Atmos Plus X1.1

Volts and Bolts / Officina de Mydia



Tutorial - IEC62305-2:2010 Office Building Example from Annex E using Software Atmos Plus X1.1, update 11.1 (1st ed. 06/07/2016)

1. Creating a new file and entering basic data

Create a new Master file, called "OfficeBuilding_IEC62305-2.am1":

		Atmos Plus X1.1 - OfficeBuilding	_IEC62305-2.am1		X
File Project Materials Calculate Reports	s Help Atmos				
Projects (Locations, Structures):		Picture:			
Local: Vers	são:	ew Location Master			
Novo Local	110				
		Delete			
	T				
Coments:					
		A			
		,			
4		•			
Mactax file: OfficeRuilding JEC62205-2 are1	Local: Novo Local	Option #11	Chandlards	Brotection	
Master nie: Onicebuilding_IEC62305-2.ami	LOCAL NOVO LOCAL	Opuon # 1 1	otandard:	Protection:	

Access 'Project / Local data' to enter some basic info: today's date, a proper name for the Local,

sum of people = 200 and total value = 10,000,000.00. After click on Update, you can also Load some picture to illustrate the reports - in this case, we got the draw from the standard:

E File Project Materials Calculate Reports Help Atmos	Atmos Plus X1.1 - OfficeBuilding	_IEC62305-2.am1	
Update			
date: 06/07/2016 customer:	Picture:]	
Sum of people in all zones: 200,00			
Values : annual rates: Building and all contents = 100000000,C interest = 0,01 Insurance (not - prot) 0.00 amoutization = 0.01	Power line (aerial)		H = 25 m
Profit loss (event) = 0,00 maintenance = 0,01			Z2
Standard: IEC 62305:2010 Prot Level: IV = 60 m (not for Relacão de coleta = 3 nn Sobrer radius = 60 no	▶ ▼	W = 40 m	Telecom line (buried)
Near structure 500,00 Near service 4000, Faraday length 20,00 Faraday width 20,00	00	•le	P 4 P
Standard and Level are for Current Option			
Coments: example from Appex F of IEC 82305-2-2010 standard			
Master file: Local: Office Building	Option # 1 1	Standard: IEC 62305:2010	Protection level: IV

Notes:

- Don't worry now about 'Standard' and 'Protection Level', our first Option will be the original building, with no LPS installed, so we can have a base for comparison.
- We've chosen to set this data to 'all Options', then we can modify any Option later as needed.

Now we access 'Project/Options' and enter the name and description of our first Option:

E File Project Ma	iterials Calculate Report	Atmos Plus X1.1 - OfficeBuilding_IEC62305-2.am1 ts Help Atmos	
		Load Option to Memory: 1 - Original V Load	
Names LPS	Risk Zones Service	e Lines	
		Update	
Option:	Name:	Description:	
1	Original	Building as constructed, no LPS, no SPD, no safety measures.	
	2	Entre descr;	
	3	Entre descr;	
	4	Entre descr;	
	5	Entre descr;	
	6	Entre descr;	
		Save	

We don't have yet nothing to add to the other tabs: LPS, Risk, Zones, Service lines, we'll get back to them latter.

On the upper box, select the first Option: '1 - Original' and click Load; now all the operations and data will relate to this Option until we came back on this screen and change to another Option.

Now we set a 'Model' to our structure, the closest is 'Industrial (block)' - the name 'industrial' is only indicative, of course, anything that fits in this Model can be used here, like our Office

Building, or a residential building, shopping mall, and so on.

Enter the dimensions and click at Update:

File Project Materials C	Atmos Plus X1.1 - Offi alculate Reports Help Atmos	iceBuilding_IEC62305-2.am1	
		Confirmar <- click here after selecting the Model and set dimentions	
Structures		height A = 25,00 m width B = 20,00 m comprimento C = 40 m	

2. Risk assessment

At the menu, we select 'Project / Risk (Complete)' - note that the 'Basic' risk assessment is currently valid only to NFPA 780:2014.

The first tab on this screen is the 'Tolerable' (or admissible) risk; here, also, IEC differs from NFPA, but next edition (2017) of NFPA 780 will probably align this (and several other parameters) with IEC 62305-2:2010.

Enter your numbers or click at Standard to get the default values and click on Update:

File Project Materials Calculate Reports He	Atmos Plus X1.1 - OfficeBu elp Atmos	lding_IEC62305-2.am1
Toleráveis Incidence Services Zonas	Options Preview	
Update Risk - Personal (Rt1): 1,00E-5 Risk to Services (Rt2): 1,00E-3 Risk - Cultural (Rt3): 1,00E-4	Eventos toleráveis por ano. Entre valores ou use os padrões da norma. (Norma já selecionada em Projetos / Dados do Local)	
Standard Risk - Economic (Rt4): 1,00E-3	(IEC sug. = 1E-3)	

Second tab is for Incidence data: on this example we have 4 flashes $/ \text{km}^2 / \text{year of density}$ - when you click at Update, Atmos will use the dimensions of the Model and the environment factor to calculate the areas of collection and influence and the expected number of events per year:



Services:

At the tab 'Services' we'll enter the data for the Service lines that enter the building; Atmos can have up to 16 lines - of course you won't have all that on a building but, to be able to do some comparisons between the Options, we'll set one Service line for the original power line, than other for the same power line with some SPD and so on.

Click at 'New' to create a new Service line:

File Project Materials Calculate Reports	; Help Atmos	Atmos Plus X1.1 - OfficeBuild	ding_IEC62305-2.am1	
Toleráveis Incidence Services Zona	s Options Preview			
Linhe:	New Edit C Ir Delete	Service Selection Area = 0,00 Ifluence Area = 0,00 Adj. Area = 0,00	e Lines: Strikes to service N = 0,000000 Strikes near the service Ni = 0,000000 rikes to adj structure Nadj = 0,000000	Atmos Plus can use up to 16 Service lines for each local (structure, building). Any one of them can be used by one or more Zones. Please note that, to be used by a Zone calculation, you must click on the button 'Update', above, after changing some parameter and before moving to another Service on the table.
Incidence Loss of Services Direct hil Instalation: Aéreo Line type: LV power, telecom or data line Environment: Rural	Update Internal Injuries	Name: Power original Type: Power Power	ServDialog OK Cancel Instalation: Aerisl Lenght: 200,00 0,00 lenght: 0,00 e e tty "a" e Height A: 0,00 Height B: 0,00	alue if < 500.
Master file:	Local:	Option # 1 Original	Standard: IEC 62305:2010	Protection level: IV

At the tabs on the lower part of the screen, enter the relevant parameters and click the Update button to get the areas and incidence of the line:

a) File Project Materials Calculate Reports Help Atmos	Atmos Plus X1.1 - Of	fficeBuilding_IEC62305-2.am1	
Toleráveis Incidence Services Zonas Options F	Preview		
Linha: Power original Kew Edit Delete	Collection Area = 8000,00 Influence Area = 80000,00 Adj. Area = 0,00	Service Lines: Strikes to service NI = 0,032000 Strikes near the service NI = 3,200000 Strikes to adj structure Nadj = 0,000000	Atmos Plus can use up to 16 Service lines for each local (structure, building). Any one of them can be used by one or more Zones. Please note that; to be used by a Zone calculation, you must dick on the button Update', above, after changing some parameter and before moving to another Service on the table.
Update Incidence Loss of Services Direct hit Internal Ir Type of internal wiring: Unshielded cable – no routing precaution in order to avoic	njuries Line Type Costs		
Withstand volkage Uw:			

Repeat the procedure for the Telecom line:

	Atmos Plus X1.1 - OfficeBuilding_IEC62305-2.am1	
le Project Materials Calculate Reports Help Atmos		
Toleráveis Incidence Services Zonas Options Previe	ew	
Linha: New New	Service Lines:	Atmos Plus can use up to 16 Service lines for each local (structure, building).
Telecom original	Collection Area = 40000,00 Strikes to service NI = 0,080000	Any one of them can be used by one or more Zones.
	Influence Area = 4000000,00 Strikes near the service Ni = 8,000000	must click on the button 'Update', above, after changing some parameter and before moving to another Service on
▼ Delete	Adj. Area = 0,00 Strikes to adj structure Nadj = 0,000000	the table.
Update		
Incidence Loss of Services Direct hit Internal Injurie	es Line Type Costs	
Instalation:		
Enterrado		
Line type:		
LV power, telecom or data line 🔹		
Environment:		

Zones:

The zones 1 and 2 have very small risk, so let's use zone 3 to illustrate the procedure. The archive has 20 people inside, with low level of panic, high risk of fire and so on, but first you need to create the zone: at the Zones tab, click on New and enter the basic data:

E Zones	
ОК	Cancel
Zone name:	Z3 original archive
Numer of people at the zone - nz:	20
Hours / year of ocupation - tz:	8760

Then, on the first of the lower tabs, select the service lines that enter the zone:

E File Project Materials Calculate	Reports Help	Atmos	Atmos P	Nus X1.1 - OfficeBuilding_IEC62	2305-2.am1		
Toleráveis Incidence Services	Zonas Opt	ions Preview					
				Zones:			
Zona: Z1 original entrance Z2 original garden ▶ Z3 original archive	# pessoas: 4 2 20	horas/ano: 8760 8760 8760	New Edit Delete	Atmos Plus can use up to 16 Zones fo 780:2014 standard uses only one zor Please note that you must click on the	ir each local (structure), building) for he for the whole structure), a button 'Update' at 'Zone Preview'	IEC and NBR standards (NFPA	
Zone Probabilities Losses Co Name: Z3 original archive # people: hour: 20,00 8760	s / year:	eview ces: er original, Telecor Power original Telecom original	n original	Picture: Load	Delete		
Description:				•			
Master file: OfficeBuilding_IEC62305-2	.am1 Local	: Office Building		Option # 1 Original	Standard:	Protection:	

At the next tab, Probabilities, select the relevant risk components:

	Select all the applicable for this zone:	
🗹 Life:	RA - ferimentos a seres vivos – descarga na estrutura,RB - danos físicos na estr 💌	
	🗹 RA - ferimentos a seres vivos – descarga na estrutura	
Services:	🗹 RB - danos físicos na estrutura – descarga na estrutura	Update
	🔲 RC - falha dos sistemas internos – descarga na estrutura	
🔄 Cultural:	🔲 RM - falha dos sistemas internos – descarga perto da estrutura	
	🗹 RU - ferimentos a seres vivos – descarga na linha conectada	
Economic:	🗹 RV - danos físicos na estrutura – descarga na linha conectada	
	🔲 RW - falha dos sistemas internos – descarga na linha conectada	
	🔲 RZ - falha dos sistemas internos – descarga perto da linha	
	er o intocolico.	
	Structure not protected by LPS	Update
	Security measures (set all that apply):	

At the Losses tab, select the parameters:

Life Services Cultural	Economic	
Circo Dervices Calcurar	Conomic	
Physical damages: Inc	dustrial, commercial	•
Life: IEC	C, NBR - unique value	•
Type of surface: As	phalt, linoleum, wood / >= 100	•
Provisions taken:		•
Risk of fire / amount: fire	e / high	•
Special hazard: Lo	w level of panic (e.g. a structure limited to two floors and the number of persons nc	-

As we're not considering the costs yet, we can go to the Zone Preview tab:



Risk components RA and RU are close to zero, but components RB and RV are both over 10⁻⁵, so the zone 3 is clearly over tolerable level and will need lightning protection and/or other safety measures for the zone itself or the service lines.

Repeating the process for zone 4 - offices - we get:



The sum of Risk components RB and RV has the value of 7×10^{-6} , so it's bellow - but not by much - the tolerable level and, of course, when you add the risks from the other zones, the total will be over 10^{-5} ; as a result, we'll probably need protection measures also for zone 4.

For the last zone, the Computer Centre, we get a low risk, as shown bellow:



To obtain the total Risk for the building, select the tab Options, then select the zones wanted for this Option; note that, as we're entering the original building, all the zones defined so far will be counted:

At the Preview tab for the Option:



To get more comparative reports, select Calculate / Risk / Complete:

]						
<u>File Projec</u>	t <u>M</u> aterials	<u>C</u> alculate	<u>R</u> eports	Help	<u>A</u> tmos	
Toleráveis Incidence		Risks	Þ	Com	plete	eview
		Protect	ion	Basi	ic	
Up	date	Verifica	tion	[able]	Copy C	hart
Risk		¥,	Value Zone: Z1 original entrance			^
		Z				
R1 =			2,19771669411541E-8			
			0			
R2 =		0				

Now, select Reports / Risk / Complete:

Eile	Project Materials ⊆alcula	te	Reports Help A	tmos		
Tol	eráveis Incidence Servi	ces	Location Options		Preview	
	Update Clear		Model	DDV	/ Chart	
		-	Risk)	32	Risk (complete)	,
	Risk	۷.	LPS I		Risk (basic)	
		Zo	Materials	hce		
	R1 =	2,	Verifications			1
	R2 =	0	Print / PDF			
	R3 =	0				
	0.4	0				

At the first tab, Text, we have the data for standard used, tolerable levels and incidence, then the table from the Options Preview:



The Croquis tab presents a plant view of the building and the collection area:



The tab Graph repeats the chart from the Option Preview:



Now, at the Zones tab, we can select the zones one by one to get the chart of their risk components (sabe chart as each zone preview):



At the Risks tab, we can see all this on pie charts, that don't give numbers but are more suitable for the comparison task:



Note that here, as the pie chart scale is linear and not logarithmic, the smaller risks disappear so we can see more clearly where the danger really is!

The final tab, Worksheet, gives the report on table form as suggested by the NFPA 780:2014 standard (for now, it's available only when there's only one zone for the whole building, as by NFPA 780 Risk assessment).

		Atmos Plus X1.1 - Offi	iceBuilding_IEC62305-2.am1	
File Project Materials Calcul	ate Reports Help Atmos			
Text Croqui Graph Zo	nes Risks WorkSneet			
	NF	PA 780:2014 - Worksheet according to A	nnex L 🗹 Only selected risk compo	onents
Incidence Probabilities Lo	osses Risks			
Areas and Incidence			0	^
Equivalent Collective Area				
	L =	4,0000E+1	m	
	W =	2,0000E+1	m	
	H =	2,5000E+1	m	
	Ae =	2,7471E+4	m ²	_
	Annual Threat of Occurence			_
Direct Strikes to Structure				
	Ng =	4,0000E+0	events/year	
	Ae =	2,7471E+4	m²	
	CI =	1,0000E+0		
	Nd =	1,0989E-1		_
Strikes Near Structure				_
	Ng =	4,0000E+0		
	Am =	8,4540E+5	m²	
	Ae =	2,7471E+4	m ²	
	Cl =	1,0000E+0		
	Nm =	3,3816E+0		
Master file: OfficeBuilding IEC62	305-2.am1 Local: Office Building	Option # 1 Or	riginal Standard:	Protection:

If your need is only to get the original Risk status of the building, the above reports is all you need and you can jump to the PDF report generation.

We'll now continue the Risk assessment with the solutions proposed by the IEC 62305-2:2010, then the cost analysis (not on the standard example) to make the decision on what measures to adopt.

3. Solutions as by 62305-2 example

There are several possible measures to apply to reduce the risk, some more effective, some more expensive and some could be impracticable to implement in some cases. For this example, the standard suggest two solutions:

A) protect the building with a level III LPS, with the required bonding of the service lines - the RB risk would be reduced by 90% and RV for both service lines reduced by 95%

B) protect the building with a level IV LPS, wich gives a 80% reduction on RB risk (with the same bonding and 95% reduction of RV as in solution A) and, additionally, install some fire extinguishing or alarm

To be able to compare graphically both solutions, lets separate them on different Options; we do that on Project / Options :

File Project Mat	erials Calculate Report	Atmos Plus X1.1 - OfficeBuilding_IEC62305-2.am1 ts Help Atmos	
		Load Option to Memory: 1 - Original	
Names LPS	Risk Zones Service	re Lines	
		Update	
Option:	Name:	Description:	
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;	
		Save	

Now we select option 2 on the box "Load Option to memory" and click at Load. Then we'll do the following:

- Confirm the Options data: level of protection and Model
- Create new Service lines with the bonding parameter set to level III-IV (it's the same for both)
- Create new Zones 3 and 4 using these new lines instead of the originals, and using LPS
- We could enter new Zones 1, 2 and 5, but their risk is very low, so we can use the original values

- Besides calculating the Risks, will also enter the data and calculate the LPS protection for both level III and IV levels and get the corresponding drafts

Options data for the location:

E	Droject	Matoriale Calculato	Doporte I		_	Atr
File	Project	materiais Calculate	Reports	neip Aurio	>	
			Update			
	date:	11/07/2016		customer:		
	Location:	Office Building		designer:		
	s	um of people in all zo	nes: 200,0	0		
		Values :			annual	rates:
	Bulding	and all contents =	10000000,0		interest =	0,05
	Insur	ance (not - prot) =	0,00	amo	rtization =	0,20
	F	rofit loss (event) =	0,00	main	tenance =	0,10
	Standard:	IEC 62305:2010	→ P	rot Level:	III = 45 m ((46 for N 💌
		Collection ratio =	3,00	Spher	IV = 60 m (III = 45 m (Not for NEPA
		Near structure =	500,00	Near	II = 30 m	
		Faraday length =	15,00	Farad	I = 20 m (n	ot for NFPA!
		Standard and Level	are for		User define	ed (see manu
		Current Option		🔄 all Op	User / EGM tions	ratio (see m

Service Lines with bonding:

Create new Power and Telecom lines with the same data as the originals, but with protection level III-IV:

∎ Eile Project Materials ⊆alculate §	<u>R</u> eports <u>H</u> elp <u>A</u> tmos	Atmos Plus X1.1 - C)fficeBuilding_IEC62305-2.am1	
Toleráveis Incidence Services	Zonas Options Pro	sview		
Linha: Power original Telecom original Power w/ bonding	New Edit Delete	Collection Area = 8000,00 Influence Area = 800000,00 Adj. Area = 0,00	Service Lines: Strikes to service NI = 0,032000 Strikes near the service NI = 3,200000 Strikes to adj structure Nadj = 0,000000	Atmos Plus can use up to 16 Service lines for each local (structure, building). Any one of them can be used by one or more Zones. Please note that, to be used by a Zone calculation, you must cirk on the builton Tupdate', above, after changing some parameter and before moving to another Service on the table.
Incidence Loss of Services D Protection measures: Protection level: III - IV 0.05 No SPD 1.0 III - IV 0.05 III 0.02 I 0.01 Better than I - 0.005 a 0.001	Update Direct hit Internal Inj w	uries Line Type Costs		

Let's also enter some cost for the bonding; probably it will be much cheaper than the LPS, but let's enter it anyway so it appears on the reports:

Project Materials Calculate Re	ports Help Atmos	Ath	nos Plus X1.1 - Ur	mcebuilding_lEC62305-2.am.	
bleráveis Incidence Services	Zonas Options Pr	eview			
Linha:	A New		E	Service Lines:	
Telecom original	Edit	Collection Area =	8000,00	Strikes to service NI =	0,032000
Power w/ bonding		Influence Area =	800000,00	Strikes near the service Ni =	3,200000
	Delete	Adj. Area =	0,00	Strikes to adj structure Nadj =	0,000000
Incidence Loss of Services Dire	ect hit Internal Inj	juries Line Type Co	osts		
Incidence Loss of Services Dire	ect hit Internal Inj	juries Line Type Co	osts		
Incidence Loss of Services Dire SPDs:	ect hit Internal Inj	juries Line Type Co	otected Service.		
Incidence Loss of Services Dire SPDs: ✓ Shield/bond (ext):	0,00 200,00	juries Line Type Co Not for original upro Enter the estimated installation of each	otected Service.		
Incidence Loss of Services Dire SPDs: Shield/bond (ext): Shield/routing (int):	0,00 200,00 0,00	juries Line Type Co Not for original upro Enter the estimated installation of each measure, as selecte corresponding tabs	otected Service.		
Incidence Loss of Services Dire SPDs: SPDs: Shield/bond (ext): Shield/routing (int): Warnings:	0,00 0,00 0,00 0,00	juries Line Type Co	otected Service. d costs for protection or ed at the at left. computed when this Service. to		
Incidence Loss of Services Dire SPDs: Shield/bond (ext): Shield/routing (int): Warnings: Insulation:	0,00 200,00 0,00 0,00 0,00	juries Line Type Co Not for original upro Enter the estimated installation of each measure, as selecte corresponding tabs This values will be c one Option selects I compare with other	otected Service. d costs for protection or ed at the at left. computed when this Service, to o Options costs.		

Note: when modifying any line parameter, don't forget to click on the Update button before moving to another line on the table.

Zones 3 and 4 with LPS level III:

Let's create new zones 3 and 4 with solution A (LPS level III); we now need to enter the LPS:

Zone	Probabilities	Losse	es Costs	Zone Preview		
				Select all the applicable for	r this zone:	
	I√ Life:		P.A ferimen	tos a seres vivos – descaro	ia na estrutura PB - danos físicos na estr	Ð
	-		ICH TOTIMON			
	Service	s:				
	🗌 Cultura	al:				-
						_
	Econom	nic:				-
	_			Protection and measures		
				Protection and measures;		
			LPS installed:			
			Structure pro	otected by LPS III		Update
			Structure no	t protected by LPS		
			Structure pro	otected by LPS IV (no NFF	PA)	
			Structure pro	otected by LPS III		
			Structure pro	otected by LPS II		
			Structure pro	otected by LPS I (no NFPA)	
			LPSI + Fra	amework (no NFPA)		
			Metal roof +	complete prot. Framework	k	
Master file	в:			Local: Office Building	Option # 2 A	- LPS III

And select the new service lines with bonding:

▶ Z3	sol. A		20 8760
Zone	Probabilities	Losses Costs	Zone Preview
		C	Update
Name			Services:
Z3 s	ol. A		Power w/ bonding, Telecom w/ bondin(VDDD Update list
			Power original
# pe	ople:	hours / yea	ar: 🔲 Telecom original
20,0	0	8760,00	Power w/ bonding
			Telecom w/ bonding

This new Zone 3 A has the Preview:

Zona:	# pessoas:	horas/ano: 🔺	New	Atmos Plus can use up to 16 Zones for each local (structure, building) for IEC and NBR standards (NFPA					
Z3 original archive	20	8760		780:2014 standard uses only one zone for the whole structure).					
Z4 original offices	160	8760		Please note that you must click on the button 'Update' at 'Zone Preview' tab.					
Z5 original computer room	14	8760	Delete						
🕨 Z3 sol. A	20	8760 👻							
Zone Probabilities Losses	Costs Zone Pre	view							
Update Preview	Clear	Copy Tab	copy G	Graph Zone: Z3sol. A	1				
Probabilidade I	Perda	Risco			R1				
Pa = 1,0000E-1	a = 1,0000E-8	Ra = 1,09	89E-10	1 x10 E-1	R2				
Pb = 1,0000E-1	.b = 4,0000E-4	Rb = 4,39	54E-6		R4				
Pu = 0,0000E+0	.u = 1,0000E-8	Ru = 5,60	00E-11	1 x10 E-2 :					
Pv = 0,0000E+0	v = 4,0000E-4	Rv = 2,24	00E-6						
		R1 = 6,63	56E-6	1 x10 E-3	1				
		RT1 = 1,0	000E-5	4.405.4					
		LPS OPTIC	ONAL	1 X10 E-4					
				1x10E-5					
				1x10 E-6					
				1 x10 E-7					
				1x10E-8 RA RB RC RM RU RV RW RZ]				

Note that it's now bellow the tolerable level but not by much, so Atmos labels it with the yellow color; the table color code is:

- Red = over tolerable level, must protect better

- Yellow = over 10% of tolerable level, so it's OK but, when added to other components and zones, can produce a red risk

- Green = bellow 10% of tolerable level, probably it's OK even when added to others.

Please note that the chart color isn't related to the table, the colors on the chart are related to risks R1, R2, R3 and R4.

Repeating the process to create a new Zone 4 with solution A, we get:



Considering the new zones Z3A and Z4A for Option 2:

E File C	Project Materials	Calculate Der	orte He	alo Atmos	Atmos Plus
Tolera	áveis Incidence	e Services Z	onas	Options Preview	
	Select Zones:	 Z1 original entra Z1 original entra Z2 original g Z3 original a Z4 original of Z5 original of Z3 sol. A Z4 sol. A 	nce,Z2 o ntrance arden rchive ffices omputer i	riginal garden, 25 c 💌 (room	Update List
	Option Zones:			Option Services:	
	Z1 original entr. Z2 original gard Z5 original comp Z3 sol. A Z4 sol. A	ance len outer room	•	Power w/ bonding Telecom w/ bonding	
			v		•

Note that we're using "old" zones Z1, Z2 and Z5 because their risk is already very low, but you could easily add new ones with solution A.

The Options preview:



LPS design:

The standard doesn't present the cost comparison, but we can do it here; for that, besides the bonding costs for the Service lines, we need to design the LPS level III protection for the whole building.

Select Materials / Air Terminals; check each used component (see note bellow) then click on the corresponding Select button to access the materials database and choose the material - for example, select a compression connector or an exothermic welding for the connections:

File Project Materials Calculate Report	ts Help Atmos	Atmos Plus	K1.1 - OfficeBuilding_IEC62305-2.am1	
	odate			
🗹 A - mast / terminal / post	Selec. H1	captor vertical 3 m		
(H2 and H3 where available)	Selec. H2	captor vertical 6 m		
	Selec. H3	captor mastro 9m	B	
🗹 B - conexão com condutor	Select	split-bolt p/ cabos 35		
C - condutores superiores	Select	cabo de cobre nu 50		
🗹 D - conexão condutores	Select	conector G-G 35 a 50		
🗹 E - conexão com perimetral	Select	conector G-G 35 a 50		
F - condutor perimetral	Select	cabo de cobre nu 50		
🗹 G - suporte / fixação	Select	espaçador simples 200 mm		
H - space betw	een fasteners =	2,00 m	I F, E	

Note: you can freely turn on and off each component: for example, if you have a metallic structure under the roof tiles, you can use it for conducting the lightning current from the air terminal to the perimeter conductor, so you won't need components B, C, D and I above.

Repeat the procedure to set the Down Conductors and Grounding materials, then select Calculate / Protection:



Now select Reports / LPS to get the Air Terminals, Down Conductors and Grounding reports - lists of materials and drafts; this is the Down Conductors draft:



The Model used has 5 alternatives for Air Terminals: 3 heights of rods plus Faraday cages oriented on both directions. To chose one, go to Reports / Materials and click at the Update button to get the comparative chart of costs for the Air Terminal alternatives; at the right, select the option you want and click on Select:



At the next tab, Graphics, you can get a comparative chart between costs for the selected alternative:



And, at Materials tab, there's a list of all materials used:

			Clear Update Copy -> CSV> XL	5		
cod	quant	unid	descr	custoun	custoquant	^
8	2	un	captor vertical 3 m	80	160	
20	2	un	split-bolt p/ cabos 35	12	24	
1	40	m	cabo de cobre nu 50	20	800	
6	0	un	conector G-G 35 a 50	10	0	
6	4	un	conector G-G 35 a 50	10	40	
1	120	m	cabo de cobre nu 50	20	2400	
4	80	un	espaçador simples 200 mm	10	800	
6	10	un	conector G-G 35 a 50	10	100	
1	250	m	cabo de cobre nu 50	20	5000	
4	251	un	espaçador simples 200 mm	10	2510	
5	10	un	conector desmontável 4 paraf	10	100	
1	0	m	cabo de cobre nu 50	20	0	
26	10	un	solda T 50 x 50	10	100	
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:			

We won't show all the screens here because it's just a repetition with slightly different data or parameters, but this is the result Options Preview for the solution B:



There are too many reports available to show here, let's present the more important ones; if you select Reports / Options, the second tab - LPS - will give you this table:

Eile Project Materials C	alculate Deports Help	Atmos	Atmos Plus X1.1 -	OfficeBuilding_I	EC62305-2.am1		
Die Flolerr Warenas C	Location Options	Enios	Select to copy:		- Copy		
Names LPS Risk	Zones Model	ts Compare data	Compare Charts				
	Risk	•		adata 🗍			
	LPS	•	Liear U	pdate			
Option:	1 Materials		3	4	5	6	^
Name	Origin Drink (DDC	- LPS III	B - LPS IV	4	5	6	
	Air Terminais.						
A - mast / termina		captor vertical 3	captor vertical 3				
H2		captor vertical 6	captor vertical 6				
НЗ		captor mastro 9m	captor mastro 9m				
B - conexão com co		split-bolt p/ cab	split-bolt p/ cab				
C - condutores sup		cabo de cobre nu	cabo de cobre nu				
D - conexão condut		conector G-G 35 a	conector G-G 35 a				
E - conexão com pe		conector G-G 35 a	conector G-G 35 a				
F - condutor peris		cabo de cobre nu	cabo de cobre nu				
G - suporte / fix:		espaçador simples	espaçador simples				
H - space between	0	2	2	0	0	0	
	Down conductors:						
A - connection wit		conector G-G 35 a	conector G-G 35 a				
B - condutor		cabo de cobre nu	cabo de cobre nu				
C - fixação		espaçador simples	espaçador simples				
D - Espaçamento f:							
force down conduct							~
	1		1.0000000				
Master file:	Local	: Office Building	Option #	3 B - LPS IV	Standard: IEC	62305:2010	Protection level: IV

It shows, for each Option, the LPS components that were used.

On the Risk tab, you get, for each Option, which zones were considered:

File Pr	oject Ma	aterials Calculate	Reports Help Atmo	s	Atmos Plus X	1.1 - OfficeB	uilding_IEC62	2305-2.am1		
					Select to co	py:		- Copy]	
Names	LPS	Risk Zones	Service Lines Costs	Compare data	Compare Charts					
						Update				
Opt:	ion:		1	2	3	4	5	6		
Nam	e:		Original	A - LPS III	B - LPS IV	4	5	6		
Zon	e 1:		Zl original	e Zl original e	Zl original e					
Zon	e 2:		22 original	g Z2 original o	Z2 original g					
Zon	e 3:		Z3 original	a						
Zon	e 4:		Z4 original	o						
Zon	e 5:		25 original	c Z5 original o	25 original c					
Zon	e 6:			Z3 sol. A						
Zon	e 7:			Z4 sol. A						
Zon	e 8:				Z3 sol. B					
Zon	e 9:				Z4 sol. B					

At the Zones tab, you have the parameters for all zones created for this Location, the same for the Services tab; here's the Zones table:

			Select to cop	y:		Copy]			
mes LPS Risk Zones S	Service Lines Costs	Compare data	Compare Charts							
		0	Clear	Update						
Zone:	1	2	3	4	5	6	7	8	9	^
Name:	Zl original e	Z2 original g	Z3 original a	Z4 original o	Z5 original c	Z3 sol. A	Z4 sol. A	Z3 sol. B	Z4 sol. B	
Iz	4	2	20	160	14	20	160	20	160	
Tz	8760	8760	8760	8760	8760	8760	8760	8760	8760	
Security measures	Structure not	Structure not	Structure not	Structure not	Structure not	Structure pro	Structure pro	Structure pro	Structure pro	
Ph	Turburganial		Tu du at ué a l	Tu du sta vi a 1 a	Tuducturini	Tuduatuisla	Tu du atu da 1 a	Tuducturini	Tuduatudala	
Taternal sustance	mish of our lo	vish of ownlo	nich of such	nich of ownlo	nich of ownlo	nich of ourle	nich of emle	nich of ownlo	rich of ownlo	
Two of surface:	Marble cerem	Maricultural	Acchelt line	Asphalt line	Asphalt line	Asphalt ling	Acoust line	Asphalt line	Asphalt line	
Provisions taken:	marbie, ceram	Agriculturar,	Aspinato, 1110	Aspinato, 1110	Aspharo, 11no	Aspinato, 1110	Aspinato, 1110	Aspharo, 11no	Aspinato, 1110	
Risk of fire / amount:	none	none	fire / high	fire / low	fire / low	fire / high	fire / low	fire / high	fire / low	
Special hazard:	no special ha	no special ha	Low level of	Low level of	Low level of	Low level of	Low level of	Low level of	Low level of	
Cultural value:	0	0	1000000	1000000	1000000	1000000	1000000	1000000	1000000	
Animals value:	0	0	0	0	0	0	0	0	0	
Building value:	0	0	0	0	0	0	0	0	0	
Content:	0	0	0	0	0	0	0	0	0	~

At the Compare data tab, a concise view of the costs for each Option; note the costs added: 200 for the Power line bonding, 150 for the Telecom line bonding, and 2000 for the fire extinguishing system for Zone Z3 B and Z4 B (4000 total):

lames	LPS	Risk	Zones	Service Lines Co	osts Compare dat	a Compare Charts	
			Selecione	as opções para comp	aração: 1 - Origina	al,2 - A - LPS III,3 · 💌	
Option	n:			1	2	3	
Name:	(Original	A - LPS III	B - LPS IV	
Ext LP	PS [\$]:			0,00	32414,00	23600,00	
measu	ures Servs	[\$]:		0,00	350,00	350,00	
measu	ires Zones	Zones [\$]: 0,00		0,00	4000,00		
total [:	tal [\$]: 0,00 :		32764,00	27950,00			
Risk ei	con R4:			0.0000F+0	0.0000F+0	0.0000F+0	
Cost la	oss [\$]:			0,00	0,00	0,00	
Resid	loss [\$]:			0,00	0,00	0,00	
Annua	al cost [\$]:	8		0,00	11467,40	9782,50	

Finally, on this chart we have the visual comparative between costs of solutions for both Options 2 (solution A) and 3 (solution B):



On this case, the economy of using LPS level IV instead of III gives a cheaper result for solution B, even with the added costs of the fire extinguishing system - of course, those are specific for the data used here, in other cases the cheaper solution could be another one - for example, here we used cable for the Down Conductors, if we had used rebars (or metallic columns), the cost for the "cables" would be zero. Atmos allows 6 Options for each Location, so we could have 3 more here for comparison - that's enough for even the most complex case, as if you add too many options, you'll lose too much time for small increases in cost reduction.

Please find on our site the PDF report generated by Atmos for this tutorial, or ask us at sales@voltsandbolts.com.