



electrical training ALLIANCE
Standardized Task Evaluation
Program

Implementation Guide

STE-IC04.01
Maintain and Calibrate
General Instrumentation

November, 2019

Version 1.0



This Implementation Guide is a supplement to the *electrical training ALLIANCE STE Program Administration Guide (Administration Guide)*. It serves as a guide to the *electrical training Alliance* and to Local Host Organizations in the administration Part A Written Examinations and Part B Performance Evaluations for STE IC.04.01, Maintain and Calibrate General Instrumentation. All sections of the Administration Guide, as revised and/or supplemented by this Implementation Guide, shall apply to the administration of STE-IC04.01. Proper administration of STE-IC04.01 requires adherence to the standards and procedures detailed in both documents. Local Host Organizations wishing to administer STE-IC04.01 examinations and evaluations must be familiar with and adhere to all requirements detailed in both documents.

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electrical training ALLIANCE
Standardized Task Evaluation Program
STE-IC04.01
Maintain and Calibrate General Instrumentation
Implementation Guide
January, 2019 (Version 1.0)

Introduction

1. Purpose

The specific guidelines defined in this Implementation Guide, combined with the general guidelines defined in the *electrical training ALLIANCE* Standardized Task Evaluation Program Administration Guide (Administration Guide) are intended to provide information for an IBEW/NECA affiliate (Host Organization) to offer the STE Part A Knowledge Examinations and Part B Performance Evaluations STE-IC04.01, Maintain and Calibrate General Instrumentation, in compliance with the standards and requirements set forth in the Electric Power Research Institute's (EPRI) Standardized Task Evaluation Administrative Protocol for Portable Practicals (AP3), Revision 2017, as implemented by the *electrical training ALLIANCE* for the IBEW and NECA.

The guidelines contained herein, along with the guidelines contained in the Administration Guide, optimize the quality and the effectiveness of the *electrical training ALLIANCE* STE Instrumentation Calibration Certification Program by providing a documented path for IBEW/NECA affiliates to offer and host the STE Part A Knowledge Examinations and Part B Performance Evaluations. Management Representatives of Local Host Organizations, all persons proctoring the Part A Knowledge Examination, and all Performance Evaluators administering the Part B Performance Evaluation shall be thoroughly familiar with and shall administer all examinations and evaluations in accordance with the requirements set forth in both the Administration Guide and this Implementation Guide.

2. Applicability

These guidelines are intended to apply to the following IBEW/NECA affiliated Host Organizations:

1. Local Joint Apprenticeship Training Committees
2. Area-wide Joint Apprenticeship Training Committees
3. IBEW Local Unions.
4. IBEW Signatory Contractors.

Affiliated organizations, as listed above, choosing to act as Host Organizations in the administration of *electrical training ALLIANCE* Standardized Task Evaluation Part A Knowledge Examinations and/or *electrical training ALLIANCE* Standardized Task Evaluation Part B Performance Evaluations for STE-IC04.01 are required to adhere to all requirements of the *electrical training ALLIANCE* Standardized Task Evaluation Program Administration Guide and this STE-IC04.01 Implementation Guide.

3. This Implementation Guide

This Implementation Guide is intended for task evaluations when utilizing the EPRI Standardized Task Evaluation (STE) process ONLY and should not replace or alter existing policies or procedures such as (but not limited to): Contract Language, Equal Employment Opportunity (EEOC) or The Americans with Disabilities Act (ADA), or other applicable processes and/or procedures.

This document contains guidelines as implemented by the *electrical training ALLIANCE* for administration of Electric Power Research Institute (EPRI) Standardized Task Evaluations (STE) as adopted by the International Brotherhood of Electrical Workers (IBEW) and the National Electrical Contractors Association (NECA). Copies of this Implementation Guide shall be supplied to every Local Host Organization authorized to administer the Part A Knowledge Examination and/or the Part B Performance Evaluation for STE-IC04.01. It is the responsibility of the Host Organization to ensure that all persons proctoring the Part A Knowledge Examination and all Performance Evaluators administering

the Part B Performance Evaluation are familiar with and abide by the guidelines that are set forth in this Implementation Guide.

Other documents, attached herein as appendices, developed by and approved by the *electrical training ALLIANCE* used in the administration of the *electrical training ALLIANCE* Standardized Task Evaluation Program STE-IC04.01 include:

Appendix A: Task Analysis/Table of Specifications:

These documents outline the objective structure of the Part A Knowledge Examination and Part B Performance Evaluation. These documents are intended to be used in the design and delivery of instruction and, where needed, remediation toward the STE-IC04.01 certification.

Appendix B: Pre-Job Brief / Objectives:

The Pre-Job Brief is used by the Part B Performance Evaluator as an in-hand guide to prepare the examinee for the hands-on Performance Evaluation. The Pre-Job Brief should be read to and discussed with the examinee before beginning the Performance Evaluation. The examinee should sign the Pre-Job Brief and should receive a copy as acknowledgement that he or she has been briefed on the evaluation process and is ready to be evaluated.

The Performance Objectives are used to inform the examinee of the terminal objectives of the Performance Evaluation. The examinee should be advised of the objectives of the evaluation and should be given a copy of the Performance Objectives before beginning the Performance Evaluation.

Appendix C: Work Orders

These documents will be used as in-hand work performance guides by Part B Performance Evaluation examinees.

Appendix D: STE Certification Renewal Forms

These documents will be completed by the applicant and approved and signed by the Host Organization to request extension of current STE certifications and to request renewal of expired STE certifications.

The *electrical training ALLIANCE* Standardized Task Evaluation Program Administration Guide is a general guideline detailing the basic requirements for the administration of ALL Standardized Task Evaluations. This specific Implementation Guide addresses the unique and special requirements for administering STE-IC04.01, Maintain and Calibrate General Instrumentation. The general Administration Guide and dedicated Implementation Guides for administering any specific STE supported by the *electrical training ALLIANCE* can be found on the *electrical training ALLIANCE* website at:

<http://www.electricaltrainingalliance.org/training/certifications>

or can be obtained by contacting the STE Facilities Administrator at:

electrical training ALLIANCE
ATTENTION: STE Request
5001 Howerton Way, Suite N
Bowie, MD 20715
email: STerequest@electricaltrainingalliance.org
Phone: 301-715-2300.

4. Substantive Changes

Substantive changes to these guidelines that affect how the *electrical training ALLIANCE* and/or Local Host Organizations administer critical aspects of STE-IC04.01, defined by EPRI as AP3 Process Attributes, will be reflected in a revised version of this Implementation Guide. Changes to the administration of the STE that could be considered substantive could include, but would not necessarily be limited to, changes to 1) roles and responsibilities of identified personnel, 2) eligibility requirements for workers and evaluators, 3) evaluation site requirements, 4) documents and/or database administration. Any such changes will first be submitted to EPRI for initial approval. Following EPRI approval, revised versions of this Implementation Guide will be coordinated by the *electrical training ALLIANCE*'s STE Certification Administrator and will be formally communicated to Local Host Organizations in a timely manner to allow efficient implementation of such changes. Formal communication of such changes will be through the *electrical training ALLIANCE*'s normal channels of communication (broadcast fax, email lists, web postings, et al).

1.0 Part A Certification: Cognitive (Knowledge) Examination

1.1 Part A Examination Format

The Part A Knowledge Examination consists of 200 multiple choice questions which must be completed within a four (4) hour time period. Refer to Appendix A of this Implementation Guide for a listing of the cognitive enabling objectives (learning objectives) for this STE.

See Section 1.1 of the Administration Guide for more details regarding the format of the Part A Knowledge Examination.

1.2 Part A Examination Host Organizations

See Section 1.2 of the Administration Guide for complete details regarding Part A Knowledge Examination Host Organization Requirements.

1.3 Part A Participant Eligibility

1.3.1 Training: Successful completion of the three *electrical training ALLIANCE* courses, Instrumentation Introduction -Module 1, -Module 2: Basics, and -Module 3: Advanced, as verified and documented by the Host Organization, will be accepted as having prepared the applicant for successful completion of the STE-IC04.01 Part A Knowledge Examination.

See Section 1.3 of the Administration Guide for other methods of eligibility to sit for the Part A Knowledge Examination.

1.4 Part A Examination Proctor:

See Section 1.4 of the Administration Guide for complete details regarding Examination Proctor Requirements.

1.5 Part A Examination Fees

See Section 1.5 of the Administration Guide for complete details regarding Part A Examination Fees.

1.6 Part A Records Database

See Section 1.6 of the Administration Guide for complete details regarding Part A Records Database Requirements.

1.7 Part A Examination Revisions:

See Section 1.7 of the Administration Guide for complete details regarding Part A Examination Revisions.

1.8 Part A Certification Renewal

See Section 1.8.1 of the Administration Guide for complete details regarding Host Organization Renewal.

1.8.2 Individual Renewal: An STE-IC04.01 Part A certification is awarded for a period of three (3) years. An individual's period of certification is displayed on their respective credentials. It is the individual's responsibility to keep his or her certification current.

1.8.2.1 Renewing Current or Expired Certifications: An individual who holds a current STE-IC04.01 certification for the Part A Knowledge Examination is eligible to take the Part B Performance Evaluation. An individual whose Part A certification has expired will not be eligible to take the Part B Performance Evaluation. A Part A certification may be renewed or extended by successfully completing the Part A Knowledge Examination at any time within the twelve (12) months prior to one's expiration date (*See Section 4.5, of the Administration Guide, Application for Test*). The new certification period shall become that of the most recent examination. An individual's Part A certification is automatically renewed concurrent with their initial or renewed Part B certification. The *electrical training ALLIANCE* will issue to the applicant a new certification card reflecting the renewed Part A certification period.

1.8.2.2 Renewal Fees: Any fee assessed by the *electrical training ALLIANCE* for recertification of a current or expired STE-IC04.01 Part A certification may be paid at the time of examination or invoiced to the Host Organization. Contact the *electrical training ALLIANCE* for examination fees associated with STE-IC04.01 examinations.

1.9 Part A Remediation

See Section 1.9 of the Administration Guide for complete details regarding Part A Remediation.

2.0 Part B Certification: Hands-On Performance Evaluation

2.1 Part B Performance Evaluation

See Section 2.1 of the Administration Guide for complete details regarding the format, documentation, scoring, and scheduling of the Part B Performance Evaluation.

2.2 Part B Performance Evaluation Host Organizations

See Section 2.2 of the Administration Guide for complete details regarding Part B Performance Evaluation Host Organizations.

2.3 Part B Participant Eligibility:

See Section 2.3 of the Administration Guide for methods of eligibility to sit for the Part B Performance Evaluation

NOTE: To improve an examinee's chances of successfully completing the Part B Performance Evaluation, the *electrical training ALLIANCE* strongly recommends that the examinee has 1) adequate field experience to have become proficient in instrument calibration, and/or 2) completed face-to-face, instructor-led, training in instrument calibration.

2.4 Part B Performance Evaluator:

See Section 2.4 of the Administration Guide for complete details regarding Part B Performance Evaluator Requirements.

2.5 Part B Evaluation Fees

See Section 2.5 of the Administration Guide for complete details regarding Part B Evaluation Fees.

2.6 Part B Records Database

See Section 2.6 of the Administration Guide for complete details regarding Part B Records Database Requirements.

2.7 Part B Evaluation Revisions:

See Section 2.7 of the Administration Guide for complete details regarding Part B Evaluation Revisions.

2.8 Part B Certification Renewal

2.8.2 Individual Renewal: STE-IC04.01 Part B Individual certifications are awarded for a period of three (3) years. An individual's Part A certification is renewed automatically concurrent with a Part B certification renewal.

2.8.2.1 Renewal Methods: Part B certifications may be renewed through any of the following methods.

2.8.2.1.1 Renewing a Current Certification Through Work Experience: A currently certified individual may be recertified by documenting a minimum of twelve hundred (1200) hours of work experience in instrument calibration within the current three (3) year certification period. Application for renewal through this method must be submitted before the current certification expiration date. Work experience must be documented by using a Part B Certification Renewal Work Record (Form 4.7, see Appendix D of this Implementation Guide) or by documentation supplied by the applicant, which must satisfy the following requirements:

1. Must be presented on company letterhead or other employer identifying medium.
2. Must specify the work hours spent in instrument calibration.
3. Must be signed by a Management Representative of the employer.

2.8.2.1.2 Renewing a Current Certification Through Reevaluation: A currently certified individual may be recertified by successfully completing the STE-IC04.01 Part B Performance Evaluation. Recertification through this method must be completed before the current certification expiration date.

2.8.2.1.3 Renewing an Expired Certification Within Two Years: If an individual's STE-IC04.01 certification has expired, the individual may recertify at the Part B level by successfully completing the STE-IC04.01 Part B Performance Evaluation. The Part B Evaluation must be successfully completed within two (2) years of the date of expiration stated on the individual's certification card.

2.8.2.1.4. Renewing an Expired Certification After Two Years: If an expired STE-IC04.01 Part B certification is not renewed within two (2) years from its expiration date, the individual must be recertified as a Part A certificant before applying to take the Part B Performance Evaluation.

2.8.2.2 Renewal Documentation: All recertification requests, whether through documented work experience or through reevaluation, shall be submitted to the Local Host Organization. All recertification requests shall be accompanied by a Part B Certification Renewal Request (*Form 4.7, see Appendix D of this Implementation Guide*).

2.8.2.3 Host Organization Review: the Host Organization will review all employer's documentation submitted for recertification through work experience to determine if an applicant meets the work experience recertification requirements. If the requirements are met, the Part B Certification Renewal Request will be signed by a Management Representative of the Host Organization and forwarded to the *electrical training ALLIANCE* for the awarding of recertification.

For those applicants seeking recertification through reevaluation, the Host Organization will forward the successfully completed Part B Performance Evaluation and the Part B Certification Renewal Request, signed by a Management Representative of the Host Organization, to the *electrical training ALLIANCE* for awarding of recertification.

All documentation should be sent to:

electrical training ALLIANCE
ATTENTION: STE Renewal
5001 Howerton Way, Suite N
Bowie, MD 20715
email: STERenewal@electricaltrainingalliance.org

The *electrical training ALLIANCE* will issue to the applicant a new certification card reflecting the renewed concurrent Part A and Part B certification period.

2.8.2.4 Renewal Fees: Any fee assessed by the *electrical training ALLIANCE* for recertification of a current or expired STE-IC04.01 Part B certification may be paid at the time of renewal application or may be invoiced to the Host Organization.

See Section 2.8 of the Administration Guide for more details regarding *Part B Certification Renewal*.

2.9 Part B Remediation

See Section 2.9 of the Administration Guide for complete details regarding *Part B Remediation*.

3.0 Host Organization Resource Requirements

3.1 Required Resources: STE-IC04.01 requires the use of the following calibration equipment and field devices for the completion of the Part B Performance Evaluation. The following list does not designate specific equipment and devices, however, the *electrical training ALLIANCE* reserves the right to designate specific equipment (brand, model, etc.) allowed in administration of the performance evaluation.

NOTE: *The STE-IC04.01 performance evaluation requires the examinee to select the proper calibration equipment to perform a given task. Having a selection of at least two pieces of differing calibration equipment for the examinee to choose from is required.*

The following calibration equipment and field devices must be available to the examinee for administration of the STE-IC04.01 Part B Performance Evaluation.

- A. Personal Protective Equipment (PPE) satisfying the requirement(s) of individual Host Organization evaluation sites.
 - Examples:
 - safety glasses
 - hard-toe foot wear

- B. Two (minimum) separate choices for each of the following calibration tools (* = with current calibration documentation where indicated):
 - 1. Pneumatic Calibrator (0-100 psi range) *
 - Examples:
 - Transmation PneuCal IV-B
 - WIKA Wally Box III
 - Fluke 3130- G2M
 - 2. Digital Multi Meter *
 - Example:
 - Fluke 87V
 - 3. DC Power Supply (24 volt DC, nominal) *
 - Examples:
 - Transcat 23232E
 - B&K Precision 1735A
 - 4. DC Current Simulator (4-20 mA) *
 - Examples:
 - Altek 334A
 - PIE 334
 - PIE 334 Plus
 - 5. Temperature Simulator (RTD and Type J Thermocouple) *
 - Example:
 - Altek Tech Chek 820
 - PIE 820
 - 6. Pneumatic Pressure Supply (0-100 psig)
 - Examples:
 - Compressed continuous source with precision regulator
 - Transmation 6215P
 - 7. HART Communicator
 - Examples:
 - Rosemount 375
 - Emerson 475
 - Emerson AMS Trex

NOTE: *A Fluke Model 744 or 754 Documenting Process Calibrator (DPC) may be used to accomplish the functions of several of these individual pieces of equipment, including the HART communication and DC loop power supply.*

C. One each of the following field devices for the examinee to calibrate:

1. Current to Pressure Transducer (I/P), 4-20 mA/3-15 psi
(tagged I/P-1003)
Example:
Rosemount 0846DS1J
2. Differential Pressure Transmitter (legacy), 100"-500" H₂O calibration range capability
(tagged DPT-1001)
Example:
Rosemount 1151DP5E
2. Differential Pressure Transmitter (HART capable), 0"-220" H₂O calibration range capability
(tagged FT-1002)
Example:
Rosemount 3051S2CD2A
4. Pressure Switch, 25-45 psi adjustment capability
(tagged PS-1004)
Examples:
ASCO HB20A214
ASCO HB26A214
5. Temperature Transmitter (HART capable), 32°-212° F calibration range capability
(tagged TT-1005)
Example:
Rosemount 3144P

3.2 Host Organization Responsibilities: It is the responsibility of the Host Organization to supply any required items for the Part B Performance Evaluations and, when required, to provide documentation to the *electrical training ALLIANCE* that such required resources have been procured. It is recommended that the Host Organization have available a reasonable reserve supply of required resources to be used in the event of tool, equipment, or device malfunction during the administration of a Part B Performance Evaluation. This recommendation may circumvent the necessity of curtailing and rescheduling the administration of a performance evaluation in the event of such a malfunction.

3.3 Required Service: Some of the calibration equipment specified in Section 3.1(B) (*as indicted by a * following the tool description*) is required to be currently calibrated by an independent calibration service. It is the Host Organization's responsibility to provide current calibration documentation to the *electrical training ALLIANCE*. Current calibration documentation must be supplied to the *electrical training ALLIANCE* to qualify the Host Organization for renewal as a certified Part B Performance Evaluation site (see Section 2.8.1 of the Administration Guide). Various certification periods (1 year, 2 years, etc.) offered by an independent calibration service are acceptable to the *electrical training ALLIANCE*.

Questions regarding resource requirements, Host Organization responsibilities, or service requirements for any specific resources required for the administration of STE-IC04.01 should be addressed to:

electrical training ALLIANCE
ATTENTION: STE Facilities Administrator
5001 Howerton Way, Suite N
Bowie, MD 20715
email: STEfacility@electricaltrainingalliance.org
Phone: 301-715-2300.

Appendix A

Standardized Task Evaluation IC04.01 Maintain and Calibrate General Instrumentation

Task Analysis

TASK ANALYSIS DEVELOPMENT

I. TASK INFORMATION

STE Number: **IC04.01**

STE Title: **Maintain and Calibrate General Instrumentation**

STE Scope: This STE provides for the sampling of the knowledge and skills needed to maintain and calibrate general instrumentation. The evaluator selects three of the five instruments listed below to be used for the evaluation with at least one of the instruments being an intelligent device requiring communication using the HART communication protocol:

- Differential pressure transmitter
- I/P transducer
- Pressure switch
- Hart capable differential pressure transmitter
- Hart capable temperature transmitter

In addition, at least two available choices of the following calibration tools are available for the examinee's use:

- Pneumatic calibrator
- Digital multi-meter
- DC power supply
- DC current simulator
- Hart communicator
- Temperature simulator
- Pneumatic pressure supply

II. ROLES

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III. REFERENCES

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IV. INITIAL CONDITIONS AND ASSUMPTIONS

Initial Conditions:

Work Documents Reviewed and Applicable Pre-Job Brief Conducted prior to Evaluation.

Initiating Cue:

Authorization to Work by appropriate personnel.

Assumptions:

- Candidate has been trained on human performance techniques
- Candidate has been trained on isolation techniques and requirements
- Candidate has been trained on the measuring and test equipment required for this STE
- Candidate can read prints, P&ID, etc.

V. TERMINATING CONDITION

Successful Completion of Evaluation.

VI. TASK AIDS (TOOLS, EQUIPMENT, JOB AIDS, ETC.)

- Personal protective equipment (PPE) satisfying the requirement(s) of individual evaluation sites.
- Typical I&C hand tools
- One each of the following devices for calibrating:
 - differential pressure transmitter (legacy), 100”-500” H₂O calibration range capability, tagged DPT-1001
 - differential pressure transmitter (intelligent, HART capable), 0”-220” H₂O calibration range capability, tagged FT-1002
 - current to pressure transducer (I/P), 4-20 mA/3-15 psi, tagged I/P-1003
 - pressure switch, 25-45 psi adjustment capability, tagged PS-1004
 - temperature transmitter (intelligent, HART capable), 32°-212° F calibration range capability, tagged TT-1005
- Two (minimum) separate choices for each of the following calibration tools with current calibration documentation where indicated (*):
 - pneumatic calibrator (0-100 psi range) *
 - digital multi meter *
 - DC power supply (24-volt nominal) *
 - DC current simulator (4-20 mA) *
 - HART communicator
 - Temperature simulator (RTD and type J thermocouple) *
 - Pneumatic pressure supply

VII. SAFETY CONSIDERATIONS

1. Use of Personal Protective Equipment
2. Work Area Cleanliness
3. Engineering Controls and Work Practices

CONSEQUENCES OF INADEQUATE PERFORMANCE

Non-Compliance with Procedural and /or Site Requirements.

VIII. TERMINAL OBJECTIVE:

Given access to test equipment, tools, prints/schematics, calibration sheets, and instrumentation components, calibrate instrumentation in accordance with manufacturer guidance and recognized industry practices.

**IX. TASK – BREAKDOWN STRUCTURE
TASK ELEMENTS/SUB-TASKS**

<u>No.</u>	<u>Element</u>	<u>Standard</u>	<u>Rating</u>	<u>Knowledge Of</u>	<u>Skill In</u>
1.	Electrical theory related to instrumentation	Electrical engineering principles	6	1. General Electrical/Electronic Theories	N/A – evaluated during knowledge exam
2.	Safety	Recognized Federal and industry practices	8	2. Workplace Safety Processes	N/A – evaluated during knowledge exam
3.	Circuit operation principles	Manufacturer and Industry guidance	8	3. Calculating Electrical/Electronic Circuit Performance	N/A – evaluated during knowledge exam
4.	Print reading	Manufacturer and Industry standards	8	4. Identification of Electrical/Electronic Symbols	N/A – evaluated during knowledge exam
5.	Lockout/tagout	Federal and industry guidelines	8	5. Lockout-Tagout Processes	N/A – evaluated during knowledge exam
6.	Instrument loops	Manufacturer and Industry guidance	8	6. Identification of Instrument Loop Components	N/A – evaluated during knowledge exam
7.	Instrument terminology	Manufacturer and Industry guidance	8	7. Instrumentation Terminology	N/A – evaluated during knowledge exam
8.	Instrumentation	Manufacturer and Industry guidance	8	8. Instrument Inputs/Outputs	Addressed during knowledge and performance evaluation
9.	Determining Instrument calibration	Engineering principles and Manufacturer guidance	8	9. Evaluating Instrument Calibrations	Addressed during knowledge and performance evaluation
10.	Instrument calibration techniques	Engineering and Manufacturer standards	8	10. Science of Instrument Calibration	N/A – evaluated during knowledge exam

<u>No.</u>	<u>Element</u>	<u>Standard</u>	<u>Rating</u>	<u>Knowledge Of</u>	<u>Skill In</u>
11.	Test equipment for calibrating instruments	Manufacturer and Industry guidance	8	11. Test Equipment used for instrument calibration	1. Set up and use of a pneumatic calibrator 2. Set up and use of a digital multimeter 3. Set up and use of a DC power supply 4. Set up and use of a current simulator 5. Set up and use of a temperature simulator
12.	Interpreting instrument calibration	Engineering principles	8	12. Applying Instrument Calibration Formulas	Evaluated as a standard of each performance objective
13.	Component safety	Manufacturer and Industry guidance	8	13. Component Safety	Evaluated as a standard of each performance objective
14.	Instrument nomenclature	Manufacturer and Industry standards	8	14. Identification of Instrumentation Symbols and Letters	N/A – evaluated during knowledge exam
15.	P&ID and Loop drawings	Industry guidance	8	15. Interpreting P&IDs and Loop Diagrams	N/A – evaluated during knowledge exam
16.	Documentation	Industry guidance	6	16. Instrumentation Calibration Documentation	Evaluated as a standard for the appropriate performance objective
17.	Component operation	Manufacturer and Industry guidance	8	17. Operation of the Components of an Instrument loop	Evaluated in performance objectives 6-12
18.	Diagnosing malfunctions	Manufacturer and Industry guidance	8	18. Instrument Loop Malfunctions diagnostics	Evaluated in performance objectives 6-12
19.	Analytical instrument operation	Manufacturer and Industry guidance	8	19. Operation of Analytical Instrumentation	Addressed in performance objective #8

<u>No.</u>	<u>Element</u>	<u>Standard</u>	<u>Rating</u>	<u>Knowledge Of</u>	<u>Skill In</u>
20.	Prepare Component for Calibration	Manufacturer and Industry guidance - Fasteners Removed - Housing Cover removed - Safely Stored	8	N/A Evaluated as a standard for the performance objectives	Evaluated as part of performance objectives 6-12
21.*	Visual inspection of a Differential Pressure Transmitter	Manufacturer and Industry guidance	9	N/A Evaluated as a standard for the performance objectives	6. Visual inspection of a differential pressure transmitter
22.*	Calibrating a Differential Pressure Transmitter (#1)	Manufacturer and Industry guidance	9	Evaluated by cognitive objectives 6-10	7. Calibrate a differential pressure transmitter
23.*	Calibration of a Differential Pressure Transmitter using a communicator (#2)	Manufacturer and Industry guidance	9	Evaluated by cognitive objectives 6-10	8. Calibrate a pressure transmitter using a communicator
24.*	Calibration of an I/P (current to pressure) Transducer	Manufacturer and Industry guidance	9	Evaluated by cognitive objectives 6-10	9. Calibrate an I/P Transducer
25.*	Calibration of a Pressure Switch	Manufacturer and Industry guidance	9	Evaluated by cognitive objectives 6-10	10. Calibrate a pressure switch
26.*	Visual inspection of a Temperature Transmitter	Manufacturer and Industry guidance	9	Evaluated by cognitive objectives 6-10	11. Visual inspection of a temperature transmitter
27.*	Calibration of a Temperature Transmitter	Manufacturer and Industry guidance	9	Evaluated by cognitive objectives 6-10	12. Calibrate a temperature transmitter
28.	Restore Component to Original Configuration	Manufacturer and Industry guidance	9	N/A Evaluated as a standard for the performance objectives	Evaluated as a standard for the performance objectives

***Critical Step: Any step or element that, if performed incorrectly, will result in a safety event or is unrecoverable.**

X. COGNITIVE ENABLING OBJECTIVE DEVELOPMENT

<u>No.</u>	<u>Knowledge Of</u>	<u>Cognitive Enabling Objective</u>	<u>Weighting (percent)</u>
1.	General Electrical/Electronic Theories	From memory, describe general electrical and electronic theory in accordance with engineering principles.	9
2.	Workplace Safety Processes	Given various work situations, select the safety practices to use in accordance with federal and industry work practices.	9
3.	Calculating Electrical/Electronic Circuit Performance	Given various circuits, use Ohm's Law to calculate resistance, voltage, current, and power without error.	8
4.	Identification of Electrical/Electronic Symbols	Given electrical or electronic symbols, identify the symbol in accordance with manufacturer or industry standards.	8
5.	Lockout-Tagout Processes	Given various work situations, select the lockout tagout process in accordance with federal and industry guidelines.	7
6.	Identification of Instrument Loop Components	Given instrument loop components, identify the function of the component in accordance with manufacturer and industry standards.	9
7.	Instrumentation Terminology	Given instrumentation terminology, define the terms without error.	8
8.	Instrument Inputs/Outputs	Given instrument parameters, calculate the instrument inputs, outputs, accuracy, and calibration status in accordance with manufacturer and industry guidance.	9
9.	Evaluating Instrument Calibrations	Given various loop or instrument situations, select the correct response for the situation in accordance with engineering principles and manufacturer guidelines.	8
10.	Science of Instrument Calibration	Given various scenarios, explain the science of instrument calibration in accordance with engineering principles and manufacturer standards.	9

<u>No.</u>	<u>Knowledge Of</u>	<u>Cognitive Enabling Objective</u>	<u>Weighting (percent)</u>
11.	Test Equipment used for instrument calibration	Given instrument loop situations, identify the test equipment, connection point, or parameter in accordance with manufacturer guidance.	9
12.	Applying Instrument Calibration Formulas	Given various processes, calculate or convert weight, psi, pressure, temperature, force, or density in accordance with engineering principles.	9
13.	Component Safety	Given various loop or instrument descriptions, describe the safety steps to be taken in accordance with manufacturer or industry guidance.	9
14.	Identification of Instrumentation Symbols and Letters	Given instrument symbols or letters, identify the symbol or letter in accordance with manufacturer or industry standards.	8
15.	Interpreting P&IDs and Loop Diagrams	Provided with P&IDs and Loop Diagrams, interpret the diagrams without error.	7
16.	Instrumentation Calibration Documentation	From memory, identify the calibration documentation for instrument calibrations in accordance with manufacturer or industry guidance.	7
17.	Operation of the Components of an Instrument loop	Given various loop processes, describe the operation of the components without error.	8
18.	Instrument Loop Malfunctions diagnostics	Given various loop or component issues diagnose the problem or repair needed in accordance with manufacturer or industry guidance.	7
19.	Operation of Analytical Instrumentation	Identify the operation of analytical instrumentation when provided with examples in accordance with manufacturer or industry guidance.	7

XI. PERFORMANCE ENABLING OBJECTIVE DEVELOPMENT

<u>No.</u>	<u>Skill In</u>	<u>Performance Enabling Objective</u>
1.	Set up and use of a pneumatic calibrator	Given an air supply and pneumatic calibrator, prepare and connect the air supply and calibrator in accordance with recognized industry practices.
2.	Set up and use of a digital multimeter	Given a Digital Multimeter, set-up the meter to take voltage, current, and resistance measurements in accordance with manufacturer guidance.
3.	Set up and use of a DC power supply	Given a DC Power Supply, set-up the Power Supply for an output of 24 VDC without error.
4.	Set up and use of a current simulator	Given a current simulator and test equipment, set-up the current simulator for an output of 13mA DC without error.
5.	Set up and use of a temperature simulator	Given a temperature simulator and various temperature simulations, set-up the temperature simulator for the simulations without error.
6.*	Visual inspection of a differential pressure transmitter	Given a differential pressure transmitter, visually inspect the transmitter and document the range of operation, input voltage and output range, and identified issues in accordance with manufacturer guidance.
7.*	Calibrate a differential pressure transmitter	Given a differential pressure transmitter and test equipment, calibrate the transmitter to within 0.5% accuracy.
8.*	Calibrate a pressure transmitter using a communicator	Given a differential pressure transmitter and test equipment, calibrate the transmitter using a HART Communicator to within 0.5% accuracy.
9.*	Calibrate an I/P Transducer	Given an I/P Transducer and test equipment, calibrate the Transducer to within 0.5% accuracy.
10.*	Calibrate a pressure switch	Given a Pressure Switch and test equipment, calibrate the Pressure Switch to within 0.5% accuracy.
11.*	Visual inspection of a temperature transmitter	Given a Temperature Transmitter and test equipment, visually inspect the transmitter and document the range of operation, input voltage, output range, and wiring terminations in accordance with manufacturer guidance.
12.*	Calibrate a temperature transmitter	Given a Temperature Transmitter and test equipment, calibrate the transmitter using a HART Communicator to within 0.5% accuracy.

XII. TASK OBJECTIVE FORM

Terminal Objective: Given access to test equipment, tools, prints/schematics, calibration sheets, and instrumentation components, calibrate instrumentation in accordance with manufacturer guidance and recognized industry practices.

COGNITIVE ENABLING OBJECTIVES

Table of Specifications

No.	Cognitive Enabling Objective	Cognitive Level	Exam Rating
1.	From memory, describe general electrical and electronic theory in accordance with engineering principles.	Comprehension	21 of 200
2.	Given various work situations, select the safety practices to use in accordance with federal and industry work practices.	Analysis	11 of 200
3.	Given various circuits, use Ohm's Law to calculate resistance, voltage, current, and power without error.	Application	10 of 200
4.	Given electrical or electronic symbols, identify the symbol in accordance with manufacturer or industry standards.	Knowledge	12 of 200
5.	Given various work situations, select the lockout tagout process in accordance with federal and industry guidelines.	Comprehension	3 of 200
6.	Given instrument loop components, identify the function of the component in accordance with manufacturer and industry standards.	Knowledge	16 of 200
7.	Given instrumentation terminology, define the terms without error.	Knowledge	21 of 200
8.	Given instrument parameters, calculate the instrument inputs, outputs, accuracy, and calibration status in accordance with manufacturer and industry guidance.	Analysis	7 of 200
9.	Given various loop or instrument situations, select the correct response for the situation in accordance with engineering principles and manufacturer guidelines.	Comprehension	11 of 200
10.	Given various scenarios, explain the science of instrument calibration in accordance with engineering principles and manufacturer standards.	Comprehension	25 of 200
11.	Given instrument loop situations, identify the test equipment, connection point, or parameter in accordance with manufacturer guidance.	Comprehension	6 of 200

<u>No.</u>	<u>Cognitive Enabling Objective</u>	<u>Cognitive Level</u>	<u>Exam Rating</u>
12.	Given various processes, calculate or convert weight, psi, pressure, temperature, force, or density in accordance with engineering principles.	Analysis	5 of 200
13.	Given various loop or instrument descriptions, describe the safety steps to be taken in accordance with manufacturer or industry guidance.	Comprehension	2 of 200
14.	Given instrument symbols or letters, identify the symbol or letter in accordance with manufacturer or industry standards.	Knowledge	16 of 200
15.	Provided with P&IDs and Loop Diagrams, interpret the diagrams without error.	Application	8 of 200
16.	From memory, identify the calibration documentation for instrument calibrations in accordance with manufacturer or industry guidance.	Comprehension	7 of 200
17.	Given various loop processes, describe the operation of the components without error.	Comprehension	14 of 200
18.	Given various loop or component issues diagnose the problem or repair needed in accordance with manufacturer or industry guidance.	Analysis	2 of 200
19.	Identify the operation of analytical instrumentation when provided with examples in accordance with manufacturer or industry guidance.	Comprehension	3 of 200

Examination Cognitive Domain Weighting

Knowledge	65
Comprehension	92
Application	18
<u>Analysis</u>	<u>25</u>
Total	200

PERFORMANCE ENABLING OBJECTIVES:

<u>No.</u>	<u>Performance Enabling Objective</u>	<u>Performance Level</u>
1.	Given an air supply and pneumatic calibrator, prepare and connect the air supply and calibrator in accordance with recognized industry practices.	Perform
2.	Given a Digital Multimeter, set-up the meter to take voltage, current, and resistance measurements in accordance with manufacturer guidance.	Perform
3.	Given a DC Power Supply, set-up the Power Supply for an output of 24 VDC without error.	Perform
4.	Given a current simulator and test equipment, set-up the current simulator for an output of 13mA DC without error.	Perform
5.	Given a temperature simulator and various temperature simulations, set-up the temperature simulator for the simulations without error.	Perform
6.*	Given a differential pressure transmitter, visually inspect the transmitter and document the range of operation, input voltage and output range, and identified issues in accordance with manufacturer guidance.	Perform
7.*	Given a differential pressure transmitter and test equipment, calibrate the transmitter to within 0.5% accuracy.	Perform
8.*	Given a differential pressure transmitter and test equipment, calibrate the transmitter using a HART Communicator to within 0.5% accuracy.	Perform
9.*	Given an I/P Transducer and test equipment, calibrate the Transducer to within 0.5% accuracy.	Perform
10.*	Given a Pressure Switch and test equipment, calibrate the Pressure Switch to within 0.5% accuracy.	Perform
11.*	Given a Temperature Transmitter and test equipment, visually inspect the transmitter and document the range of operation, input voltage, output range, and wiring terminations in accordance with manufacturer guidance.	Perform
12.*	Given a Temperature Transmitter and test equipment, calibrate the transmitter using a HART Communicator to within 0.5% accuracy.	Perform

*Critical Step: Any step or element that, if performed incorrectly, will result in a safety event or is unrecoverable.

Appendix B

Standardized Task Evaluation IC04.01

Pre-Job Brief / Objectives

electrical training ALLIANCE Standardized Task Evaluation
Maintain and Calibrate General Instrumentation (IC04.01)

Pre-Job Brief

*The Performance Evaluator shall discuss and clarify the following to the examinee's satisfaction prior to beginning the performance evaluation. The sections appearing in **bold, underlined italics** should be read verbatim to the examinee.*

1. REGISTRATION

- ___ A. IDENTIFICATION: Verify that the examinee matches his or her government-issued photo identification.
- ___ B. VALIDATION: Verify that the examinee is currently credentialed as a Part A certificant.
- ___ C. APPLICATION: Have the examinee complete the Application for Test, pointing out that the address entered will be the address where certification cards and renewal information will be sent.
- ___ D. ADA ASSISTANCE: Requests for reasonable accommodation in conformance with ADA requirements must be made at the time of application.

If you have requested ADA accommodations that have not been adequately met, identify deficiencies to your Performance Evaluator for correction. If adequate accommodations cannot be made, please reschedule your evaluation with the Host Organization. This will not adversely affect your evaluation scoring.

2. EXAMINEE FAMILIARIZATION

- ___ A. TOOL AND EQUIPMENT REVIEW: Allow the examinee to become familiar with the tools, devices, and equipment that will be used in the evaluation.
- ___ B. VENDOR DOCUMENTATION: Allow the examinee to become familiar with any documentation associated with the tools, devices, and equipment that will be used in the evaluation.

All calibration equipment user manuals and documentation are available for your use at any time during the evaluation.

3. EXAMINEE REVIEW

- ___ A. EVALUATION OBJECTIVES: Give the examinee a copy of and discuss the performance objectives that will be tested by the evaluation.

This performance evaluation will test your knowledge and skills in the domains indicated by this list of Performance Objectives. You should determine at this time if you are adequately prepared to demonstrate your ability to satisfy these objectives.

- ___ B. EVALUATION PROCESS EXPLANATION: Explain the general progression of the evaluation, including which instruments will be included for calibration.

This evaluation will consist of several general calibration equipment configurations and settings and the complete calibration of three instrumentation devices, including a minimum of one smart device. You will randomly select the devices you will calibrate using a common random selection procedure provided by the evaluator.

Evaluator NOTE: Allow the examinee to randomly select the calibration devices at this point.

The tasks to be performed are actual calibrations of devices and must be treated as such. All equipment is to be used as is and you are not to assume that any device or equipment has been set up specifically for this exam. Treat each device and piece of equipment as if it is being used for the first time in the work day to perform an actual calibration and remember proper documentation is also required.

- ___ C. SCORING EXPLANATION: Explain the general criteria for scoring the evaluation.

This is a pass or fail evaluation. You will be graded on your ability to successfully complete each step of the assigned tasks. No credit will be given for partial completion of any task. I may terminate the evaluation at any time and score the evaluation as a failure if I determine that you have performed a task or a critical step incorrectly, in an unsafe manner, or in a manner that may be harmful to the calibration equipment or test devices.

4. STE DOCUMENT REVIEW

- ___ A. INFORMATION RELEASE STATEMENT (STE, PG 2): Have the examinee read, complete, and sign the Information Release Statement, explaining its use.

The electrical training ALLIANCE and EPRI maintain registries listing the names and scores of any person who passes this evaluation, based on a pass/fail criterion. By placing your signature on the Information Release Statement, you are authorizing the release of information regarding your evaluation.

- ___ B. QUESTIONS/PERFORMANCE (STE, pg 4): Discuss the contents of this section with the examinee.

I am allowed to answer your questions related to the evaluation format and standards. In no case will I answer a question that would provide coaching of knowledge or skills required of the examinee.

- ___ C. INSTRUCTIONS TO EXAMINEE (STE, pg 5): Read this section to the examinee.

- ___ D. EVALUATION FORMAT (STE, pg 5): Read this section to the examinee.

5. WORK PACKAGE REVIEW: Review format only. Do not review in such a way that may coach or instruct the examinee.

- ___ A. SCOPE: Review the scope of each assigned work package.

B. REQUIREMENTS

- ___ 1. PRE-JOB BRIEF: Discuss any pre-job information applicable to the tasks performed for each individual work order. For example, the device calibrations require the accurate completion of Calibrated Data Records, including as-found data, as-left data, and as-left accuracy calculations.
- ___ 2. WORK DIRECTION: Discuss this section with the examinee.

If assistance is needed, it may be only at your direction, I may act as a "second hand" only if you direct me to do so.

3. WORK PROGRESS VERBALIZATION: Discuss the importance of having the examinee verbalize all actions to the Performance Evaluator.

During your configurations and calibrations, I would like for you to tell me what you are doing both before and as you perform each task. This helps me evaluate your actions for the purpose of scoring the evaluation and provided me the opportunity to interrupt your actions if I suspect imminent damage to any of the equipment or the presence of a safety violation.

4. WORK VERIFICATION: Discuss the evaluator's various methods of work verification (i.e. close observation of actions, inspection of completed tasks and documents).

During the evaluation, I will try to not be intrusive, but I will be making careful and close observations of your actions as you complete your tasks. I will also ask to witness your calibration results and review any documentation that you are instructed to complete.

- C. PRECAUTIONS AND LIMITATIONS: Discuss the limitations and requirements for assuring an orderly and safe evaluation.

1. GENERAL HOUSEKEEPING: Discuss any housekeeping issues applicable to the tasks performed for each individual work order. For example, the amount of supplies, tools, and equipment used in device calibrations requires the examinee to maintain a neat and orderly work bench.

This evaluation will require the use of many different pieces of calibration equipment, tools, devices, and materials. Please make every effort to keep your work area well organized. This will help assure your orderly progression between specific tasks and will help me make more objective observations and evaluations of your progress.

2. GENERAL SAFETY: Discuss any general safety issues applicable to the tasks performed for each individual work order. For example, using some of the pneumatic calibrators and calibration of the I/P Transducer requires the use of compressed air or gas and may necessitate the use of safety glasses.

For the purpose of this evaluation safety procedures must be adhered to, as multiple energy sources are in use. Safety glasses are required when compressed gasses are in use. Be sure to observe all facility specific posted safety rules with regards to fall protection, head wear, and footwear.

3. ELECTRICAL SAFETY: Discuss any electrical safety issues applicable to the tasks performed for each individual work order. For example, using certain power supplies requires the use of 110 volts AC supply power and possibly the use of extension cords.

The electrical test equipment used as part of this evaluation are listed limited energy sources, therefore, the risk of arc flash exposure is not applicable to these procedures.

- D. EQUIPMENT REQUIREMENTS: Discuss the requirement for the examinee to choose the appropriate tools, supplies, and equipment for the assigned tasks.

All of the tasks can be performed using the provided equipment, tools, and materials. It is your duty to choose which calibration equipment, tools, and materials will effectively complete the desired task and to demonstrate proper techniques to achieve the desired result.

- ___ E. WORK INSTRUCTIONS: Discuss the importance of progressing through the tasks in the indicated order and the severe penalty (evaluation failure) for violating any indicated *Hold for Verification* points.

The Work Instructions have been created in an orderly progression. Please follow the work progression in the indicated order. At specific points in the work progression, there are indications to “Hold for Verification”. These Hold points are designed into the work instructions to allow me to make accurate and objective evaluations of your work. Your failure to Hold for Verification by the Performance Evaluator at any of the indicated Hold Points will constitute a failure of the performance evaluation.

- ___ F. SCRATCH PAPER: Discuss the use of scratch paper, including the option of recording all calibration data onto the scratch paper before completing the Calibrated Data Record.

To minimize errors, the provided scratch paper may be used. The required information should be copied into the official paperwork prior to completing the task. Be careful to copy the information accurately. Scratch paper is not official paperwork and an official paper work submission not accurately reflecting the task parameters may be graded as a failure.

- ___ G. CALIBRATED DATA RECORD: Discuss the location of calibration standards and the importance of completing all blank fields. Discuss the proper procedure for correcting an erroneous entry (single strike-through and initial).

All paperwork must be completed in a neat and legible manner. If a mistake is made, please draw a single line through the error and initial, writing the correct value above or below.

6. EXAMINEE QUESTIONS: Answer any questions and address any concerns as long as your answers and explanations do not coach or instruct the examinee in the completion of any of the required tasks.

This is a three-hour timed evaluation which will begin when the Performance Evaluator officially initiates the evaluation. Take your time and perform the procedures carefully.

7. QUESTION CHALLENGES: Instruct the examinee to submit a formal question challenge to any of the task items or steps or instructions that may be vague, misleading, or otherwise confusing. This will help in future revisions of the work orders.

If any of the task items, steps, or instructions seem to be vague, misleading, or otherwise confusing, please point them out to me and make a note of them on the Test Question Challenge form and submit to me before completing the evaluation.

8. PRE-JOB BRIEF VERIFICATION:

By signing below, the Performance Evaluator and the examinee verify that the above referenced documents, instructions, processes, requirements, and precautions have been discussed and clarified to the examinee's satisfaction prior to beginning the performance evaluation. The examinee also verifies that he/she has been given a copy of the objectives that will be tested by this performance evaluation and that he/she understands the following:

- 1. Task expectations regarding the three devices*
- 2. Equipment/ Device/ Documentation locations*
- 3. Safety glass requirement as well as any specific individual lab procedure*
- 4. Requested ADA accommodations have been provided.*
- 5. Examinee must direct the evaluator for any needed assistance*
- 6. Documentation clarity*
- 7. Performance objectives to be tested*
- 8. Timed evaluation of 3 hours.*

Performance Evaluator: _____

Examinee: _____

Date: _____

***electrical training ALLIANCE* Standardized Task Evaluation**
MAINTAIN AND CALIBRATE GENERAL INSTRUMENTATION – STE IC04.01

Cognitive Objectives

The Part A Knowledge Examination for this Standardized Task Evaluation will evaluate your knowledge in the following domains:

Cognitive Enabling Objectives

1. General Electrical/Electronic Theories
2. Workplace Safety Processes
3. Calculating Electrical/Electronic Circuit Performance
4. Identification of Electrical/Electronic Symbols
5. Lockout-Tagout Processes
6. Identification of Instrument Loop Components
7. Instrumentation Terminology
8. Instrument Inputs/Outputs
9. Evaluating Instrument Calibrations
10. Science of Instrument Calibration
11. Test Equipment used for instrument calibration
12. Applying Instrument Calibration Formulas
13. Component Safety
14. Identification of Instrumentation Symbols and Letters
15. Interpreting P&IDs and Loop Diagrams
16. Instrumentation Calibration Documentation
17. Operation of the Components of an Instrument loop
18. Instrument Loop Malfunctions diagnostics
19. Operation of Analytical Instrumentation

***electrical training ALLIANCE* Standardized Task Evaluation**
MAINTAIN AND CALIBRATE GENERAL INSTRUMENTATION – STE IC04.01

Performance Objectives

The Part B Performance Evaluation for this Standardized Task Evaluation will evaluate your skills in the following domains:

Performance Enabling Objectives

1. Set up and use of a pneumatic calibrator
2. Set up and use of a digital multimeter
3. Set up and use of a DC power supply
4. Set up and use of a current simulator
5. Set up and use of a temperature simulator
6. Visual inspection of a differential pressure transmitter
7. Visual inspection of a temperature transmitter
8. Calibration of a differential pressure transmitter
9. Calibration of a pressure transmitter using a communicator
10. Calibration of an I/P Transducer
11. Calibration of a pressure switch
12. Calibration of a temperature transmitter

Appendix C

Standardized Task Evaluation IC04.01

Work Orders

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P1-P5
Work Order: IC04.01-WO1-GC	General Instrument Configuration	Maintain and Calibrate General Instrumentation

**Maintain and Calibrate General Instrumentation
STE IC04.01**

Work Order 01
General Instrument Configuration

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P1-P5
Work Order: IC04.01-WO1-GC	General Instrument Configuration	Maintain and Calibrate General Instrumentation

SCOPE: The scope of this work order is to demonstrate the proper configuration and adjustment of various pneumatic and electrical test and calibration equipment commonly utilized in the calibration of industrial process control instrumentation.

1.0 REQUIREMENTS:

1.1 PRE-JOB BRIEF:

The examinee shall receive a thorough pre-job brief prior to beginning work.

1.2 WORK DIRECTION:

All work steps, tasks, and any required assistance shall be performed at the direction of the Examinee.

1.3 WORK PROGRESS VERBALIZATION:

The Examinee shall verbalize each work step before performing each step during the progression and up until the completion of each task.

1.4 WORK VERIFICATION:

The Examinee's progress and completion of each work step shall be verified by the Performance Evaluator throughout the performance evaluation. The Examinee is to observe all indicated holds for Performance Evaluator verification.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 GENERAL HOUSEKEEPING:

All work shall be performed observing jobsite housekeeping practices as required by 29CFR Part 1926, Safety and Health Regulations for Construction.

2.2 GENERAL SAFETY:

All work shall be performed observing general jobsite safety practices as required by 29 CFR Part 1926, Safety and Health Regulation for Construction.

2.3 ELECTRICAL SAFETY:

All work shall be performed observing electrical jobsite safety practices as required by NFPA 70E, Standard for Electrical Safety in the Workplace.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P1-P5
Work Order: IC04.01–WO1-GC	General Instrument Configuration	Maintain and Calibrate General Instrumentation

3.0 EQUIPMENT REQUIREMENTS:

The tasks outlined in this work order will require a minimum of two choices for each of the following calibration equipment, complete with user's guides and currently valid calibration documentation. Final selection of the equipment to be used for each work step shall be at the direction of the Examinee.

- 3.1 Pneumatic Calibrator (0-100 psig range)
- 3.2 Digital Multimeter
- 3.3 Power Supply (24 volt DC, nominal)
- 3.4 DC Current Simulator (4-20 mA)
- 3.5 HART Protocol Communicator
- 3.6 Temperature Simulator (RTD and type J thermocouple)
- 3.7 Pneumatic Pressure Supply (0-50 psig)

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P1-P5
Work Order: IC04.01-WO1-GC	General Instrument Configuration	Maintain and Calibrate General Instrumentation

4.0 WORK INSTRUCTIONS:

The following tasks require configuring, setting, and adjusting the test and calibration equipment to take various measurements, verifying the measurements with a second meter where indicated. The Examinee is to direct the Performance Evaluator to verify each configuration before proceeding to the next simulation or measurement.

- 4.1 Connect the Pneumatic Pressure Supply to the Pneumatic Calibrator.
Adjust the supply for a pressure suitable for calibrating a standard I/P transducer.

Hold For Verification: _____
Performance Evaluator Initials

- 4.2 Properly configure the leads and settings of the Digital Multimeter for measuring 20 millivolts DC.

Hold For Verification: _____
Performance Evaluator Initials

- 4.3 Properly configure the leads and settings of the Digital Multimeter for measuring 120 volts AC.

Hold For Verification: _____
Performance Evaluator Initials

- 4.4 Properly configure the leads and settings of the Digital Multimeter for measuring 20 milliamps DC.

Hold For Verification: _____
Performance Evaluator Initials

- 4.5 Properly configure the leads and settings of the Digital Multimeter for measuring 20 Ohms.

Hold For Verification: _____
Performance Evaluator Initials

- 4.6 Configure and adjust the DC Power Supply for an output of 24 volts DC.
Verify the Output with the Digital Multimeter.

Hold For Verification: _____
Performance Evaluator Initials

- 4.7 Configure and adjust the Current Simulator for an output of 13 milliamps DC.
Verify the Output with the Digital Multimeter.

Hold For Verification: _____
Performance Evaluator Initials

- 4.8 Configure and adjust the Temperature Simulator for an output of 100 Ohm, 4-wire, platinum RTD with an alpha curve of 0.0385.

Hold For Verification: _____
Performance Evaluator Initials

- 4.9 Configure and adjust the Temperature Simulator for an output of a Type J Thermocouple.

Hold For Verification: _____
Performance Evaluator Initials

- 4.10 Return this Work Order and any other applicable documentation to the Performance Evaluator.

- 4.11 Break down all test and calibration equipment and return to proper storage.

- 4.12 Begin the next Work Order at the direction of the Performance Evaluator.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P6-P7
Work Order: IC04.01–WO2-DPT1001	Differential Pressure Transmitter Calibration	Maintain and Calibrate General Instrumentation

**Maintain and Calibrate General Instrumentation
STE IC04.01**

Work Order 02

**Differential Pressure Transmitter Calibration
DPT-1001**

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P6-P7
Work Order: IC04.01–WO2-DPT1001	Differential Pressure Transmitter Calibration	Maintain and Calibrate General Instrumentation

SCOPE: The scope of this work order is to demonstrate the proper calibration of a legacy (non-communicating) Differential Pressure Transmitter (DPT).

1.0 REQUIREMENTS:

1.1 PRE-JOB BRIEF:

The Examinee shall receive a thorough pre-job brief prior to beginning work.

1.2 WORK DIRECTION:

All work steps, tasks, and any required assistance shall be performed at the direction of the Examinee.

1.3 WORK PROGRESS VERBALIZATION:

The Examinee shall verbalize each work step before performing each step during the progression and up until the completion of each task.

1.4 WORK VERIFICATION:

The Examinee’s progress and completion of each work step shall be verified by the Performance Evaluator throughout the performance evaluation. The Examinee is to observe all indicated holds for Performance Evaluator verification.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 GENERAL HOUSEKEEPING:

All work shall be performed observing jobsite housekeeping practices as required by 29CFR Part 1926, Safety and Health Regulations for Construction.

2.2 GENERAL SAFETY:

All work shall be performed observing general jobsite safety practices as required by 29 CFR Part 1926, Safety and Health Regulation for Construction.

2.3 ELECTRICAL SAFETY:

All work shall be performed observing electrical jobsite safety practices as required by NFPA 70E, Standard for Electrical Safety in the Workplace.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P6-P7
Work Order: IC04.01–WO2-DPT1001	Differential Pressure Transmitter Calibration	Maintain and Calibrate General Instrumentation

3.0 EQUIPMENT REQUIREMENTS:

The tasks outlined in this work order will require a minimum of two choices for each of the following calibration equipment, complete with user's guides and currently valid calibration documentation. Final selection of the equipment to be used for each work step shall be at the direction of the Examinee.

- 3.1 Pneumatic Calibrator (0-100 psig range)
- 3.2 Digital Multimeter
- 3.3 Power Supply (24 volt DC, nominal)
- 3.4 DC Current Simulator (4-20 mA)
- 3.5 HART Protocol Communicator
- 3.6 Temperature Simulator (RTD and type J thermocouple)
- 3.7 Pneumatic Pressure Supply (0-50 psig)

The tasks outlined in this Work Order will require one each of the following device with user's guide:

- 3.8 Differential Pressure Transmitter tagged DPT-1001
legacy (non-communicating) transmitter
Range: 100" – 500" H₂O input

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P6-P7
Work Order: IC04.01–WO2-DPT1001	Differential Pressure Transmitter Calibration	Maintain and Calibrate General Instrumentation

4.0 WORK INSTRUCTIONS:

FOR THE FLOW TRANSMITTER TAGGED DPT-1001:

- 4.1 Identify the transmitter’s input range of operation, in engineering units.

Transmitter Input Range of Operation: _____

- 4.2 Identify the transmitter’s input voltage supply range.

Transmitter Input Voltage Supply Range: _____

- 4.3 Identify the transmitter’s output range, in engineering units.

Transmitter Output Range: _____

Hold For Verification: _____
Performance Evaluator Initials

- 4.4 Locate and identify the transmitter Zero and Span adjustments to the Performance Evaluator.

Hold For Verification: _____
Performance Evaluator Initials

- 4.5 Locate and identify the transmitter HI and LO side calibration connections to the Performance Evaluator.

Hold For Verification: _____
Performance Evaluator Initials

- 4.6 Record all indicated information from the transmitter and test equipment into the appropriate fields on the Calibrated Data Record.

- 4.7 Select and connect input source and an instrumentation test loop as required to the transmitter.

- 4.8 Input five cardinal test points, increasing and decreasing, while recording indicated data into the appropriate fields on the Calibrated Data Record.

- 4.9 Calibrate the transmitter to comply with the range and accuracy requirements indicated on the Calibrated Data Record.

- 4.10 Repeat inputting five cardinal test points, increasing and decreasing, while recording indicated data into the appropriate fields on the Calibrated Data Record.

- 4.11 Sign and date the Calibrated Data Record.

Hold For Verification: _____
Performance Evaluator Initials

- 4.12 Return this Work Order and any other applicable documentation to the Performance Evaluator.

- 4.13 Break down all test and calibration equipment and return to proper storage.

- 4.14 Begin the next Work Order at the direction of the Performance Evaluator.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P6-P7
Work Order: IC04.01-WO2-DPT1001	Differential Pressure Transmitter Calibration	Maintain and Calibrate General Instrumentation

Scratch Page

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P6-P7
Work Order: IC04.01–WO2-DPT1001	Differential Pressure Transmitter Calibration	Maintain and Calibrate General Instrumentation

Scratch Page

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P6-P7
Work Order: IC04.01-WO2-DPT1001	Differential Pressure Transmitter Calibration	Maintain and Calibrate General Instrumentation

CALIBRATED DATA RECORD

Manufacturer:	
Instrument Tag #: DPT-1001	Model #:
Calibration Range: 100" to 500" H₂O	
Input Units:	Output Units:

Test Equipment	Model	S/N

**Accuracy of calibration is ± 0.5 % of Output Range
Show all findings in proper terms**

%	INPUT	DESIRED OUTPUT	AS FOUND	AS LEFT	CALIBRATION ACCURACY
0					
25					
50					
75					
100					
75					
50					
25					
0					

CALIBRATED BY: _____

DATE: _____

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P8-P9
Work Order: IC04.01-WO3-FT1002	Flow Transmitter Calibration	Maintain and Calibrate General Instrumentation

**Maintain and Calibrate General Instrumentation
STE IC04.01**

Work Order 03
Flow Transmitter Calibration
FT-1002

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P8-P9
Work Order: IC04.01–WO3-FT1002	Flow Transmitter Calibration	Maintain and Calibrate General Instrumentation

SCOPE: The scope of this work order is to demonstrate the proper calibration of a Differential Pressure-type Flow Transmitter (FT) with HART protocol communication capabilities.

1.0 REQUIREMENTS:

1.1 PRE-JOB BRIEF:

The Examinee shall receive a thorough pre-job brief prior to beginning work.

1.2 WORK DIRECTION:

All work steps, tasks, and any required assistance shall be performed at the direction of the Examinee.

1.3 WORK PROGRESS VERBALIZATION:

The Examinee shall verbalize each work step before performing each step during the progression and up until the completion of each task.

1.4 WORK VERIFICATION:

The Examinee’s progress and completion of each work step shall be verified by the Performance Evaluator throughout the performance evaluation. The Examinee is to observe all indicated holds for Performance Evaluator verification.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 GENERAL HOUSEKEEPING:

All work shall be performed observing jobsite housekeeping practices as required by 29CFR Part 1926, Safety and Health Regulations for Construction.

2.2 GENERAL SAFETY:

All work shall be performed observing general jobsite safety practices as required by 29 CFR Part 1926, Safety and Health Regulation for Construction.

2.3 ELECTRICAL SAFETY:

All work shall be performed observing electrical jobsite safety practices as required by NFPA 70E, Standard for Electrical Safety in the Workplace.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P8-P9
Work Order: IC04.01–WO3-FT1002	Flow Transmitter Calibration	Maintain and Calibrate General Instrumentation

3.0 EQUIPMENT REQUIREMENTS:

The tasks outlined in this work order will require a minimum of two choices for each of the following calibration equipment, complete with user's guides and currently valid calibration documentation. Final selection of the equipment to be used for each work step shall be at the direction of the Examinee.

- 3.1 Pneumatic Calibrator (0-100 psig range)
- 3.2 Digital Multimeter
- 3.3 Power Supply (24 volt DC, nominal)
- 3.4 DC Current Simulator (4-20 mA)
- 3.5 HART Protocol Communicator
- 3.6 Temperature Simulator (RTD and type J thermocouple)
- 3.7 Pneumatic Pressure Supply (0-50 psig)

The tasks outlined in this Work Order will require one each of the following device with user's guide:

- 3.8 Differential Pressure Transmitter tagged FT-1002
HART protocol communicating transmitter
Range: 0" – 220" H₂O input

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P8-P9
Work Order: IC04.01–WO3-FT1002	Flow Transmitter Calibration	Maintain and Calibrate General Instrumentation

4.0 WORK INSTRUCTIONS:

FOR THE FLOW TRANSMITTER TAGGED FT-1002:

- 4.1 Record all indicated information from the transmitter and test equipment into the appropriate fields on the Calibrated Data Record.
- 4.2 Select and connect supply voltage, current readout, input source, and communicator to the transmitter.
- 4.3 Input five cardinal test points, increasing and decreasing, while recording indicated data into the appropriate fields on the Calibrated Data Record.
- 4.4 Calibrate the transmitter to comply with the range and accuracy requirements indicated on the Calibrated Data Record.
- 4.5 Repeat inputting five cardinal test points, increasing and decreasing, while recording indicated data into the appropriate fields on the Calibrated Data Record.
- 4.6 Sign and date the Calibrated Data Record.

Hold For Verification: _____
Performance Evaluator Initials

- 4.7 Return this Work Order and any other applicable documentation to the Performance Evaluator.
- 4.8 Break down all test and calibration equipment and return to proper storage.
- 4.9 Begin the next Work Order at the direction of the Performance Evaluator.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P8-P9
Work Order: IC04.01-WO3-FT1002	Flow Transmitter Calibration	Maintain and Calibrate General Instrumentation

SCRATCH PAGE

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P8-P9
Work Order: IC04.01-WO3-FT1002	Flow Transmitter Calibration	Maintain and Calibrate General Instrumentation

SCRATCH PAGE

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P8-P9
Work Order: IC04.01-WO3-FT1002	Flow Transmitter Calibration	Maintain and Calibrate General Instrumentation

CALIBRATED DATA RECORD

Manufacturer:	
Instrument Tag #: FT-1002	Model #:
Calibration Range: 0" to 220" H₂O	
Input Units:	Output Units:

Test Equipment	Model	S/N

**Accuracy of calibration is ± 0.5 % of Output Range
Show all findings in proper terms**

%	INPUT	DESIRED OUTPUT	AS FOUND	AS LEFT	CALIBRATION ACCURACY
0					
25					
50					
75					
100					
75					
50					
25					
0					

CALIBRATED BY: _____

DATE: _____

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P10
Work Order: IC04.01-WO4-IP1003	Current to Pressure Transducer Calibration	Maintain and Calibrate General Instrumentation

**Maintain and Calibrate General Instrumentation
STE IC04.01**

Work Order 04
Current to Pressure Transducer Calibration
I/P-1003

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P10
Work Order: IC04.01–WO4-IP1003	Current to Pressure Transducer Calibration	Maintain and Calibrate General Instrumentation

SCOPE: The scope of this work order is to demonstrate the proper calibration of a Current to Pressure Transducer (I/P).

1.0 REQUIREMENTS:

1.1 PRE-JOB BRIEF:

The Examinee shall receive a thorough pre-job brief prior to beginning work.

1.2 WORK DIRECTION:

All work steps, tasks, and any required assistance shall be performed at the direction of the Examinee.

1.3 WORK PROGRESS VERBALIZATION:

The Examinee shall verbalize each work step before performing each step during the progression and up until the completion of each task.

1.4 WORK VERIFICATION:

The Examinee’s progress and completion of each work step shall be verified by the Performance Evaluator throughout the performance evaluation. The Examinee is to observe all indicated holds for Performance Evaluator verification.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 GENERAL HOUSEKEEPING:

All work shall be performed observing jobsite housekeeping practices as required by 29CFR Part 1926, Safety and Health Regulations for Construction.

2.2 GENERAL SAFETY:

All work shall be performed observing general jobsite safety practices as required by 29 CFR Part 1926, Safety and Health Regulation for Construction.

2.3 ELECTRICAL SAFETY:

All work shall be performed observing electrical jobsite safety practices as required by NFPA 70E, Standard for Electrical Safety in the Workplace.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P10
Work Order: IC04.01–WO4-IP1003	Current to Pressure Transducer Calibration	Maintain and Calibrate General Instrumentation

3.0 EQUIPMENT REQUIREMENTS:

The tasks outlined in this work order will require a minimum of two choices for each of the following calibration equipment, complete with user's guides and currently valid calibration documentation. Final selection of the equipment to be used for each work step shall be at the direction of the Examinee.

- 3.1 Pneumatic Calibrator (0-100 psig range)
- 3.2 Digital Multimeter
- 3.3 Power Supply (24 volt DC, nominal)
- 3.4 DC Current Simulator (4-20 mA)
- 3.5 HART Protocol Communicator
- 3.6 Temperature Simulator (RTD and type J thermocouple)
- 3.7 Pneumatic Pressure Supply (0-50 psig)

The tasks outlined in this Work Order will require one each of the following device with user's guide:

- 3.8 Current to Pressure Transducer tagged I/P-1003
legacy (non-communicating) transducer
Range: 3 – 15 psig output

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P10
Work Order: IC04.01–WO4-IP1003	Current to Pressure Transducer Calibration	Maintain and Calibrate General Instrumentation

4.0 WORK INSTRUCTIONS:

FOR THE CURRENT TO PRESSURE TRANSDUCER TAGGED I/P-1003:

- 4.1 Record all indicated information from the transducer and test equipment into the appropriate fields on the Calibrated Data Record.
- 4.2 Select and connect input source and other calibration equipment as required to the transducer.
- 4.3 Input five cardinal test points, increasing and decreasing, while recording indicated data into the appropriate fields on the Calibrated Data Record.
- 4.4 Calibrate the transducer to comply with the range and accuracy requirements indicated on the Calibrated Data Record.
- 4.5 Repeat inputting five cardinal test points, increasing and decreasing, while recording indicated data into the appropriate fields on the Calibrated Data Record.
- 4.6 Sign and date the Calibrated Data Record.

Hold For Verification: _____
Performance Evaluator Initials

- 4.7 Return this Work Order and any other applicable documentation to the Performance Evaluator.
- 4.8 Break down all test and calibration equipment and return to proper storage.
- 4.9 Begin the next Work Order at the direction of the Performance Evaluator.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P10
Work Order: IC04.01-WO4-IP1003	Current to Pressure Transducer Calibration	Maintain and Calibrate General Instrumentation

SCRATCH PAGE

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P10
Work Order: IC04.01-WO4-IP1003	Current to Pressure Transducer Calibration	Maintain and Calibrate General Instrumentation

SCRATCH PAGE

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P10
Work Order: IC04.01-WO4-IP1003	Current to Pressure Transducer Calibration	Maintain and Calibrate General Instrumentation

CALIBRATED DATA RECORD

Manufacturer:	
Instrument Tag #: I/P-1003	Model #:
Calibration Range: 3 – 15 psig	
Input Units:	Output Units:

Test Equipment	Model	S/N

**Accuracy of calibration is ± 0.5 % of Output Range
Show all findings in proper terms**

%	INPUT	DESIRED OUTPUT	AS FOUND	AS LEFT	CALIBRATION ACCURACY
0					
25					
50					
75					
100					
75					
50					
25					
0					

CALIBRATED BY: _____

DATE: _____

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P11
Work Order: IC04.01-WO5-PS1004	Pneumatic Pressure Switch Calibration	Maintain and Calibrate General Instrumentation

**Maintain and Calibrate General Instrumentation
STE IC04.01**

Work Order 05
Pneumatic Pressure Switch Calibration
PS-1004

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P11
Work Order: IC04.01–WO5-PS1004	Pneumatic Pressure Switch Calibration	Maintain and Calibrate General Instrumentation

SCOPE: The scope of this work order is to demonstrate the proper calibration of a pneumatic Pressure Switch (PS).

1.0 REQUIREMENTS:

1.1 PRE-JOB BRIEF:

The Examinee shall receive a thorough pre-job brief prior to beginning work.

1.2 WORK DIRECTION:

All work steps, tasks, and any required assistance shall be performed at the direction of the Examinee.

1.3 WORK PROGRESS VERBALIZATION:

The Examinee shall verbalize each work step before performing each step during the progression and up until the completion of each task.

1.4 WORK VERIFICATION:

The Examinee's progress and completion of each work step shall be verified by the Performance Evaluator throughout the performance evaluation. The Examinee is to observe all indicated holds for Performance Evaluator verification.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 GENERAL HOUSEKEEPING:

All work shall be performed observing jobsite housekeeping practices as required by 29CFR Part 1926, Safety and Health Regulations for Construction.

2.2 GENERAL SAFETY:

All work shall be performed observing general jobsite safety practices as required by 29 CFR Part 1926, Safety and Health Regulation for Construction.

2.3 ELECTRICAL SAFETY:

All work shall be performed observing electrical jobsite safety practices as required by NFPA 70E, Standard for Electrical Safety in the Workplace.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P11
Work Order: IC04.01–WO5-PS1004	Pneumatic Pressure Switch Calibration	Maintain and Calibrate General Instrumentation

3.0 EQUIPMENT REQUIREMENTS:

The tasks outlined in this work order will require a minimum of two choices for each of the following calibration equipment, complete with user's guides and currently valid calibration documentation. Final selection of the equipment to be used for each work step shall be at the direction of the Examinee.

- 3.1 Pneumatic Calibrator (0-100 psig range)
- 3.2 Digital Multimeter
- 3.3 Power Supply (24 volt DC, nominal)
- 3.4 DC Current Simulator (4-20 mA)
- 3.5 HART Protocol Communicator
- 3.6 Temperature Simulator (RTD and type J thermocouple)
- 3.7 Pneumatic Pressure Supply (0-50 psig)

The tasks outlined in this Work Order will require one each of the following device with user's guide:

- 3.8 Pressure Switch tagged PS__-1004
legacy (non-communicating) switch
range: 20 – 50 psig input

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P11
Work Order: IC04.01–WO5-PS1004	Pneumatic Pressure Switch Calibration	Maintain and Calibrate General Instrumentation

4.0 WORK INSTRUCTIONS:

FOR THE PRESSURE SWITCH TAGGED PS-1004:

- 4.1 Record all indicated information from the switch and test equipment into the appropriate fields on the Calibrated Data Record.
- 4.2 Select and connect input source and test equipment required for the output function of the switch.
- 4.3 Apply input pressure, increasing or decreasing according to the information on the Calibrated Data Record, and record the required data, including trip/reset setting into the appropriate fields on the Calibrated Data Record.
- 4.4 Adjust the pressure switch actuation point based on the set point and switch action indicated on the Calibrated Data Record.
- 4.5 Record all indicated calibration data for two complete switching cycles into the appropriate fields on the Calibrated Data Record.
- 4.6 Sign and date the Calibrated Data Record.

Hold For Verification: _____
Performance Evaluator Initials

- 4.7 Return this Work Order and any other applicable documentation to the Performance Evaluator.
- 4.8 Break down all test and calibration equipment and return to proper storage.
- 4.9 Begin the next Work Order at the direction of the Performance Evaluator.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P11
Work Order: IC04.01-WO5-PS1004	Pneumatic Pressure Switch Calibration	Maintain and Calibrate General Instrumentation

SCRATCH PAGE

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P11
Work Order: IC04.01-WO5-PS1004	Pneumatic Pressure Switch Calibration	Maintain and Calibrate General Instrumentation

SCRATCH PAGE

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Step P11
Work Order: IC04.01-WO5-PS1004	Pneumatic Pressure Switch Calibration	Maintain and Calibrate General Instrumentation

CALIBRATED DATA RECORD

Manufacturer:	
Instrument Tag #: PS ___ -1004	Model #:
Input Range: 20 – 50 psig	
Set Point: _____ psig	Switch Action ___ inc ___ dec
Input Units:	Output Units:

Test Equipment	Model	S/N

Record at least two 'As Left' data to document repeatability
Accuracy of calibration is $\pm 1.0\%$ of Input Range
Show all findings in proper terms

Test	ACTUATION POINT	INCREASE/ DECREASE	AS FOUND	AS LEFT	TRIP / RESET	CALIBRATION ACCURACY
1			 	 		
2			 	 		
3			 	 		
4			 	 		

CALIBRATED BY: _____

DATE: _____

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P12-P13
Work Order: IC04.01-WO6-TT1005	Temperature Transmitter Calibration	Maintain and Calibrate General Instrumentation

**Maintain and Calibrate General Instrumentation
STE IC04.01**

Work Order 06
Temperature Transmitter Calibration
TT-1005

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P12-P13
Work Order: IC04.01–WO6-TT1005	Temperature Transmitter Calibration	Maintain and Calibrate General Instrumentation

SCOPE: The scope of this work order is to demonstrate the proper calibration of a Temperature Transmitter (TT) with HART protocol communication capabilities.

1.0 REQUIREMENTS:

1.1 PRE-JOB BRIEF:

The Examinee shall receive a thorough pre-job brief prior to beginning work.

1.2 WORK DIRECTION:

All work steps, tasks, and any required assistance shall be performed at the direction of the Examinee.

1.3 WORK PROGRESS VERBALIZATION:

The Examinee shall verbalize each work step before performing each step during the progression and up until the completion of each task.

1.4 WORK VERIFICATION:

The Examinee's progress and completion of each work step shall be verified by the Performance Evaluator throughout the performance evaluation. The Examinee is to observe all indicated holds for Performance Evaluator verification.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 GENERAL HOUSEKEEPING:

All work shall be performed observing jobsite housekeeping practices as required by 29CFR Part 1926, Safety and Health Regulations for Construction.

2.2 GENERAL SAFETY:

All work shall be performed observing general jobsite safety practices as required by 29 CFR Part 1926, Safety and Health Regulation for Construction.

2.3 ELECTRICAL SAFETY:

All work shall be performed observing electrical jobsite safety practices as required by NFPA 70E, Standard for Electrical Safety in the Workplace.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P12-P13
Work Order: IC04.01–WO6-TT1005	Temperature Transmitter Calibration	Maintain and Calibrate General Instrumentation

3.0 EQUIPMENT REQUIREMENTS:

The tasks outlined in this work order will require a minimum of two choices for each of the following calibration equipment, complete with user's guides and currently valid calibration documentation. Final selection of the equipment to be used for each work step shall be at the direction of the Examinee.

- 3.1 Pneumatic Calibrator (0-100 psig range)
- 3.2 Digital Multimeter
- 3.3 Power Supply (24 volt DC, nominal)
- 3.4 DC Current Simulator (4-20 mA)
- 3.5 HART Protocol Communicator
- 3.6 Temperature Simulator (RTD and type J thermocouple)
- 3.7 Pneumatic Pressure Supply (0-50 psig)

The tasks outlined in this Work Order will require one each of the following device with user's guide:

- 3.8 Temperature Transmitter tagged TT-1005
HART protocol communicating transmitter
Range: 32° – 212° F input

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P12-P13
Work Order: IC04.01–WO6-TT1005	Temperature Transmitter Calibration	Maintain and Calibrate General Instrumentation

4.0 WORK INSTRUCTIONS:

FOR THE TEMPERATURE TRANSMITTER TAGGED TT-1005:

- 4.1 Identify the transmitter input range of operation, in engineering units.

Transmitter Input Range of Operation: _____

- 4.2 Identify the transmitter input supply voltage range.

Transmitter Input Supply Voltage Range: _____

- 4.3 Identify the transmitter output range, in engineering units.

Transmitter Output Range: _____

- 4.4 Identify the transmitter RTD and thermocouple wiring terminal numbers.

Transmitter RTD wiring terminal numbers: _____

Transmitter thermocouple wiring terminal numbers: _____

Hold For Verification: _____

Performance Evaluator Initials

- 4.5 Record all indicated information from the transmitter and test equipment into the appropriate fields on the Calibrated Data Record.
- 4.6 Select and connect supply voltage, current readout, input source, and communicator to the transmitter.
- 4.7 Input five cardinal test points, increasing and decreasing, while recording indicated data into the appropriate fields on the Calibrated Data Record.
- 4.8 Calibrate the transmitter to comply with the range and accuracy requirements indicated on the Calibrated Data Record.
- 4.9 Repeat inputting five cardinal test points, increasing and decreasing, while recording indicated data into the appropriate fields on the Calibrated Data Record.
- 4.10 Sign and date the Calibrated Data Record.

Hold For Verification: _____

Performance Evaluator Initials

- 4.11 Return this Work Order and any other applicable documentation to the Performance Evaluator.
- 4.12 Break down all test and calibration equipment and return to proper storage.
- 4.13 Begin the next Work Order at the direction of the Performance Evaluator.

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P12-P13
Work Order: IC04.01-WO6-TT1005	Temperature Transmitter Calibration	Maintain and Calibrate General Instrumentation

SCRATCH PAGE

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P12-P13
Work Order: IC04.01-WO6-TT1005	Temperature Transmitter Calibration	Maintain and Calibrate General Instrumentation

SCRATCH PAGE

<i>Electrical training ALLIANCE</i>	Standardized Task Evaluation	STE IC04.01: Performance Steps P12-P13
Work Order: IC04.01-WO6-TT1005	Temperature Transmitter Calibration	Maintain and Calibrate General Instrumentation

CALIBRATED DATA RECORD

Manufacturer:	
Instrument Tag #: TT-1005	Model #:
Calibration Range: 32.0° F to 212° F	
Input Type: ___ 2-Wire RTD, platinum, 100 ohm, alpha = 0.0385 ___ 3-Wire RTD, platinum, 100 ohm, alpha = 0.0385 ___ Thermocouple, Type J	
Input Units:	Output Units:

Test Equipment	Model	S/N

**Accuracy of calibration is ± 0.5 % of Output Range
Show all findings in proper terms**

%	INPUT	DESIRED OUTPUT	AS FOUND	AS LEFT	CALIBRATION ACCURACY
0					
25					
50					
75					
100					
75					
50					
25					
0					

CALIBRATED BY: _____

DATE: _____

Appendix D

Standardized Task Evaluation IC04.01

Certification Renewal Forms

IBEW/NECA Standardized Task Evaluation Certification Part B Certification Renewal Request – Form 4.7

Certificant Name: _____

Address: _____

Phone Number: _____

Email: _____

Social Security Number: _____
(Last 5 Digits Only)

IBEW Card Number: _____

IBEW Local Union Name and Number: _____

STE Certification Number and Title: **IC04.01 / Maintain and Calibrate General Instrumentation**

STE Certification Expiration Date: _____

Current Date: _____

Renewal Method: Work Experience – must be submitted within 3 years of initial certification date.
 Reevaluation – must be submitted within 5 years of initial certification date.

Please provide the name and location of the Host Organization and the date of your Part B Evaluation.

IMPORTANT: Host Organization or Training Director of local JATC Approval Signature

The *electrical training ALLIANCE* must receive this completed form to process a recertification credential. This form must be completed and submitted to the Host Organization for signature approval before submission to the *electrical training ALLIANCE*. An individual's Local JATC may also submit signature for approval.

Consult the *electrical training ALLIANCE* for applicable fee.
Make check payable to the *electrical training ALLIANCE*

Submit to: *electrical training ALLIANCE*
ATTENTION: STE Renewal
5001 Howerton Way, Suite N, Bowie, MD 20715
email: STERenewal@electricaltrainingalliance.org



IBEW/NECA Standardized Task Evaluation Certification Part B Certification Renewal Work Record – Form 4.8

Certificant Name: _____

Social Security Number: _____
(Last 5 Digits Only)

IBEW Card Number: _____

IBEW Local Union Name and Number: _____

STE Certification Number and Title: **IC04.01 / Maintain and Calibrate General Instrumentation**

STE Certification Expiration Date: _____

Current Date: _____

Document your employment throughout your certification period. Start with your most recent position and account for all employment as an Instrument Technician (or related experience.) If necessary make additional copies so that you can give a detailed and descriptive narrative of your job duties.

Dates of Employment		Total Hours Worked	For each position, list: a) Name, address and phone number of employer, b) Title of your position, c) Name and title of your immediate supervisor, d) Management signature
From Month/Year	To Month/Year		

(combine rows if necessary to fit information)

Total Hours Worked
in Certification Period: _____

I certify that all information on this form is correct and complete. Any misrepresentation will result in the removal of certification status.
(NOTE: Form will not be accepted without certificant and Host Organization representative's signature and date.)

IMPORTANT: Host Organization or Training Director of local JATC Approval Signature

The *electrical training ALLIANCE* must receive this completed form to process a recertification credential. This form must be completed and submitted to the Host Organization for signature approval before submission to the *electrical training ALLIANCE*. An individual's Local JATC may also submit signature for approval.

Consult the *electrical training ALLIANCE* for applicable fee.
Make check payable to the *electrical training ALLIANCE*

Submit to: *electrical training ALLIANCE*
ATTENTION: STE Renewal
5001 Howerton Way, Suite N, Bowie, MD 20715
email: STERenewal@electricaltrainingalliance.org



Appendix E

Program Review Forms

Program Review Forms

An *electrical training ALLIANCE* initial or periodic review of a Local Host Organization will include the completion of Forms 5.1 and 5.3 from Appendix E of the STE Administration Guide and Form 5.5.1 from this STE Implementation Guide. Forms 5.2 and 5.4 from Appendix E of the STE Administration Guide should be kept current by the Host Organization throughout their various examination and evaluation sessions and should be presented to the *electrical training ALLIANCE* during a review.

5.5.1 Part B Device Approval List: This form will be completed by the *electrical training ALLIANCE* during an Initial Evaluation Review and during any Periodic Review of a Local Host Organization, as detailed in Sections 2.2.2 and 2.2.3 of the STE Administration Guide.

Form 5.5.1 - Part B Device Approval List - IC04.01 Instrument Certification (November, 2018 – Version 1.0)

This form is to be completed by the electrical training ALLIANCE during a review.

Equipment	Example Models	Manufacturer/Model	Serial Number	Certification Date	Approved By	Approval Date	Renewal Date
DC Current Source (4-20 mA)	Altek 334A milliamp loop calibrator PIE 334 milliamp loop calibrator PIE-334 Plus milliamp loop						
Temperature Simulator (RTD and Type J Thermocouple)	Altek Tech Chek 820 Calibrator Practical Instrument Electronics 820						
Precision Pressure Indicator (0-100 psig)	Fluke 744, 754 DPC with Fluke Pressure Module 750P05						
Digital Multimeter	Fluke 87-5						
HART Protocol Communicator	Rosemount 275, 375 Emmerson 475 Emerson AMS Trex			NA			NA
DC Power Supply (24 volt DC, nominal)	Transcat 23232E DC B&K Precision 1735A						
Pneumatic Calibrator (0-100 psi range)	Transmation PneuCal IVB Wika WallyBox III Fluke 3130-G2M						
Pneumatic Pressure Supply (0-100 psig)	Compressed source with precision regulator Transmation 6215P Pressure Pump					NA	NA
<p>Note: Fluke 744, 754 may be used to accomplish the functions of several of these individual pieces of equipment, including the HART communicator and the DC loop power supply</p>							

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Device	Model #	Equivalent Substitution	Serial Number	Calibration Range	Approved By	Approval Date	Renewal Date
Rosemount Differential Pressure Transmitter	1151DP5Exx			0.0 to 750 in H ₂ O			
Rosemount Pressure Transmitter	3051S2CD2Axxx Axx			-250 to 250 in H ₂ O			
Rosemount Current to Pressure Transducer (I/P)	0846DS1Jxxx			4-20 mA / 3-15 psig			
Rosemount Temperature Transmitter	3144PxxA 1xx			0.0 – 100.0 deg C			
ASCO Pressure Switch	HB20A214 HB26A214			20-50 psig Adjustable Trip			
Notes:							

Note: x = non-critical specification (may be configured to user preference). The use of any calibration equipment not found on this list for the purpose of IBEW/UA EPRI Part B Certification must be pre-approved and recorded by the electrical training ALLIANCE.

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Test Evaluator	Approval Date	Renewal Date			
Notes:					

3

Part B Examinee	SSN (Last 4)	Affiliation (LU)	Part A Certification Date	Part B Test Date	Performance Evaluator	Test Results	Evaluator Accept	Renewal Date
Notes:								

4

Name of Host Organization	Copies of Calibration Certificates	Original Location	Approved By	Approval Date	Renewal Date
Notes:					

5

Host Organization Representative's Signature and Date:

Auditor's Approval Signature and Date:

