



Credentialing Achievement Record

Industrial Technology Maintenance
Electrical Systems
Level I

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ITM CREDENTIALING PROGRAM

Level I Credentialing Achievement Record (CAR)

Name:	Job Title / Student ID:
Duty Cluster Name: Electrical Systems Level I	
Date Completed: _____	

Directions

This Credentialing Achievement Record (**CAR**) is the official training and performance document for the above named NIMS credentialing candidate. The CAR is used by the trainer/supervisor and candidate as a record of individual performance. The CAR is the vehicle that will allow eligible candidates to take the NIMS online theory credentialing examination(s). Supervisors, trainers, and candidates should take care of this record and be sure that it is accurate, kept up to date, filled out correctly, and properly stored. All information recorded in the CAR should be considered **CONFIDENTIAL**. The CAR is the property of the candidate and must be returned to the candidate when employment ends or at the completion of the training / school program.

Candidates may select as many credentialing areas as applicable to the facility or appropriate to the job. There are separate CAR booklets for each credentialing area. This CAR opens with a list of Critical Work Activities & Experiences (or experience statements) that must be acknowledged and documented. However, actual performance is assessed in two ways: 1) by fulfilling these general experience and historical statements and 2) by an examiner administering the *Skill Checks (or performance assessments)*. Three successful Skill Check attempts are required. Skill Checks are clearly marked with the title **“Skill Check.”**

Candidate performance is documented by a checkmark on the *Examiner’s Checklist*. All Skill Checks must be co-initialed and dated by the trainer/supervisor and candidate. Work activity sign-offs must be co-initiated by the trainer/supervisor and candidate then dated.

When the candidate has successfully demonstrated abilities in each of the critical work activities and experiences and skills checks to the satisfaction of the supervisor or trainer, he/she is eligible to take the online theory credentialing exam. The Affidavit of Successful Completion is completed and signed by the sponsor. It is co-signed by the trainer/ supervisor and the candidate, and then e-mailed to **support@nims-skills.org** to request access to the online theory exam. The candidate’s sponsor will be notified when the online theory exam is made available on the NIMS testing system.

ITM CREDENTIALING PROGRAM
Level I Credentialing Achievement Record (CAR)

Examiner's Checklist: Electrical Systems Level I

Critical Work Activities & Experiences	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
All of the following statements must be completed prior to submission of the CAR			
1.1 Adhere to safety, health, and environmental rules and regulations			
Describe use and selection of fire extinguishers			
Demonstrate use of fall protection safety in use of ladders and platforms			
Demonstrate use of common PPE for maintenance work to be performed			
Perform a job safety analysis of work to be performed			
1.2 Describe, locate, and interpret safety data sheets			
Describe, locate, and interpret the following for safety data sheets: <ul style="list-style-type: none"> • Locate current safety material data sheets for given machines or processes • Interpret information on SDS and apply • Determine appropriate PPE required • Describe uses of SDS 			
1.3 Technical documentations			
Locate and Interpret function and operation using technical documents			
Identify symbols for duty area			
Demonstrate knowledge of how to locate and maintain maintenance documents			

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Skill Check #1	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.1 Interpret electrical and ladder logic diagrams			
Locate electrical schematic and power diagram with multiple step sequence, control relays, manual switches, limit switches, disconnect switch, and circuit protection			
Create bill of materials (Identification of Symbols) from schematic			
Determine the sequence of operations-describe signal flow			
1.2 Adjust trip point of automatic switches			
Adjust trip position of 2 of these 3 switches given manufacturer's spec: <ul style="list-style-type: none"> • Limit switch • Pressure switch • Float switch (liquid level) 			
1.3 Adjust trip point of automatic sensors			
Adjust trip position of 3 of these 6 sensors given manufacturer's spec: <ul style="list-style-type: none"> • Inductive Sensor • Capacitive Sensor • Hall Effect Sensor • Photoelectric Sensor • Fiber Optic Sensor • Magnetic Reed 			
Operate system to test trip point of each switch			

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Skill Check #1	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.4 Make electrical measurements in an electrical circuit			
Obtain PPE and tools: multimeter and clamp-on ammeter			
Locate machine with ladder diagram control schematic			
Use multimeter to measure resistance of an lamp or resistor			
Use multimeter to measure continuity in one branch of a circuit			
Use clamp-on ammeter to measure current of one phase of an AC electric motor			
Use clamp-on ammeter to measure current of incoming power to control panel			
Use multimeter to measure voltage of incoming power to control panel			
1.5 Select, install and test fuses and circuit breakers			
Size fuses for application given load requirements			
Size circuit breaker for application given load requirements			
Test and replace fuse: <ul style="list-style-type: none"> • Locate machine control panel with fuses • Install lockout/tagout • Remove fuse • Verify fuse is correct given manufacturer's specifications • Verify fuse is matched to ampacity of wiring • Test fuse using multimeter • Replace fuse in holder 			
Test and replace circuit breaker: <ul style="list-style-type: none"> • Locate machine control panel with a circuit breaker • Install lockout/tagout • Check circuit breaker to determine if tripped • Reset circuit breaker if tripped • Verify circuit breaker is correct given manufacturer's specifications • Verify circuit breaker is matched to ampacity of wiring • Test circuit breaker using multimeter • Replace circuit breaker 			

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Skill Check #1	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.6 Test motors			
Use a multimeter to test a DC motor			
Use a multimeter to test a single phase AC motor			
Use a multimeter to test a 3-Phase motor			
Use a megger to test a DC motor			
Use a megger to test an AC motor			
1.7 Install and test grounds			
Test ground			
Inspect ground for correct fasteners and attachment to machine			
Inspect ground for correct wire type, size and color			
1.8 Install, wire and test AC 3-phase electric motor control relay circuit			
Locate electrical schematic with transformer, 3-phase motor, reversing motor starter, control relays, manual switches, automatic switch interlock, disconnect switch, and circuit protection			
Obtain components required, identifying components and motor given specifications			
Install lockout/tagout			
Replace electrical control components given ladder diagram or circuit schematic: <ul style="list-style-type: none"> • Wires are properly stripped • Wires are properly run in cabinet raceways between components • Components are correctly connected and wire labels added • Use safety procedures for tightening, disconnecting, or connecting electrical conductors and components 			
Wire 3-phase AC motor to control circuit according to schematic: <ul style="list-style-type: none"> • Verify nameplate data • Wire motor for specific voltage specified by schematic 			
Perform functional check for correct operation			

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Skill Check #1	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.9 Install, wire and test electro-fluid power relay control circuit			
Locate electrical schematic with solenoid operated fluid power valve, control relays, manual switches, automatic pressure switch interlock, limit switch, disconnect switch, and circuit protection			
Obtain components required, identifying components and motor given specifications			
Install lockout/tagout			
Replace electrical control and fluid power components given ladder diagram circuit schematic: <ul style="list-style-type: none"> • Wires are properly stripped • Wires are properly run in cabinet raceways between components • Components are correctly connected and wire labels added • Use safety procedures for tightening, disconnecting, or connecting electrical conductors and components 			
Perform functional check for correct operation			

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Skill Check #1	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.10 Use soldering to attach wire to electrical terminals			
Locate wiring schematic			
Obtain components required, identifying components given specifications			
Install lockout/tagout			
Solder wire according to wiring diagram: <ul style="list-style-type: none"> • Wires form a good physical connection to terminal without solder first • Wire colors and wire gauge • Solder joints shiny and uniform in color • Correct amount of solder on each joint • All strands of wire, if braided wire, are visible • If solid wire, wire shape is clearly visible • No large blobs of solder • Wires neatly placed without excessive length or so short they tension wire • Flux or solder with flux should be used • Joint/wire should be heated before applying the solder • Solder was allowed to flow to the heat source • A heat sink was used to keep solder from flowing under the wire installation 			
Perform functional check			

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Skill Check #1	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.11 Troubleshoot an electro-fluid power relay control circuit			
Locate electrical schematic of machine			
Perform functional check			
Troubleshoot two of three machine symptoms: <ul style="list-style-type: none"> • Actuator does not move • Actuator moves erratically or out of sequence • Actuator moves in wrong direction 			
Replace failed component			
Perform functional check			
1.12 Troubleshoot 3-phase AC electric motor control circuit			
Locate electrical schematic of machine			
Perform functional check			
Troubleshoot machine symptoms identifying techniques used			
Replace failed component			
Perform functional check with assistance of operator			

Skill Check #2	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.1 Interpret electrical and ladder logic diagrams			
Locate electrical schematic and power diagram with multiple step sequence, control relays, manual switches, limit switches, disconnect switch, and circuit protection			
Create bill of materials (Identification of symbols) from schematic			
Determine the sequence of operations-describe signal flow			
1.2 Adjust trip point of automatic switches			
Adjust trip position of 2 of these 3 switches given manufacturer's spec: <ul style="list-style-type: none"> • Limit switch • Pressure switch • Float switch (liquid level) 			
1.3 Adjust trip point of automatic sensors			
Adjust trip position of 3 of these 6 sensors given manufacturer's spec: <ul style="list-style-type: none"> • Inductive Sensor • Capacitive Sensor • Hall Effect Sensor • Photoelectric Sensor • Fiber Optic Sensor • Magnetic Reed 			
Operate system to test trip point of each switch			

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Skill Check #2	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.4 Make electrical measurements in an electrical circuit			
Obtain PPE and tools: multimeter and clamp-on ammeter			
Locate machine with ladder diagram control schematic			
Use multimeter to measure resistance of an lamp or resistor			
Use multimeter to measure continuity in one branch of a circuit			
Use clamp-on ammeter to measure current of one phase of an AC electric motor			
Use clamp-on ammeter to measure current of incoming power to control panel			
Use multimeter to measure voltage of incoming power to control panel			
1.5 Select, install and test fuses and circuit breakers			
Size fuses for application given load requirements			
Size circuit breaker for application given load requirements			
Test and replace fuse: <ul style="list-style-type: none"> • Locate machine control panel with fuses • Install lockout/tagout • Remove fuse • Verify fuse is correct given manufacturer's specifications • Verify fuse is matched to ampacity of wiring • Test fuse using multimeter • Replace fuse in holder 			
Test and replace circuit breaker: <ul style="list-style-type: none"> • Locate machine control panel with a circuit breaker • Install lockout/tagout • Check circuit breaker to determine if tripped • Reset circuit breaker if tripped • Verify circuit breaker is correct given manufacturer's specifications • Verify circuit breaker is matched to ampacity of wiring • Test circuit breaker using multimeter • Replace circuit breaker 			

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Skill Check #2	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.6 Test motors			
Use a multimeter to test a DC motor			
Use a multimeter to test a single phase AC motor			
Use a multimeter to test a 3-Phase motor			
Use a megger to test a DC motor			
Use a megger to test an AC motor			
1.7 Install and test grounds			
Test ground			
Inspect ground for correct fasteners and attachment to machine			
Inspect ground for correct wire type, size and color			
1.8 Install, wire and test AC 3-phase electric motor control relay circuit			
Locate electrical schematic with transformer, 3-phase motor, reversing motor starter, control relays, manual switches, automatic switch interlock, disconnect switch, and circuit protection			
Obtain components required, identifying components and motor given specifications			
Install lockout/tagout			
Replace electrical control components given ladder diagram or circuit schematic: <ul style="list-style-type: none"> • Wires are properly stripped • Wires are properly run in cabinet raceways between components • Components are correctly connected and wire labels added • Use safety procedures for tightening, disconnecting, or connecting electrical conductors and components 			
Wire 3-phase AC motor to control circuit according to schematic: <ul style="list-style-type: none"> • Verify nameplate data • Wire motor for specific voltage specified by schematic 			
Perform functional check for correct operation			

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Skill Check #2	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.9 Install, wire and test electro-fluid power relay control circuit			
Locate electrical schematic with solenoid operated fluid power valve, control relays, manual switches, automatic pressure switch interlock, limit switch, disconnect switch, and circuit protection			
Obtain components required, identifying components and motor given specifications			
Install lockout/tagout			
Replace electrical control and fluid power components given ladder diagram circuit schematic: <ul style="list-style-type: none"> • Wires are properly stripped • Wires are properly run in cabinet raceways between components • Components are correctly connected and wire labels added • Use safety procedures for tightening, disconnecting, or connecting electrical conductors and components 			
Perform functional check for correct operation			

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Skill Check #2	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.10 Use soldering to attach wire to electrical terminals			
Locate wiring schematic			
Obtain components required, identifying components given specifications			
Install lockout/tagout			
Solder wire according to wiring diagram: <ul style="list-style-type: none"> • Wires form a good physical connection to terminal without solder first • Wire colors and wire gauge • Solder joints shiny and uniform in color • Correct amount of solder on each joint • All strands of wire, if braided wire, are visible • If solid wire, wire shape is clearly visible • No large blobs of solder • Wires neatly placed without excessive length or so short they tension wire • Flux or solder with flux should be used • Joint/wire should be heated before applying the solder • Solder was allowed to flow to the heat source • A heat sink was used to keep solder from flowing under the wire installation 			
Perform functional check			

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Skill Check #2	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.11 Troubleshoot an electro-fluid power relay control circuit			
Locate electrical schematic of machine			
Perform functional check			
Troubleshoot two of three machine symptoms: <ul style="list-style-type: none"> • Actuator does not move • Actuator moves erratically or out of sequence • Actuator moves in wrong direction 			
Replace failed component			
Perform functional check			
1.12 Troubleshoot 3-phase AC electric motor control circuit			
Locate electrical schematic of machine			
Perform functional check			
Troubleshoot machine symptoms identifying techniques used			
Replace failed component			
Perform functional check with assistance of operator			

Skill Check #3	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.1 Interpret electrical and ladder logic diagrams			
Locate electrical schematic and power diagram with multiple step sequence, control relays, manual switches, limit switches, disconnect switch, and circuit protection			
Create bill of materials (Identification of symbols) from schematic			
Determine the sequence of operations-describe signal flow			
1.2 Adjust trip point of automatic switches			
Adjust trip position of 2 of these 3 switches given manufacturer's spec: <ul style="list-style-type: none"> • Limit switch • Pressure switch • Float switch (liquid level) 			
1.3 Adjust trip point of automatic sensors			
Adjust trip position of 3 of these 6 sensors given manufacturer's spec: <ul style="list-style-type: none"> • Inductive Sensor • Capacitive Sensor • Hall Effect Sensor • Photoelectric Sensor • Fiber Optic Sensor • Magnetic Reed 			
Operate system to test trip point of each switch			

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Skill Check #3	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.4 Make electrical measurements in an electrical circuit			
Obtain PPE and tools: multimeter and clamp-on ammeter			
Locate machine with ladder diagram control schematic			
Use multimeter to measure resistance of an lamp or resistor			
Use multimeter to measure continuity in one branch of a circuit			
Use clamp-on ammeter to measure current of one phase of an AC electric motor			
Use clamp-on ammeter to measure current of incoming power to control panel			
Use multimeter to measure voltage of incoming power to control panel			
1.5 Select, install and test fuses and circuit breakers			
Size fuses for application given load requirements			
Size circuit breaker for application given load requirements			
Test and replace fuse: <ul style="list-style-type: none"> • Locate machine control panel with fuses • Install lockout/tagout • Remove fuse • Verify fuse is correct given manufacturer's specifications • Verify fuse is matched to ampacity of wiring • Test fuse using multimeter • Replace fuse in holder 			
Test and replace circuit breaker: <ul style="list-style-type: none"> • Locate machine control panel with a circuit breaker • Install lockout/tagout • Check circuit breaker to determine if tripped • Reset circuit breaker if tripped • Verify circuit breaker is correct given manufacturer's specifications • Verify circuit breaker is matched to ampacity of wiring • Test circuit breaker using multimeter • Replace circuit breaker 			

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Skill Check #3	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.6 Test motors			
Use a multimeter to test a DC motor			
Use a multimeter to test a single phase AC motor			
Use a multimeter to test a 3-Phase motor			
Use a megger to test a DC motor			
Use a megger to test an AC motor			
1.7 Install and test grounds			
Test ground			
Inspect ground for correct fasteners and attachment to machine			
Inspect ground for correct wire type, size and color			
1.8 Install, wire and test AC 3-phase electric motor control relay circuit			
Locate electrical schematic with transformer, 3-phase motor, reversing motor starter, control relays, manual switches, automatic switch interlock, disconnect switch, and circuit protection			
Obtain components required, identifying components and motor given specifications			
Install lockout/tagout			
Replace electrical control components given ladder diagram or circuit schematic: <ul style="list-style-type: none"> • Wires are properly stripped • Wires are properly run in cabinet raceways between components • Components are correctly connected and wire labels added • Use safety procedures for tightening, disconnecting, or connecting electrical conductors and components 			
Wire 3-phase AC motor to control circuit according to schematic: <ul style="list-style-type: none"> • Verify nameplate data • Wire motor for specific voltage specified by schematic 			
Perform functional check for correct operation			

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Skill Check #3	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.9 Install, wire and test electro-fluid power relay control circuit			
Locate electrical schematic with solenoid operated fluid power valve, control relays, manual switches, automatic pressure switch interlock, limit switch, disconnect switch, and circuit protection			
Obtain components required, identifying components and motor given specifications			
Install lockout/tagout			
Replace electrical control and fluid power components given ladder diagram circuit schematic: <ul style="list-style-type: none"> • Wires are properly stripped • Wires are properly run in cabinet raceways between components • Components are correctly connected and wire labels added • Use safety procedures for tightening, disconnecting, or connecting electrical conductors and components 			
Perform functional check for correct operation			

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Skill Check #3	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.10 Use soldering to attach wire to electrical terminals			
Locate wiring schematic			
Obtain components required, identifying components given specifications			
Install lockout/tagout			
Solder wire according to wiring diagram: <ul style="list-style-type: none"> • Wires form a good physical connection to terminal without solder first • Wire colors and wire gauge • Solder joints shiny and uniform in color • Correct amount of solder on each joint • All strands of wire, if braided wire, are visible • If solid wire, wire shape is clearly visible • No large blobs of solder • Wires neatly placed without excessive length or so short they tension wire • Flux or solder with flux should be used • Joint/wire should be heated before applying the solder • Solder was allowed to flow to the heat source • A heat sink was used to keep solder from flowing under the wire installation 			
Perform functional check			

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Skill Check #3	Date Completed	Supervisor's or Trainer's Initials	Candidate's Initials
1.11 Troubleshoot an electro-fluid power relay control circuit			
Locate electrical schematic of machine			
Obtain PPE and tools required			
Perform functional check			
Troubleshoot two of three machine symptoms: <ul style="list-style-type: none"> • Actuator does not move • Actuator moves erratically or out of sequence • Actuator moves in wrong direction 			
Replace failed component			
Perform functional check			
1.12 Troubleshoot 3-phase AC electric motor control circuit			
Locate electrical schematic of machine			
Perform functional check			
Troubleshoot machine symptoms identifying techniques used			
Replace failed component			
Perform functional check with assistance of operator			

Comments:

Affidavit of Successful Completion

NIMS ITM Electrical Systems Level I Credentialing Program Credentialing Achievement Record (CAR)

The affidavit must be filled-out in its entirety in order to ensure timely processing.

Candidate Name:	Date Completed:
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The credentialing candidate named above has completed all necessary CAR requirements for NIMS ITM Electrical Systems Level I Recognition.

Site Name and Address:

Indicate successful completion of Critical Work Activities & Experiences and Skills Checks, by checking either Yes or No.

Electrical Systems Level I		
	Yes	No
Successful completion of Critical Work Activities & Experiences statements have been completed, dated, and co-initialed.	<input type="checkbox"/>	<input type="checkbox"/>
Successful completion of Skill Check #1, all components have been completed, dated, and co-initialed.	<input type="checkbox"/>	<input type="checkbox"/>
Successful completion of Skill Check #2, all components have been completed, dated, and co-initialed.	<input type="checkbox"/>	<input type="checkbox"/>
Successful completion of Skill Check #3, all components have been completed, dated, and co-initialed.	<input type="checkbox"/>	<input type="checkbox"/>

Sponsor Signature

Date

Trainer/Supervisor Signature

Date

Candidate Signature

Date

Make a copy of the completed *Affidavit of Successful Completion* for your records and email the CAR to:

NIMS
10565 Fairfax Boulevard, Suite 10
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<http://nims-skills.org>
support@nims-skills.org