

Chicago Supervising Electricians Licensure Examination Study Guide

This candidate guide should help you prepare for the Chicago Supervising Electricians licensure examinations. Part I contains general information about testing procedures. Part II describes the content of these examinations and recommends study materials. Part III presents a set of sample questions to help candidates prepare for these examinations.

Part I General Information

PURPOSE OF THE EXAMINATIONS

This examination is required for professional licensure of six classifications of supervising electricians in the City of Chicago: Supervising Electrician, Supervising Maintenance Electrician, Supervising Health Facilities Electrician, Supervising Elevator Electrician, Supervising Sign Electrician, Supervising Low Voltage Electrician and Supervising Theater Electrician.

TEST VALIDITY

The content of these examinations has been based on a survey of Supervising Electricians licensed to practice in Chicago and on the recommendations of an expert panel of trainers, inspectors and licensed Supervising Electricians. All test questions have been subjected to strict psychometric controls and reflect standards and practices as described by supervising electricians who are licensed in Chicago.

STUDY MATERIALS

Study materials for each of these examinations are described in Part II of this candidate guide. Each may be purchased directly from the publishers identified in Part II; some also may be available from Prairie Avenue Bookshop, 418 S. Wabash Avenue, Chicago 60605 (312-922-8311).

MISSING AN EXAMINATION

There are no "make-up" examinations. You may re-register for the next examination date. **THERE ARE NO REFUNDS.**

SUCCESS/ LICENSURE

Candidates who score 70 or higher will receive a PASS notice and an application for licensure.

FAILURE

Candidates who score below 70 will receive a FAILURE notice and an application for re-examination. Candidates are encouraged to retake the examination; many candidates who initially fail such an exam pass on subsequent attempts.

**WHAT YOU MUST
BRING TO THE
EXAMINATION**

Each candidate should bring two (2) sharpened Number 2 black lead pencils and a non-programmable, non-printing, solar- or battery-powered portable or pocket calculator. No power source will be available for calculators at the test site. No other types of calculators, markers or writing tools will be permitted at any time during this examination.

**USE OF CODE
BOOKS DURING
THE TEST**

You should bring a clean, unmarked, bound copy of the *Chicago Electrical Code* to the test. You may refer to a copy of the *Code* during the examination **ONLY** if it meets the following requirements:

1. No additions, supplements, notes or other reference materials that are not part of the original printed text may be stapled, glued, clipped or otherwise attached to the book.
2. No loose-leaf formats are permitted and no tabs, notes, insertions or other marks may be attached to any part of the book.
3. No highlighting, handwritten notes or other annotations may be added to the original printed text of the book.

Candidates will **NOT** be permitted to use any books, notes or other reference materials other than a clean, bound, unmarked copy of the *Chicago Electrical Code* as defined above during this examination.

Candidates may not annotate, highlight or otherwise change the content of a reference copy of the *Chicago Electrical Code* (2006-2008 edition) during the test. Any copy of the *Chicago Electrical Code* that is found to include such changes will be confiscated immediately and the candidate may be immediately excused from the examination and disqualified.

**LENGTH AND
TIME LIMITS
FOR EACH TEST**

Each examination consists of 75 questions covering principles and practices common to all classifications of Supervising Electrician, plus from 25 to 75 questions addressing *Chicago Electrical Code* requirements related to work in that classification as indicated below:

Classification	Total test length	Time limit
Supervising Electrician	150 questions	4 hours
Supervising Maintenance Electrician	125 questions	3½ hours
Supervising Health Facilities Electrician	125 questions	3½ hours
Supervising Elevator Electrician	100 questions	3 hours
Supervising Low Voltage Electrician	100 questions	3 hours
Supervising Sign Electrician	100 questions	3 hours
Supervising Theater Electrician	100 questions	3 hours

Part II Test Content and Recommended Study Materials

Supervising Electricians must demonstrate that they are familiar with safe practices and procedures in their profession. Each examination consists of a 75 questions covering principles and practices common to all classifications of Supervising Electrician, plus a supplemental section addressing *Chicago Electrical Code* requirements related to work in that classification.

Core Examination (75 questions common to all classifications)

- I. Principles and Practices of Electricity (25 questions, 3-5 per content area)
 - A. Fundamental concepts
 - B. Electrical blueprint reading
 - C. Conductors, conduit and grounding
 - D. Transformers, delta and wye loads
 - E. Power factor and volt-amps
 - F. Service and voltage drops
 - G. OSHA regulations and workplace safety
- II. *Chicago Electrical Code* (50 questions)

Definitions & General Provisions	5- 7 questions
Articles 90, 100, 110	
Administration	5- 7 questions
Chapters 13-12 & 13-20	
Wiring Design and Protection	10-12 questions
Articles 200, 210, 220, 240 & 250	
Wiring Methods and Materials	12-16 questions
Articles 300, 305, 310, 333-336, 345-356, 362, 370, 373, 374, 380, 384	
Electric Equipment for General Use	5- 7 questions
Articles 400, 450, 480	
Hazardous Locations	5- 7 questions
Articles 500-504, 510	

Supervising Electrician Supplemental Examination (75 questions)

- | | |
|---|-----------------|
| Definitions & General Provisions | 4- 6 questions |
| Articles 90, 100, 110 | |
| Administration | 4- 6 questions |
| Chapters 13-12 & 13-20 | |
| Wiring Design and Protection | 8-10 questions |
| Articles 200, 210, 215, 220, 225, 230, 240, 250, 280 | |
| Wiring Methods and Materials | 8-10 questions |
| Articles 300, 305, 310, 318, 320, 333-356, 362, 363, 364, 370, 373, 374, 380, 384 | |
| Electric Equipment for General Use | 16-18 questions |
| Articles 400, 402, 410, 411, 422, 424, 430, 440, 445, 450, 460, 470, 480, 490 | |
| Special Occupancies | 9-12 questions |
| Articles 511-14, 517, 518, 520, 530, 560, 570 | |
| Special Equipment | 9-12 questions |
| Articles 600, 605, 610, 620, 625, 630, 640, 645, 660, 665, 670, 680, 690, 695 | |
| Special Conditions | 9-12 questions |
| Articles 700, 701, 702, 705, 720, 725, 727, 760, 770 | |
| Communication Systems | 3- 5 questions |
| Articles 800, 810, 820, 830 | |

**Supervising Maintenance Electrician Supplemental Examination
(50 questions)**

Definitions & General Provisions	2- 4 questions
Articles 90, 100, 110	
Administration	2- 4 questions
Chapters 13-12 & 13-20	
Wiring Design and Protection	2- 4 questions
Articles 200, 210, 220, 230, 240, 250	
Wiring Methods and Materials	5- 9 questions
Articles 300, 305, 310, 318, 320, 330, 333-356, 362, 363, 370, 373, 374, 380, 384	
Electric Equipment for General Use	9-12 questions
Articles 400, 402, 410, 411, 422, 424, 430, 440, 445, 450, 460, 470, 480, 490	
Special Occupancies	7-10 questions
Articles 511-14, 518, 560, 570	
Special Equipment	9-12 questions
Articles 605, 610, 620, 625, 630, 660, 665, 670, 680, 690, 695	
Special Conditions	8-10 questions
Articles 700, 701, 702, 705, 720, 725, 727, 760, 770	
Communication Systems	3- 5 questions
Articles 800, 810, 820, 830	

**Supervising Health Facilities Electrician Supplemental Examination
(50 questions)**

Definitions & General Provisions	2- 4 questions
Articles 90, 100, 110	
Administration	2- 4 questions
Chapters 13-12 & 13-20	
Wiring Design and Protection	2- 4 questions
Articles 200, 210, 215, 220, 230, 240, 250	
Wiring Methods and Materials	5- 9 questions
Articles 300, 305, 310, 318, 330, 333-356, 362, 363, 370, 373, 374, 380, 384	
Electric Equipment for General Use	12-15 questions
Articles 400, 402, 410, 411, 422, 424, 426, 427, 430, 440, 445, 450, 480, 490	
Special Occupancies	5- 7 questions
Articles 511, 517, 518	
Special Equipment	8-10 questions
Articles 605, 620, 660, 680, 695	
Special Conditions	9-12 questions
Articles 700, 701, 702, 725, 727, 760, 770	
Communication Systems	2- 4 questions
Article 800	

Supervising Elevator Electrician Supplemental Examination (25 questions)

Definitions & General Provisions	2- 3 questions
Articles 90, 100, 110	
Wiring Design and Protection	2- 3 questions
Articles 200, 210, 215, 220, 230, 240, 250	
Wiring Methods and Materials	3- 5 questions
Articles 300, 305, 310, 318, 330, 333-356, 362, 363, 370, 373, 374, 380, 384	
Electric Equipment for General Use	6- 8 questions
Articles 400, 402, 410, 411, 422, 424, 430, 440, 445, 450, 480	
Special Equipment	7- 9 questions
Article 620	

**Supervising Low Voltage Electrician Supplemental Examination
(25 questions)**

Definitions & General Provisions	2- 3 questions
Articles 90, 100, 110	
Wiring Design and Protection	2- 3 questions
Articles 200, 210, 220, 240, 250	
Wiring Methods and Materials	2- 4 questions
Articles 300, 305, 310, 318, 328, 333-356, 362, 363, 370, 373, 374, 380, 384	
Special Occupancies	4- 6 questions
Articles 517, 560, 570	
Special Equipment	4- 6 questions
Articles 605, 620, 640, 645, 650	
Special Conditions	6- 8 questions
Articles 720, 725, 727, 760, 770	
Communication Systems	4- 6 questions
Articles 800, 810, 820, 830	

Supervising Sign Electrician Supplemental Examination (25 questions)

Definitions & General Provisions	2- 3 questions
Articles 90, 100, 110	
Administration	6- 8 questions
Chapter 13-20	
Wiring Design and Protection	3- 5 questions
Articles 200, 210, 220, 225, 230, 240, 250	
Wiring Methods and Materials	3- 5 questions
Articles 300, 305, 310, 320, 321, 333-356, 362, 370, 373, 374, 380, 384	
Electric Equipment for General Use	3- 5 questions
Articles 400, 402, 410, 411, 422, 424, 430, 440, 445, 450, 480	
Special Equipment	6- 8 questions
Article 600	

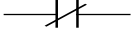
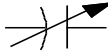
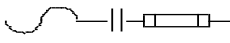
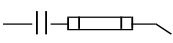
Part III Sample Tests

All questions on these examinations are multiple choice with one correct answer and three incorrect choices. Choose the best answer to each question. The answers to most questions can be found in the *Chicago Electrical Code* (2002, 2003 or 2004 editions); many questions may require locating information from more than one section of the *Code*. Successful candidates must be sufficiently familiar with the organization of the *Code* to locate all information relevant to each question efficiently. The best way to prepare for this test is to practice answering questions while using only a clean, unmarked copy of the *Code* as required during the test.

Questions 1 through 15 illustrate topics in the core examination, which covers content common to all Supervising Electrician classifications. The remaining questions offer examples of items that may appear in the examinations for any Supervising Electrician classifications for which that section of the *Code* appears in the content outline for that category of license. References document the answers to sample questions in an Answer Key at the end of this test.

1. Which statement most accurately describes the skin effect?
 - A. It has the same value for all conductor and cable gauge sizes.
 - B. It indicates increased resistance of a circuit to alternating current.
 - C. It measures condensation of a moisture film on a conductor's surface.
 - D. It reduces the attraction of two wires with similarly directed DC currents.

2. Which of the following symbols represents an adjustable capacitor in an electrical diagram?

A. 	C. 
B. 	D. 

3. What electrical units are used to express the actual maximum load for lighting units that employ ballasts, transformers or auto-transformers?

A. Volts	C. Watt-hours
B. Amperes	D. Amps Volt-Amperes

4. What is the line current drawn to a 3Ø generator that is delta-connected to a balanced three-wire, 20 kVA, 240 V, 3Ø load with a power factor of one?

Assume $I_L = \frac{W}{\sqrt{3}}$	
A. 48.1	C. 104.3
B. 83.3	D. 144.3

11. For direct current systems supplied from an off-premises source, the grounding connection is made
 - A. on interior wiring.
 - B. at a supply station.
 - C. at individual services.
 - D. on the supply side of the service disconnecting means.

12. What is generally the minimum size conductor, either solid or stranded, used in electrical contracting work other than for special applications?
 - A. AWG No. 12
 - B. AWG No. 13
 - C. AWG No. 14
 - D. AWG No. 15

13. The radius of the curve of the inner edge must be at least five times the diameter of the cable for bends in all of the following **EXCEPT**
 - A. armored cable.
 - B. nonmetallic sheathed cable.
 - C. 1" metal-clad cable.
 - D. ¾" mineral insulated metallic sheathed cable.

14. What is the ampacity for a type HPD No. 14 flexible cord with four current-carrying conductors?
 - A. 20 amperes
 - B. 17 amperes
 - C. 16 amperes
 - D. 14 amperes

15. Which of the following is a provision of the *Chicago Electrical Code* for transformers?
 - A. Water piping is not permitted to pass through a transformer vault.
 - B. Transformer vaults shall be ventilated with flues or ducts, have fire doors, be kept locked and have a door sill or curb at least 6 inches high.
 - C. A 75 kVA transformer shall be installed at least one foot from any combustible walls.
 - D. Electric furnace transformers with a total rating greater than 25 kVA shall be installed in a vault.

16. How much unobstructed bending space is required in the gutter for a four-wire, size 350 kcmil conductor in a motor control center?
- A. 8 inches
B. 10 inches
C. 12 inches
D. 14 inches
17. What is the full-load current for a $\frac{3}{4}$ horsepower single-phase alternating current motor rated at 200 volts running at ordinary speed?
- A. 6.9 A
B. 7.9 A
C. 9.2 A
D. 13.8 A
18. Stairways in common areas of three-flat apartment buildings shall
- A. be illuminated at all times.
B. have standard exit signs above all doors leading to the stairs.
C. be illuminated from one hour before sunset until one hour after sunrise.
D. be illuminated and have double-pole switches to control the lighting at each door leading to the stairs.
19. Portable equipment for audio signal processing shall be
- A. grounded by an approved means when housed in a metal enclosure.
B. securely mounted on the building at each location where it is used.
C. installed only with an approved flexible cord or MI cable.
D. served by isolated ground receptacles.
20. How far below grade must underground service conductors in rigid metal conduit for a fire pump be buried?
- A. At least 6 inches
B. At least 18 inches
C. At least 24 inches
D. At least 36 inches
21. The auxiliary source of current in a hospital emergency system
- A. may be an on-site generator or an approved storage battery.
B. may be from the same service drop as the normal source of current.
C. shall be from approved transformers in a vault inside a hospital building.
D. shall be an approved service from a utility if the normal source of current is an isolated plant.

22. Which of the following is **INCORRECT** regarding overcurrent devices for circuits operating at less than 50 volts?
- A. Overcurrent devices shall be enclosed or suitably protected.
 - B. Enclosures for overcurrent devices shall be mounted vertically.
 - C. Circuit breakers shall indicate whether they are in open or closed position.
 - D. A disconnecting means shall be provided on the supply side of the fuses or thermal cutouts.
23. Which of the following are Class I remote control circuits?
- A. Signal circuits in which power is limited
 - B. Remote control circuits in which power is not limited
 - C. Circuits that would be Class 2 if they were not in a hazardous location
 - D. Signal circuits whose conductors are in the same cable with conductors of communication circuits
24. Optical fibers may always be installed in the same cable with conductors for
- A. electrical power circuits operating at 600 volts or less.
 - B. television, communication and signaling circuits.
 - C. electrical lighting circuits.
 - D. Class 1 circuits.
25. Which of the following is required by the *Chicago Electrical Code* when poles support both communication conductors and light or power conductors?
- A. Open communication conductors shall be insulated from woodwork.
 - B. Communication conductors shall be kept at least 8 feet above all roofs.
 - C. The light and power conductors shall be below communication conductors.
 - D. Communication conductors shall not be attached to a cross-arm that carries light or power conductors.

ANSWER KEY

The *Chicago Electrical Code* (2002, 2003 or 2004 editions) is the primary reference for these examinations. Answers to most items can be located through the *Code* index; other items require the candidate to refer to *Code* headings and/or section numbers. Many items also refer to additional sections of the *Code*. All applicable *Code* listings are provided, plus citations for other references.

Question	Correct Answer	<i>Chicago Electrical Code</i> plus Other References
Sample Core Examination Questions		
1	B	<i>American Electrician's Handbook</i> , §1.123, 3.61
2	C	<i>Handbook</i> §1.19
3	B	<i>Handbook</i> §3.37, 38; 2002 <i>Code</i> , §220.4b
4	A	<i>Handbook</i> §1.152 to 155; $I_L = 20\text{kVA}/(240 \cdot \sqrt{3})$ $= 20,000/(240 \cdot 1.732) = 48.1 \text{ A}$
5	D	<i>Code</i> §900, Table 8; <i>Handbook</i> §1.103, Equation 27. Table 8 shows resistance= $0.0797/1000' = .000797 \text{ ohms}$. Voltage drop is $E=IR=(300\text{A})(.000797\Omega) = 0.2391 \text{ V} = 0.24 \text{ V}$
6	D	<i>OSHA</i> §1926.403(c)(2)
7	A	<i>Code</i> §110.5
8	D	<i>Code</i> §13-12-040, 430.7, 450.43c, 502.2a3
9	C	<i>Code</i> §13-20-480
10	D	<i>Code</i> §210.56, 250.119
11	B	<i>Code</i> §250.164a
12	C	<i>Code</i> §310.5
13	C	<i>Code</i> §330.13, 333.8, 336.16
14	C	<i>Code</i> §400.5
15	A	<i>Code</i> §450.47, 450.43, 450.26, 450.21a

Sample Supplemental Examination Questions

16	C	<i>Code</i> §430.10b, 373.6a
17	B	<i>Code</i> §430.148
18	A	<i>Code</i> §560.7a2
19	A	<i>Code</i> §640.7, 640.9
20	A	<i>Code</i> §695.6a1, 300.5
21	D	<i>Code</i> §700.33
22	D	<i>Code</i> §720.8, 240.40, 240.20b, 240.30, 240.33
23	B	<i>Code</i> §725.21
24	B	<i>Code</i> §770.52
25	D	<i>Code</i> §800.10a2