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Appendix B - Sizing and Calculation Methods

Revit MEP automatically calculates sizing information and selects ductwork, piping and wire sizes for the systems created in a project. The following topics provide tables and methods used for calculating size requirements and selecting wire, ducts, and pipe for systems.

Wire Sizing

Revit MEP calculates the wire sizes for power circuits, based on the size specified for circuit protection, voltage drop calculation, and correction factor. Wire sizes are automatically sized to maintain a voltage drop of less than 3 percent for branch circuits, and 2 percent for feeder circuits at the outlet furthest from the source. That is, the load determines the circuit over-current protection (circuit rating) required, which when specified, then determines the wire sizes required for hot conductors, neutral conductors and ground conductors.

Wire Sizing Examples

In this example the following wire type settings are specified for two circuits created in the project, carried in steel conduit.

Material	Temperature Rating	Insulation	Max Size	Neutral Multiplier	Neutral Required	Neutral Size	Conduit Type
Copper	90 C	THHN	500 MCM	1.5	Yes	Hot Conductor	Steel
Copper	75 C	THWN	500 MCM	1.0	Yes	Hot Conductor	Steel

Feeder Circuit 1

Circuit	Power Factor	Voltage	Load	Poles	Rating	Wire Type	Ambient Temperature	Length of the Wiring Run
Feeder	1.0	240 V	12 kVA	2	50A	THHN	80 F	100 ft.

1. Basic sizing for the hot conductor size is determined by the circuit rating (50A) and wire type (THHN, Copper, 90C). The basic wire size table on page 8, without considering the ambient temperature, calls for 2-#8 hot conductors for circuit 1.
2. The neutral conductor is sized as 1.5 times the cross sectional area of the hot conductors. A 300MCM conductor has a cross sectional area of 0.0129686799 sq. in. Applying the 1.5 multiplier (1.5 * 0.0129686799 = 0.01945301985 sq. in.), The basic wire size table calls for a #6 wire (area of 0.0206119720 sq. in.), which provides the minimum area that will satisfy the neutral conductor requirement. The Neutral conductor is sized as 1-#6.
3. The ground conductor size table for a 50A copper conductor, calls for a #10 ground conductor (#10 is adequate for up to 60A).

   Preliminary sizing for the wiring package for circuit 1 is 2-#8, 1-#6, and 1-#10. However, the sizing must consider the correction factor (based on the ambient temperature) and support less than a 2 percent voltage drop at the furthest fixture from the source.
4. Assuming the #8 hot conductors at an ambient temperature of 80 degrees Fahrenheit (correction factor on page 9 =1), the voltage drop calculation is (VD = (L * R * I)/1000:
   - Length (L) = 100 ft.
   - Impedance (R) = 1.148 from Wire Impedance Factors on page 3 table for #8 in steel conduit at 80 degrees.
   - Load (I) = 50A

   VD = (100 ft. *1.148 * 50A) = 5.74 V

   5.74/240 = 0.0239166 = 2.39166% which exceeds the 2 percent allowable voltage drop.
5. Assume #6 hot conductors (wiring package is adjusted to 2-#6, 1-#6, and 1-#10) and calculate the voltage drop again.

   VD = (100 ft. * 0.745 * 50A)/1000 = 3.725V

   3.725/240 = 0.0155208 = 1.55208% within the 2 percent allowable voltage drop.
6. The neutral conductor is sized, 1.5 * 0.020611972 = 0.030917958 sq. in. The basic wire size table calls for a #3 wire (area of 0.0413310408 sq. in.), which provides the minimum area that will satisfy the adjusted neutral conductor requirement. The Neutral conductor is resized as 1-#4.
7. The ground conductor must be changed in proportion to the change in the hot conductors:
   - Cross sectional area of #8 = 0.029686799 sq. in.
   - Cross sectional area of #6 = 0.0206119720 sq. in.
   - Ratio = 1.5893
   - 1.5893 * 0.0081552613 sq. in. = 0.01296115 sq. in. The ground conductor must be resized to #8.

   The wiring package is adjusted to 2-#6, 1-#4, 1#8.

Feeder Circuit 2

Circuit	Power Factor	Voltage	Load	Poles	Rating	Wire Type	Ambient Temperature	Length of the Wiring Run
Branch	0.85	240 V	24 kVA	3	125A	THHN	80 F	150 ft.

1. Basic sizing for the hot conductors is determined by the circuit rating (125A) and wire type (THHN, Copper, 90 C). The basic wire size table calls for #2 hot conductors.

2. The neutral conductor is sized as 1.5 times the cross sectional area of the hot conductors (1.5 * 0.0521172118 sq. in. = 0.0781758177 sq. in.).

   The neutral conductor is sized as 1- 1/0 (0.0829065680 sq. in.).

3. The ground conductor size table for a 125A copper conductor, calls for a #6 ground conductor.

   Before considering voltage drop and ambient temperature, the wiring package consists of 3-#2, 1-1/0, and 1-#6.

4. The voltage drop calculation is (VD = (L * R * I)/1000:
   - VD = (150 ft. * 0.388 * 100A)/1000 = 5.82V
   - 5.82/240 = 0.02425 = 2.425% greater than the 2% allowable voltage drop.

   Working in reverse from the 2 percent allowable voltage drop and solving for impedance:

5. 240V * 0.02 = 4.8V = maximum allowable voltage drop

6. 4.8V = (150ft. * R * 100A)/1000

7. R = (150ft. * 100A)/1000 * 4.8 = 0.32 which is approximately the impedance factor for #1 wire in steel conduit, in a 3-phase circuit.

   The hot conductors are resized as 3-#1.

8. The neutral conductor is resized to #4 wire. (1.5 * 0.0206119720 sq. in. = 0.030917958 sq. in.)

9. The #6 ground conductor (0.0206119720 sq. in.) must be changed in proportion to the change in the hot conductors:
   - Cross sectional area of original #2 hot conductor = 0.0521172118 sq. in.
   - Cross sectional area of new #1 hot conductor = 0.0657664432 sq. in.
   - Ratio = 1.26
   - 1.26 * 0.0206119720 sq. in. = 0.02597108472 sq. in. = #4 wire
     The ground conductor is resized to #4 wire.

   The wiring package is adjusted to 3-#1, 1-#4, 1#4.

Wire Impedance Factors

Revit MEP uses the following tables to calculate voltage drop based on conductor impedance factors (in Ohms) per thousand feet for the specified wire type.

Conduit	Wire Size	Single Phase					Three Phase				
Ambient Temperature (F) ->		**100**	**90**	**80**	**70**	**60**	**100**	**90**	**80**	**70**	**60**
Steel	14	5.369	4.887	3.371	3.848	3.322	6.2	5.643	5.047	4.444	3.836
	12	3.464	3.169	2.841	2.508	2.172	4	3.659	3.281	2.897	2.508
	10	2.078	1.918	1.728	1.532	1.334	2.4	2.214	1.995	1.769	1.54
	8	1.35	1.264	1.148	1.026	0.9	1.56	1.46	1.326	1.184	1.04
	6	0.848	0.812	0.745	0.673	0.597	0.98	0.937	0.86	0.777	0.69
	4	0.536	0.528	0.491	0.45	0.405	0.62	0.61	0.568	0.519	0.468

Conduit	Wire Size	Single Phase					Three Phase				
Ambient Temperature (F) ->		**100**	**90**	**80**	**70**	**60**	**100**	**90**	**80**	**70**	**60**
	3	0.433	0.434	0.407	0.376	0.341	0.5	0.501	0.47	0.434	0.394
	2	0.346	0.354	0.336	0.312	0.286	0.4	0.409	0.388	0.361	0.331
	1	0.277	0.292	0.28	0.264	0.245	0.32	0.337	0.324	0.305	0.283
	1/0	0.207	0.228	0.223	0.213	0.2	0.24	0.263	0.258	0.246	0.232
	2/0	0.173	0.196	0.194	0.188	0.178	0.2	0.227	0.224	0.217	0.206
	3/0	0.136	0.162	0.163	0.16	0.154	0.158	0.187	0.188	0.184	0.178
	4/0	0.109	0.136	0.14	0.139	0.136	0.126	0.157	0.162	0.161	0.157
	250	0.093	0.132	0.128	0.129	0.128	0.108	0.142	0.148	0.149	0.148
	300	0.077	0.108	0.115	0.117	0.117	0.09	0.125	0.133	0.135	0.135
	350	0.067	0.098	0.106	0.109	0.109	0.078	0.113	0.122	0.126	0126
	400	0.06	0.091	0.099	0.103	0.104	0.07	0.105	0.114	0.118	0.12
	500	0.05	0.081	0.09	0.094	0.096	0.058	0.094	0.104	0.109	0.111
	600	0.043	0.075	0.084	0.089	0.092	0.05	0.086	0.097	0.103	0.106
	750	0.036	0.068	0.078	0.084	0.088	0.042	0.079	0.091	0.097	0.102
	1000	0.031	0.062	0.072	0.078	0.082	0.036	0.072	0.084	0.09	0.095
Non-Magnetic	14	5.369	5.876	4.355	3.83	3.301	6.2	5.63	5.029	4.422	3.812
	12	3.464	3.158	2.827	2.491	2.153	4	3.647	3.264	2.877	2.486
	10	2.078	1.908	1.714	1.516	1.316	2.4	2.203	1.98	1.751	1.52
	8	1.35	1.255	1.134	1.01	0.882	1.56	1.449	1.31	1.166	1.019
	6	0.848	0.802	0.731	0.657	0.579	0.98	0.926	0.845	0.758	0.669
	4	0.536	0.519	0.479	0.435	0.388	0.62	0.599	0.553	0.502	0.448
	3	0.433	0.425	0.395	0.361	0.324	0.5	0.49	0.456	0.417	375
	2	0.329	0.33	0.31	0.286	0.259	0.38	0.381	0.358	0.33	0.3
	1	0.259	0.268	0.255	0.238	0.219	0.3	0.31	0.295	0.275	0.253
	1/0	0.207	0.22	0.212	0.199	0.185	0.24	0.254	0.244	0.23	0.214
	2/0	0.173	0.188	0.183	0.174	0.163	0.2	0.217	0.211	0.201	0.188

Conduit	Wire Size	Single Phase					Three Phase				
Ambient Temperature (F) ->		**100**	**90**	**80**	**70**	**60**	**100**	**90**	**80**	**70**	**60**
	3/0	0.133	0.151	0.15	0.145	0.138	0.154	0.175	0.173	0.167	0.159
	4/0	0.107	0.127	0.128	0.125	0.121	0.124	0.147	0.148	0.145	0.14
	250	0.09	0.112	0.114	0.113	0.11	0.104	0.129	0.132	0.131	0.128
	300	0.076	0.099	0.103	0.104	0.102	0.088	0.114	0.119	0.131	0.128
	350	0.065	0.089	0.094	0.095	0.094	0.076	0.103	0.108	0.11	0.109
	400	0.057	0.081	0.087	0.089	0.089	0.066	0.094	0.1	0.103	0.103
	500	0.046	0.071	0.077	0.08	0.082	0.054	0.082	0.09	0.093	0.094
	600	0.039	0.065	0.072	0.076	0.077	0.046	0.075	0.083	0.087	0.09
	750	0.032	0.058	0.065	0.07	0.072	0.038	0.067	0.076	0.08	0.083
	1000	0.025	0.051	0.059	0.063	0.066	0.03	0.059	0.068	0.073	0.077

Conduit	Wire Size	Single Phase					Three Phase				
Ambient Temperature ->		**100**	**90**	**80**	**70**	**60**	**100**	**90**	**80**	**70**	**60**
Steel	12	5.542	5.039	4.504	3.963	3.419	6.4	5.819	5/201	4.577	3.948
	10	3.464	3.165	2.836	2.502	2.165	0.4	3.654	3.275	2.889	2.55
	8	2.251	2.075	1.868	1.656	1.441	2.6	2.396	2.158	1.912	1.663
	6	1.402	1.31	1.188	1.061	0.93	1.62	1.513	1.372	1.225	1.074
	4	0.883	0.84	0.769	0.692	0.613	1.02	0.97	0.888	0.799	0.708
	3	0.692	0.668	0.625	0.557	0.497	0.8	0.771	0.71	0.644	0.574
	2	0.554	0.541	0.502	0.458	0.411	0.64	0.625	0.58	0.529	0.475
	1	0.433	0.432	0.405	0.373	0.338	0.5	0.499	0.468	0.431	0.391
	1/0	0.346	0.353	0.334	0.31	0.284	0.4	0.407	0.386	0.358	0.328
	2/0	0.277	0.29	0.277	0.26	0.241	0.32	0.335	0.32	0.301	0.278
	3/0	0.225	0.241	0.234	0.221	0.207	0.26	0.279	0.27	0.256	0.239
	4/0	0.173	0.194	0.191	0.184	0.174	0.2	0.224	0.221	0.212	0.201
	250	0.148	0.173	0.173	0.168	0.161	0.172	0.2	0.2	0.194	0.186
	300	0.124	0.15	0.152	0.15	0.145	0.144	0.174	0.176	0.173	0.168

Conduit	Wire Size	Single Phase					Three Phase				
Ambient Temperature ->		**100**	**90**	**80**	**70**	**60**	**100**	**90**	**80**	**70**	**60**
	350	0.109	0.135	0.139	0.138	0.134	0.126	0.156	0.16	0.159	0.155
	400	0.095	0.122	1.127	0.127	0.125	0.11	0.141	0.146	0.146	0.144
	500	0.077	0.106	0.112	0.113	0.113	0.09	0.122	0.129	0.131	0.13
	600	0.065	0.095	0.102	0.105	0.106	0.076	0.11	0.118	0.121	0.122
	750	0.053	0.084	0.092	0.096	0.098	0.062	0.097	0.107	0.111	0.114
	1000	0.043	0.072	0.082	0.087	0.086	0.005	0.085	0.095	0.1	0.103
Non-Magnetic	12	5.542	5.029	4.49	3.946	3.4	6.4	5.807	5.184	4.557	3.948
	10	3.464	3.155	2.823	2.486	2.147	4	3.643	3.26	2.871	2.48
	8	2.251	2.065	1.855	1.64	1.423	2.6	2.385	2.142	1.894	1.643
	6	1.402	1.301	1.175	1.045	0.912	1.62	1.502	1.357	1.206	1.053
	4	0.883	0.831	0.756	0.677	0.596	1.02	0.959	0.873	0.782	0.688
	3	0.692	0.659	0.603	0.543	0.48	0.8	0.76	0.696	0.6274	0.555
	2	0.554	0.532	0.49	0.443	0.394	0.64	0.615	0.566	0.512	0.456
	1	0.433	0.424	0.394	0.36	0.232	0.5	0.49	0.455	0.415	0.373
	1/0	0.346	0.344	0.322	0.296	0.268	0.4	0.398	0.372	0.342	0.31
	2/0	0.277	0.281	0.266	0.247	0.225	0.32	0.325	0.307	0.285	0.26
	3/0	0.225	0.234	0.223	0.209	0.193	0.26	0.27	0.258	0.241	0.223
	4/0	0.173	0.186	0.181	0.171	0.16	0.2	0.215	0.209	0.198	0.185
	250	0.47	0.163	0.16	0.153	0.145	0.17	0.188	0.185	0.177	0.167
	300	0.122	0.141	0.14	0.136	0.13	0.142	0.163	0.162	0.157	0.15
	350	0.105	0.125	0.125	0.123	0.118	0.122	0.144	0.145	0.142	0.137
	400	0.093	0.114	0.116	0.114	0.111	0.108	0.132	0.134	0.132	0.128
	500	0.074	0.096	0.1	0.1	0.098	0.086	0.111	0.115	0.115	0.114
	600	0.062	0.085	0.09	0.091	0.091	0.072	0.098	0.104	0.106	0.105
	750	0.05	0.073	0.079	0.082	0.082	0.058	0.085	0.092	0.094	0.095
	1000	0.039	0.063	0.07	0.073	0.075	0.046	0.073	0.081	0.085	0.086

Conduit	Wire Size	Single Phase					Three Phase				
Ambient Temperature ->		**100**	**90**	**80**	**70**	**60**	**100**	**90**	**80**	**70**	**60**

Wire Types

The wire types table lists wire types that are provided with Revit Architecture.

Copper			Aluminum		
60 C	75 C	90 C	60 C	75 C	90 C
TW	FEPW	TA	TW	RH	TA
UF	RH	TBS	UF	RHW	TBS
	RHW	SA		THHW	SA
	THHW	SIS		THW	SIS
	THW	FEP		THWN	THHN
	THWN	FEPB		XHHW	THHW
	USE	MI		USE	THW-2
	ZW	RHH			THWN-2
		RHW-2			RHH
		THHN			RHW-2
		THHW			USE-2
		THW-2			XHH
		THWN-2			XHHW-2
		USE-2			ZW-2
		XHH			
		XHHW			
		XHHW-2			
		ZW-2			

Wire Sizes

Revit MEP specifies hot wire sizes according to the following table of basic wire sizes.

Copper				Aluminum			
Size	Temperature Rating			Temperature Rating			Size
	60 C	75 C	90 C	60 C	75 C	90 C	
	TW, UF	FEPW, RH, RHW, THHW, THW, THWN, USE, ZW	TA, TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW	TW, UF	FEPW, RH, RHW, THHW, THW, THWN, USE, ZW	TA, TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW	
18	--	--	14	--	--	--	18
16	--	--	18	--	--	--	16
14	15	15	15	--	--	--	14
12	20	20	20	15	15	15	12
10	30	30	30	25	25	30	10
8	40	50	55	30	40	45	8
6	55	65	75	40	50	60	6
4	70	85	95	55	65	75	4
3	85	110	110	65	75	85	3
2	95	115	130	75	90	100	2
1	110	130	150	85	100	115	1
0	125	150	170	100	120	135	0
00	145	175	195	115	135	150	00
000	165	200	225	130	155	175	000
0000	195	230	260	150	180	205	0000
250	215	255	290	170	205	230	250
300	240	285	320	190	230	255	300
350	260	310	350	210	250	280	350
400	280	335	380	225	270	305	400
500	320	380	430	260	310	350	500
600	355	420	475	285	340	385	600

Copper				Aluminum			
Size	Temperature Rating			Temperature Rating			Size
	60 C	75 C	90 C	60 C	75 C	90 C	
	TW, UF	FEPW, RH, RHW, THHW, THW, THWN, USE, ZW	TA, TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW	TW, UF	FEPW, RH, RHW, THHW, THW, THWN, USE, ZW	TA, TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW	
700	385	460	520	310	375	420	700
750	400	475	535	320	385	435	750
800	410	490	555	330	395	450	800
900	435	520	585	355	425	480	900
1000	455	545	615	375	445	500	1000
1250	495	590	665	405	485	545	1250
1500	520	625	705	435	520	585	1500
1750	545	650	735	455	545	615	1750
2000	560	665	750	470	560	630	2000

Wire Sizing Correction Factors

The circuit rating is adjusted according to the correction factor (circuit rating * correction factor), then using the selected wire type, the correct size is found in the basic wire size table.

Ambient Temperature C	Ambient Temperature F	60 C	75 C	90 C
21-25	70-77	1.08	1.05	1.04
26-30	78-86	1	1	1
31-35	87-95	0.91	0.94	0.96
36-40	96-104	0.82	0.88	0.91
41-45	105-113	0.71	0.82	0.87
46-50	114-122	0.58	0.75	0.82
51-55	123-132	0.41	0.67	0.76
56-60	132-140	--	0.58	0.71
61-70	141-158	--	0.33	0.58
71-80	159-176	--	--	0.41

Ground Wire Sizing

Ground conductors are sized according to the circuit rating.

Size	Copper	Aluminum	Size	Copper	Aluminum
14	15	--	250	2000	1200
12	20	15	300	2000	1200
10	60	20	350	2500	1600
8	100	60	400	3000	2000
6	200	100	500	4000	2000
4	300	200	600	5000	3000
3	400	200	700	5000	3000
2	500	300	750	5000	3000
1	600	400	800	6000	4000
1/0	800	500	900	6000	4000
2/0	1000	600	1000	6000	4000
3/0	1200	800	1250	6000	5000
4/0	1600	1000			

Neutral Wire Sizing

When a Neutral Multiplier specified, Revit MEP calculates the neutral conductor size based on the cross sections listed in the following table:

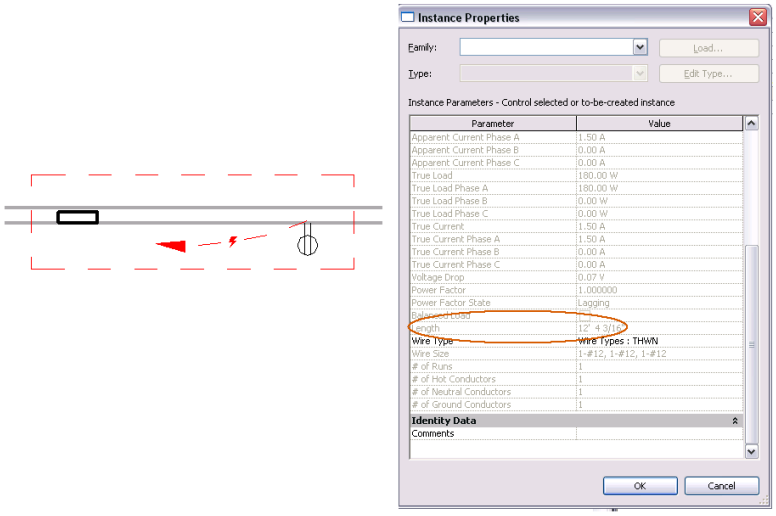
Size (AWG/kcmil)	Diameter (in.)	Area (sq. in.)	Size (AWG/kcmil)	Diameter (in.)	Area (sq. in.)
14	0.064080	0.0032250357	300	0.5477226	0.2356194490
12	0.080810	0.0015288468	350	0.5916079	0.2748893572
10	0.101900	0.0081552613	400	0.6324555	0.3141592653
8	0.128500	0.0129686799	500	0.7071068	0.3929660816
6	0.162000	0.0206119720	600	0.7745967	0.4712388980
4	0.204300	0.0327813057	700	0.8366600	0.5497787144
3	0.229400	0.0413310408	750	0.8660254	0.5890486225
2	0.257600	0.0521172118	800	0.8944271	0.6283185307
1	0.289300	0.0657664432	900	0.9486833	0.7068583471

Size (AWG/kcmil)	Diameter (in.)	Area (sq. in.)	Size (AWG/kcmil)	Diameter (in.)	Area (sq. in.)
0	0.324900	0.0829065680	1000	1	0.785398163
00	0.364800	0.1045199453	1250	1.118034	0.981747704
000	0.409600	0.1317678350	1500	1.224745	1.178097245
0000	0.460000	0.1661901110	1750	1.322876	1.374446786
250	0.5	0.19634954085	2000	1.414214	1.570796327

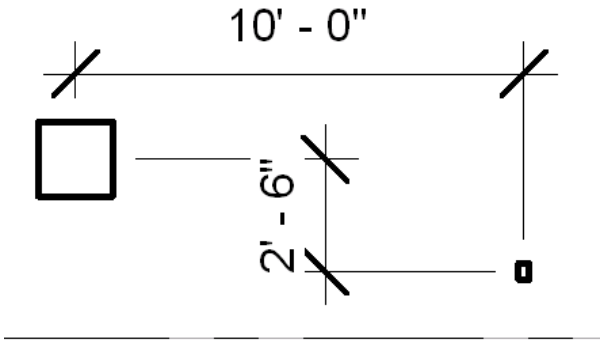
Wire Length Calculation

The overall length of wiring in a circuit is calculated as the Length parameter in the Circuit Properties dialog. The Length is computed as the sum of the distances along the X, Y, and Z axes.

In the following simple example, the length is calculated as 12' 4 3/16".

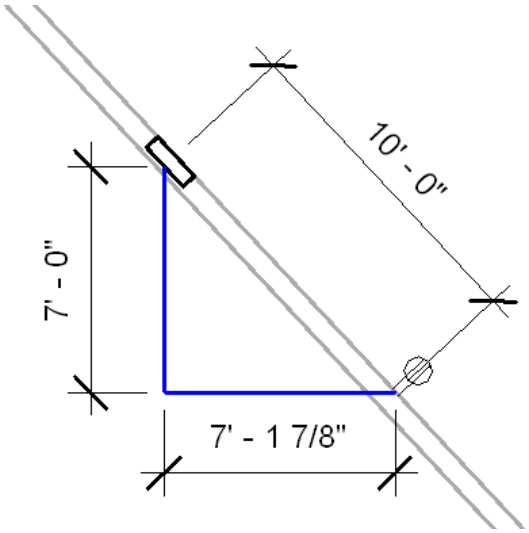


The distance between the receptacle and the panel along the X axis is 10'. However, the panel and the receptacle are at different elevations. The panel is at 4' 0" and the receptacle is at 1' 6", a difference of 2' 6" along the Z axis.



The sum of distances along the X, Y, and Z axes is 12' 6", very close to the 12' 5 9/16" shown for length in the circuit properties. The small difference can be accounted for as the distance to the connector within the components and the measurements that were done to the center of each component.

In the previous example, the calculation is straightforward because the geometry of the circuit is aligned parallel to the X, Y, and Z axes. In the following example, the distance between the panel and receptacle is still 10', however, the length is still calculated as the sum of the distances along the X, Y, and Z axes.



The length is along the X, Y, Z axes is 7' 0" + 7' 1 7/8" + 2' 6" = 16' 7 7/8" and the computed length shown in the circuit properties is 16' 6 13/256".

Lighting Calculations

Lighting calculations in Revit MEP are based on the Lumen Method (not a point-by-point method). The Lumen Method is also known as the Zonal Cavity method.

Average Estimated Illumination is defined as:

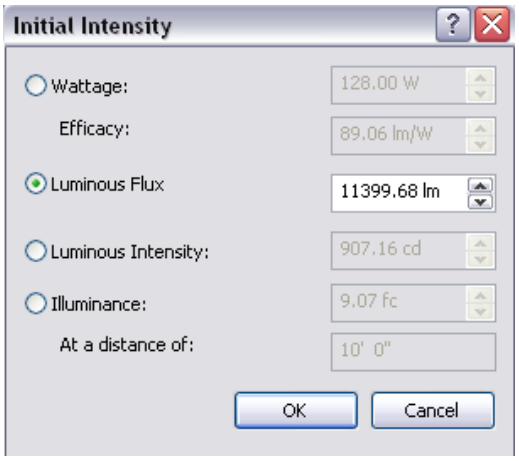
$$\sum_{i=1}^{n} A(i)/\text{Area}$$

- i = each individual luminaire.
- n = the total number of luminaires in the space.

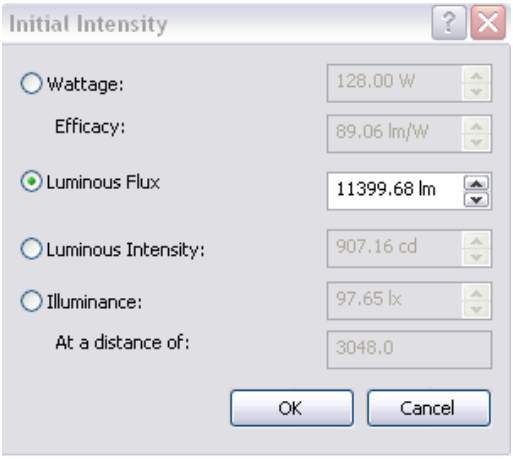
A luminaire refers to a complete lighting unit. A(i) is calculated for each luminaire as follows:

- Lumens per Luminaire * Light Loss Factor * Ballast Factor * Coefficient of Utilization

Lumens per Luminaire are as specified in the Luminous Flux parameter for each fixture type.

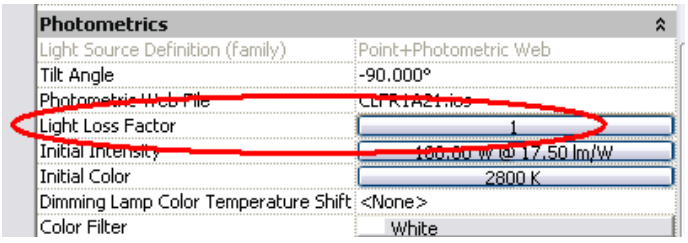


Luminous Flux parameter

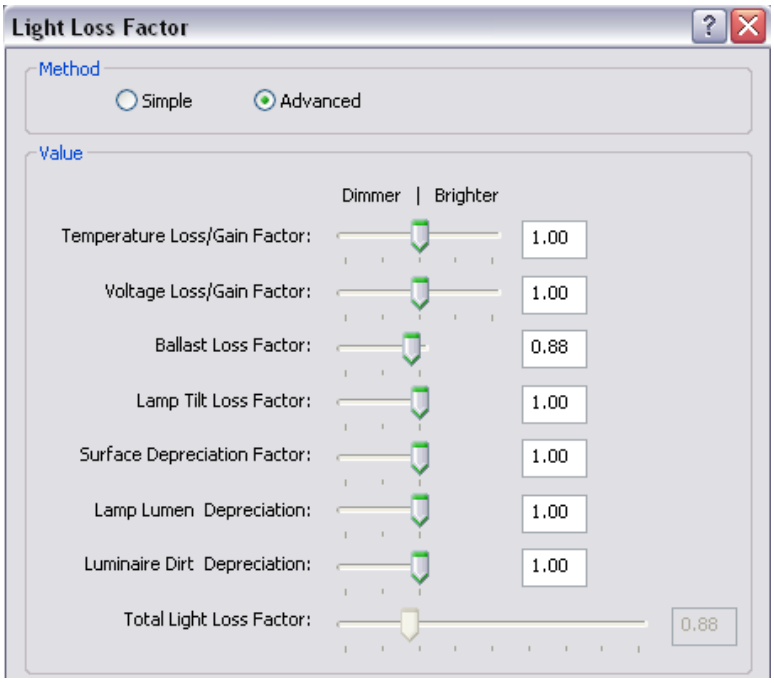


Luminous Flux parameter

Light Loss Factor is as specified in the Light Loss Factor parameter for each fixture type.



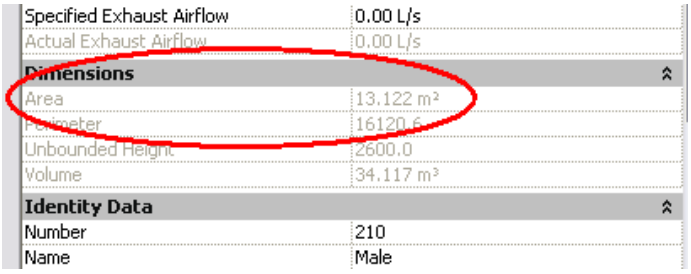
Lighting Fixture Type Parameters - Light Loss Factor



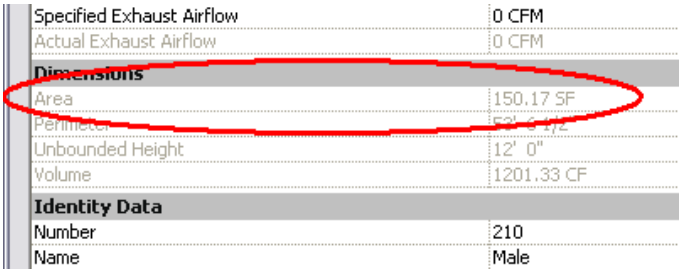
Settings used to calculate Light Loss Factor

Ballast Factor is as specified in the Ballast Loss Factor parameter for each fixture type.

Area is based on the Area of the space in which the Luminaire is placed.



Space Parameters - Area

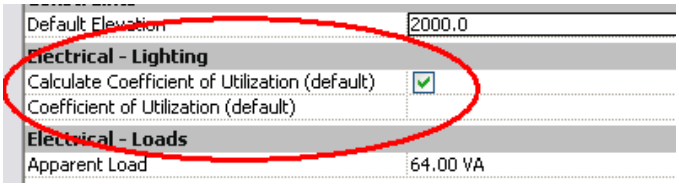


Space Parameters - Area

NOTE The height of the space should be specified to include the lighting fixture family and should not stop at the ceiling when using recessed fixtures. In general, for systems, the space height should be from the "story level" that the space is defined on to the "story level" above.

Coefficient of Utilization (CU) is the most complicated parameter involved in the calculation.

The Calculate Coefficient of Utilization parameter determines whether you specify the CU or it is calculated by Revit MEP. If Calculate Coefficient of utilization is set to Off, the Coefficient of Utilization parameter becomes editable so that you can specify a CU for this particular fixture.



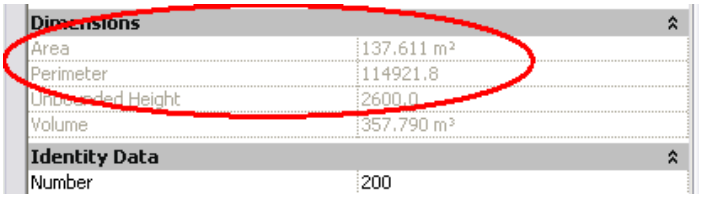
Lighting Parameters - Calculate Coefficient of Utilization

If Calculate Coefficient of Utilization is enabled, the CU is calculated using the following method:

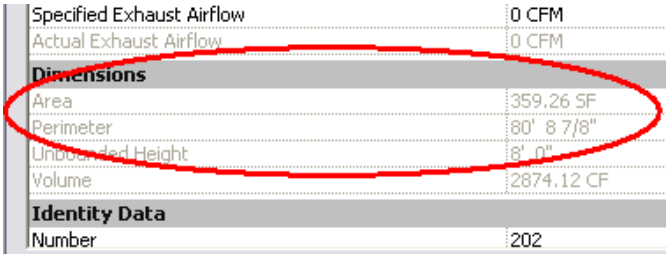
The lighting fixture determines what space it is in (if the lighting fixture is not in a space the CU calculation fails). Room Perimeter and Room Area are both properties of the room.

Each space calculates its Room Cavity Ratio according to the following equation:

- RCR = 2.5 * Hrc * Room Perimeter / Room Area



Space Parameters - Area and Perimeter

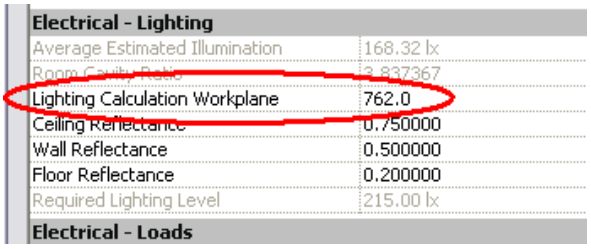


Space Parameters - Area and Perimeter

NOTE See for information about how area and perimeter are calculated for spaces.

Room Cavity Height (HRC) is calculated by determining the distance between the Lighting Calculation Workplane and the Luminaire.

The Lighting Calculation Workplane is a parameter of each space that you can specify. The default value of this parameter is 2'6" 76 cm (which represents typical desk height).



Space Parameters - Lighting Calculation Workplane

Electrical - Lighting	
Average Estimated Illumination	28.92 fc
Room Cavity Ratio	3.071774
Lighting Calculation Workplane	2' 6"
Ceiling Reflectance	0.750000
Wall Reflectance	0.500000
Floor Reflectance	0.200000
Required Lighting Level	35.00 fc
Electrical - Loads	
Design HVAC Load per area	0.00 W/ft²

Space Parameters - Lighting Calculation Workplane

The HRC is calculated individually for each individual fixture in the space, because each fixture may have a different mounting height. The RCR reported by the space, however, will be the average value for all fixtures in the space.

You can specify an IES file for each fixture.

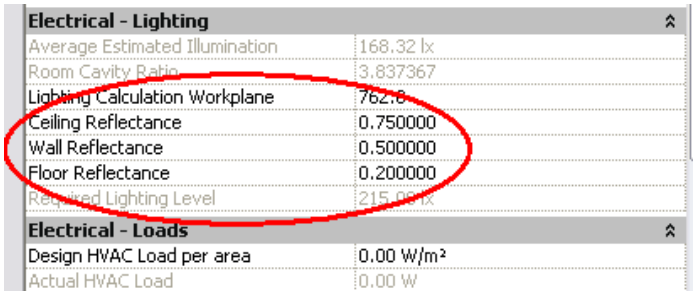
Electrical	
Ballast Voltage	277.00 V
Lamp	
Wattage Comments	
Photometrics	
Light Source Definition (family)	Rectangle+Photometric Web
Tilt Angle	90.000°
Photometric Web File	p1x82.ies
Light Loss Factor	0.88
Initial Intensity	128.00 W @ 89.06 lm/W
Initial Color	4230 K
Emit from Rectangle Width	300.0
Emit from Rectangle Length	2400.0
Emit Shape Visible in Rendering	☐
Dimming Lamp Color Temperature Shift	<None>
Color Filter	White

IES Data File

Electrical	
Ballast Voltage	277.00 V
Lamp	
Wattage Comments	
Photometrics	
Light Source Definition (family)	Rectangle+Photometric Web
Tilt Angle	90.000°
Photometric Web File	p1x82.ies
Light Loss Factor	0.88
Initial Intensity	128.00 W @ 89.06 lm/W
Initial Color	4230 K
Emit from Rectangle Width	1' 0"
Emit from Rectangle Length	8' 0"
Emit Shape Visible in Rendering	☐
Dimming Lamp Color Temperature Shift	<None>
Color Filter	White

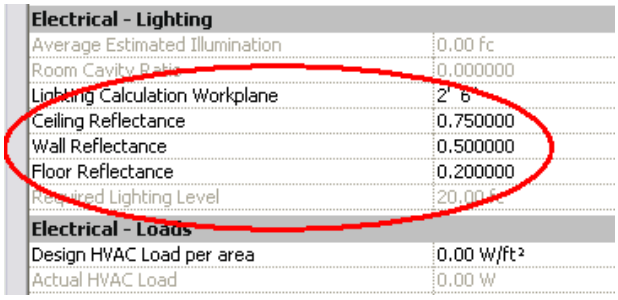
IES Data File

The CU value is calculated for each fixture using the RCR, the IES Data file, and the values specified for the Ceiling, Wall, and Floor Reflectance (Space Parameters),



Electrical - Lighting	
Average Estimated Illumination	168.32 lx
Room Cavity Ratio	3.837367
Lighting Calculation Workplane	762.0
Ceiling Reflectance	0.750000
Wall Reflectance	0.500000
Floor Reflectance	0.200000
Required Lighting Level	215.00 lx
Electrical - Loads	
Design HVAC Load per area	0.00 W/m²
Actual HVAC Load	0.00 W

Space Parameters - Space Surface Reflectances



Electrical - Lighting	
Average Estimated Illumination	0.00 fc
Room Cavity Ratio	0.000000
Lighting Calculation Workplane	2' 6"
Ceiling Reflectance	0.750000
Wall Reflectance	0.500000
Floor Reflectance	0.200000
Required Lighting Level	20.00 fc
Electrical - Loads	
Design HVAC Load per area	0.00 W/ft²
Actual HVAC Load	0.00 W

Space Parameters - Space Surface Reflectances

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