



PoE Calculator Instructions

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May 2015



Convincing cabling solutions

Excel Spreadsheet

- The Excel file contains two pages
 - «Calculator»: This is the active user interface (yellow fields for input)
 - «Presets»: Defines the values for the drop down choices (for changes the page protection has to be disabled)

Permanent Link length calculator:

PoE-Application: PoEP Power: 26 W Current: 0.300 A Wires: 4

Class: D Standard channel length: 109m

Connectors in Channel: 2

Total patchcord length: 10 m

Patchcord coefficient: 1.5

Max. cable temperature: 60 °C

Link segment no.	Cable type	Attenuation reserve of cable for app. Class	Installation cable diameter (mm)	Cable resistance (Ω/100m)	Theoretical max. PL length (m)	Ambient temperature (°C)	Cable bundle coefficient	Bundle thickness (mm)	Bundle width (mm)	Bundle size equivalent	Temp. increase inside bundle (°C)	Bundle environment coefficient	Temp. increase of bundle (°C)	Total temp. (ambient + increase) (°C)	Attenuation factor (% per °C)	Max. PL length (m)	Max. ambient temp. (°C)	Planned cabling segment length (m)	Normalized length (m)
1	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	100	200	589	4.80	0.20	6.4	41	0.2	90	49	0.0	0.0
2	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	50	100	136	1.11	0.40	6.2	37	0.2	91	53	0.0	0.0
3	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	20	50	29	0.24	1.00	7.1	37	0.2	91	53	0.0	0.0
*calculated link lengths >90m have to be limited to 90m to comply with standard requirements																			
Total * (m): 0.00																			
Length reserve (m): 94.0																			

Yellow fields can be modified

Trunk coefficient	Cable coefficient	Attenuation coefficient	Electrical length	Cable multiplier	Application	Class	Cable	Connectors	Patchcord
0.2	5	0.4	109	1	PoE	D	Special /u (AWG26)	2	1.2
0.4	3	0.2	104	1.05	PoEP	E	Cat5e/u (AWG24)	3	1.5
1	2.5			1.1	UPoE	EA	Cat6/u (AWG23)	4	
				1.15	POH	F	Cat6A/u (AWG23) WARP		
				4	4PPoE (55W)	FA	Cat6A/u (AWG23)		
				4	4PPoE (100W)		Cat6A/u Bundle (AWG23) WARP		
	Current per wire	No of wires	Power				Cat6A/u Bundle (AWG23)		
	0.175	4	15				Special /s (AWG26)		
	0.300	4	26				Cat5e/s (AWG24)		
	0.350	8	60				Cat6A/s, Cat7/s (AWG23)		
	0.440	8	100				Cat7A/s (AWG22)		
	0.325	8	55				Cat6A/s Bundle (AWG26)		
	0.500	8	100				Cat6A/s Bundle (AWG23)		

Diameter	Resistance	D	E	EA	F	FA	Attenuation	Cable coefficient
5.5	13.0	0.666	0.666	0.666	0.666	0.666	0.4	5
5.0	9.5	1	NA	NA	NA	NA	0.4	5
6.0	7.5	1.05	1	NA	NA	NA	0.4	5
7.2	9.5	1.1	1.05	1	NA	NA	0.4	5
9.0	9.5	1.1	1.05	1	NA	NA	0.4	5
7.2	10.5	1	0.95	0.9	NA	NA	0.4	5
6.0	13.0	0.666	0.666	0.666	0.666	0.666	0.2	3
5.0	9.5	1	NA	NA	NA	NA	0.2	3
7.5	7.5	1.1	1.05	1	1	NA	0.2	2.5
8.5	6.0	1.15	1.1	1.05	1	1	0.2	2.5
6.0	13.8	0.666	0.64	0.61	0.61	NA	0.2	2.5
7.5	8.0	1	0.95	0.9	0.9	NA	0.2	2.5
0.0	0.0	0	0	0	0	0	0	0

D	E	EA	F	FA
109	107	105	102	4
104	103	102	102	5
104	103	102	102	6
105	103	102	102	7
105	103	102	102	8

Basic setup

Permanent Link length calculator:

PoE Application: **PoEP** Power: **26 W** Current: **0.300 A** Wires: **4**

Class: **D** Standard channel length: **109 m**

Connectors in Channel: **2**

Total patchcord length: **10 m**

Patchcord coefficient: **1.5**

Max. cable temperature: **60 °C**

Link segment no.	Cable type	Attenuation reserve of cable for top Class (dB)	Insulation resistance (MΩ/100m)	Cable resistance (Ω/100m)	Theoret. max. PL length (m)	Ambient temperature (°C)	Cable bundle coefficient	Bundle thickness (mm)	Bundle width (mm)	Bundle size equivalent (mm)	Temp. increase of bundle (°C)	Bundle loss coefficient	Temp. increase of bundle (°C)	Total temp. (ambiant + increase) (°C)	Attenuation (dB per 100m)	Max. PL length* (m)	Max. ambiant temp. (°C)	Planned cabling length (m)	Normalized length (m)				
1	Cat5eS (AWG24)	1.00	5	9.5	94.0	30	3.00	100	200	589	4.80	0.20	6.4	41	0.2	90	49	0.0	0.0				
2	Cat5eS (AWG24)	1.00	5	9.5	94.0	30	3.00	50	100	136	1.11	0.40	6.2	37	0.2	91	53	0.0	0.0				
3	Cat5eS (AWG24)	1.00	5	9.5	94.0	30	3.00	20	50	29	0.24	1.00	7.1	37	0.2	91	53	0.0	0.0				
														Total* (m)									
														Length reserve (m)									

*calculated link lengths >90m have to be limited to 90m to comply with standard requirements

Yellow fields can be modified

- Application:
- PoE
 - PoEP
 - UPoE
 - POH
 - 4PPoE (55W)
 - 4PPoE (100W)

Permanent Link length calculator:

PoE-Application: **PoEP** Power: **26 W** Current: **0.300 A** Wires: **4**

Class: **D** Standard channel length: **109 m**

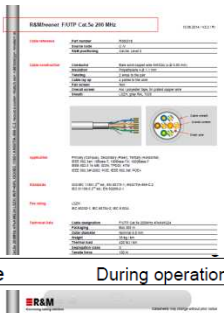
Connectors in Channel: **2**

Total patchcord length: **10 m**

Patchcord coefficient: **1.5**

Max. cable temperature: **60 °C**

Cable data sheet



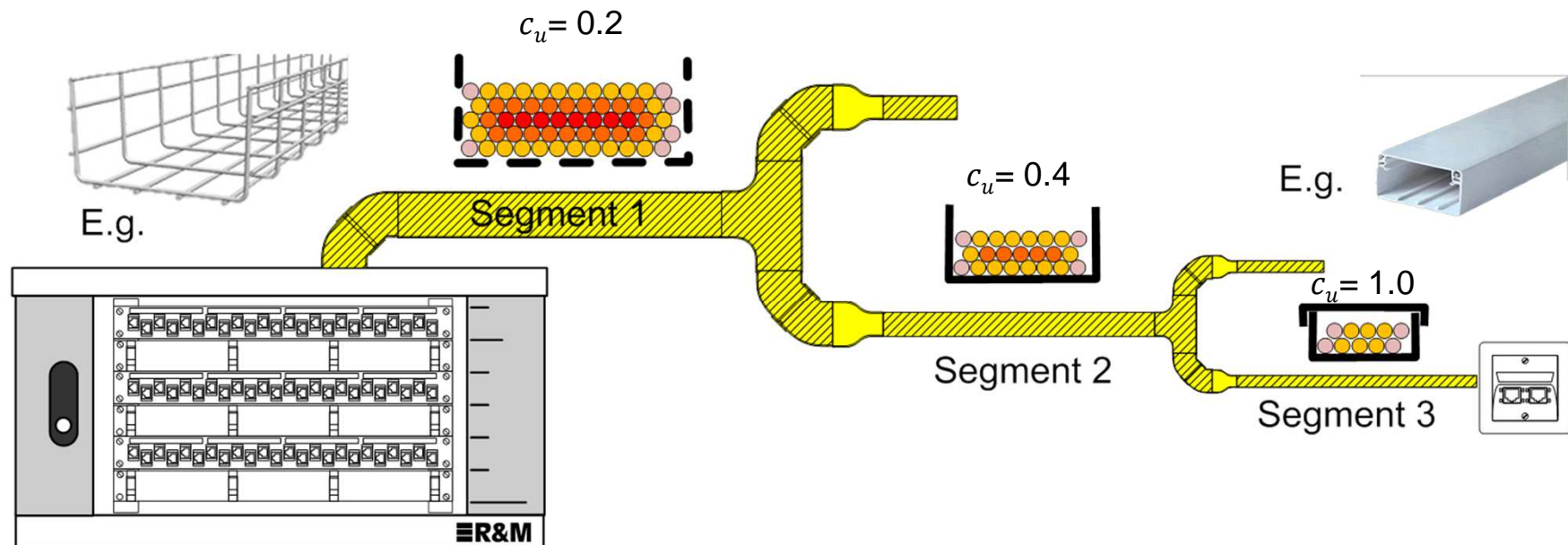
Temperature range During operation **-20°C...+ 60°C**

Implementation equation

Model	Figure	Class D	Class E and E _A	Class F and F _A
Interconnect - TO	12a	$H = 109 - FX$	$H = 107 - 3^a - FX$	$H = 107 - 2^a - FX$
Cross-connect - TO	12b	$H = 107 - FX$	$H = 106 - 3^a - FX$	$H = 106 - 2^a - FX$
Interconnect - CP -TO	12c	$H = 107 - FX - CY$	$H = 106 - 3^a - FX - CY$	$H = 106 - 2^a - FX - CY$
Cross-connect - CP - TO	12d	$H = 105 - FX - CY$	$H = 105 - 3^a - FX - CY$	$H = 105 - 2^a - FX - CY$

Segment definition

- In order to simulate real world conditions, three different segments are specified
- Each segment has to be defined separately (environmental / installation conditions)



Segment definition

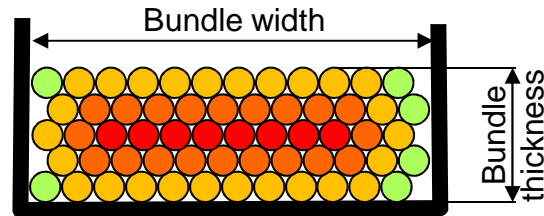
Permanent Link length calculator:

Power: 26 W Current: 0.300 A Wires: 4
 Class: D Standard channel length: 109 m
 Total patchcord length: 10 m
 Patchcord coefficient: 1.5
 Max. cable temperature: 60 °C

Link segment no.	Cable type	Attenuation reserve of cable for app. Class	Installation cable diameter (mm)	Cable resistance (Ω/100m)	Theoretical max. PL length (m)	Ambient temperature (°C)	Cable bundle coefficient	Bundle thickness (mm)	Bundle width (mm)	Bundle size equivalent	Temp. increase inside bundle (°C)	Bundle environment coefficient	Temp. Increase of bundle (°C)	Total temp. (ambient + increase) (°C)	Attenuation factor (% pro °C)	Max. PL length * (m)	Max. ambient temp. (°C)	Planned cabling length (m)	Normalized length (m)
1	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	100	200	589	4.80	0.20	6.4	41	0.2	90	49	0.0	0.0
2	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	50	100	136	1.11	0.40	6.2	37	0.2	91	53	0.0	0.0
3	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	20	50	29	0.24	1.00	7.1	37	0.2	91	53	0.0	0.0

*calculated link lengths >90m have to be limited to 90m to comply with standard requirements
 Length reserve (m): 94.0
 Yellow fields can be modified

- Cable selection:
- Special /u (AWG26)
 - Cat5e/u (AWG24)
 - Cat6/u (AWG23)
 - Cat6A/u (AWG23) WARP
 - Cat6A/u (AWG23)
 - Cat6A/u Bundle (AWG23) WARP
 - Special /s (AWG26)
 - Cat5e/s (AWG24)
 - Cat6A/s; Cat7/s (AWG23)
 - Cat7A/s (AWG22)
 - Cat6A/s Bundle (AWG26)
 - Cat6A/s Bundle (AWG23)



Calculated maximum wire temperature: ambient + increase

Calculated bundle size with equivalent thermal properties

Calculated maximum permanent link length

Link segment no.	Cable type	Attenuation reserve of cable for app. Class	Installation cable diameter (mm)	Cable resistance (Ω/100m)	Theoretical max. PL length (m)	Ambient temperature (°C)	Cable bundle coefficient	Bundle thickness (mm)	Bundle width (mm)	Bundle size equivalent	Temp. increase inside bundle (°C)	Bundle environment coefficient	Temp. Increase of bundle (°C)	Total temp. (ambient + increase) (°C)	Attenuation factor (% pro °C)	Max. PL length * (m)	Max. ambient temp. (°C)
1	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	100	200	589	4.80	0.20	6.4	41	0.2	90	49
2	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	50	100	136	1.11	0.40	6.2	37	0.2	91	53
3	Cat5e/s (AWG24)	1.00	5	9.5	94.0	30	3.00	20	50	29	0.24	1.00	7.1	37	0.2	91	53

Cat.6_A / Cat.5e: 110%
 Cat.7_A / Cat.5e: 115%
 Cat.7_A / Cat.6_A: 105%

Ambient temperature in the cabling pathway during the hottest time of the year

To be standardized:
 Open Pathway: 0.2
 Closed Trunk: 0.4
 Insulated Trunk: 1.0



Segment planning

Permanent Link length calculator:

Power: 26 W Current: 0.300 A Wires: 4
 Standard channel length: 109 m

Link segment no.	Cable type	Attenuation reserve of cable for temp. class (dBm)	Installation reserve of cable (dBm)	Cable resistance (Ω/100m)	Theoretical max. PL length (m)	Ambient temperature (°C)	Cable bundle coefficient	Bundle thickness (mm)	Bundle width (mm)	Bundle size equivalent	Temp. increase inside bundle (°C)	Bundle unconsentment coefficient	Temp. increase (°C)	Total temp. increase (°C)	Attenuation factor (% pro °C)	Max. PL length * (m)	Max. ambient temp. (°C)	Planned cabling segment length (m)	Normalized length (m)
1	CableS (AWG24)	1.00	5	9.5	94.0	30	3.00	100	200	589	4.80	0.20	6.4	41	0.2	90	49	30.0	31.3
2	CableS (AWG24)	1.00	5	9.5	94.0	30	3.00	50	100	136	1.11	0.40	6.2	37	0.2	91	53	40.0	41.4
3	CableS (AWG24)	1.00	5	9.5	94.0	30	3.00	20	40	29	0.24	1.00	7.1	37	0.2	91	53	20.0	20.7
*calculated link lengths >90m have to be limited to 90m to comply with standard requirements																			
Length reserve (m): 0.5																			

Remaining maximum link length after planned previous segment lengths

Maximum allowable ambient temperature to comply with the cable operating temperature

Planned maximum segment lengths that are valid for the entire project / installation


Attenuation faktor (% pro °C)	Max. PL length * (m)	Max. ambient temp. (°C)	Planned cabling segment length (m)	Normalized length (m)
0.2	90	49	30.0	31.3
0.2	61	53	40.0	41.4
0.2	21	53	20.0	20.7
Total * (m):			90.00	
Length reserve (m):			0.5	

Total planned permanent link length

Lengths reserve for planned segments lengths. Positive values are good, negative values need a change in the setup

Calculated electrical length for this segment under standardized conditions

Best practice

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T				
Permanent Link length calculator:																 R&M Convincing cabling solutions							
PoE-Application:	PoEP -	Power:	26 W	Current:	0.300 A	Wires:	4																
Class:	D																						
Connectors in Channel	2																						
Total patchcord length:	10 m																						
Patchcord coefficient:	1.5																						
Max. cable temperature:	60 °C																						
Link segment no.	Cable type	Attenuation reserve of cable for app. Class	Installation cable diameter (mm)	Cable resistance (Ω/100m)	Theoretical max. PL length (m)	Ambient temperature (°C)	Cable bundle coefficient	Bundle thickness (mm)	Bundle width (mm)	Bundle size equivalent	Temp. increase inside bundle (°C)	Bundle environment coefficient	Temp. increase of bundle (°C)	Total temp. (ambient + increase) (°C)	Attenuation faktor (% pro °C)	Max. PL length * (m)	Max. ambient temp. (°C)	Planned cabling segment length (m)	Normalized length (m)				
11	1	Cat5eS (AWG24)	1.00	5	9.5	94.0	30	3.00	100	200	589	4.80	0.20	6.4	41	0.2	90	49	0.0	0.0			
12	2	Cat5eS (AWG24)	1.00	5	9.5	94.0	30	3.00	50	100	136	1.11	0.40	2	37	0.2	91	53	0.0	0.0			
13	3	Cat5eS (AWG24)	1.00	5	9.5	94.0	30	3.00	20	50	29	0.24	1.00	7.1	37	0.2	91	53	0.0	0.0			
																Total * (m):				0.00			
*calculated link lengths >90m have to be limited to 90m to comply with standard requirements																Length reserve (m):				94.0			
Yellow fields can be modified																							

1. Define application and cabling model (building cabling specification)
2. Define particularities of each segment as necessary (installation conditions)
3. Define planning length of segments for the project. Adjust until reserve is green.
4. Repeat as necessary (different application, installation conditions, etc.)

Thank you!

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