

Performance Item

Tools for Improving this Skill

Details and Explanation For Assessment

Electrical Engineer - Testing and Commissioning

Skills *Objectives should be specific*

Month 1-3

Understanding and ability to perform three phase power, voltage, and current calculations	- Youtube vidoes	- Understand line to line voltage vs line to neutral voltage - Able to calculate current relative to voltage on primary or secondary of transformer - Able calculate power through transformer based on MVA rating
General Arrangements, One-Lines, and Relay One-lines	- Youtube vidoes - Lunch and learn	- Be able to identify equipment on one-line - Be able to correlate equipment on one-line to general arrangement - Be able to identify relaying zone of protection for equipment
ANSI Numbering	- ASNI relay number table - Youtube training videos	- Able to identify relay types by referencing table.
Relay and Control Panels	- On-the-job training - [New Panel Inspection Form]	- Able to perform panel inspection using panel inspection form
DC Schematic Continuity Check	- On-the-job training - Hands On Relaying and Protection and Control Training 101	- Able to perform continuity testing using ohm meter on new circuits - Able to perform continuity testing using double bulb on new circuits
Current Circuits	- On-the-job training - Hands On Relaying and Protection and Control Training 101	- Understand items to be tested including circuit continuity, phasing, circuit insulation (megger), shorting switches, relay elements, etc - Able to perform double bulb phasing from equipment to relay panel - Able to perform voltage drop test for circuit checkout - Able to perform current injection to test circuit continuity, meter checks/relay elements, and shorting switches - Able to test single point grounding and circuit insulation - Able to perform CT coupling test using voltage injection
Potential Circuits	- On-the-job training - Hands On Relaying and Protection and Control Training 101	- Able to perform continuity testing using ohm meter on new circuits - Able to perform continuity testing using double bulb - Able to perform circuit testing using full voltage - Able to perform relaying meter checks
Circuit Breaker Current Transformers	- On-the-job training - Youtube vidoes	- Understand items to be tested including polarity, saturation, and ratio for all taps - Able to perform CT testing using at least one test kit - Able to properly document CT testing
Documentation	- On-the-job training	- Understand what data is needed for RTS including as-left settings, current and voltage in-service readings, breaker 52a timing, etc - Know what to apply and be able to create test switch labels for relay panels - Know how to create relay push button labels - Understand the drawing process for reconciling station drawings to design drawings and creating as-builts for engineering - Know how to properly file and fold drawings
Equipment Outage and Zone of Protection	- On-the-job training - Hands On Relaying and Protection and Control Training 101 - LOTO Training - Youtube videos	- Able to understand safe equipment zone of protection - Understand the four types of LOTO tags - Understand how to read a clearance order

Control Scheme Isolation & Human Performance Tools	<ul style="list-style-type: none"> - On-the-job training - Hands On Relaying and Protection and Control Training 101 - LOTO Training - Youtube videos 	<ul style="list-style-type: none"> - Understand the use of Worker's Alteration Log - Understand the use of human performance tools in creating a safe working space - Understand the use of 3-part communication for relaying critical information
Three Phase Doble 6150	<ul style="list-style-type: none"> - On-the-job training 	<ul style="list-style-type: none"> - Know how to connect to Doble 6150 - Know how to connect Doble to relaying for metering checks - Know how to setup standard three phase current and voltage values for basic testing
Month 4-6		
DC Schematic Continuity Check	<ul style="list-style-type: none"> - On-the-job training - Hands On Relaying and Protection and Control Training 101 	<ul style="list-style-type: none"> - Able to perform continuity testing using ohm meter on existing circuits - Able to perform continuity testing using double bulb on existing circuits
Control Isolation	<ul style="list-style-type: none"> - On-the-job training - Hands On Relaying and Protection and Control Training 101 - LOTO training 	<ul style="list-style-type: none"> - Able to perform continuity testing using ohm meter on existing circuits - Able to perform continuity testing using double bulb on existing circuits
Relaying	<ul style="list-style-type: none"> - On-the-job training - Hands On Relaying and Protection and Control Training 101 - SEL Inc website 	<ul style="list-style-type: none"> - Able to read/write SEL settings - Able to pulse SEL outputs - Able to read inputs and find target rows for SEL relaying - Understand the concept of relay word bits SEL relaying - Able to use meter command to read metering SEL relaying
Directing Wireman	<ul style="list-style-type: none"> - On-the-job training 	<ul style="list-style-type: none"> - Understand hazards of performing wiring changes in live panels - Able to identify critical and energized parts and mask using HP tools - Understand place keeping practices for wiring changes - Able to communicate wiring changes to electrician
DC Schematic Checkout	<ul style="list-style-type: none"> - On-the-job training 	<ul style="list-style-type: none"> - Able to functional check and commission new DC schematic circuits
Month 7-9		
SCADA RTUs	<ul style="list-style-type: none"> - On-the-job training 	<ul style="list-style-type: none"> - Able to read/write settings - Able to navigate and monitor real-time data
Basic Relay Testing	<ul style="list-style-type: none"> - On-the-job training - SEL Inc website 	<ul style="list-style-type: none"> - Able to test distribution relays for line and bus protection - Know how to document testing
DC Schematic Checkout	<ul style="list-style-type: none"> - On-the-job training 	<ul style="list-style-type: none"> - Able to functional check and commission retrofit DC schematic circuits
Equipment Outage and Zone of Protection	<ul style="list-style-type: none"> - On-the-job training - Hands On Relaying and Protection and Control Training 101 - LOTO Training - Youtube videos 	<ul style="list-style-type: none"> - Able to identify if ZOP is adequate for work - Able to accept clearance of outage
Control Scheme Isolation & Human Performance Tools	<ul style="list-style-type: none"> - On-the-job training - Hands On Relaying and Protection and Control Training 101 - LOTO Training - Youtube videos 	<ul style="list-style-type: none"> - Able to create isolation plan for work - Able to identify equipment to be flagged and masked for outages
Commissioning Plan	<ul style="list-style-type: none"> - On-the-job training 	<ul style="list-style-type: none"> - Able to create commissioning plan using design drawings and outage plan
Motor Operated Disconnects	<ul style="list-style-type: none"> - On-the-job training 	<ul style="list-style-type: none"> - Able to perform contact resistance test for disconnect - Able to adjust and set MOD cam switches - Able to test/confirm function of MOD cam switches

Month 10-12

Intermediate Relay Testing	- On-the-job training	- Able to test line and transformer relays using macros - Experience performing end-to-end tests
Advanced Current Circuits	- On-the-job training	- Able to de-wire/decommission breaker current transformer inputs into live bus differentials - Able to commission new current circuits into existing bus differential - Able to commission bus differential circuits
Advanced Potential Circuits	- On-the-job training	- Able to de-wire/decommission live PT feeds to relaying being removed. -Able to commission new potential circuits into live PT feeds
Transformer Controls	- On-the-job training	- Experience modifying or commissioning transformer control cabinet

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