
Efficiency ventilation 3
Critical concentration, Xcrit 1.10e-2 vol/vol
Background concentration, Xb 5.53e-2 vol/vol



Result background concentration > critical concentration, so **Not OK**
Resulting dilution class Low dilution



Classification of area

Type of release source Secondary
Zone Zone 1 and even Zone 0
Density of gas relative to air vapour/gas is lighter than air
Type of release Jet
Radius zone area 1,0 mtr
Temperature class T1
Gas group IIA

Comments

Appr. a 5x higher ventilation capacity is needed for a background concentration which is higher than the critical concentration. Then the dilution class will be medium and the hazardous area will become zone 2.

Advice

Increase the ventilation capacity to at least 1300 m3/hr ("Check with Area Gas cylinder manifold - 1300 m3/hr").