

Office Building

Master file:

Local: Office Building

Option # B - LPS IV

Data: 11/07/2016

Cliente:

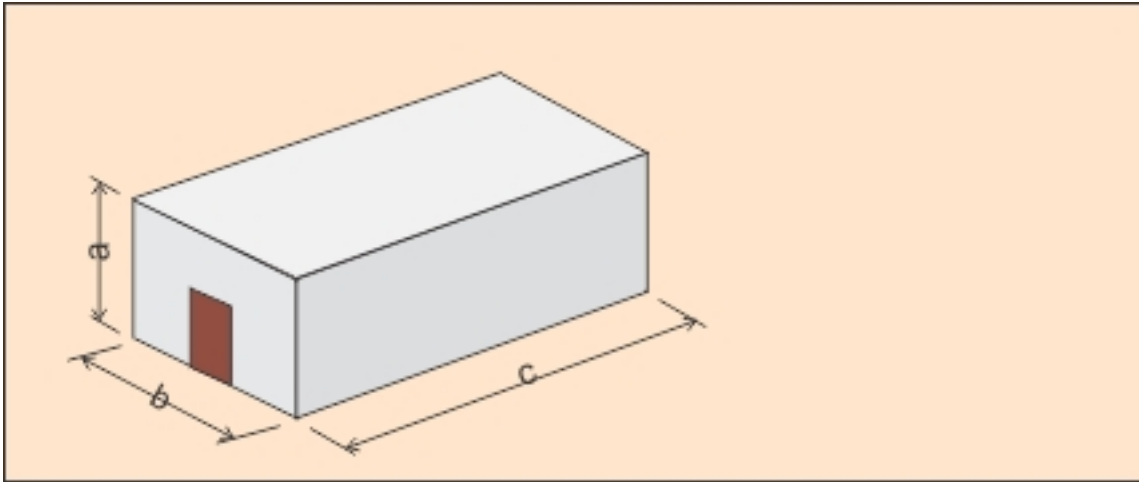
Atmos Plus X1.1 v. Build: 11.1.1.73

Office Building - B - LPS IV

Local: Office Building

Office Building - B - LPS IV

Model



Galpão Simples

altura A = 25,00 m

largura B = 20,00 m

comprimento C = 40,00 m

Office Building - B - LPS IV

Options / LPS

Options

Option #	Nome:	Descrição:
1	Original	Building as constructed, no LPS, no SPD, no safety measures.
2	A - LPS III	Install LPS level III for the building and bonding of service lines
3	B - LPS IV	Install LPS level IV for the building, bonding of service lines and manual fire extinguishing
4		Entre descr;
5		Entre descr;
6		Entre descr;

Options

Option #	Risco R4:	Custo Proteção:	Economia anual:
1	0,0000E+0	0,00	0,00
2	0,0000E+0	32764,00	-11467,4
3	0,0000E+0	27950,00	-9782,50
4	0,0000E+0	0,00	0,00
5	0,0000E+0	0,00	0,00
6	0,0000E+0	0,00	0,00

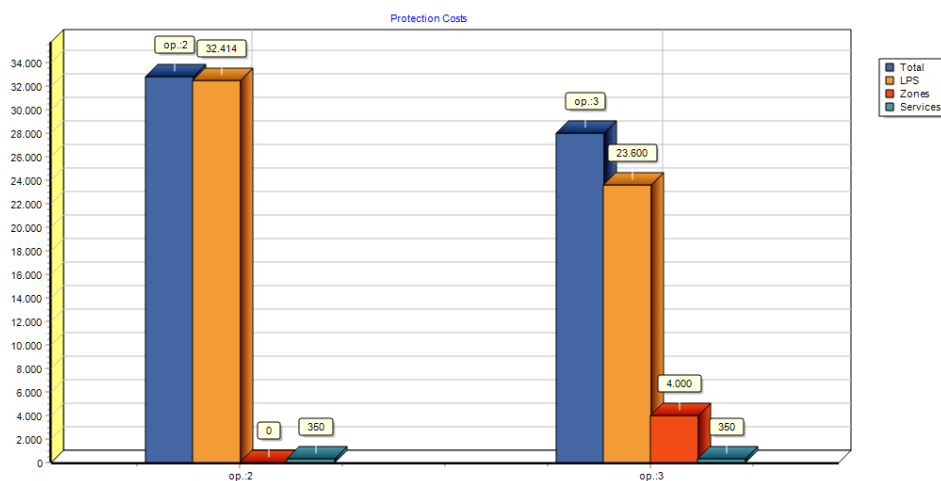
Options / Risks

Option:	1	2	3	4	5	6
Name:	Original	A - LPS III	B - LPS IV	4	5	6
Zone 1:	Z1 original entrance	Z1 original entrance	Z1 original entrance	--	--	--
Zone 2:	Z2 original garden	Z2 original garden	Z2 original garden	--	--	--
Zone 3:	Z3 original archive	--	--	--	--	--
Zone 4:	Z4 original offices	--	--	--	--	--
Zone 5:	Z5 original computer room	Z5 original computer room	Z5 original computer room	--	--	--
Zone 6:	--	Z3 sol. A	--	--	--	--
Zone 7:	--	Z4 sol. A	--	--	--	--
Zone 8:	--	--	Z3 sol. B	--	--	--
Zone 9:	--	--	Z4 sol. B	--	--	--

Office Building - B - LPS IV Cost compare

Option:	1	2	3
Name:	Original	A - LPS III	B - LPS IV
Ext LPS [\$]:	0,00	32414,00	23600,00
measures Servs [\$]:	0,00	350,00	350,00
measures Zones [\$]:	0,00	0,00	4000,00
total [\$]:	0,00	32764,00	27950,00
Risk econ R4:	0,0000E+0	0,0000E+0	0,0000E+0
Cost loss [\$]:	0,00	0,00	0,00
Resid loss [\$]:	0,00	0,00	0,00
Annual cost [\$]:	0,00	11467,40	9782,50

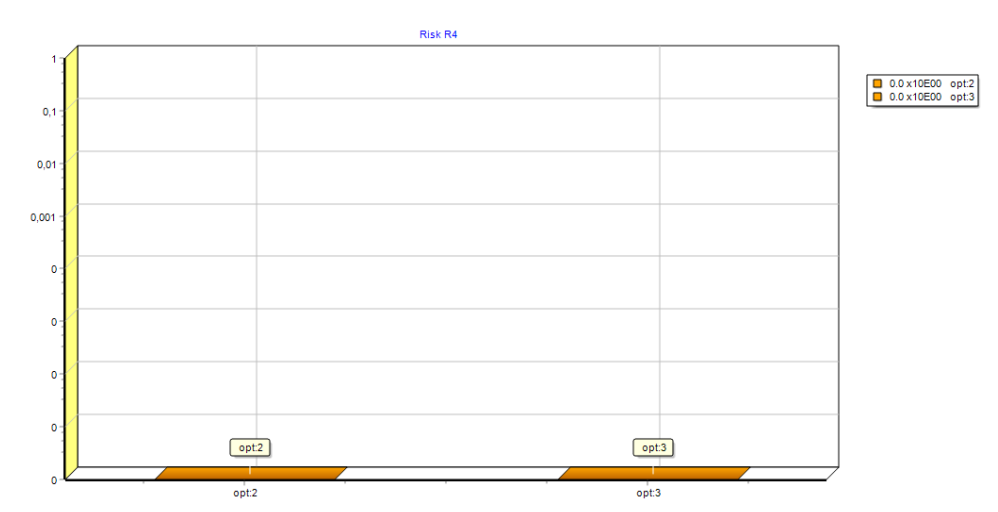
Protection costs



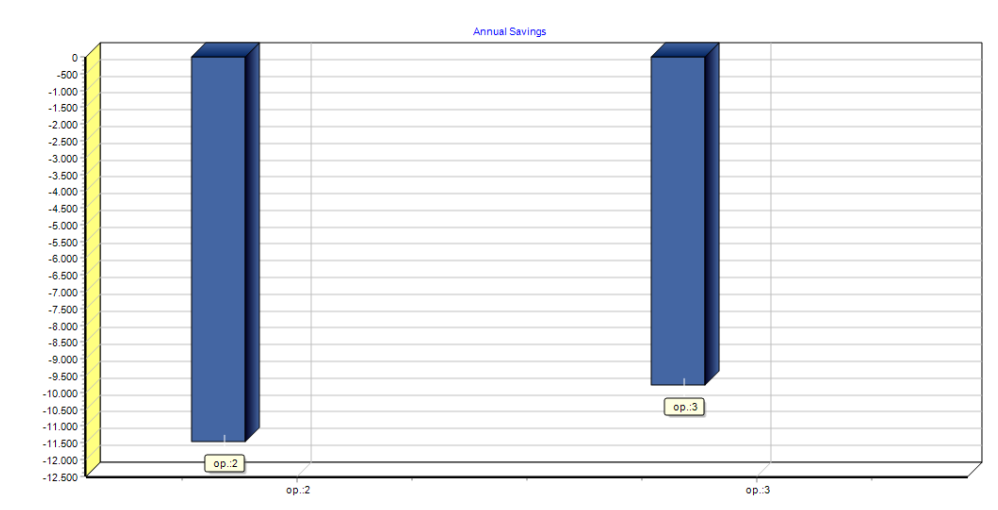
Office Building - B - LPS IV

Cost compare

Riscos R4

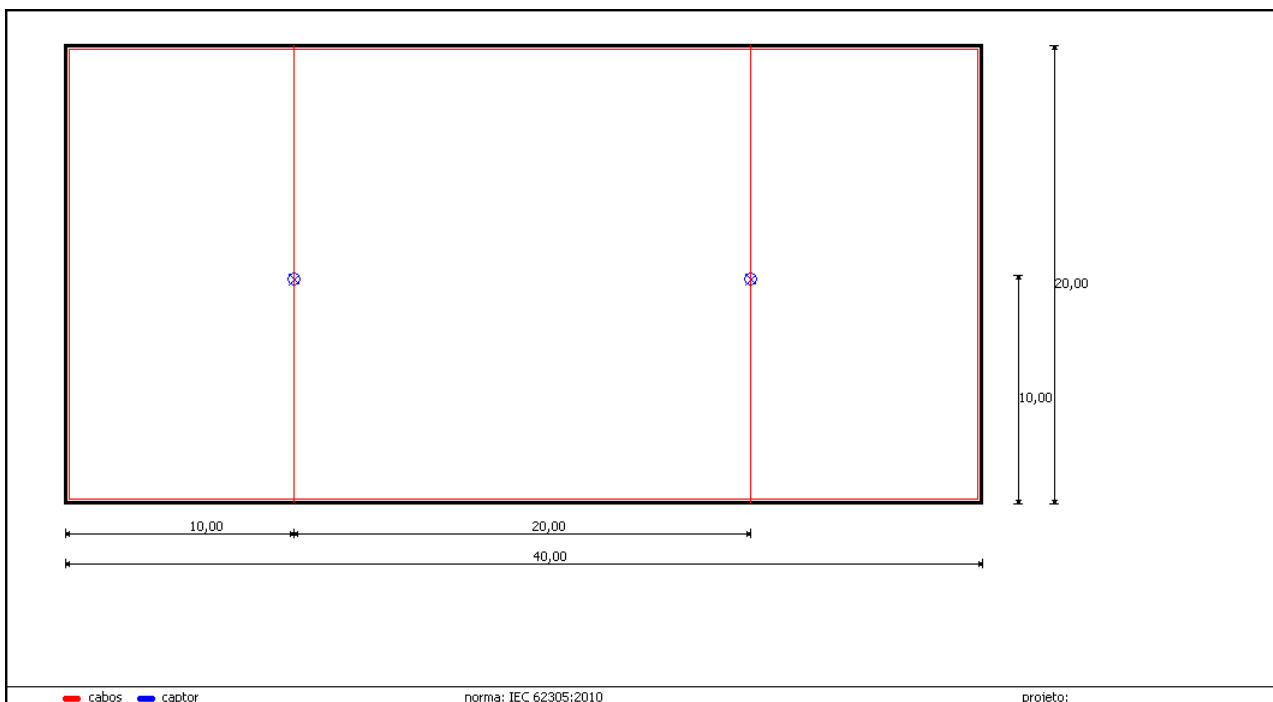


Annual economy



Office Building - B - LPS IV

LPS: Air terminals



Galpão Simples

altura = 25,00 m
 largura = 20,00 m
 comprimento = 40,00 m

RESULTADOS COM MODELO ELETROGEOMÉTRICO:

1. altura do captor = 3,00 m
 número de captores = 2 -> 1 fileiras de 2 captores
 custo total da captação [\$] = 9184,00
 tempo total da captação [h] = 184,60

material	quant.	[\$]:
captors:	2 -	200,00
conectores mastros:	2 -	64,00
condutores superiores:	40,00 -	1600,00
conectores perimetro:	4,00 -	120,00
condutor perimetral:	120,00 -	4800,00
espaçadores/fixadores:	80,00 -	2400,00
terminais no perim.:	0,00 -	0,00

2. altura do captor = 6,00 m
 número de captores = 2 -> 1 fileiras de 2 captores
 custo da captação [\$] = 9324,00
 tempo da captação [h] = 186,60

materiais : quant. [\$]:

captores: 2 - 340,00
conectores mastros: 2 - 64,00
condutores superiores: 40,00 - 1600,00
conectores perimetro: 4,00 - 120,00
condutor perimetral: 120,00 - 4800,00
espaçadores/fixadores: 80,00 - 2400,00
terminais no perim.: 0,00 - 0,00

3. altura do captor = 9,00 m
número de captores = 1 -> 1 fileiras de 1 captores
custo da captação [\$] = 8312,00
tempo da captação [h] = 162,80

materiais : quant. [\$]:

captores: 1 - 520,00
conectores mastros: 1 - 32,00
condutores superiores: 20,00 - 800,00
conectores perimetro: 2,00 - 60,00
condutor perimetral: 120,00 - 4800,00
espaçadores/fixadores: 70,00 - 2100,00
terminais no perim.: 0,00 - 0,00

RESULTADOS COM GAIOLA DE FARADAY:

1. opção comprimento:

número de terminais aéreos = 0,00
custo total da captação [\$] = 7730,00
tempo total da captação [h] = 0,00

materiais : quant. [\$]:

terminais: 0,00 - 0,00
conectores superiores: 0,00 - 0,00
condutores superiores: 20,00 - 800,00
conectores perimetro: 1,00 - 30,00
condutor perimetral: 120,00 - 4800,00
espaçadores/fixadores: 70,00 - 2100,00

2. opção largura:

número de terminais aéreos = 0,00
custo total da captação [\$] = 7730,00
tempo total da captação [h] = 0,00

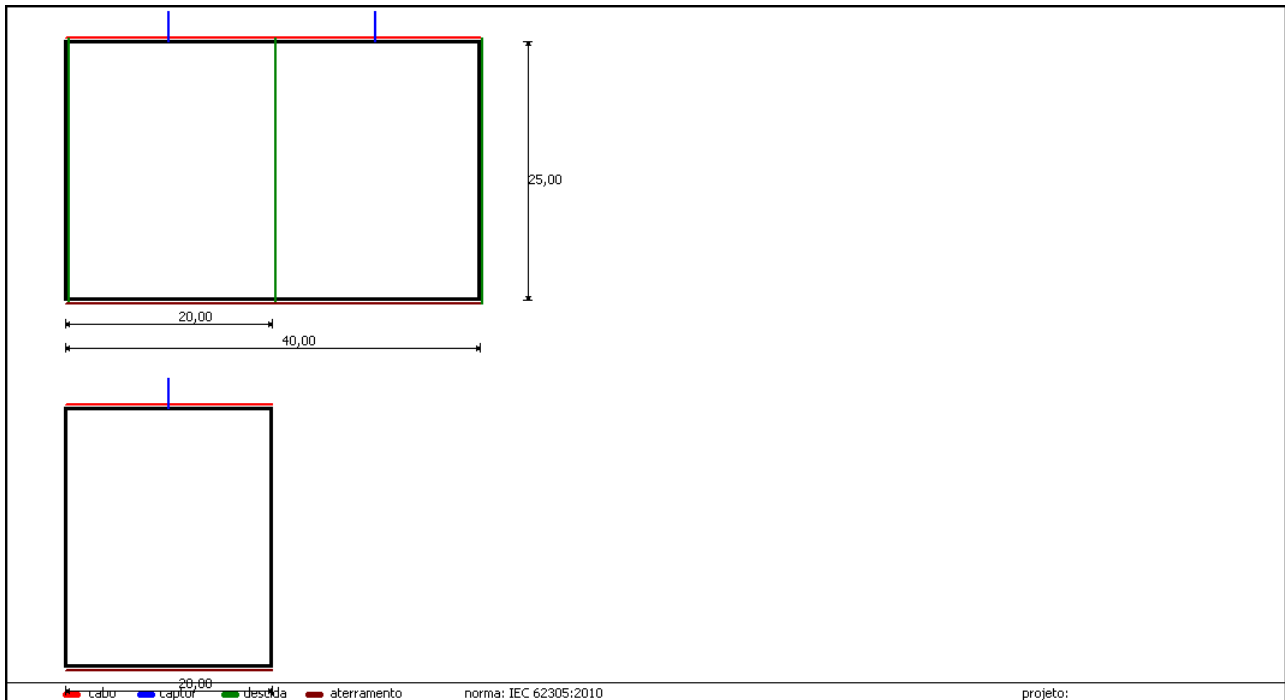
materiais : quant. [\$]:

terminais: 0,00 - 0,00

conectores superiores:	0,00 -	0,00
condutores superiores:	20,00 -	800,00
conectores perimetro:	1,00 -	30,00
condutor perimetral:	120,00 -	4800,00
espaçadores/fixadores:	70,00 -	2100,00

Office Building - B - LPS IV

LPS: Down conductors



Galpão Simples

altura = 25,00 m

largura = 20,00 m

comprimento = 40,00 m

I) RESULTADOS PARA AS DESCIDAS:

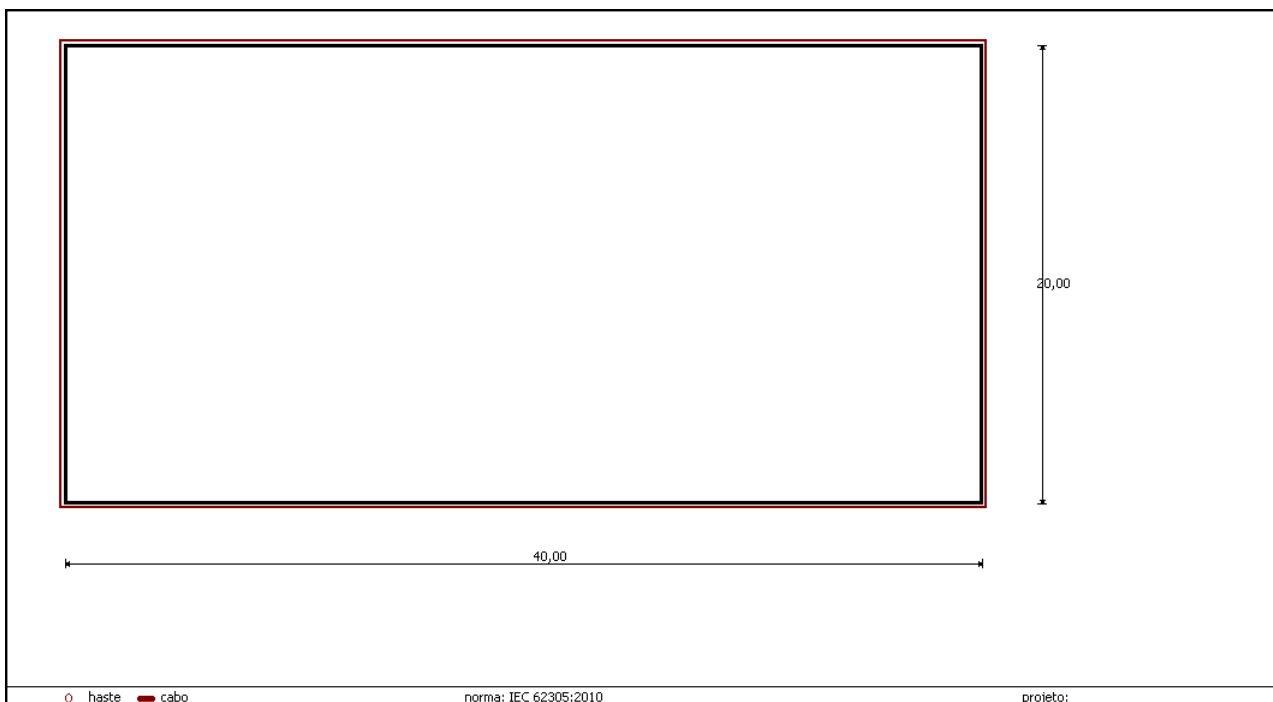
custo total das descidas [\$] = 10710,00

tempo total das descidas [h] = 190,75

materiais	:	quant.	[\$]:
conectores c/ captação:		6,00 -	180,00
condutor das descidas:		150,00 -	6000,00
fixação das descidas:		151 -	1510,00

Office Building - B - LPS IV

LPS: Grounding



Galpão Simples

altura = 25,00 m
largura = 20,00 m
comprimento = 40,00 m

I) RESULTADOS PARA ATERRAMENTO:

custo total do aterramento [\$] = 5160,00
tempo total do aterramento [h] = 120,00

materiais	:	quant.	[\$]:
conectores c/ descida:		6 -	180,00
rabicho e cabos:		0,00 -	0,00
conectores com anel:		6 -	180,00
condutor do anel:		120,00 -	4800,00
conectores com hastes:		0 -	0,00
hastes:		0 -	0,00

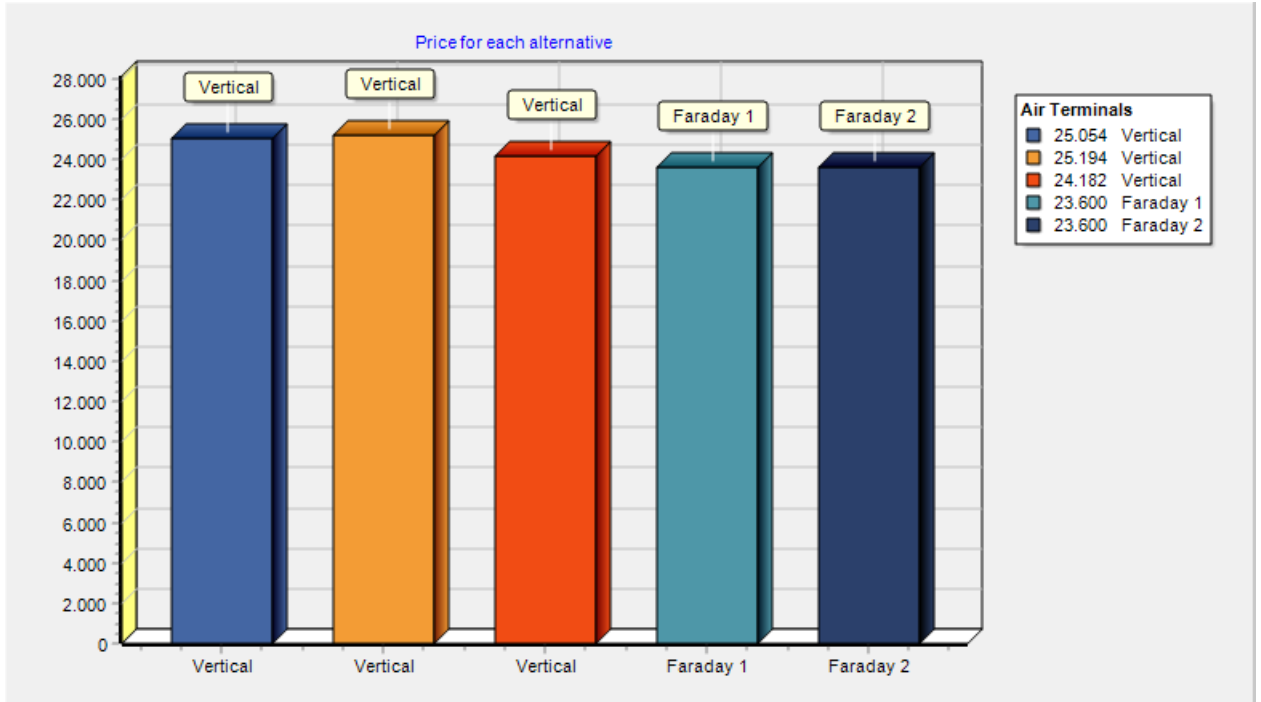
Materials: Listing

cod	quant	unid	descr	custoun	custoquant
8	0	un	captor vertical 3 m	0	0
20	0	un	split-bolt p/ cabos 35	20	800
1	20	m	cabo de cobre nu 50	20	400
6	0	un	conector G-G 35 a 50	10	0
6	1	un	conector G-G 35 a 50	10	10
1	120	m	cabo de cobre nu 50	20	2400
4	70	un	espaçador simples 200 mm	10	700
6	6	un	conector G-G 35 a 50	10	60
1	150	m	cabo de cobre nu 50	20	3000
4	151	un	espaçador simples 200 mm	10	1510
5	6	un	conector desmontável 4 paraf	10	60
1	0	m	cabo de cobre nu 50	20	0
26	6	un	solda T 50 x 50	10	60
1	120	m	cabo de cobre nu 50	20	2400
21	0	un	captor vertical 6 m	0	0
10	0	un	captor mastro 9m	0	0
			Consolidating:		
1	410	m	cabo de cobre nu 50	20	8200
2	7	un	conector G-G 35 a 50	10	70
3	221	un	espaçador simples 200 mm	10	2210
4	6	un	conector desmontável 4 paraf	10	60
5	6	un	solda T 50 x 50	10	60

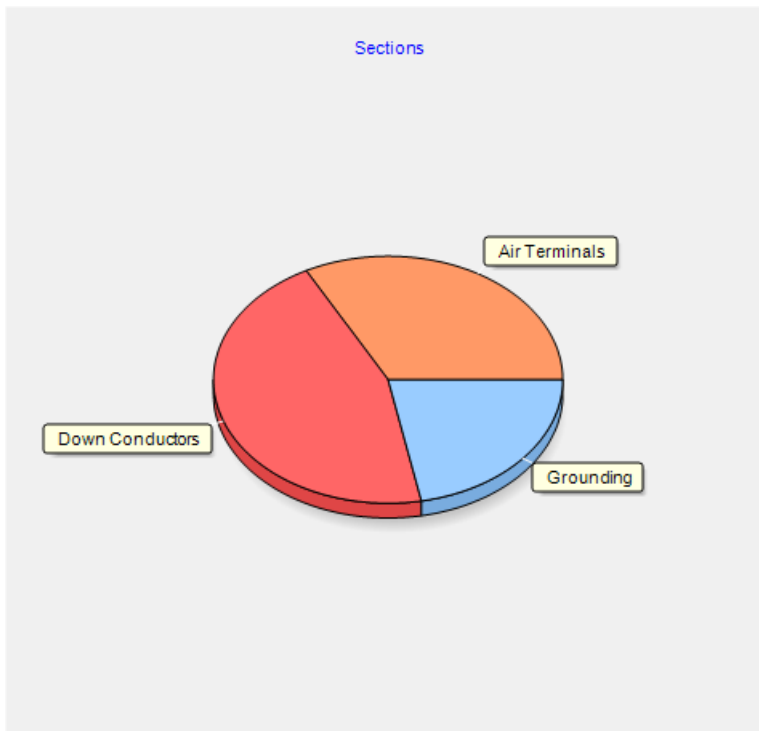
Office Building - B - LPS IV

Materials: Comparative

Cost of each alternative:



Selected alternative: 4



Office Building - B - LPS IV

Risks: global

Master:

Local:

Norma: IEC 62305:2010

Nível: IV

Riscos toleráveis:

 pessoal (vida) = 1E-5

 serviços ao público = 0,001

 patrimônio histórico / cultural = 0,0001

 econômico = 0,001

Incidência:

 ambiente: Isolated structure: no other objects in the vicinity

 exposição: 4 raios / km² / ano

Riscos por zona e totalizados:

Risk Value

 Zone: Z1 original entrance

R1 = 2,19771669411541E-8

R2 = 0

R3 = 0

R4 = 0

 Zone: Z2 original garden

R1 = 0

R2 = 0

R3 = 0

R4 = 0

 Zone: Z5 original computer room

R1 = 6,22833538019097E-7

R2 = 0

R3 = 0

R4 = 0

 Zone: Z3 sol. B

R1 = 5,51570915990023E-6

R2 = 0

R3 = 0

R4 = 0

 Zone: Z4 sol. B

R1 = 4,43440844413757E-7

R2 = 0

R3 = 0

R4 = 0

Total:

R1 = 6,60396070927423E-6

R2 = 0

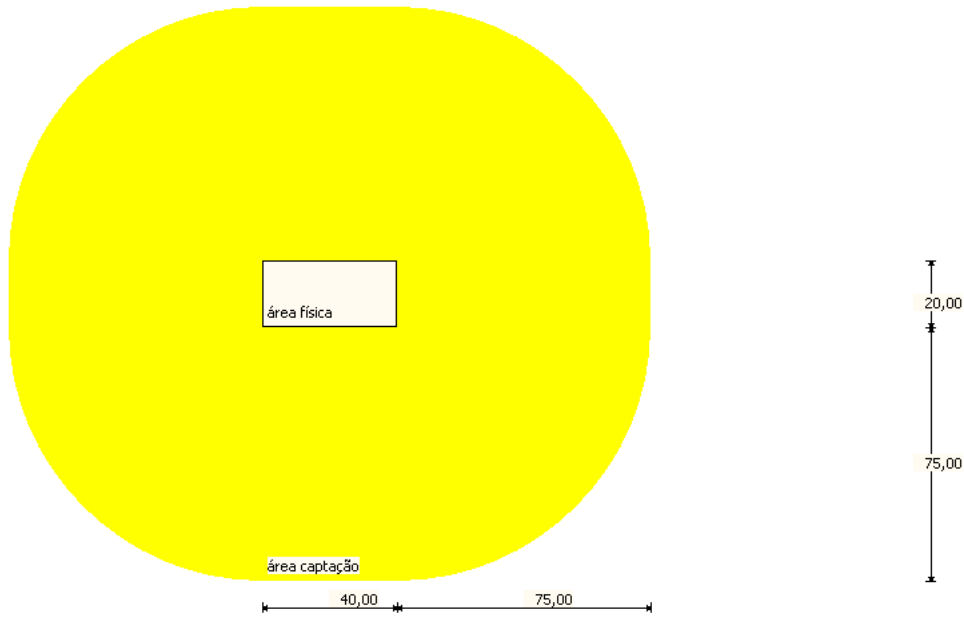
R3 = 0

R4 = 0

Rglobal = 6,60396070927423E-6

Office Building - B - LPS IV

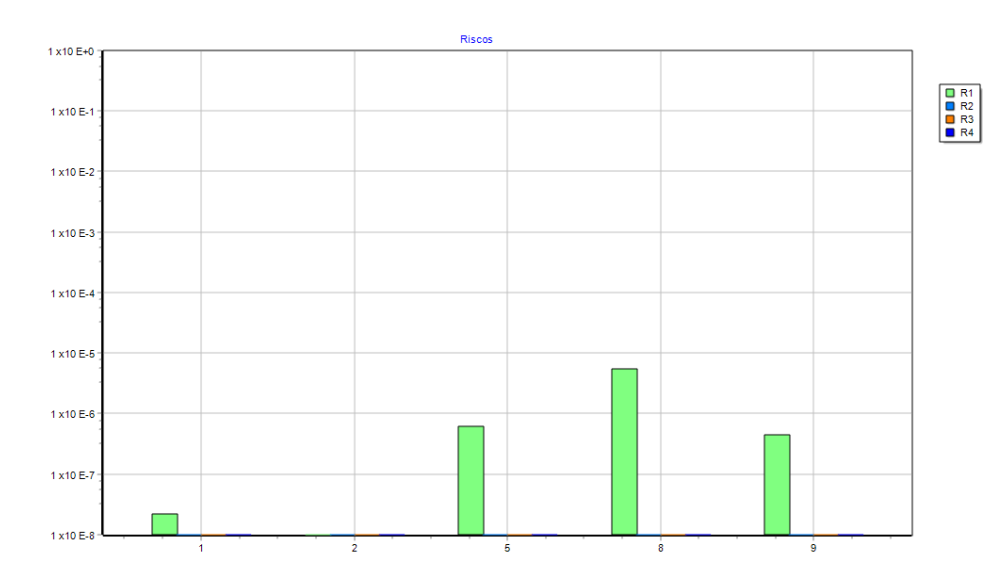
Risks: areas



Areas		Eventos
Física:	800,00	
Coleta:	27471,46	0,11
Influência:	845398,1	3,38

Office Building - B - LPS IV

Risks: global



Risk : Value

: Zone: Z1 original entrance

R1 = : 2,19771669411541E-8

R2 = : 0

R3 = : 0

R4 = : 0

:

: Zone: Z2 original garden

R1 = : 0

R2 = : 0

R3 = : 0

R4 = : 0

:

: Zone: Z5 original computer room

R1 = : 6,22833538019097E-7

R2 = : 0

R3 = : 0

R4 = : 0

:

: Zone: Z3 sol. B

R1 = : 5,51570915990023E-6

R2 = : 0

R3 = : 0

R4 = : 0

:

: Zone: Z4 sol. B

R1 = : 4,43440844413757E-7

R2 = : 0

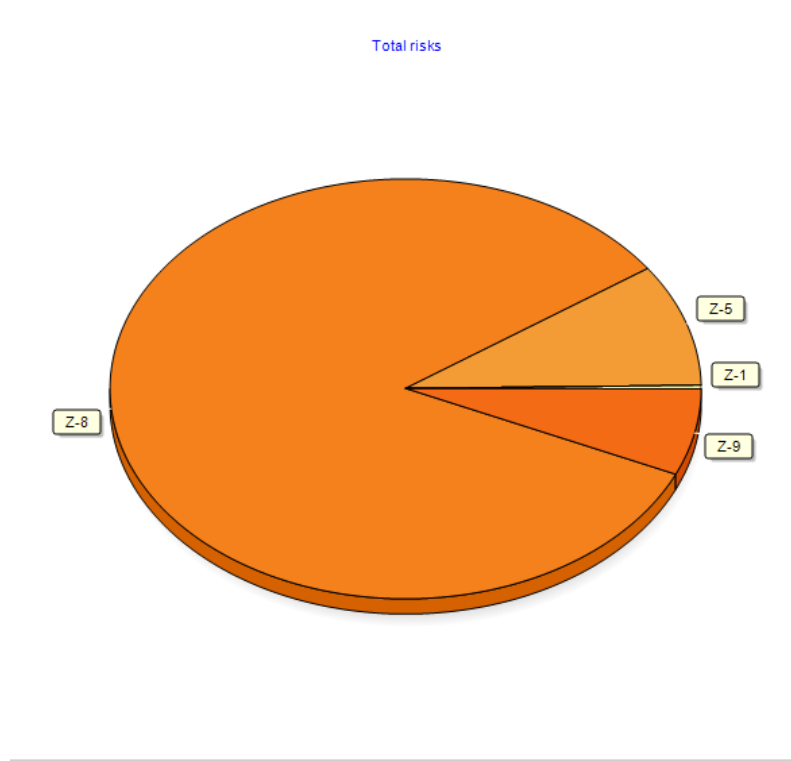
R3 = : 0

R4 = : 0

: Total:

Office Building - B - LPS IV

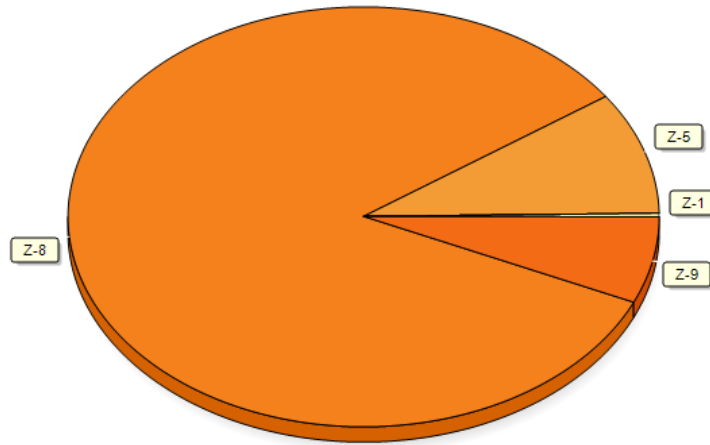
Risks: global



Office Building - B - LPS IV

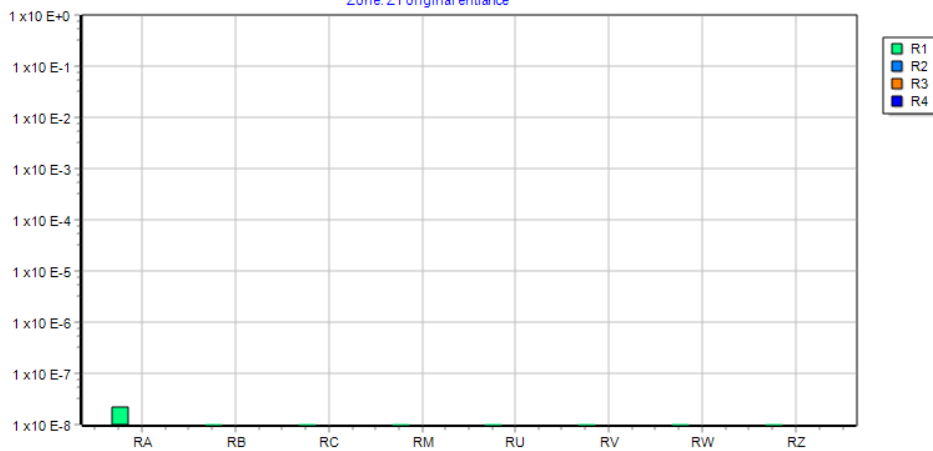
Risks: zone 4

Total risks



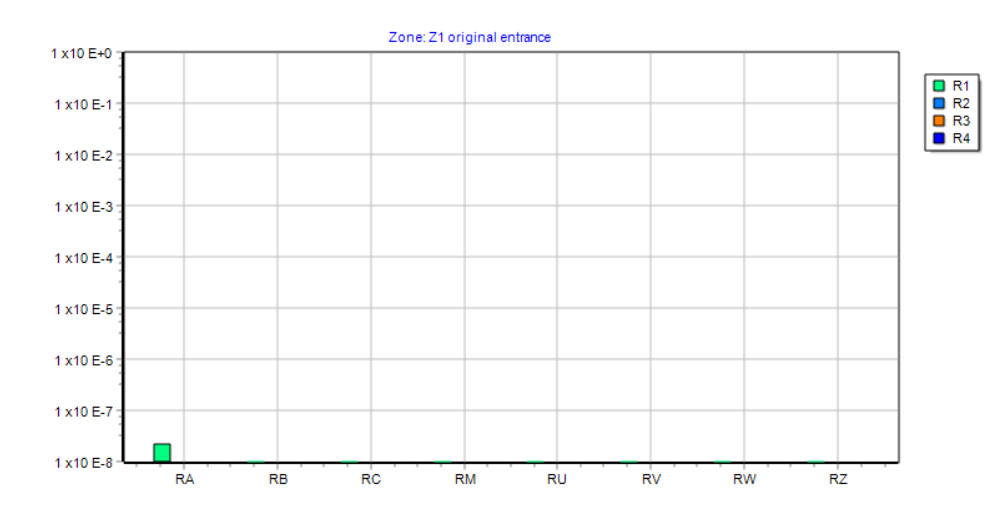
Risks: components

Zone: Z1 original entrance

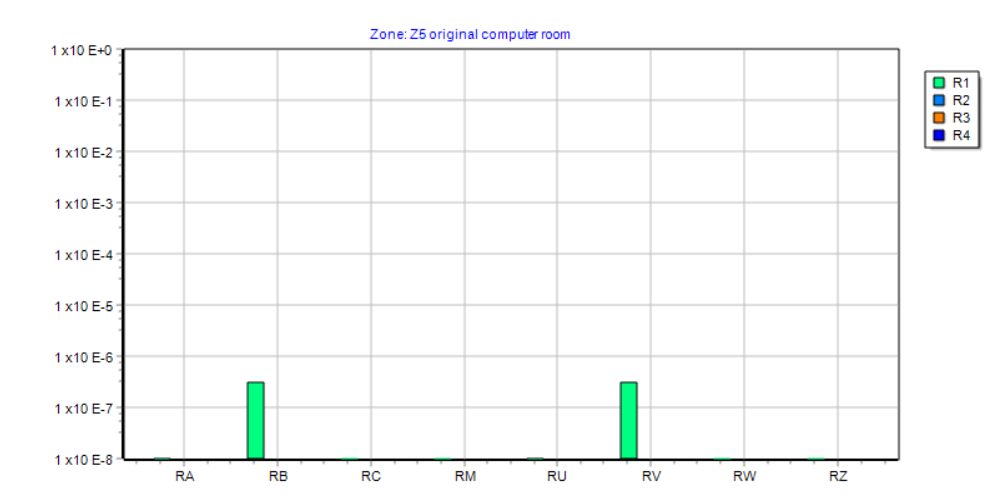


Office Building - B - LPS IV

Risks: zone 5



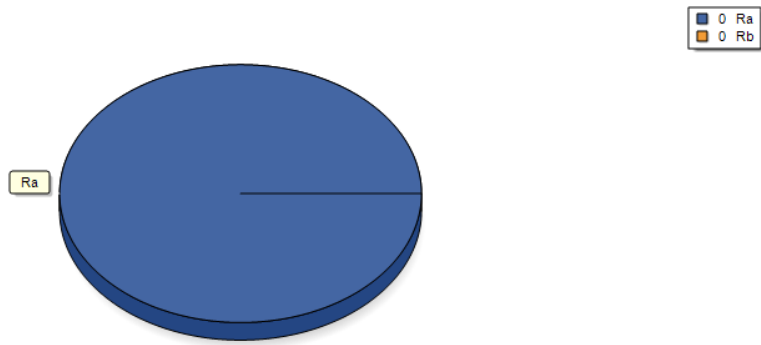
Risks: components



Office Building - B - LPS IV

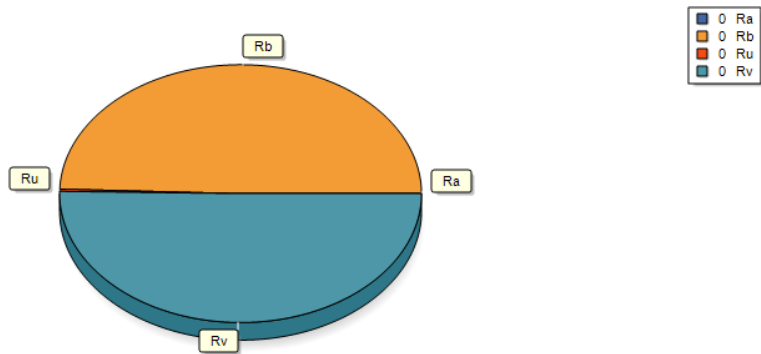
Risk: R1Zone: 4

Zone:



Risk: R1Zone: 5

Zone:



Office Building - B - LPS IV

Risk Assessment Worksheet

Areas and Incidence

Equivalent Collective Area

L = 4,0000E+1 m
W = 2,0000E+1 m
H = 2,5000E+1 m
Ae = 2,7471E+4 m²

Annual Threat of Occurrence

Direct Strikes to Structure

Ng = 4,0000E+0 events/year
Ae = 2,7471E+4 m²
Cl = 1,0000E+0
Nd = 1,0989E-1

Strikes Near Structure

Ng = 4,0000E+0
Am = 8,4540E+5 m²
Ae = 2,7471E+4 m²
Cl = 1,0000E+0
Nm = 3,3816E+0

Incoming Services: Power original

Strikes to an Incoming Service

Ng = 4,0000E+0
Al = 8,0000E+3 m²
Cl = 1,0000E+0
Ct = 1,0000E+0
Nl = 3,2000E-2

Strikes to an Adjacent Structure

Ng = 4,0000E+0
Ae = 0,0000E+0 m²
Cl = 2,5000E-1
Ct = 1,0000E+0
Nda = 0,0000E+0

Strikes Near an Incoming Service

Ng = 4,0000E+0
Ai = 8,0000E+5 m²
Ce = 1,0000E+0
Ct = 1,0000E+0
NI = 3,2000E+0

Incoming Services: Telecom original

Strikes to an Incoming Service

$$N_g = 4,0000E+0$$

$$A_l = 4,0000E+4 \text{ m}^2$$

$$C_l = 1,0000E+0$$

$$C_t = 1,0000E+0$$

$$N_l = 8,0000E-2$$

Strikes to an Adjacent Structure

$$N_g = 4,0000E+0$$

$$A_e = 0,0000E+0 \text{ m}^2$$

$$C_l = 2,5000E-1$$

$$C_t = 1,0000E+0$$

$$N_{da} = 0,0000E+0$$

Strikes Near an Incoming Service

$$N_g = 4,0000E+0$$

$$A_i = 4,0000E+6 \text{ m}^2$$

$$C_e = 1,0000E+0$$

$$C_t = 1,0000E+0$$

$$N_I = 8,0000E+0$$

Office Building - B - LPS IV

Service: 1

Service:	1
Name:	Power original
Instalation:	Aéreo
Line type:	LV power, telecom or data line
Environment:	Rural
physical damage LF:	Gas, water, power supply
failure of internal systems Lo:	Gas, water, power supply
External line type / Connection:	Aerial line unshielded / Undefined
SPD:	No coordinated SPD system
Type of internal wiring:	Unshielded cable – no routing precaution in order to avoid loops
Withstand voltage Uw:	2.5
Protection measures:	
Protection level:	No SPD 1.0
PEB for "Better than I":	
Routing, shielding, bonding:	Aerial or buried line, unshielded or shielded whose shield is not bonded to same bar
Line type:	Power line

Service: 2

Service:	2
Name:	Telecom original
Instalation:	Enterrado
Line type:	LV power, telecom or data line
Environment:	Rural
physical damage LF:	Gas, water, power supply
failure of internal systems Lo:	Gas, water, power supply
External line type / Connection:	Buried line unshielded / Undefined
SPD:	No coordinated SPD system
Type of internal wiring:	Unshielded cable – no routing precaution in order to avoid loops
Withstand voltage Uw:	1.5
Protection measures:	
Protection level:	No SPD 1.0
PEB for "Better than I":	
Routing, shielding, bonding:	Aerial or buried line, unshielded or shielded whose shield is not bonded to same bar
Line type:	Telecom line

Office Building - B - LPS IV

Service: 3

Service:	3
Name:	Power w/ bonding
Instalation:	Aéreo
Line type:	LV power, telecom or data line
Environment:	Rural
physical damage LF:	Gas, water, power supply
failure of internal systems Lo:	Gas, water, power supply
External line type / Connection:	Aerial line unshielded / Undefined
SPD:	III-IV
Type of internal wiring:	Unshielded cable – routing precaution in order to avoid loops
Withstand voltage Uw:	1.0
Protection measures:	
Protection level:	III - IV 0.05
PEB for "Better than I":	
Routing, shielding, bonding:	Aerial or buried line, unshielded or shielded whose shield is not bonded to same bar
Line type:	Power line

Service: 4

Service:	4
Name:	Telecom w/ bonding
Instalation:	Enterrado
Line type:	LV power, telecom or data line
Environment:	Rural
physical damage LF:	Gas, water, power supply
failure of internal systems Lo:	Gas, water, power supply
External line type / Connection:	Aerial line unshielded / Undefined
SPD:	III-IV
Type of internal wiring:	Unshielded cable – no routing precaution in order to avoid loops
Withstand voltage Uw:	1.0
Protection measures:	
Protection level:	III - IV 0.05
PEB for "Better than I":	
Routing, shielding, bonding:	Aerial or buried line, unshielded or shielded whose shield is not bonded to same bar
Line type:	Telecom line

Office Building - B - LPS IV

Zone : 1

Zone:	1
Name:	Z1 original entrance
Nz	4
Tz	8760
LPS installed:	Structure not protected by LPS
Security measures	
Physical damages:	Industrial, commercial
Internal systems:	risk of explosion
Type of surface:	Marble, ceramic / 1 to 10
Provisions taken:	
Risk of fire / amount:	none
Special hazard:	no special hazard
Cultural value:	0
Animals value:	0
Building value:	0
Content:	0

Zone : 2

Zone:	2
Name:	Z2 original garden
Nz	2
Tz	8760
LPS installed:	Structure not protected by LPS
Security measures	
Physical damages:	others
Internal systems:	risk of explosion
Type of surface:	Agricultural, concrete / <=1
Provisions taken:	
Risk of fire / amount:	none
Special hazard:	no special hazard
Cultural value:	0
Animals value:	0
Building value:	0
Content:	0

Office Building - B - LPS IV

Zone : 3

Zone:	3
Name:	Z3 original archive
Nz	20
Tz	8760
LPS installed:	Structure not protected by LPS
Security measures	
Physical damages:	Industrial, commercial
Internal systems:	risk of explosion
Type of surface:	Asphalt, linoleum, wood / >= 100
Provisions taken:	
Risk of fire / amount:	fire / high
Special hazard:	Low level of panic (e.g. a structure limited to two floors and the number of persons not greater than 100)
Cultural value:	1000000
Animals value:	0
Building value:	0
Content:	0

Zone : 4

Zone:	4
Name:	Z4 original offices
Nz	160
Tz	8760
LPS installed:	Structure not protected by LPS
Security measures	
Physical damages:	Industrial, commercial
Internal systems:	risk of explosion
Type of surface:	Asphalt, linoleum, wood / >= 100
Provisions taken:	
Risk of fire / amount:	fire / low
Special hazard:	Low level of panic (e.g. a structure limited to two floors and the number of persons not greater than 100)
Cultural value:	1000000
Animals value:	0
Building value:	0
Content:	0

Office Building - B - LPS IV

Zone : 5

Zone:	5
Name:	Z5 original computer room
Nz	14
Tz	8760
LPS installed:	Structure not protected by LPS
Security measures	
Physical damages:	Industrial, commercial
Internal systems:	risk of explosion
Type of surface:	Asphalt, linoleum, wood / >= 100
Provisions taken:	
Risk of fire / amount:	fire / low
Special hazard:	Low level of panic (e.g. a structure limited to two floors and the number of persons not greater than 100)
Cultural value:	1000000
Animals value:	0
Building value:	0
Content:	0

Zone : 6

Zone:	6
Name:	Z3 sol. A
Nz	20
Tz	8760
LPS installed:	Structure protected by LPS III
Security measures	
Physical damages:	Industrial, commercial
Internal systems:	risk of explosion
Type of surface:	Asphalt, linoleum, wood / >= 100
Provisions taken:	
Risk of fire / amount:	fire / high
Special hazard:	Low level of panic (e.g. a structure limited to two floors and the number of persons not greater than 100)
Cultural value:	1000000
Animals value:	0
Building value:	0
Content:	0

Office Building - B - LPS IV

Zone : 7

Zone:	7
Name:	Z4 sol. A
Nz	160
Tz	8760
LPS installed:	Structure protected by LPS III
Security measures	
Physical damages:	Industrial, commercial
Internal systems:	risk of explosion
Type of surface:	Asphalt, linoleum, wood / >= 100
Provisions taken:	
Risk of fire / amount:	fire / low
Special hazard:	Low level of panic (e.g. a structure limited to two floors and the number of persons not greater than 100)
Cultural value:	1000000
Animals value:	0
Building value:	0
Content:	0

Zone : 8

Zone:	8
Name:	Z3 sol. B
Nz	20
Tz	8760
LPS installed:	Structure protected by LPS IV (no NFPA)
Security measures	
Physical damages:	Industrial, commercial
Internal systems:	risk of explosion
Type of surface:	Asphalt, linoleum, wood / >= 100
Provisions taken:	
Risk of fire / amount:	fire / high
Special hazard:	Low level of panic (e.g. a structure limited to two floors and the number of persons not greater than 100)
Cultural value:	1000000
Animals value:	0
Building value:	0
Content:	0

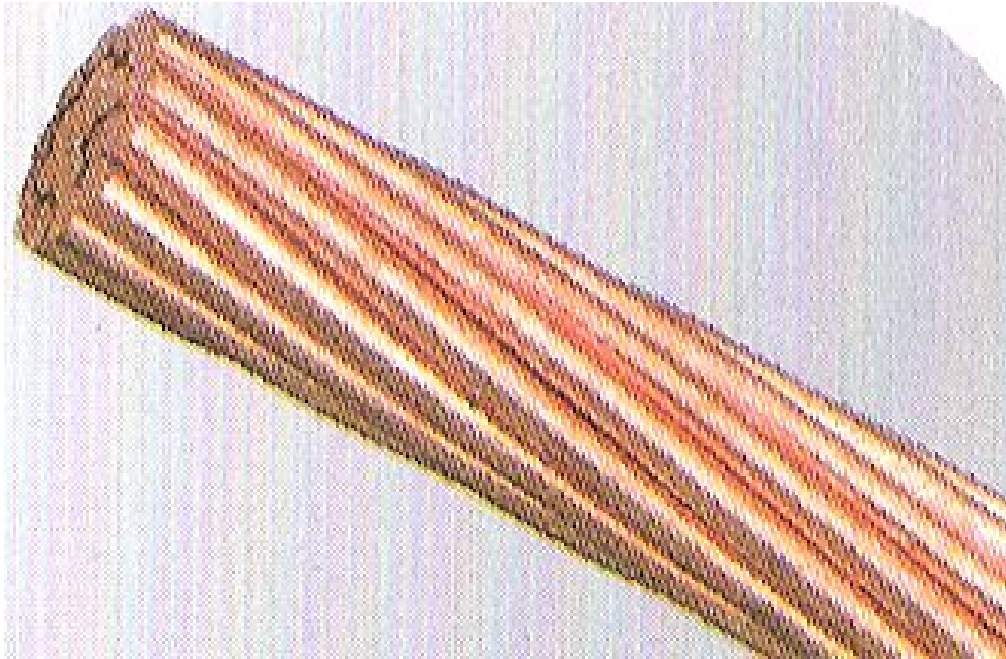
Office Building - B - LPS IV

Zone: 9

Zone:	9
Name:	Z4 sol. B
Nz	160
Tz	8760
LPS installed:	Structure protected by LPS IV (no NFPA)
Security measures	
Physical damages:	Industrial, commercial
Internal systems:	risk of explosion
Type of surface:	Asphalt, linoleum, wood / >= 100
Provisions taken:	
Risk of fire / amount:	fire / low
Special hazard:	Low level of panic (e.g. a structure limited to two floors and the number of persons not greater than 100)
Cultural value:	1000000
Animals value:	0
Building value:	0
Content:	0

Office Building - B - LPS IV

Material: cabo de cobre nu 50



Dados básicos:

Group:	conductor
Dimensions:	50 mm ²
Unit:	m
section [mm ²]:	50,00
Estim. cost [\$]	20,00
Time to instal [h]	1,00
Labor cost [\$/h]	20,00
Delivery time [d]:	5,00
Supplier #1:	- reference:
Supplier #2:	- reference:
Supplier #3:	- reference:

Office Building - B - LPS IV

Material: conector G-G 35 a 50



Dados básicos:

Group:	connector
Dimensions:	35 a 50 mm ²
Unit:	un
section 1 [mm ²]:	50,00
section 2 [mm ²]:	50,00
cost 1 mold [\$]:	50,00
uses / mold [un]:	50,00
Estim. cost [\$]:	10,00
Time to instal [h]:	0,50
Labor cost [\$/h]:	20,00
Delivery time [d]:	5,00
Supplier #1:	- reference:
Supplier #2:	- reference:
Supplier #3:	- reference:

Office Building - B - LPS IV

Material: espaçador simples 200 mm

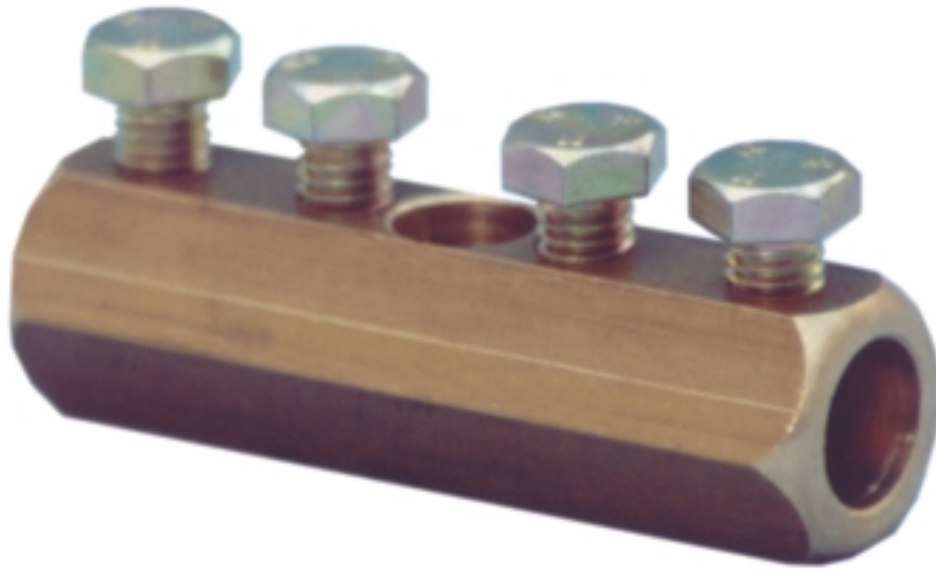


Dados básicos:

Group:	fixing
Dimensions:	200 mm
Unit:	un
spacing [mm]:	200,00
Estim. cost [\$]	10,00
Time to instal [h]	0,25
Labor cost [\$/h]	20,00
Delivery time [d]:	5,00
Supplier #1:	- reference:
Supplier #2:	- reference:
Supplier #3:	- reference:

Office Building - B - LPS IV

Material: conector desmontável 4 paraf



Dados básicos:

Group:	connector
Dimensions:	35 a 50 mm ²
Unit:	un
section 1 [mm ²]:	50,00
section 2 [mm ²]:	1,00
cost 1 mold [\$]:	50,00
uses / mold [un]:	1,00
Estim. cost [\$]	10,00
Time to instal [h]	0,15
Labor cost [\$/h]	20,00
Delivery time [d]:	5,00
Supplier #1:	- reference:
Supplier #2:	- reference:
Supplier #3:	- reference:

Office Building - B - LPS IV

Material: solda T 50 x 50



Dados básicos:

Group:	connector
Dimensions:	50 x 50
Unit:	un
section 1 [mm ²]:	50,00
section 2 [mm ²]:	50,00
cost 1 mold [\$]:	0,00
uses / mold [un]:	30,00
Estim. cost [\$]:	10,00
Time to instal [h]:	1,00
Labor cost [\$/h]:	20,00
Delivery time [d]:	5,00
Supplier #1:	- reference:
Supplier #2:	- reference:
Supplier #3:	- reference: