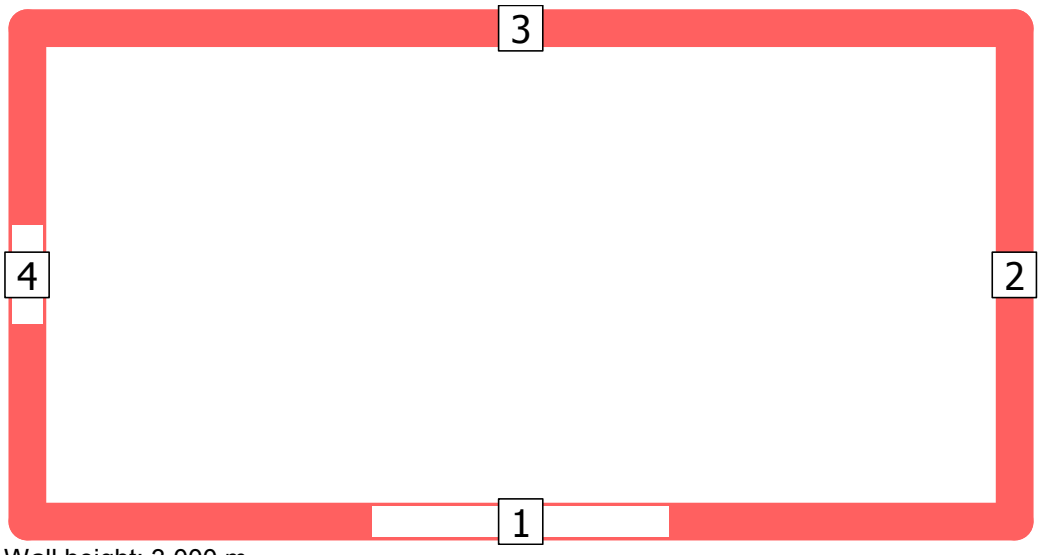
Project

Date : 17. 9. 2015

1 Input data

1.1 Fire zone walls



Wall height: 3,000 m

Number walls	Start		End		Material			Opening	
	X[m]	Y[m]	X[m]	Y[m]	density ρ [kg/m³]	specific heat c[J/kg/K]	thermal conductivity λ [W/m/K]	width b[m]	height h[m]
1	0,000	0,000	10,000	0,000	800,0	960,0	0,58	3,000	1,600
2	10,000	0,000	10,000	5,000	800,0	960,0	0,58	0,000	0,000
3	10,000	5,000	0,000	5,000	800,0	960,0	0,58	0,000	0,000
4	0,000	5,000	0,000	0,000	800,0	960,0	0,58	1,000	2,000

1.2 Floor material

density	ρ =	2400,0	kg/m³
specific heat	c =	840,0	J/kg/K
thermal conductivity	λ =	1,50	W/m/K

1.3 Ceiling material

density	ρ =	2400,0	kg/m³
specific heat	c =	840,0	J/kg/K
thermal conductivity	λ =	1,50	W/m/K

1.4 Fire parameters

Time of fire development	t_{lim} =	20,0	min
The characteristic fire load density per unit floor area	$q_{f,k}$ =	511,0	MJ/m²
Factor of combustion	m =	0,8	
Factor related to the size of the compartment on fire risk	δ_{q1} =	1,144	
Factor related to the kind of operation to fire hazard	δ_{q2} =	1,000	
Factor related to the active fire protection measures	δ_n =	1,000	

2 Results

The result of the calculation are the values of the parameters that determine the parametric temperature curve for the fire zone according to EN 1991-1-2, Annexes A and E.

Parameter values are as follows:
Opening factor:
O = 0,047 $m^{1/2}$
Thermal characteristics of boundary structures surface:
b = 1252,321 $J/(m^2s^{1/2}K)$
The design value of the fire load density, relative to the total enveloping constructions of the fire zone:
$q_{t,d}$ = 123,1 MJ/m^2
Time to peak temperature:
t_{max} = 31,6 min
$t_{max} > t_{lim} \Rightarrow$ ventilation controlled fire

Parametric curve graph is described by the functions:
$\Theta_g = 20 + 1325 (1 - 0.324\ e^{-0,004t} - 0.204\ e^{-0,033t} - 0.472\ e^{-0,370t})$ for t in interval <0;31,649>,
$\Theta_g = 870,585 - 11,599\ (t - 31,649)$ for t in interval <31,649;104,979>,
$\Theta_g = 20$ for t >104,979,
where Θ_g is temperature °C and t is time [minutes].