OAHI Electrical Performance Standard and Knowledge Base

June 10, 2002 v.1.2

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Acknowledgements

The OAHI thanks Humber College and the following participants for their contributions to this project:

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1. Introduction

a. Home inspectors are independent consultants providing an impartial assessment of building conditions to assist their clients' property decisions. Inspections are typically performed for buyers or occupants of small residential and light commercial (non-assembly) properties. The goal of the inspection is to:

(i) describe installed building systems by their type,

(ii) identify defects that are significant to safety, normal function, and the clients's intended use, and

(iii) report the findings and recommendations to the client.

b This document is restricted to the skills and knowledge required for the competent inspection of ELECTRICAL systems. ELECTRICAL [1] systems refer to permanently installed service and distribution wiring, fixtures and equipment in the building.

c. This document is based on the OAHI validation session held at Humber College in January 2002, during which a group of experienced OAHI members validated the component skills and knowledge required for the various inspection subtasks.

2. Purpose

The purpose of this document is

a. to provide students and educators in the home inspection field with the areas of study and background knowledge needed to achieve a basic understanding of the ELECTRICAL requirements for small buildings of residential and light commercial (non-assembly) occupancies, in order to perform inspections of these systems in accordance with the standards of the OAHI; and

b. to provide the profession with a format for defining the ELECTRICAL curriculum for home inspectors, and determining the importance of various skills and background knowledge for curriculum development and qualification testing.

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[1] ASHI/OAHI Standards currently exclude low voltage systems, part of the Electrical Safety Code and OBC, and relevant to occupant safety.

3. Learning Outcomes

Upon successful completion of areas of study outlined in this document, the student will be able to:

a. identify the various components typically found in residential ELECTRICAL Systems and be familiar with the fundamental principles of their operation (background theory and terminology);

b. identify typical residential ELECTRICAL Systems, both new and old, have a basic understanding of the legal requirements regulating the installation and maintenance of these systems, and know where to find references;

c. understand how to safely perform visual inspections of ELECTRICAL Systems in accordance with OAHI standards, and understand proper use of tools and procedures necessary to do so;

d. identify and report deficiencies commonly found in these installations, and make recommendations to the client in a clear and concise manner; and

e. understand the interrelationship of ELECTRICAL systems and components with other building components, and the impact of ELECTRICAL related deficiencies on the building and its occupants.

4. Knowledge and Skill Types

A home inspector requires five knowledge and skill types to competently perform the various inspection tasks. Students should be able to demonstrate a basic understanding of the following:

a. Background Theory and Terminology

Understand terminology, operating principles, normal operation, and interaction of ELECTRICAL systems and their components with other building systems, to the extent that these concepts can be explained to a non technical client.

b. Installation and Maintenance Practices

Understand how ELECTRICAL systems and their components should be installed and maintained, to the extent that significant installation and maintenance deficiencies can be identified and described.

c. Related Regulations and Requirements

Understand code and other legal requirements for installation and maintenance for ELECTRICAL systems, to the extent that significant deviations can be

identified and described, with the assistance of appropriate references.

d. Inspection Procedures, Tools and Safety

Understand which visual and functional tests should be performed, parameters of acceptable conditions, which tools used, and associated limitations and safety issues, to the extent that the student can describe appropriate inspection procedures, acceptable conditions and safety concerns for common ELECTRICAL equipment.

e. Reporting Defects

Understand how defects should be reported both verbally and in writing to the extent that the client or others affected understand the significance of the situation, and act accordingly. Students should be able to apply the OAHI Defect Recognition and Reporting Five-Step Model for Analyzing and Reporting conditions.

i. Describe the component and its installation
ii. Identify the function it performs
iii. Identify the deficiency and how it affects the function
iv. Identify how will this condition affect the client, owner or occupant
v. Report so the client understands and acts on your recommendations

5. ELECTRICAL Inspection Task Types (Description and Rationale)

Tasks typically performed by home inspectors are as follows:

a. Identify a system or component by its type

The home inspector identifies a system or component by its characteristics to distinguish it from other types. The home inspector describes the system or component in writing to document that the component was inspected and to verify technical information which may have been represented by others. The home inspector frequently explains details of the operation, required maintenance and other serviceability issues to the client, based on the type.

Aspects of the system or component which are commonly identified by type include:

i purpose or function of the system or component,

ii location of equipment and extent of building area served,

iii energy source(s),

iv rating,

v capacity to serve modern requirements, and

vi operating controls.

b. Visually observe the physical condition

The home inspector conducts a visual examination of readily accessible components with the goal of determining if the components appear to be in safe and serviceable conditional, capable of meeting the required function. The home inspector reports in writing situations in which equipment appears to be unsafe, damaged, deteriorated, unserviceable or not functioning, and provides recommendations regarding corrective action or further evaluation.

Aspects of the physical condition which are typically observed include:

i location and clearances of equipment,

ii age, rating and size (capacity) of the equipment,

iii installation, and connections to other components

iv apparent state of repair, and

v presence of deterioration, damage or other conditions that affect normal operation.

General Limitations - A home inspector by virtue of his or her training should be capable of opening access panels intended for the use of the occupant, or designed to permit [2] safe component inspection without disassembly of operating components. The home inspector should not be opening equipment where there is a risk of damage, disruption or safety may be compromised. The client should be advised when equipment can not be observed and why. A home inspector typically accesses service and distribution panels with connections to overcurrent protection, but will not open all accesses, and junction boxes due to time limitations.

c. Observe operation of a system or component

The home inspector operates the system or component by activating normal operating controls intended for the use of the occupant, such as switches. The home inspector reports in writing situations in which the operation of a component can not be tested, or appears to be unsafe, not functioning,

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2. It is debatable whether the current practice of removing access covers without deenergizing the system is safe, or should be endorsed.

malfunctioning or not capable of meeting its required function and provides recommendations regarding corrective action or further evaluation.

Aspects of the operation of a system or component which are typically observed include:

i operation of permanently installed lighting fixtures and equipment;

ii operation of receptacles and presence of correct polarity;

iii operation of GFCI devices and extent of circuit protection;

iv. presence of abnormal discharge, odours, vibration or other apparent malfunctions;

General Limitations - A home inspector by virtue of his or her training should be capable of operating systems with controls intended for the use of the occupant and detecting readily observable defects and malfunction. The home inspector should not be operating equipment which is shut down, where the controls are unclear, or any other situation where there is a risk of damage, disruption or safety may be compromised. The client should be advised when equipment can not be operated and why. A home inspector typically checks operation of a representative number of lighting fixtures and receptacles, but may not operate all switches, equipment or receptacles due to time limitations, and access restrictions such as the presence of furnishings.

6. ELECTRICAL Systems and Components (Typical Types)

Home inspectors need to be familiar with the typical residential ELECTRICAL system types and components as listed below.

a. Typical ELECTRICAL System Types

The following heating system types may be encountered by home inspectors:

i 120/240 volt Systems

ii Three phase Systems (seldom encountered)

iii Low Voltage Systems

iv Self Contained (Generator) Systems (seldom encountered)

b. Electrical Components Inspected

The components inspected typically include:

i Service conductors from point of entry at the property;

ii Service entrance conductors, mast, conduits, meters, etc, on building exterior and interior;

iii Service disconnect;

iv Service grounding equipment;

v Distribution panels including overcurrent protection;

vi Distribution branch circuit wiring;

vii Permanently installed receptacles, fixtures and equipment.

c. Electrical Components Identified

Home inspectors typically identify Electrical systems according to:

i service utility and entrance type (underground vs overhead);

ii main disconnect type (fuse vs circuit breaker) and location;

iii voltage and amperage rating;

iv overcurrent protection type(s) (fuse vs circuit breaker)

v wiring types (service and distribution) such as copper vs aluminum, grounded vs.ungrounded, and conduit type such as Loomex, BX and knob and tube.

7. Specific ELECTRICAL Inspection Tasks and Required Knowledge/Skills

The knowledge and skills required to competently perform inspections are listed in the Appendix according to the Tasks summarized below. This listing is not intended to be all inclusive and may not include all systems or situations a home inspector may encounter in the field.

Electrical

1. Inspect service entrance
3. Inspect service disconnect
4. Inspect distribution panels
5. Inspect distribution system
6. Observe operation of lighting fixtures, receptacles and fixed equipment

8. Explanation of Importance Scale

The importance of the knowledge and skills has been validated by experienced OAHI members, according to a Likert scale ranking of Importance or Frequency of Practice. The home inspector is likely to encounter certain types of equipment and issues based on geographic location, individual tools and practices, and types of properties inspected. The importance of various skills and background knowledge and the ranking of individual skills and knowledge required may change in future updates of this document. The following scale has been applied:

Likert Scale Ranking of Importance or Frequency of Practice

1.	Never	The skill or knowledge is never required for performing a competent inspection.
2.	Seldom	The skill or knowledge is seldom or infrequently required for performing a competent inspection.
3.	Sometimes	The skill or knowledge is sometimes or frequently required for performing a competent inspection.
4.	Usually	The skill or knowledge is usually or in most situations required for performing a competent inspection.
5.	Always	The skill or knowledge is always required for performing a competent inspection.

The Mean score of Importance indicates the average ranking (as scored by a number of

individuals) and may be categorized and interpreted as follows:

i Essential Category (Mean score between 3.5 and 5.0)

These skills and knowledge are fundamental to performing a competent inspection and should receive priority in both educational presentation and qualification testing.

ii Useful Category (Mean score between 2.0 and 3.5)

These skills and knowledge are useful and sometimes required for performing a competent inspection, but should receive lower priority in both educational presentation and qualification testing.

iii Peripheral Interest (Mean score between 0 and 2.0)

These skills and knowledge are seldom required for performing a competent inspection, but should receive some (minimal) mention in educational presentation and qualification testing.

9. Qualification Testing Formula

Students should be evaluated according to the following weighting.

a. Weighting of Skill Types (50% Theory and 50% Application)

As a guideline, 50 % of the grade weighting should be comprised of background Theory and Terminology, Installation and Maintenance Practices, and Related Regulations and Requirements. The remaining 50 % should be comprised of Inspection Procedures, Tools, Safety and Reporting Defects.

b. Importance of the Concepts

As a guideline, 60 % of the weighting should be concepts considered to be in the Essential Category, 30 % of the weighting should be concepts considered to be in the Useful Category, and the remaining 10% of the weighting should be concepts considered to be in the Peripheral Category.

10. Reference Texts

a. Background Theory, Terminology, Installation and Maintenance

i Electrical Wiring- Residential (Nelson) Mullin and Fraser

ii Electrical Code Simplified - Ontario Book 1 P.S. Knight

iii Electrical Code Simplified - Book 2 P.S. Knight

b. Regulations

i Ontario Building Code 1997

Section 9.34 Electrical Facilities
Section 9.10.17-18 Alarm and Detection Systems, Smoke Alarms

ii Ontario Electrical Safety Code

iii. Natural Gas and Propane Installation Codes B149.1-00

c. Home Inspection Practice and Procedures

Various authors and proprietary training materials.

OAHI Electrical Curriculum Session Conducted at Humber College on Jan 7, 2002

To perform a competent inspection, a student requires a basic understanding of the following SKILL TYPES

a	Background Theory and Terminology	Understand terminology, operating principles, normal operation, and interaction so these concepts can be explained to a non technical client.
b	Installation / Maintenance Practices	Understand how the components should be installed and maintained so significant installation and maintenance deficiencies can be identified and described
c	Related Regulations / Requirements	Understand code and other legal requirements for installation and maintenance so significant deviations can be identified and described, with the assistance of references.
d	Inspection Procedures, Tools and Safety	Understand which visual and functional tests should be performed, acceptable conditions, which tools used, limitations and safety issues
e	Reporting Defects...	Understand how defects should be reported both verbally and in writing

Likert Scale Ranking of Importance or Frequency of Practice

1	**Never**..	The skill or knowledge is never required for performing a competent inspection.
2	**Seldom**..	The skill or knowledge is seldom or infrequently required for performing a competent inspection.
3	**Sometimes**..	The skill or knowledge is sometimes or frequently required for performing a competent inspection.
4	**Usually**..	The skill or knowledge is usually or in most situations required for performing a competent inspection.
5	**Always**..	The skill or knowledge is always required for performing a competent inspection.

Ref	Tasks and Subtasks	Skill Type	Description of Knowledge or Skill Required	Responses R1	R2	R3	R4	R5	Mean
1.00	**Preinspection Preparations**								
1.01	Arrange for power to be on	c d e	Understand the limitations of an electrical inspection if the power is not on.	2	6	3			**2.09**
1.02	Assess unsafe conditions before accessing all electrical equipment	c d e	Understand safety precautions and procedures around live power including adequate clearances, proper light, need for dry conditions and opening equipment which is deteriorated				3	9	**4.75**

1.03	Have tools and safety equipment	d	Understand what tools and equipment are needed to perform safe inspection including insulated tools, shoes, gloves and eye protection.	0	0	0	1	12	**4.92**
1.04	Advise vendor of potential power interruption during the inspection	a d	Understand what equipment should not be turned off during an inspection (such as alarms, medical and safety circuits)and what to advise the vendor about potential power interruption.	1	5	7			**2.46**
1.05	Advise client and agent of safety issues (Stay clear and Don't touch)	a d	Understand basic safety issues and be able to explain electrical inspection procedures to the client.		1	4	7	0	**3.5**
1.06	Advise client of scope and limitations of electrical inspection	a d e	Both verbally and in writing				8	5	**4.38**
1.07	Assess the understanding level of the client	a e	Be able to describe the function and operation of components in both simplistic and technical terms, depending on the understanding of the client			1	12		**3.92**
1.08	Assess current and intended use	a c	Understand modern domestic electrical requirements			1	8	3	**4.17**
2.00	**Inspect condition of service entrance**								
2.01	Determine if service is overhead or underground	a e	Be able to describe these installations and which components are the responsibility of the property owner and electrical service utility					13	**5**
2.02	Inspect overhead clearances and condition	abcde	Above roof , driveways, swimming pools, etc.				2	11	**4.85**
2.03	Inspect service poles and wires on the property	abcde			1		4	7	**4.42**
2.04	Inspect weather head and mast	abcde	Height, support, guy wires, flashing, wood mast rot, strength of support				1	13	**4.93**
2.05	Inspect drip loop connections	abcde	Connections, length of loop and dripability					14	**5**
2.06	Determine phase and voltage of service (120/240 volt) and recognize 3 phase services	abe	Understand how to count the wires and other indicators to determine if the service is single or three phase				1	13	**4.93**
2.07	Inspect for underground conduit separation (settlement) and shifting or separation of meter base	abcde	Understand dangers of shifting of meter and its assembly					*14*	**5**
2.08	Inspect overhead service attachments, mast, insulators and meter base	abcde	Understand modern requirements, older installations and restrictions of utilities				1	13	**4.93**

2.09	Inspect meter location	abcde	Understand vulnerability to mechanical damage and clearances, height, accessibility, for pools and fences					14	**5**
2.10	Inspect meter seals	bce	Recognize utility tag to ensure power is not stolen, unauthorized alteration and related safety issues	1	1	3	3	5	**3.77**
2.11	Determine if meter is conventional or demand, time and use	a	Understand typical methods of calculating power usage as high usage meters are becoming more common	3	3	4		3	**2.77**
2.12	Inspect conduit entrance and seal to building envelope	cde	Recognize potential sources of animal, insect and water entry where gaps are present				3	11	**4.79**
2.13	Visually inspects compatibility of service component	abcde	Recognize acceptable older installations with conductors and small diameter conduits, and inappropriate changeover of main panel such as 60 to 100 amp				4	10	**4.71**
3.00	**Inspect condition of service disconnect and grounding/bonding**								**####**
3.01	Identifies type of main disconnect.	ab	Identify circuit breaker, fuse or none					14	**5**
3.02	Visually inspects condition of panel.	abcde	Recognize computability, deterioration, damage, overheating, location, other adverse conditions, and accessibility issues					14	**5**
3.03	Open main disconnect fuse panel	abcde	Recognize situations where disconnect is easily and safely accessible, but also deteriorated and some older (generally pre 1960) disconnects that may fall apart				4	9	**4.69**
3.04	Remove disconnect cover on combination panels	d	Understand the dangers. This procedure viewed as usually dangerous	9	2	1	2		**1.71**
3.05	Visually inspect conduit seal at main disconnect	bcd	Recognize signs of condensation, insects, water, rodents, etc. (assuming cover is removed)				4	9	**4.69**
3.06	Identifies size (rating plate) of disconnect and service panel.	bcd	Be able to identify the rating of the disconnect panel and explain limitation of service size				4	10	**4.71**
3.07	Determine the factor(s) limiting ampacity	abcde	Understand these factors (acceptable conditions generally not reported)			1	2	11	**4.71**
3.08	Determines compatibility of wire size with main fuses/breakers.	abcde	Where the disconnect panel can be safely accessed					14	**5**
3.09	Visually inspects existence and condition of grounding.	abcde	Understand neutral to grounding clamp to water main or ground rods, issues related to plastic water mains, corrosion of wires under slabs, connection of service neutral and ground wires, and grounding screws					14	**5**

3.10	Locate panel and evaluate accessibility	abcde							14	**5**
3.11	Measure voltage and amperage	d	This procedure is hazardous and is not recommended.	10	4					**1.29**
3.12	Evaluate adequacy of capacity	abcde	Understand the client's intended use, and ballpark assessment for adequacy in typical residential use. Student should be familiar with calculation methods of the Ontario Electrical Code			1	8	5		**4.29**
3.13	Inspect for corrosion inhibitors on aluminum wire	bcde	Understand requirements for stranded aluminum conductors (assumes panel can be safely opened)				3	11		**4.79**
3.14	Inspect for tap on main	abcde	Recognize double taps and unauthorized connections						14	**5**
3.15	Inspect grounding and bonding to downstream electrical and other components	cd	Such as gas lines				5	9		**4.64**
3.16	Inspect for branch circuit conductors passing through main breaker compartment	cd	Where accessible						14	**5**
4.00	**Inspect condition of distribution panels**									
4.01	Determine wire type and materials (copper /aluminum)	abcde	Recognize copper, tin coated copper, aluminum, knob and tube etc. Understand requirements for specific wire types						14	**5**
4.02	Determine overcurrent protection device ratings in relation to conductor size and material	abcde	Recognize special needs of dedicated motor circuits and central air compressors						14	**5**
4.03	Check panel capacity against the size of main disconnect	abcde	Understand computability issues						14	**5**
4.04	Inspect for multiple taps	abcde							14	**5**
4.05	Inspect for signs of loose connections	abcde	Recognize corrosion, insulation deterioration, and discolouration and their significance						14	**5**
4.06	Inspect for signs of overheating	abcde	Recognize odours, noises (buzzing at bus bars) distinguish from relays and transformers normal buzz, stains, discolouration, etc.						14	**5**
4.07	Inspect phasing of overcurrent protection	abcde	Understand how this situation may occur (example FPE panels) and its significance	4	5	1	2	2		**2.5**
4.08	Inspect breaker condition and tightness	bd	Recognize visual signs of looseness and deterioration, without manipulating the breaker			6	6	2		**3.71**
4.09	Test ground fault circuit interrupter breakers	cd	Understand typical GFCI installations and testing problems where the GFCI is not accessible						14	**5**
4.10	Inspect for openings in panel	cd	Understand the safety implications						14	**5**

4.11	Inspect for cable termination restraint clamps	cd	Understand clearances and need for restraint of components						14	**5**
4.12	Inspect for room for expansion (more circuits)	bc	Recognize situations where more circuits may be required, methods of expanding distribution and limitations to expanding existing panels			2	6	5	**4.23**
4.13	Inspect 3 wire (240 volt) circuits for proper linking	d	Recognize visual signs of proper linking (Editor's addition: and understand how to verify 240 voltage using test equipment)				1	13	**4.93**
4.14	Inspect grounding connections of distribution circuits at panel	d	Understand requirements for neutral and bonding conductors for distribution circuits to subpanels and subpanels to distribution panels, within the same building and where connected to other buildings				1	13	**4.93**
4.15	Inspect low voltage transformer connections	cd	Understand requirements for connections to 120 volt circuits		5	5	2	2	**3.07**
4.16	Inspect subpanel overcurrent protection devices and conductors	acd	Understand requirements for sizing and computability					14	**5**
4.17	Inspect for abandoned wires in panel	bcd	Understand significance					14	**5**
4.18	Inspect for obsolete or recalled overcurrent devices	b	Understand serviceability issues such as the need to replace older components where replacement parts are no longer readily available (such as Bulldog Pushamatic circuit breakers)		2	3	3	5	**3.85**
4.19	Inspect for circuit identification	bc	Understand significance and requirements	2		3	6	2	**3.46**
4.20	Inspect for anti-oxidant on aluminum conductors	bc	Understand significance and requirements					14	**5**
5.00	**Inspect condition of distribution system**									**####**
5.01	Identify wiring type (three wire/knob and tube)	abcde	Understand methods of installation, serviceability issues such as expansion and connections, and concerns of insurers					14	**5**
5.02	Inspect visible wiring installation	d	Understand methods of installation, clearances and signs of improper installation					14	**5**
5.03	Inspect connections to junction boxes	d	Understand where junction boxes are required and access issues					14	
5.04	Inspect connections in junction boxes	d	Understand when junction box covers should be removed. (There is varied opinion how many covers of junction boxes should be removed.)	4	5	5			**2.07**
5.05	Inspect accessible switches and /or receptacles of aluminum wire connections	bcd	Understand and recognize problems with these connections	2	2	3	3	2	**3.08**

5.06	Inspect clearances of conductors	abcde	Understand requirements and signs of deterioration where conductors touch metal ductwork, wall surfaces, metal studs			2	4	6	**4.33**
5.07	Inspect for grounded/ungrounded circuits	abcde	Understand visual signs and circuit tester use and their limitations					14	**5**
5.08	Inspect compatibility of wire type with installation	acde	Understand requirements for wet locations, romex underground, knob and tube (designed to be air cooled)				3	11	**4.79**
5.09	Inspect bonding of water line with gas line	cd	Understand requirements (newer code requirement)	1	4	6	2	1	**2.86**
5.10	Test electrical outlets for polarity and grounding	d	Understand testing and sampling (Performed as random sample)					14	**5**
5.11	Inspect location, number and condition of receptacles	acd	where accessible				1	13	**4.93**
5.12	Inspect lighting fixtures for condition, clearances and location, damp conditions, recessed lighting protection	abcde	Understand computability, accessibility, clearances, typical installations including closets, insulated ceilings, and low height applications			1	2	11	**4.71**
5.13	Inspect fixture-bulb compatibility	bc	Understand the significance. (This issue is generally not addressed, but we should do it, especially for pot lights)	4	4	1	3	1	**2.46**
5.14	Inspect exterior receptacles for weather proofing and location	abc	Understand installation, maintenance and clearance issues					14	**5**
5.15	Inspect ground fault circuit interrupters where installed	bd	Inspect ground fault circuit interrupters where installed, and recommend installation for safety where appropriate					14	**5**
5.16	Inspect location and condition of switches	abcde	Understand significance of switch location for occupant safety, including 3 way switches at stairs				3	11	**4.79**
5.17	Inspect for ungrounded 3-prong receptacles	d	Understand how to test and randomly sample, where accessible, and limitations					14	**5**
5.18	Inspect compatibility of aluminum wire to fittings	bcd	Understand specific connection requirements and history of problems, remedies, and recommendations from ESA	5	1	5	1		**2.17**
5.19	Inspect for shut-off switches on permanently connected equipment (furnace motor, etc)	abcde	Understand requirements and significance of accessible shut off switches				2	12	**4.86**
5.20	Inspect for open splices	bd	Understand the significance and identify where visible					14	**5**
5.21	Inspect location of smoke alarms and CO alarms	abcd	Understand and be able to explain requirements		2	1	7	4	**3.93**

5.22	Inspect presence of smoke alarms and CO alarm	bde	Understand and be able to explain requirements		1		2	11	**4.64**
5.23	Inspect operation of smoke alarm and CO alarm	de	Activating test button, assuming unit can be tested and is not connected to a monitoring station. Explain limitations to client	8		2	3	1	**2.21**
5.24	Inspect for permanent use of extension cords	abcde	Understand the significance					14	**5**
5.25	Inspect location and condition of fire alarm system	ecd	Identify the presence of these systems to clients. (Student should understand these systems are required where 10 or more occupants (Ontario Fire Code) and specialized testing is required)	13	1				**1.07**
5.26	Inspect location and condition of security system	ad	Identify the presence of these systems to clients. (Verification of system operation requires specialized knowledge)	13	1				**1.07**
5.27	Inspect low voltage systems (such as permanently installed lighting circuits)	abcd	Understand how these systems operate including lighting relays, smart relays	8	2	4			**1.71**
5.28	Inspect distribution wiring to out-buildings	abcde	Understand typical requirements and deficiencies					14	**5**
5.29	Inspect conductor size in relation to appliance rating plate	abcde	Understand the significance. (Mostly applies to permanent connections, where appliance or fixture and rating plate are accessible)				4	10	**4.71**
5.30	Inspect grounding and bonding of appliances	abcde	Understand the significance. (Mostly applies to permanent connections, where appliance or fixture is accessible)	8	3	1	1	1	**1.86**
5.31	Inspect clearances of ceiling fans	abcde	Understand the significance		1	2	2	9	**4.36**
5.32	Evaluate adequacy of capacity of distribution circuits	abcde	Understand typical residential requirements			1	7	6	**4.36**
5.33	Inspect flat rate equipment	abcde	Inspect connections and verify operation of equipment such as domestic water heaters	3	2	1	1	6	**3.38**
5.34	Inspect backup power connections and switches such as generators	acd	Understand safety and installation requirements. This equipment is often owner installed, comparatively rare, but now readily available. Issues include: double throw switch, and ESA and other approval stickers	1			1	9	**4.55**
5.35	Inspect load misers	acd	Recognize and understand the operation of these devices	3	3	3	1	3	**2.85**
6.01	**Use of Specific Tools**		How often do you use the following tools; (1) Never, (2) Seldom, (3) Sometimes, (4) Often, (5) Always						
6.01	rated shoes		CSA green tag	1	4	1		2	**2.75**

6.02	power screwdrivers		4			1	3	**2.88**
6.03	GFCI tester						8	**5**
6.04	volt meter		1	5			2	**2.63**
6.05	amp meter		3	2		1	2	**2.63**
6.06	wire size gauge		8					**1**
6.07	voltage sniffer detector					1	7	**4.88**
6.08	regular screw drivers						8	**5**
6.09	flashlight						8	**5**
6.10	wood probe		6				2	**2**
6.11	Trouble light		4	3			1	**1.88**
6.12	Binoculars		1	2	2		3	**3.25**
6.13	Gloves insulated		5	2	1			**1.5**
6.14	Ladder uninstalled						8	**5**
6.15	Ladder insulated		8					**1**
6.16	Eye protection		1	1	1		5	**3.88**
6.17	Camera or digital images		2	1	1		4	**3.38**
7.00	**Theory**	How important is theory needed to understand what is observed: (1) not important, (2) seldom important, (3) sometimes important, (4) usually important, (5) always important						**####**
7.01	Ohms law and relationship of voltage, current, power, amperage				1	3	4	**4.38**
7.02	service size calculation					2	5	**4.71**
7.03	phasing		1		2	0	4	**3.86**
7.04	understand basic circuits						8	**5**
7.05	Theory of grounding and bonding						8	**5**
7.06	Ground faults						8	**5**
7.07	Overcurrent protection						8	**5**
7.08	Installation codes					4	4	**4.5**
7.09	Inspection limits relative to codes						8	**5**
7.10	AC vs. DC				1	2	5	**4.5**
7.11	Terminology						8	**5**
7.12	Insurance Issues	Knob and tube, 60 amp					8	**5**
7.13	Read blueprints		1	3	2	1	1	**2.75**
7.14	Administration of codes	Who does what, ESA for installation and ongoing issues		1		2	5	**4.38**