

ETA **BASIC** RESI COMPETENCIES - 2009 NCEE COMPETENCIES PROJECT

RESIDENTIAL ELECTRONICS SYSTEMS INTEGRATOR – RESI

There are **two** levels of expertise proposed for those who install and integrate electronics systems in residences and interconnect electronics communications, computer, control or entertainment equipment: the **Basic RESI**, Residential Electronics Systems Integrator, and the **Master RESI**, Residential Electronics Systems Integrator.

The **BASIC RESI** is proficient in the design of pre-wiring for home theater and telecommunications equipment interconnection. He/she will install network wiring for cable TV, satellite and antenna outlets, telephone equipment outlets, audio and video entertainment, and computer equipment in such a manner that all control and communication signals can be integrated at the home controller and converged into one cogent IP bit stream, to either be used within the residence or to be passed back and forth through the home gateway. He/she will be proficient in the many protocols used over diverse media to communicate with and control residential electronics systems, in addition to the skills required for low voltage wiring installation. He/she will work from house telecommunications wiring plans, installing cable fittings and selecting the specified cabling for each technology. He/she will test, mark and document all cabling and will have the ability to troubleshoot and restore pre-existing cabling systems. RESI Integrators typically will also be qualified in one or more of the five (5) endorsement specialty areas listed below.

The **MASTER RESI** will be proficient in all of the core RESI skills and knowledge and in planning and designing electronics and communications equipment systems and layout for new and existing construction. The MASTER RESI is capable of designing the entire system and network for audio, video, data and control of security and environment to function in one IP bit stream converged at the home controller. He/she is also capable of troubleshooting and debugging the system and planning installation or modifications. The MASTER RESI has extensive knowledge of the operation and technology and is proficient in each of the basic five subcategories of residential electronics.

RESI CERTIFICATION PROGRAMS:

The **RESI** can become certified with ETA® International by passing the knowledge examination assessments, **RESI BASIC Skills & Knowledge**.

In addition, **RESI** certificants can also acquire one or more of the five (5) subcategories endorsement certifications, as listed below:

- **RESI (Basic Core Integrator)**
- **RESI Endorsements:**
 1. **Audio/Video**
 2. **Computer Networking**
 3. **Security-Surveillance**
 4. **CCTV (Closed-Circuit TV)**
 5. **Environmental Control**
- **MASTER RESI Integrator**

The **MASTER RESI** certification prerequisites include successfully completing the core RESI certification requirements, plus holding **each** of the five (5) RESI subcategory endorsements.

To qualify for the ETA **MASTER RESI**, Residential Electronics Systems Integrator, a technician must:

- Hold the RESI Basic certification
- Pass each of the five (5) specialty endorsements
- Pass a separate Master RESI examination

ETA BASIC RESI COMPETENCIES - 2009

BASIC CABLING/ELECTRONICS SKILLS & KNOWLEDGE

1.0 Safety

- 1.1 List tasks that may, or may not, be performed by trained First Aid workers
- 1.2 List the level of electricity (shock) considered lethal to humans
- 1.3 Describe OSHA body restraint rules and list hazards associated with the use of ladders and working at heights
- 1.4 Explain the purposes and reasons for technician adherence to NEC and NFPC codes
- 1.5 Explain the purpose and usage of the REMC (Residential Electrical Maintenance Code)

2.0 Industry Standards

- 2.1 Describe the situations where an installer needs to refer and abide by TIA 570-A
- 2.2 Describe the cabling components and methods addressed by TIA/EIA-568-A, TIA/EIA-568-B, and ANSI/TIA-568-C
- 2.3 Describe the Telcordia standards related to cabling
- 2.4 Explain how to find correct cable pair colors and list the applicable TIA/EIA standard

3.0 Low Voltage Wiring

- 3.1 Demonstrate use of blue prints – and adherence to specifications
- 3.2 Explain wire size standards AWG, and define AWG
- 3.3 List possible governmental permits required to install or service low voltage wiring
- 3.4 Describe low voltage lighting, its usage and precautions
- 3.5 Describe current audio signal and speaker cabling and wiring and reasons for choices of wire
- 3.6 Describe CAT 5e and 6 UTP cables and preferred usages
- 3.7 Describe control and sensor wiring used for home automation and manual operation

4.0 Cabling – Connectors

- 4.1 Compare copper coax and plastic optical fiber usage in residential applications
- 4.2 Explain how 66 or 110 block panels are used as distribution and interface center for telecom services
- 4.3 Define Patch Cable and list the maximum length allowed by standards
- 4.4 Define Workstation Cables and explain usage
- 4.5 Define Backbone/Distribution cabling and compare with link, workstation and patch cables
- 4.6 Explain the differences between Composite and Hybrid Cables
- 4.7 Describe proper cable prepping tools, how ends of cables are prepared for connectors and how connectors are properly crimped
- 4.8 List the types of signal losses in cables, the purpose of matching correct impedances and convert dB levels to microvolt levels
- 4.9 Properly prep and install F coaxial cable fittings and explain impedance problems
- 4.10 Properly install UTP, CAT 5e and 6 fittings
- 4.11 Explain how and why ground loops occur in electrical circuits

5.0 Pre-wiring

- 5.1 Describe the task of roughing-in cabling in new structures, installing wall boxes, conduit, distribution boxes, speaker in-wall units, CCTV mounts, etc.
- 5.2 Explain the purpose and usage of biscuit jacks/surface mount boxes
- 5.3 Explain the use of wall plates and indicate proper locations
- 5.4 Describe purposes and locations for J-hooks and cable trays

- 5.5 Explain inductive signals and interference, their effects and precautions and separation distances for cabling
 - 5.6 List advantages of stranded vs. solid wiring and reasons for choosing either
 - 5.7 Describe detriments in exceeding TIA/EIA Tensile Strength/Bend Ratios
 - 5.8 Outline the purposes of wiring labeling and how applied
 - 5.9 Explain methods used to closely estimate cable requirements for individual applications
 - 5.10 Explain UTP untwist precautions and define NEXT/FEXT
 - 5.11 List common problems encountered in coaxial cable installation or repair
 - 5.12 Describe Surface Mount Channeling and how it is utilized
- 6.0 Electrical Basics**
- 6.1 Demonstrate calculations using each type of Ohm's Law, E, I, R & W formulas
 - 6.2 Explain electric power generators and service to residences
 - 6.3 Describe wire size choices and distribution for house electrical circuitry
 - 6.4 Compare fuse and circuit breaker boxes and describe the components and meter
 - 6.5 Compare DC and AC current and voltages
 - 6.6 Explain the purpose of electric circuit grounding and NEC rules for residences
 - 6.7 Describe lightning hazards, lightning arrestors used in electronics applications and how ground blocks are used
 - 6.8 Compare AC power frequency, voice, radio, TV and data frequencies
 - 6.9 Describe causes and methods of reducing electrical interference
- 7.0 Telephone Systems**
- 7.1 Diagram a basic telephone circuit
 - 7.2 Define Tip and Ring and show wiring conventions in POTS systems and list expected voltages on telephone plugs
 - 7.3 Name the conventional color of UTP wires used with 2/4/8 wire connections
 - 7.4 Compare Analog and Digital telephone systems
 - 7.5 Explain where Punch Down Blocks – 66/110 are used and their purpose
 - 7.6 Differentiate between Internet - Cable TV - Wireless Systems and B-VoIP
 - 7.7 Summarize common troubles associated with telephone systems and suggest repair solutions (cut underground phone drop; interface lightning damage; poor punch-down or equipment connections.)
- 8.0 Fiber Optics**
- 8.1 List fiber optic cable eye, skin and inhalation safety precautions
 - 8.2 Summarize basic light theory and list commonly used wavelengths/frequencies
 - 8.3 Demonstrate connector and splice methods and testing
 - 8.4 Differentiate between glass and plastic optical fiber and list reasons for choices
- 9.0 Residential Management**
- 9.1 Explain bar coding and modern inventory control methods for residences
 - 9.2 Explain manual, automatic and programmable appliances control
- 10.0 Premises Restoration**
- 10.2 Describe the need for drywall and other penetrations of walls and ceilings in retrofit applications
 - 10.2 Demonstrate restoration techniques and list materials used
- 11.0 Tools & Equipment**
- 11.1 Explain usage of Volt/Ohm/Amp – Multimeters in residential cabling, and demonstrate use of each function
 - 11.2 Demonstrate ability to use wire strippers/crimps/punch-down tool & fish tapes
 - 11.3 Explain usage of gopher poles, drills/bits, scissors and face mask
 - 11.4 Explain the use of a toner and light meter/source

- 11.5 Describe proper installation of F connector using compression tool and fittings
- 11.6 Explain why wire pull lubricant is needed
- 11.7 Describe proper usage and safety concerns for hand & power tools
- 11.8 Identify cable using the cable markers and discuss how to identify wires that have no markers

12.0 Customer Orientation & Documentation

- 12.1 Compare excellent customer/owner relations, problem prevention and conflict resolution concepts

13.0 Troubleshooting

- 13.1 Explain the Divide & Conquer troubleshooting method
- 13.2 List common problems and solutions in residential cabling
- 13.3 Identify sources of on-line and phone technical help from product makers and suppliers

Recommended Study Material:

Introduction to Residential Technologies, Bedrock Learning – Course Guides/Online Training
Home Theater Design and Installation, Bedrock Learning – Course Guides/Online Training
Home Networking for Installers, Bedrock Learning – Course Guides/Online Training
Fundamentals of Structured Wiring, Bedrock Learning – Course Guides/Online Training
Residential Lighting Control, Bedrock Learning – Course Guides/Online Training
Whole House Audio Technology and Distribution, Bedrock Learning – Course Guides/Online Training
RESI Basic Skills & Knowledge; eITPrep LLP, ISBN 1581220847
RESI Audio/Video; eITPrep LLP, ISBN 1581220871
RESI Computer Networking Endorsement; eITPrep LLP, ISBN 9781581221022
RESI Audio and Video Systems Endorsement; eITPrep LLP, ISBN 9781581221039
RESI Home Security and Surveillance Systems Endorsements; eITPrep LLP, ISBN 9781581221046
RESI Environmental Control Endorsement; eITPrep LLP, ISBN 9781581221053
HTI+ Certification – Concepts and Practice, Chuck Brooks, 4th Edition; Pearson Prentice Hall; ISBN 0131147722