Certified Industrial Energy Professional™

A Certification for Industrial Energy Professionals.

CERTIFICATION SCHEME **2.0**

Version No: 1.1
Effective Date: 3/15/2024

Association of Energy Engineers

Scope

Certified Industrial Energy Professionals (CIEP™) ensure that industrial plants and manufacturing facilities are operated and maintained to the highest performance while using the lowest amount for energy possible. Using proven energy management systems and audit processes, such as ISO 50001 and ISO 50002, they help identify inefficiencies and define energy strategies for reducing costs. As technical experts, they understand the varied equipment and systems used through industry and can leverage this knowledge to improve overall systems performance.

Certified Industrial Energy Professionals demonstrate competency in the following areas that are included in the CIEP Body of Knowledge to gain certification: introduction to industrial energy management; control systems; audit tools; industrial water systems; heat exchange systems; industrial refrigeration systems; furnaces, boilers, and fired equipment; steam systems; turbine systems; motor systems; pump systems; fan systems; and compressed air systems.

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Eligibility Requirements for Competence

Individuals applying for the CIEP™ Certification Examination must attend an approved preparatory training course, meet the following education, and experience requirements, and complete a certification application.

Education and Experience Requirements

Education		Work Experience
4-year related* degree OR Professional Engineer (PE) OR Registered Architect (RA)	and	2+ years related** experience
4-year unrelated degree	and	3+ years related** experience
2-year technical degree*	and	4+ years related** experience
NONE	and	6+ years related** experience
Current status of Certified Energy Manager® (CEM®)		

*Related degree in technology, plant engineering, industrial engineering, mechanical/electrical engineering.
** Related experience in manufacturing or industrial facilities or plant facilities operations.

Examination Requirements for Competence

To earn the CIEP™ Certification, candidates must pass the certification examination. The competency requirements assessed are the following:

Certified Industrial Energy Professional - Examination Blueprint

Body of Knowledge / Duties and Tasks	
1	**Introduction to Industrial Energy Management (5-7%)**
101	Define the objectives of energy management
102	Awareness on climate change & clean energy
103	Conceptualize the need for industrial energy management
104	Understand energy basics
105	Understand energy systems efficiency
106	Understand energy balance
107	Calculate sensible and latent heat transfer
108	Overview of the energy audit types
109	Overview of the ISO 50002 energy audit standards
110	Overview of the ISO 50001 energy management systems standard and elaborate on its model
111	Identify relevant driving variable(s) through regression analysis
112	Develop an energy review, baseline, and energy performance indicators

2	Control Systems (5-7%)
201	Understand the basic process and concepts of control systems
202	Determine the types of control systems
203	Identify field input elements (thermocouples, RTD's, transmitters, transducers)
204	Identify field output elements (control valves, actuators, relays)
205	Understand control algorithms, and control technologies
206	Define Energy Information Systems (EIS)
207	Identify Energy Efficiency Measures (EEMs) on control system effectiveness

3	Audit Tools (5-7%)
301	Consider industrial safety
302	Understand electrical metering equipment and data loggers
303	Understand combustion metering
304	Understand rotor and vibration metering
305	Understand temperature metering
306	Understand compressed air leak detection
307	Understand pressure metering
308	Understand flow metering (velocity, differential pressure, displacement, open flow)
309	Understand solar PV and other commercial building metering

4	Industrial Water Systems (5-7%)
401	Establish water context and the need for water treatment
402	Overview industrial water uses (oil & gas, food & beverage, mining, construction, forestry, pulp & paper, desalination
403	Understand basics and types of water treatment
404	Understand reverse osmosis system basics
405	Evaluate cooling towers and its associated water loss
406	Understand ion exchange, hardness, and blowdown in stream systems
407	Identify energy and water efficiency measures on industrial water systems

5	Heat Exchange Systems (6-8%)
501	Define heat exchangers basics and design
502	Understand main heat exchangers types used in industry and its applications
503	Assess heat exchange fouling
504	Understand heat exchangers in boiler systems
505	Understand heat exchangers in buildings
506	Understand heat rejection and approach temperatures in cooling towers
507	Identify EEMs on heat exchangers

6	Industrial Refrigeration Systems (6-8%)
601	Differentiate between different refrigerants and its impact
602	Understand the basic refrigeration cycle
603	Overview different complex industrial refrigeration systems (single stage, multistage, cascade, liquid overfeed, absorption)
604	Consider different types of refrigeration equipment
605	Calculate system efficiency metrics
606	Identify EEMs on refrigeration systems

7	Furnaces, Boilers, and Fired Equipment (7-11%)
701	Differentiate fuel types and heating values
702	Understand furnace types
703	Test furnace efficiency
704	Describe fired heater construction and components
705	Understand boiler types and operation
706	Understand fuel train, construction, function, and firing rate control
707	Describe burner systems, mix design styles, flames, and combustion
708	Minimize flaring
709	Identify EEMs on furnaces, boilers, and fired equipment

8	Steam Systems (7-11%)
801	Understand steam properties and use saturated and superheated steam tables
802	Calculate and improve boiler efficiency (direct & indirect method)
803	Determine boiler losses (shell, blowdown, stack)
804	Ascertain common methods to reduce Stack Temperature Rise
805	Evaluate deaerator tanks
806	Audit the distribution system (steam leaks, piping, insulation)
807	Assess the end use (steam traps, condensate return, flash steam)
808	Identify EEMs on boilers, steam systems

9	Turbine Systems (6-8%)
901	Explore steam turbines and gas turbines
902	Understand the Rankine cycle, the Brayton cycle, and the combines cycle
903	Overview on combustion chambers, turbine blades and nozzles, seals and glands
904	Classify turbines on design, steam flow, and blade types
905	Maintain turbines and optimize its control
906	Compare CHP technologies
907	Integrating conventional power stations with renewable energy, distributed generation, and smart grids
908	Identify EEMs on turbine systems

10	Motor Systems (8-12%)
1001	Understand electrical fundamentals (induction, electromagnets, power factor)
1002	Understand electric motor basics, types, construction, causes of failure
1003	Comprehend electric motor nameplate data (Frame size, Kw, insulation class, SF, Volt, etc.)
1004	Evaluate motor efficiency and efficiency classes
1005	Evaluate losses in motors
1006	Understand motor drives and speed control
1007	Compare transmission types (gears, belts)
1008	Identify EEMs in motors

11	Pumps Systems (7-11%)
1101	Differentiate pump components and pump type classifications
1102	Illustrate impellers, seals, bearings, couplings
1103	Calculate delivered power, total head, static head, velocity
1104	Calculate total head, friction head, static head, velocity head
1105	Determine distribution losses
1106	Analyze pump and system performance curves
1107	Appreciate impact of changes in speed
1108	Analyze pump in series and in parallel
1109	Identify pump cavitation, its causes, and remedies
1110	Calculate Net Positive Suction Head available
1111	Establish pump maintenance and reliability aspects
1112	Identify EEMs on pump systems (operation, maintenance, and control)

12	Fan Systems (6-10%)
1201	Establish fan system fundamentals and components
1202	Differientiate fan types and their various applications considering impeller efficiency and dust loading
1203	Analyze fan and system performance curves
1204	Assess fan controls methods (dampers, inlet louvre dampers, variable inlet vanes, variable speed)
1205	Calculate the effect of variable flow by using the fam laws or affinity laws
1206	Establish fam maintenance practices
1207	Identify EEMs on fan systems (low cost, retrofit, maintenance)

13	Compressed Air Systems (8-12%)
1301	Establish compressed air system fundamentals
1302	Considering heat recovery and compressor operating conditions
1303	Understand compressor types (reciprocating, rotary vane, screw, axial, centrifugal)
1304	Investigate load control and its application on screw and centrifugal compressors
1305	Understand air treatment (condensate, drains, dryers, and filters)
1306	Understand air distribution (piping, storage tanks)
1307	Measure leaks and perform leakage quantification tests
1308	Identify and reduce artificial demand
1309	Identify and reduce inappropriate use
1310	Identify EEMs on compressed air systems (supply side, treatment, distribution, demand side)

Examination Specifications

The examination will be 4-hours, open book / open notes and follow the specifications outlined in the examination blueprint and will include 100 multiple-choice graded questions in accordance with the percent range for each task.

Code of Ethics

Codes of Practice are found in the Code of Ethics for Certified Professionals V1.1 dated November 21, 2019, available at www.aeecenter.org/CodeOfEthics.

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Recertification Requirements

A CIEP™ must accumulate ten professional credits every three years and submit a completed Renewal Form to AEE to remain certified. Professional credits for recertification can be accumulated at any time within the three-year period. Detailed explanation of activities applicable as credits for certification renewal available at www.aeecenter.org/certification/renewal.

Activities for CIEP™ Renewal Credits

Continued employment in energy auditing activities:
– 1 credit per year

Membership in a professional engineering society
– 1 credit per year

Offices held in a professional engineering society
– 1 credit per year

Continuing education (CEU's) / professional activities (seminars or conferences) including but not limited to energy efficiency, energy management, operations or maintenance of a building or facility.
– 2 credits per CEU, college credit hour or 10 contract hours for training

Awards presented and/or papers published involving energy, operations, or maintenance:
– 1 credit per: one energy-related presentation
– 2 credits per: one energy-related paper
– 2 credits per: one energy-related individual award

Certified Professionals who do not acquire sufficient CIEP maintenance points to be recertified on the recertification date will no longer have an active certification and be notified in writing of suspension from using the CIEP designation. They will also no longer be listed as a CIEP in any AEE publication. A lapsed CIEP must resubmit to the certification process and successfully meet the criteria for certification by personal data information and examination. Another option for certified professionals is to acquire make-up points at a cumulative total equal to 3.5 per year for every year since date of expiration. This option is available one-time only. Certifications that have lapsed more than three renewal cycles must retake the CIEP exam.
A CIEP, upon retiring and/or and reaching the age of sixty-five, can be designated as "CIEP™ – Retired," will no longer be required to pay renewal fees, and will no longer be listed in our directory of actively practicing CIEPs. No further reporting is necessary except to notify AEE of meeting the age requirement by sending a copy of the retired CIEP's Driver's License.

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