

2020

Electrical Design/Build Guide

Based on the 2020
National Electrical Code

Copyright
Durand & Associates 1986-2019

Standard Conduit Fill
THHN, THWN, THWN-2 Type Conductors
All Conductors of Same Size

40% Fill (3-Conductors or More)

WIRE SIZE	CONDUIT TRADE SIZE IN INCHES											
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"
14	11	21	33	52	76	134	193	291	396	517	801	1171
12	8	15	24	38	56	97	141	212	289	377	584	854
10	5	9	15	24	35	61	89	134	182	238	368	538
8	3	5	9	14	20	35	51	77	105	137	212	310
6		4	6	10	14	25	37	55	76	99	153	224
4			4	6	9	15	22	34	46	61	94	138
3			3	5	7	13	19	29	39	51	80	116
2			3	4	6	11	16	24	33	43	67	98
1				3	4	8	12	18	24	32	49	72
1/0					4	7	10	15	20	27	42	61
2/0					3	6	8	12	17	22	35	51
3/0						5	7	10	14	18	29	42
4/0						4	6	8	12	15	24	35
250						3	4	7	9	12	19	28
300						3	4	6	8	11	17	24
350							3	5	7	9	15	21
400							3	5	6	8	13	19
500								4	5	7	11	16
600								3	4	5	9	13
700								3	4	5	8	11
750									3	4	7	11

31% Fill (2-Conductors)

WIRE SIZE	CONDUIT TRADE SIZE IN INCHES											
	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"
14	2	2	2	2	2	2	2	2	2	2	2	2
12	2	2	2	2	2	2	2	2	2	2	2	2
10	2	2	2	2	2	2	2	2	2	2	2	2
8	2	2	2	2	2	2	2	2	2	2	2	2
6		2	2	2	2	2	2	2	2	2	2	2
4		2	2	2	2	2	2	2	2	2	2	2
3			2	2	2	2	2	2	2	2	2	2
2			2	2	2	2	2	2	2	2	2	2
1				2	2	2	2	2	2	2	2	2
1/0				2	2	2	2	2	2	2	2	2
2/0					2	2	2	2	2	2	2	2
3/0					2	2	2	2	2	2	2	2
4/0						2	2	2	2	2	2	2
250						2	2	2	2	2	2	2
300						2	2	2	2	2	2	2
350						2	2	2	2	2	2	2
400							2	2	2	2	2	2
500							2	2	2	2	2	2
600								2	2	2	2	2
700								2	2	2	2	2
750								2	2	2	2	2

NOTE: Use this table for all conduit types except PVC Schedule 80 , ENT, and Liquidtight Flexible Nonmetallic Conduits.

60° C Copper Ampacity
3 - Wire Fill
2 or 3 - Parallel Raceways

1	2	3	4	5	6	7	8	9	10	11
AMPS	60° C WIRE SIZE AWG	GND WIRE SIZE AWG	3-WIRE (40% FILL) CONDUIT SIZE				3-WIRE WITH GROUND (40% FILL) CONDUIT SIZE			
			THW	RHH RHW	THWN TTHN	XHHW	THW	RHH RHW	THWN TTHN	XHHW
	NOTE #3	NOTE #1 & 3		NOTE #2				NOTE #2		

2 - PARALLEL RACEWAYS (NOTE #3)

250	2-1/0	2-4	2-1 1/2"	2-2"	2-1 1/2"	2-1 1/2"	2-2"	2-2"	2-1 1/2"	2-1 1/2"
290	2-2/0	2-4	2-1 1/2"	2-2"	2-1 1/2"	2-1 1/2"	2-2"	2-2"	2-2"	2-1 1/2"
330	2-3/0	2-3	2-2"	2-2"	2-2"	2-1 1/2"	2-2"	2-2 1/2"	2-2"	2-2"
390	2-4/0	2-3	2-2"	2-2 1/2"	2-2"	2-2"	2-2"	2-2 1/2"	2-2"	2-2"
430	2-250	2-2	2-2"	2-2 1/2"	2-2"	2-2"	2-2 1/2"	2-3"	2-2 1/2"	2-2"
480	2-300	2-2	2-2 1/2"	2-3"	2-2"	2-2"	2-2 1/2"	2-3"	2-2 1/2"	2-2 1/2"
520	2-350	2-1	2-2 1/2"	2-3"	2-2 1/2"	2-2 1/2"	2-3"	2-3"	2-2 1/2"	2-2 1/2"
560	2-400	2-1	2-2 1/2"	2-3"	2-2 1/2"	2-2 1/2"	2-3"	2-3 1/2"	2-3"	2-3"
640	2-500	2-1/0	2-3"	2-3"	2-3"	2-3"	2-3"	2-3 1/2"	2-3"	2-3"
700	2-600	2-1/0	2-3"	2-3 1/2"	2-3"	2-3"	2-3 1/2"	2-4"	2-3"	2-3"
770	2-700	2-1/0	2-3 1/2"	2-3 1/2"	2-3"	2-3"	2-3 1/2"	2-4"	2-3 1/2"	2-3 1/2"
800	2-750	2-1/0	2-3 1/2"	2-4"	2-3 1/2"	2-3 1/2"	2-3 1/2"	2-4"	2-3 1/2"	2-3 1/2"

3 - PARALLEL RACEWAYS (NOTE #3)

375	3-1/0	3-3	3-1 1/2"	3-2"	3-1 1/2"	3-1 1/2"	3-2"	3-2"	3-1 1/2"	3-1 1/2"
435	3-2/0	3-2	3-1 1/2"	3-2"	3-1 1/2"	3-1 1/2"	3-2"	3-2"	3-2"	3-2"
495	3-3/0	3-2	3-2"	3-2"	3-2"	3-1 1/2"	3-2"	3-2 1/2"	3-2"	3-2"
585	3-4/0	3-1	3-2"	3-2 1/2"	3-2"	3-2"	3-2 1/2"	3-2 1/2"	3-2"	3-2"
645	3-250	3-1/0	3-2"	3-2 1/2"	3-2"	3-2"	3-2 1/2"	3-3"	3-2 1/2"	3-2 1/2"
720	3-300	3-1/0	3-2 1/2"	3-3"	3-2"	3-2"	3-2 1/2"	3-3"	3-2 1/2"	3-2 1/2"
780	3-350	3-1/0	3-2 1/2"	3-3"	3-2 1/2"	3-2 1/2"	3-3"	3-3"	3-2 1/2"	3-2 1/2"
840	3-400	3-2/0	3-2 1/2"	3-3"	3-2 1/2"	3-2 1/2"	3-3"	3-3 1/2"	3-3"	3-3"
960	3-500	3-2/0	3-3"	3-3"	3-3"	3-3"	3-3"	3-3 1/2"	3-3"	3-3"
1050	3-600	3-3/0	3-3"	3-3 1/2"	3-3"	3-3"	3-3 1/2"	3-4"	3-3 1/2"	3-3 1/2"
1155	3-700	3-3/0	3-3 1/2"	3-3 1/2"	3-3"	3-3"	3-3 1/2"	3-4"	3-3 1/2"	3-3 1/2"
1200	3-750	3-3/0	3-3 1/2"	3-4"	3-3 1/2"	3-3 1/2"	3-3 1/2"	3-4"	3-3 1/2"	3-3 1/2"

NOTES: 1. Ground wire sizes are based on conductor ampacity as shown in Column 1.

2. RHW and RHH conductor fill with outer covering.

3. Multiple conductors are per phase, neutral, and ground wire (1-each) per raceway.

75° C Copper Ampacity

4 - Wire Fill - (Non-Current Carrying Neutral)

1 - Raceway

1	2	3	4	5	6	7	8	9	10	11
AMPS	75° C WIRE SIZE AWG	GND WIRE SIZE AWG	4-WIRE (40% FILL) CONDUIT SIZE				4-WIRE WITH GROUND (40% FILL) CONDUIT SIZE			
			THW	RHH RHW	THWN THHN	XHHW	THW	RHH RHW	THWN THHN	XHHW
		NOTE #1		NOTE #2				NOTE #2		

1 - RACEWAY

15	14	14	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	1/2"	1/2"
20	12	12	1/2"	3/4"	1/2"	1/2"	1/2"	3/4"	1/2"	1/2"
30	10	10	1/2"	3/4"	1/2"	1/2"	3/4"	1"	1/2"	3/4"
50	8	10	3/4"	1"	3/4"	3/4"	3/4"	1 1/4"	3/4"	3/4"
65	6	8	1"	1 1/4"	3/4"	1"	1 1/4"	1 1/4"	1"	1"
85	4	8	1 1/4"	1 1/4"	1"	1"	1 1/4"	1 1/2"	1 1/4"	1 1/4"
100	3	8	1 1/4"	1 1/2"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/4"	1 1/4"
115	2	6	1 1/4"	1 1/2"	1 1/4"	1 1/4"	1 1/2"	2"	1 1/2"	1 1/2"
130	1	6	1 1/2"	2"	1 1/2"	1 1/2"	2"	2"	1 1/2"	1 1/2"
150	1/0	6	2"	2"	1 1/2"	1 1/2"	2"	2 1/2"	2"	2"
175	2/0	6	2"	2 1/2"	2"	2"	2"	2 1/2"	2"	2"
200	3/0	6	2"	2 1/2"	2"	2"	2 1/2"	2 1/2"	2"	2"
230	4/0	4	2 1/2"	2 1/2"	2"	2"	2 1/2"	3"	2 1/2"	2 1/2"
255	250	4	2 1/2"	3"	2 1/2"	2 1/2"	3"	3"	2 1/2"	2 1/2"
285	300	4	3"	3"	2 1/2"	2 1/2"	3"	3 1/2"	3"	3"
310	350	3	3"	3 1/2"	3"	3"	3"	3 1/2"	3"	3"
335	400	3	3"	3 1/2"	3"	3"	3"	3 1/2"	3"	3"
380	500	3	3 1/2"	3 1/2"	3"	3"	3 1/2"	4"	3 1/2"	3 1/2"
420	600	2	3 1/2"	4"	3 1/2"	3 1/2"	4"	5"	3 1/2"	3 1/2"
460	700	2	4"	5"	3 1/2"	3 1/2"	4"	5"	4"	4"
475	750	2	4"	5"	4"	4"	4"	5"	4"	4"

NOTES: 1. Ground wire sizes are based on conductor ampacity as shown in Column 1.

2. RHW and RHH conductor fill with outer covering.

3 - Wire Panel Schedules

60° C - Copper Conductors

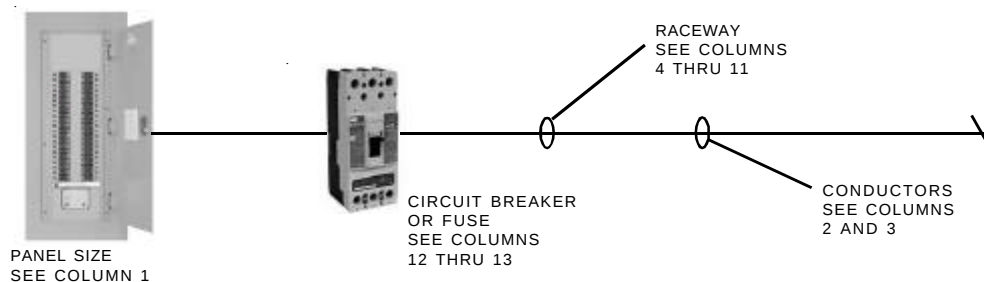
1	2	3	4	5	6	7	8	9	10	11	12	13
PANEL SIZE AMPS	CU WIRE SIZE AWG	GND WIRE SIZE AWG	3-WIRE (40% FILL)				3-WIRE WITH GROUND (40% FILL)				BKR FUSE AMPS	FUSED SWITCH SIZE AMPS
			THW	RHH RHW	THWN THHN	XHHW	THW	RHH RHW	THWN THHN	XHHW		
	NOTE #3	NOTE #1		NOTE #2				NOTE #2				

60° C Temperature Rating

60	4	8	1"	1 1/4"	1"	1"	1 1/4"	1 1/4"	1"	1"	60	60
100	1	6	1 1/2"	2"	1 1/4"	1 1/4"	1 1/2"	2"	1 1/2"	1 1/2"	100	100
125	1/0	6	1 1/2"	2"	1 1/2"	1 1/2"	1 1/2"	2"	1 1/2"	1 1/2"	125	200
150	3/0	6	2"	2"	2"	1 1/2"	2"	2 1/2"	2"	2"	150	200
200	250	4	2"	2 1/2"	2"	2"	2 1/2"	3"	2"	2"	200	200
225	300	4	2 1/2"	3"	2"	2"	2 1/2"	3"	2 1/2"	2 1/2"	225	400
300	500	3	3"	3"	3"	3"	3"	3 1/2"	3"	3"	300	400
400	750	3	3 1/2"	4"	3 1/2"	3 1/2"	3 1/2"	4"	3 1/2"	3 1/2"	400	400
600	2-500	2-1/0	2-3"	2-3"	2-3"	2-3"	2-3"	2-3 1/2"	2-3"	2-3"	600	600
800	2-750	2-1/0	2-3 1/2"	2-4"	2-3 1/2"	2-3 1/2"	2-3 1/2"	2-4"	2-3 1/2"	2-3 1/2"	800	800
1000	3-600	3-3/0	3-3"	3-3 1/2"	3-3"	3-3"	3-3 1/2"	3-4"	3-3 1/2"	3-3 1/2"	1000	1000
1200	3-750	3-3/0	3-3 1/2"	3-4"	3-3 1/2"	3-3 1/2"	3-3 1/2"	3-4"	3-3 1/2"	3-3 1/2"	1200	1200
1600	5-500	5-4/0	4-3"	4-3"	4-3"	4-3"	4-3"	4-3 1/2"	4-3"	4-3"	1600	1600
2000	5-750	5-250	5-3 1/2"	5-4"	5-3 1/2"	5-3 1/2"	5-4"	5-4"	5-3 1/2"	5-3 1/2"	2000	2000

NOTES:

1. Ground wire sizes are based on conductor ampacity.
2. RHW and RHH conductor fill with outer covering.
3. Multiple conductors are per phase, neutral, and ground wire (1-each) per raceway.



Transformer Short-Circuit Currents

Single Phase

XMFR KVA	115/230 VOLTS SECONDARY			120/240 VOLTS SECONDARY		
	XMFR FLA	% IMPEDANCE	SHORT CIRCUIT AMPS L - N	XMFR FLA	% IMPEDANCE	SHORT CIRCUIT AMPS L - N
25	109	1.6	10,190	104	1.6	9,766
30	130	1.6	12,228	125	1.6	11,719
37.5	163	1.6	15,285	156	1.6	14,648
50	217	1.7	19,182	208	1.7	18,382
100	435	1.6	40,761	417	1.6	39,063
150	652	1.6	61,141	625	1.6	58,594
167	726	1.8	60,507	696	1.8	57,986
200	870	1.8	72,464	833	1.8	69,444
250	1,087	1.8	90,580	1,042	1.8	86,806
333	1,448	2.0	108,587	1,388	2.0	104,063
500	2,174	2.0	163,043	2,083	2.0	156,250

XMFR KVA	460 VOLTS SECONDARY			480 VOLTS SECONDARY		
	XMFR FLA	% IMPEDANCE	SHORT CIRCUIT AMPS L - N	XMFR FLA	% IMPEDANCE	SHORT CIRCUIT AMPS L - N
25	54	1.6	5,095	52	1.6	4,883
30	65	1.6	6,114	63	1.6	5,859
37.5	82	1.6	7,643	78	1.6	7,324
50	109	1.7	9,591	104	1.7	9,191
100	217	1.6	20,380	208	1.6	19,531
150	326	1.6	30,571	313	1.6	29,297
167	363	1.8	30,254	348	1.8	28,993
200	435	1.8	36,232	417	1.8	34,722
250	543	1.8	45,290	521	1.8	43,403
333	724	2.0	54,293	694	2.0	52,031
500	1,087	2.0	81,522	1,042	2.0	78,125

Three-phase short-circuit currents based on "infinite" primary.

Single phase values are L-N values at transformer terminals. These figures are based on change in turns ratio between primary and secondary, 100,000 KVA primary, zero feet from terminals of transformer, 1.2 (%X) and 1.5 (%R) for L-N vs L-L reactance and resistance values, and transformer X/R ratio =3.

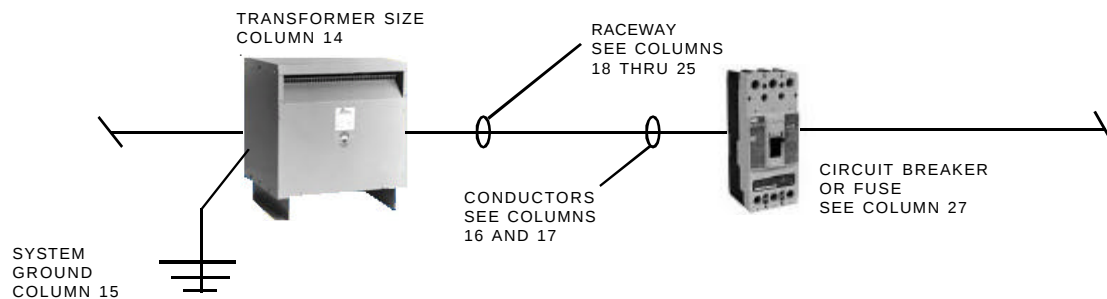
Single Phase Transformer Schedules
Primary Side - 480 Volts
75° C Copper Conductors

14	15	16	17	18	19	20	21	22	23	24	25	26	27
PRIMARY SIDE - 480 VOLT - SINGLE PHASE													
TRANSFORMER		CONDUCTORS		RACEWAYS								PRIMARY	
40° C RISE XMFR KVA	SYS. GND WIRE AWG	WIRE SIZE AWG	EQUIP. GND WIRE AWG	2-WIRE (31% FILL)				2-WIRE WITH GROUND (40% FILL)				MAX. LOAD AMPS	BREAKER FUSE SIZE AMPS
				THW	RHH RHW	THWN THHN	XHHW	THW	RHH RHW	THWN THHN	XHHW		
		NOTE #3	NOTE #1		NOTE #2				NOTE #2				

75° C Copper Conductors

3	8	14	14	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	6.3	10
5	8	14	14	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	10.4	10
7.5	8	14	14	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	1/2"	15.6	15
10	8	10	10	1/2"	1/2"	1/2"	1/2"	1/2"	3/4"	1/2"	1/2"	20.8	25
15	8	8	10	1/2"	3/4"	1/2"	1/2"	1/2"	1"	1/2"	1/2"	31.3	35
25	4	6	8	3/4"	1"	3/4"	3/4"	3/4"	1"	3/4"	3/4"	52.1	60
37.5	2	3	8	1"	1 1/4"	1"	1"	1"	1 1/4"	1"	1"	78.1	90
50	2	1	6	1 1/4"	1 1/2"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/4"	1 1/4"	104	125
75	2/0	2/0	6	1 1/2"	2"	® 1 1/2"	1 1/4"	1 1/2"	2"	® 1 1/4"	1 1/4"	156	175
100	3/0	250	4	2"	2 1/2"	2"	2"	2"	2 1/2"	2"	2"	208	250
167	3/0	600	2	3"	3"	® 3"	® 3"	3"	3"	® 2 1/2"	® 2 1/2"	348	400

- NOTES:
1. Equipment Ground wire sizes are based on conductor ampacity.
 2. RHW and RHH conductor fill with outer covering.
 3. Multiple conductors are per phase, neutral, and ground wire (1-each) per raceway.
- ® 2-wire with ground results in a smaller conduit size than 2-wire with no ground.



Motor Schedules - 75° C Conductors

1	2	3	4	5	6	7	8	9	10
HP	FLA	KW	WIRE SIZE AWG	GND WIRE SIZE AWG	MAX WIRE LENGTH FEET	CONDUIT SIZE 2-WIRE (31% FILL)			
						THW	RHH RHW	THWN THHN	XHHW
						NOTE #1		NOTE #2	

208 Volt Single Phase

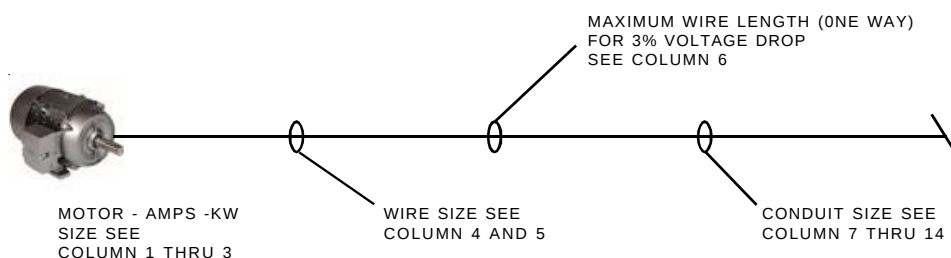
1/6	2.4	0.5	14	14	419'	1/2"	1/2"	1/2"	1/2"
1/4	3.2	0.7	14	14	315'	1/2"	1/2"	1/2"	1/2"
1/3	4	0.8	14	14	252'	1/2"	1/2"	1/2"	1/2"
1/2	5.4	1.1	14	14	186'	1/2"	1/2"	1/2"	1/2"
3/4	7.6	1.6	14	14	132'	1/2"	1/2"	1/2"	1/2"
1	8.8	1.8	14	14	114'	1/2"	1/2"	1/2"	1/2"
1 1/2	11	2.3	14	14	91'	1/2"	1/2"	1/2"	1/2"
2	13.2	2.7	12	12	118'	1/2"	1/2"	1/2"	1/2"
3	18.7	3.9	10	10	139'	1/2"	1/2"	1/2"	1/2"
5	30.8	6.4	8	10	130'	1/2"	3/4"	1/2"	1/2"
7 1/2	44	9.2	6	8	145'	3/4"	1"	3/4"	3/4"
10	55	11.4	4	8	183'	1"	1"	3/4"	3/4"

230 Volt Single Phase

1/6	2.2	0.5	14	14	506'	1/2"	1/2"	1/2"	1/2"
1/4	2.9	0.7	14	14	384'	1/2"	1/2"	1/2"	1/2"
1/3	3.6	0.8	14	14	309'	1/2"	1/2"	1/2"	1/2"
1/2	4.9	1.1	14	14	227'	1/2"	1/2"	1/2"	1/2"
3/4	6.9	1.6	14	14	161'	1/2"	1/2"	1/2"	1/2"
1	8	1.8	14	14	139'	1/2"	1/2"	1/2"	1/2"
1 1/2	10	2.3	14	14	111'	1/2"	1/2"	1/2"	1/2"
2	12	2.8	14	14	93'	1/2"	1/2"	1/2"	1/2"
3	17	3.9	10	10	169'	1/2"	1/2"	1/2"	1/2"
5	28	6.4	8	10	158'	1/2"	3/4"	1/2"	1/2"
7 1/2	40	9.2	8	8	111'	3/4"	3/4"	1/2"	1/2"
10	50	11.5	6	8	141'	3/4"	1"	3/4"	3/4"

NOTES:

1. Maximum wire length (one-way) for 3% voltage drop.
2. RHW and RHH conductor fill with outer covering.
3. Disconnects must be horsepower rated.
4. @ May require larger size if fused switch is used.



Motor Schedules - 75° C Conductors (continued)

11	12	13	14	15	16	17	18	19
CONDUIT SIZE 2-WIRE - WITH GROUND (40% FILL)				MIN. SWITCH SIZE AMPS	MTR STR NEMA SIZE	SHORT CIRCUIT BKR SIZE AMPS	SHORT CIRCUIT RK5 FUSE AMPS	OVER LOAD RK5 FUSE AMPS
THW	RHH RHW	THWN THHN	XHHW					
	NOTE #2			NOTE #3 & 4				

208 Volt Single Phase

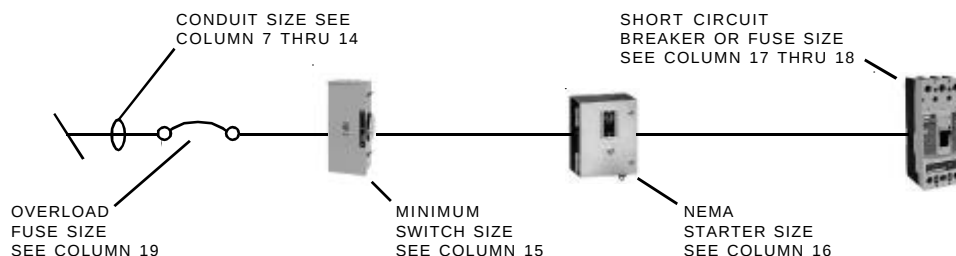
1/2"	1/2"	1/2"	1/2"	30	00	10	4	2
1/2"	1/2"	1/2"	1/2"	30	00	10	5	4
1/2"	1/2"	1/2"	1/2"	30	00	10	7	5
1/2"	1/2"	1/2"	1/2"	30	00	10	9	6
1/2"	1/2"	1/2"	1/2"	30	00	10	12	9
1/2"	1/2"	1/2"	1/2"	30	00	15	15	10
1/2"	1/2"	1/2"	1/2"	30	0	15	17.5	12
1/2"	1/2"	1/2"	1/2"	30	0	20	20	15
1/2"	3/4"	1/2"	1/2"	30	1	30	30	20
1/2"	1"	1/2"	1/2"	60	2	50	50	35
3/4"	1"	3/4"	3/4"	@ 60	2	70	70	50
1"	1 1/4"	3/4"	1"	100	3	90	90	60

230 Volt Single Phase

1/2"	1/2"	1/2"	1/2"	30	00	10	3	2
1/2"	1/2"	1/2"	1/2"	30	00	10	5	3
1/2"	1/2"	1/2"	1/2"	30	00	10	6	4
1/2"	1/2"	1/2"	1/2"	30	00	10	8	6
1/2"	1/2"	1/2"	1/2"	30	00	10	12	8
1/2"	1/2"	1/2"	1/2"	30	00	10	12	10
1/2"	1/2"	1/2"	1/2"	30	0	15	17.5	12
1/2"	1/2"	1/2"	1/2"	30	0	20	20	15
1/2"	3/4"	1/2"	1/2"	30	0	25	25	20
1/2"	1"	1/2"	1/2"	60	2	45	45	35
3/4"	1"	1/2"	3/4"	@ 60	2	70	70	50
3/4"	1"	3/4"	3/4"	@ 60	3	80	80	60

NOTES:

1. Maximum wire length (one-way) for 3% voltage drop.
2. RHW and RHH conductor fill with outer covering.
3. Disconnects must be horsepower rated.
4. @ May require larger size if fused switch is used.



Voltage Drop

200 Volt - Single Phase (24-120 Amps)

Maximum Conductor Length (One Way)

1	2	3	4	5	6	7	8	9	10	11
LOAD	MAXIMUM LENGTH AT 3% VOLTAGE DROP					MAXIMUM LENGTH AT 2% VOLTAGE DROP				
AMPS	#4	#3	#2	#1	1/0	#4	#3	#2	#1	1/0
24	403'	500'	625'	781'	962'	269'	333'	417'	521'	641'
28	346'	429'	536'	670'	824'	230'	286'	357'	446'	549'
32	302'	375'	469'	586'	721'	202'	250'	313'	391'	481'
36	269'	333'	417'	521'	641'	179'	222'	278'	347'	427'
40	242'	300'	375'	469'	577'	161'	200'	250'	313'	385'
44	220'	273'	341'	426'	524'	147'	182'	227'	284'	350'
48	202'	250'	313'	391'	481'	134'	167'	208'	260'	321'
52	186'	231'	288'	361'	444'	124'	154'	192'	240'	296'
56	173'	214'	268'	335'	412'	115'	143'	179'	223'	275'
60	161'	200'	250'	313'	385'	108'	133'	167'	208'	256'
64	151'	188'	234'	293'	361'	101'	125'	156'	195'	240'
68	142'	176'	221'	276'	339'	95'	118'	147'	184'	226'
72		167'	208'	260'	321'		111'	139'	174'	214'
76		158'	197'	247'	304'		105'	132'	164'	202'
80		150'	188'	234'	288'		100'	125'	156'	192'
84			179'	223'	275'			119'	149'	183'
88			170'	213'	262'			114'	142'	175'
92			163'	204'	251'			109'	136'	167'
96				195'	240'				130'	160'
100				188'	231'				125'	154'
104				180'	222'				120'	148'
108					214'					142'
112					206'					137'
116					199'					133'
120					192'					128'

NOTES:

1. Columns 2-6 indicated the maximum one-way conductor length at 3% voltage drop.
2. Columns 7-11 indicated the maximum one-way conductor length at 2% voltage drop.

1-LED



2' X 2' Recessed

Lighting Fixtures

8' x 10' Spacing

29 Foot-Candles Avg

Room Size 32' x 26' x 9'

Task Height 2.5'

Reflectance 80-50-20

Lumens Per Fixture 2939

Power Density 0.28 W/sq ft

	12			19	19			21		19				19			
	19			35	32			38		32				35			
	19			33	33			37		33				33			
	21			39	37			43		37				39			
	19			34	34			37		34				34			
	19			36	33			38		33				36			

1-LED



2' X 2' Recessed

Lighting Fixtures

8' x 10' Spacing

40 Foot-Candles Avg

Room Size 32' x 26' x 9'

Task Height 2.5'

Reflectance 80-50-20

Lumens Per Fixture 4073

Power Density 0.39 W/sq ft

	15			26	25			28		25				26			
	24			48	42			52		42				48			
	25			45	43			49		43				45			
	28			53	48			58		48				53			
	25			45	44			50		44				45			
	25			48	42			52		42				48			



LED

Low Bay Lighting Fixtures

18' Mounting Height

10' X 8' Spacing

61 Foot-Candles Avg

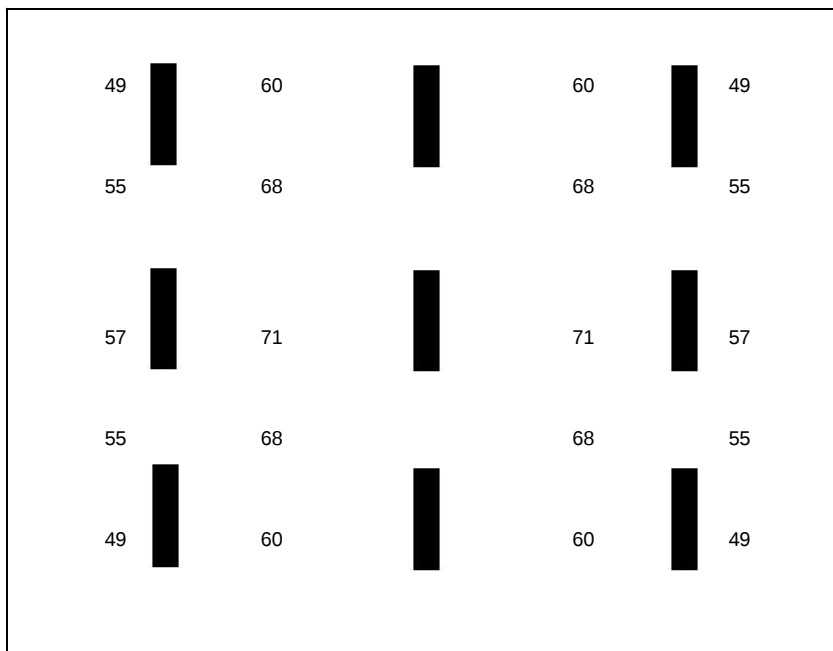
Room Size 32' x 26' x 20'

Task Height 2.5'

Reflectance 80-50-20

Lumens Per Fixture 9567

Power Density 0.80 W/sq ft



LED

Low Bay Lighting Fixtures

18' Mounting Height

8' X 8' Spacing

81 Foot-Candles Avg

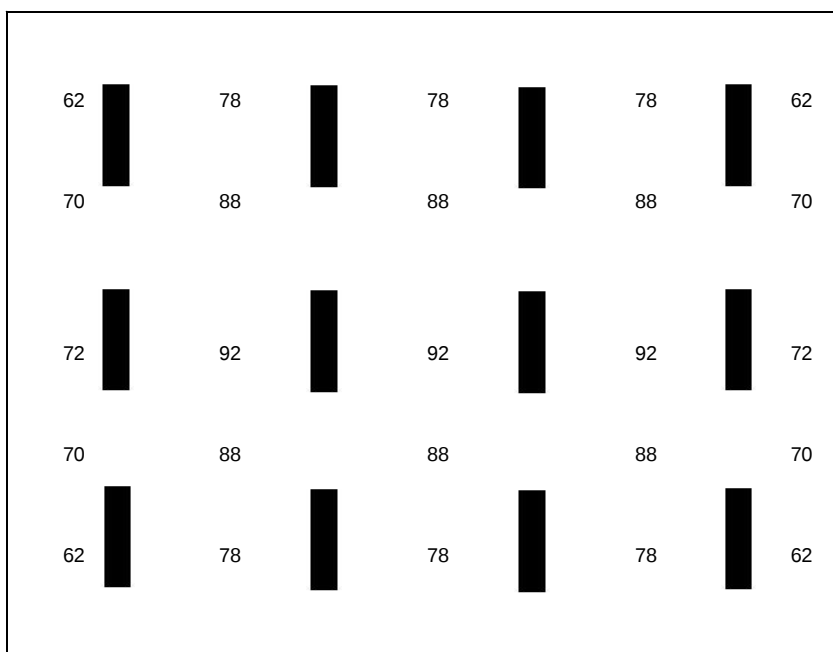
Room Size 32' x 26' x 20'

Task Height 2.5'

Reflectance 80-50-20

Lumens Per Fixture 9567

Power Density 1.07 W/sq ft



LED



High Bay Lighting Fixtures

26' Mounting Height

18' X 16' Spacing

64 Foot-Candles Avg

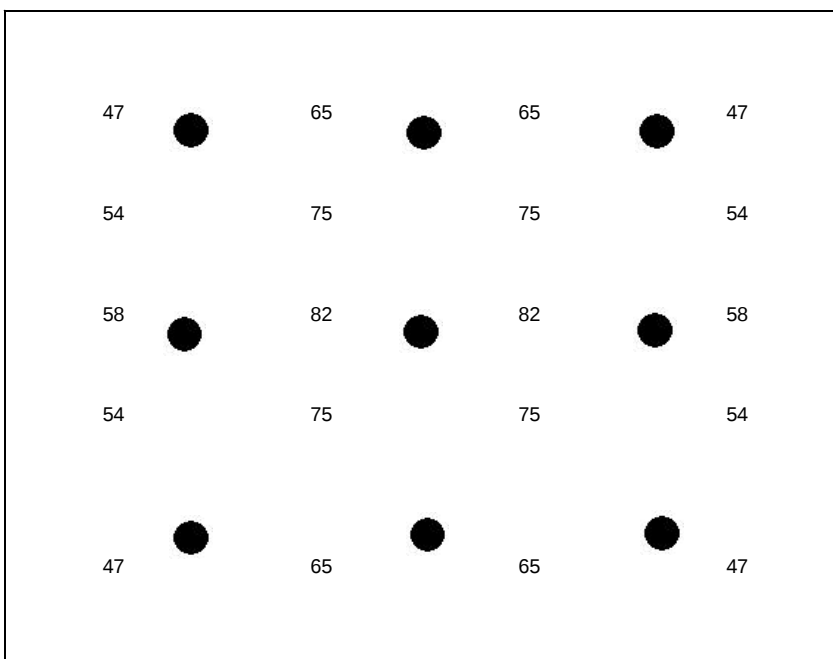
Room Size 64' x 52' x 26'

Task Height 2.5'

Reflectance 80-50-20

Lumens Per Fixture 30400

Power Density 0.58 W/sq ft



LED



High Bay Lighting Fixtures

26' Mounting Height

16' X 14' Spacing

85 Foot-Candles Avg

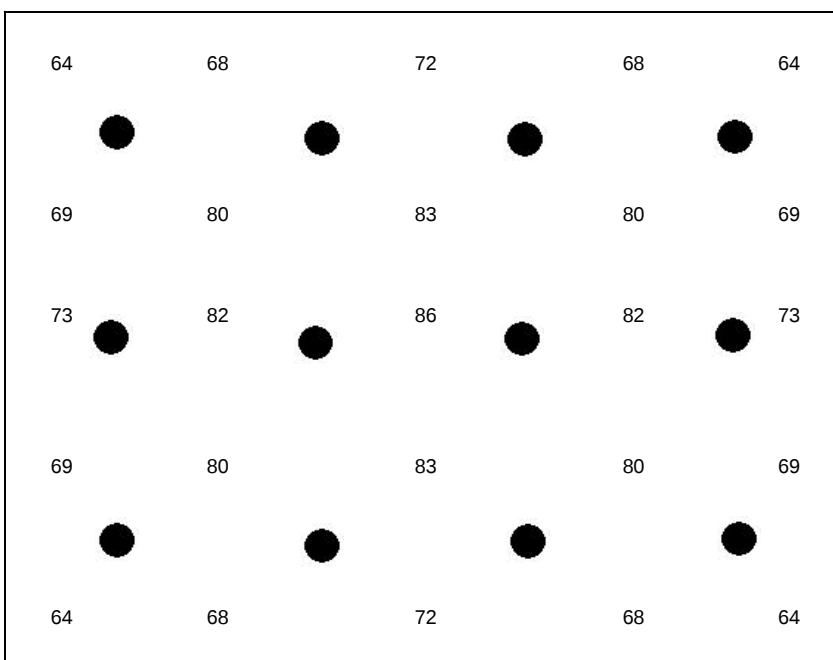
Room Size 64' x 52' x 26'

Task Height 2.5'

Reflectance 80-50-20

Lumens Per Fixture 30400

Power Density 0.78 W/sq ft





2-LAMP
2' X 4' Recessed
Lighting Fixtures
2-T8 32 Watt Lamps
8' x 6' Spacing
66 Foot-Candles Avg

Room Size 32' x 26' x 9'
 Task Height 2.5'
 Reflectance 80-50-20
 Lumens Per Lamp 2800
 Powe Density 1.12 W/sq ft

			39		42		46		43		46		42		39		
			56		59		66		60		66		59		56		
			64		68		76		69		76		67		64		
			68		73		80		74		80		72		68		
			66		73		81		74		81		73		68		
			68		73		81		74		81		73		68		
			65		69		77		71		77		69		65		
			58		61		68		62		68		60		58		



3-LAMP
2' X 4' Recessed
Lighting Fixtures
3-T8 32 Watt Lamps
8' x 6' Spacing
92 Foot-Candles Avg

Room Size 32' x 26' x 9'
 Task Height 2.5'
 Reflectance 80-50-20
 Lumens Per Lamp 2800
 Powe Density 1.69 W/sq ft

			53		62		58		64		59		63		53		
			77		90		85		92		85		90		77		
			87		103		95		105		95		103		87		
			93		110		102		112		102		110		93		
			93		110		101		113		102		110		93		
			93		110		102		113		103		110		93		
			89		105		97		108		98		105		89		
			80		92		89		94		89		92		80		

Roof Top Air Conditioners With Gas Heat (3-25 Ton)



208/230V-1Ø-60HZ (3-5 Ton)

SIZE TONS	MIN VOLT	MAX VOLT	MIN CIR AMPS	MAX FUSE OR BKR	MIN SW SIZE	WIRE SIZE/LENGTH 75° C LIMITING 2% VOLTAGE DROP						
						#12 CU	#10 CU	#8 CU	#6 CU	#8 AL	#6 AL	#4 AL
3.0	208	230	27.1	40	60	---	95'	151'	234'	91'	142'	227'
4.0	208	230	36.3	60	60	---	---	113'	175'	68'	106'	169'
5.0	208	230	46.5	60	60	---	---	88'	137'	---	83'	132'

208/230V-3Ø-60HZ (3-10 Ton)

SIZE TONS	MIN VOLT	MAX VOLT	MIN CIR AMPS	MAX FUSE OR BKR	MIN SW SIZE	WIRE SIZE/LENGTH 75° C LIMITING 2% VOLTAGE DROP						
						#12 CU	#10 CU	#8 CU	#6 CU	#8 AL	#6 AL	#4 AL
3.0	208	230	18.6	25	30	100'	160'	254'	394'	154'	240'	381'
4.0	208	230	24.8	35	60	---	120'	190'	296'	115'	180'	286'
5.0	208	230	31.3	45	60	---	---	151'	234'	91'	142'	227'
6.2	208	230	36.6	50	60	---	---	129'	200'	78'	122'	194'
7.5	208	230	41.7	60	60	---	---	113'	176'	---	107'	170'
8.5	208	230	49	60	60	---	---	96'	150'	---	91'	145'
10.0	208	230	56	70	100	---	---	---	131'	---	---	127'

208/230V-3Ø-60HZ (12-25 Ton)

SIZE TONS	MIN VOLT	MAX VOLT	MIN CIR AMPS	MAX FUSE OR BKR	MIN SW SIZE	WIRE SIZE/LENGTH 75° C LIMITING 2% VOLTAGE DROP						
						#4 CU	#2 CU	#1 CU	#1/0 CU	#2 AL	#1/0 AL	#2/0 AL
12.5	208	230	71	80	100	165'	262'	329'	416'	159'	252'	403'
15.0	208	230	82	90	100	143'	226'	285'	360'	138'	219'	349'
17.5	208	230	100	110	200	---	186'	234'	295'	---	179'	286'
20.0	208	230	123	150	200	---	---	190'	240'	---	---	232'
25.0	208	230	132	150	200	---	---	---	224'	---	---	217'

460V-3Ø-60HZ (3-25 Ton)

SIZE TONS	MIN VOLT	MAX VOLT	MIN CIR AMPS	MAX FUSE OR BKR	MIN SW SIZE	WIRE SIZE/LENGTH 75° C LIMITING 2% VOLTAGE DROP						
						#12 CU	#10 CU	#8 CU	#6 CU	#8 AL	#6 AL	#4 AL
3.0	460	460	9.4	15	30	439'	700'	1109'	1726'	673'	1049'	1669'
4.0	460	460	11.9	15	30	347'	553'	876'	1364'	531'	829'	1318'
5.0	460	460	16.3	25	30	253'	404'	640'	996'	388'	605'	962'
6.2	460	460	17.7	25	30	233'	372'	589'	917'	357'	557'	886'
7.5	460	460	20.9	30	30	---	315'	499'	776'	303'	472'	750'
8.5	460	460	29	35	60	---	227'	360'	560'	218'	340'	541'
10.0	460	460	31	40	60	---	---	336'	523'	204'	318'	506'
12.5	460	460	32	40	60	---	---	326'	507'	198'	308'	490'
15.0	460	460	37	45	60	---	---	282'	439'	171'	267'	424'
17.5	460	460	47	60	60	---	---	222'	345'	---	210'	334'
20.0	460	460	53	60	60	---	---	---	306'	---	---	296'
25.0	460	460	57	70	100	---	---	---	285'	---	---	275'