



CIH Candidate Handbook

Your guide to qualifying for the Certified Industrial Hygienist® (CIH®) Exam

January 1, 2022



Please visit the BGC website for the most up-to-date version of this handbook.

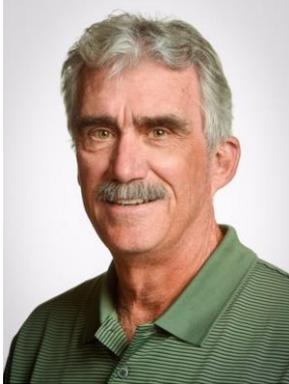
January 1, 2022

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Welcome...

I and the Directors of the Board for Global EHS Credentialing (BGC) would like to thank you for your interest in advancing your career by obtaining a BGC credential. We wish you success in achieving this tangible expression of your dedication to the health of your community.

The Certified Industrial Hygienist® (CIH®) certification program enables you to establish your professional level knowledge and skills in Occupational Health and Safety/Industrial Hygiene. My CIH has provided opportunities that would not have been possible if I had not taken the time and effort required to achieve it. The CIH credential is a globally respected standard that is only granted to those who meet our education and experience requirements along with successfully completing an examination. Once granted, the CIH designation can be proudly used as long as you follow our certification maintenance process and uphold the *BGC Code of Ethics*.

Our staff is here to help you with any questions that might arise during your journey to join the CIH family. We are committed to world class customer service and value your feedback on any areas of excellence or where we can improve.

**Tom Grumbles, CIH, CPPS, FAIHA
BGC Chair (2022)**



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Overview

Certified Industrial Hygienist (CIH) is the global standard for certification in protecting the health and safety of workers and the public by anticipating, recognizing, evaluating, and controlling chemical, physical, ergonomic, or biological hazards, including COVID-19.

The Certified Industrial Hygienist (CIH) certification program enables you to establish your professional level knowledge and skills in Occupational Health and Safety/Industrial Hygiene. The CIH credential is a globally respected standard that is only granted to those who meet our education and experience requirements along with successfully completing an examination. CIH professionals also agree to abide by *BGC's Code of Ethics*.

Certified Industrial Hygienist

The Certified Industrial Hygienist (CIH) certification program enables you to establish your professional level knowledge and skills in Occupational Health and Safety/Industrial Hygiene. The CIH credential is a globally respected standard that is only granted to those who meet our education and experience requirements along with successfully completing an examination. CIH professionals also agree to abide by *BGC's Code of Ethics*.

A Certified Industrial Hygienist (CIH) is an individual who has met the minimum requirements for education and experience and, through examination, has demonstrated a minimum level of knowledge and skills in the following subject areas (rubrics):

- Air Sampling & Instrumentation
- Analytical Chemistry
- Basic Science
- Biohazards
- Biostatistics & Epidemiology
- Community Exposure
- Engineering Controls/Ventilation
- Ergonomics
- Health Risk Analysis & Hazard Communication
- IH Program Management
- Noise
- Non-Engineering Controls
- Radiation – Ionizing and Non-ionizing
- Thermal Stressors
- Toxicology
- Work Environments & Industrial Processes

As the industrial hygiene profession itself continued to evolve, it was believed that more people were doing industrial hygiene-like work but would otherwise be unable to qualify for the CIH due to some aspect of their education or experiences. These individuals were still making valuable contributions to the prevention of occupational and non-occupational illnesses. It was felt that professional certification would improve recognition of their contributions by management, employees, and the public.

Once the CIH credential is obtained, Diplomates can apply their knowledge in many different situations, some broad scope and comprehensive, some narrow scope as the person specializes. The domains of practice often differ and change many times during the course of a career. Thus, BGC places no restrictions or qualifications on the career paths of a CIH as long as the person meets the on-going requirements in the certification maintenance program and adheres to the professional, enforceable *BGC Code of Ethics*.

Application Requirements

To qualify for admission to the BGC examinations as an applicant, you must comply with all Board requisites. Documents and forms sent by you and third parties will be needed to assess your eligibility to sit for the exam(s). BGC will evaluate all applicants using the criteria established for the certification eligibility and will not discriminate on the basis of race, creed, national origin, religion, age, disability, political affiliation, sex, sexual orientation, or marital, parental, military, or any other legally protected status. We may ask you for additional documentation when initial review of your application (or reapplication) indicates that pertinent information is missing or unclear. In that case, review of your application or reapplication will not proceed until we receive the requested information. Submitting your application well in advance of deadlines may give you sufficient time to provide additional information without delaying your approval to sit for the exam. Your application packet is active for two years. If you do not pass the exam within the two years, you are required to submit an updated supervisory reference and pay a reapplication fee every two years to keep your application active.

Application Steps

There are two steps to the application process for becoming certified as a CIH. Please familiarize yourself thoroughly with the requirements before you begin your application. Please also note that you must meet all current eligibility requirements.

Step 1: Submission of General Application Documents:

- Create an account and apply online by visiting the Computer Application and Portfolio System (CAPS) by clicking [here](#). This will tell BGC about you and your IH background as well as confirm your agreement to abide by the *BGC Code of Ethics*.
- Ask your university/universities to send official transcripts to BGC.
 - They must show all degree courses with conferral dates.
 - They must be sent directly to BGC via surface mail or email to applications@GoBGC.org.
 - Official transcripts in a sealed envelope with the registrar's stamp across the seal are acceptable.
 - We can **NOT** accept transcripts uploaded, mailed, or emailed directly from the applicant.
 - If your degree was earned outside the U.S. or Canada, BGC will ask you to submit your transcript(s) for a credential evaluation. This can be obtained from a member organization of either NACES or AICE.
- List academic and continuing education coursework to meet the STEM, IH, and Ethics Training requirements.
- Describe your professional-level IH work experience.
 - You will need to show that you have worked for at least 4 years (48 months) at a professional IH level.
 - One year or 6 months of credit is granted to graduates of an ABET-accredited IH program with a master's or bachelor's degree, respectively.
 - Answer the questions about your work experience as prompted by CAPS.
 - Avoid generic statements like "Recognition, evaluation, and control of environmental factors which may relate to worker illness or impaired health." Provide sufficient details on your professional responsibilities to clearly highlight your IH activity.
- Ask your references to submit an online [Professional Reference Questionnaire Form \(PRQ\)](#) to BGC on your behalf.
 - BGC requires **at least** two PRQs: one from your current supervisor and from your past supervisors, which will cover the 48 months of professional-level IH work you are claiming. In addition, one of the PRQs must be submitted by a CIH familiar with your practice.
- Pay the Application Fee (non-refundable) and submit your application on CAPS.

Step 2: Examination:

- If you have a documented disability, you may submit a [Test Accommodation Request Form](#) before the application deadline.
- Pay all examination fees.
- Schedule the exam.

If you successfully meet the requirements of both steps and pass the exam, you will be awarded the CIH credential. Details for completing the steps are found in the remainder of this document. A [CIH Eligibility Checklist](#) has been designed for you to determine whether you have met requirements for steps 1 through 2 before applying for your CIH exam and is included at the end of this document.

Qualifications and Evaluation

To qualify for admission to the BGC examinations as an applicant, you must comply with all Board requisites:

- Submit only one application per person.
- Meet academic requirements/IH coursework.
- Meet the professional industrial hygiene experience requirement documented by references.

- Be in the current practice of industrial hygiene.
- Agree to adhere to the *BGC Code of Ethics* and to be governed by the *BGC Ethics Case Procedures*.
- Pay your application fee and examination fee.

Your application packet is active for 4 consecutive exam windows, which is equal to two years. You are required to submit an updated supervisory reference and pay a reapplication fee every two years to keep your application active.

Deadline

Your application materials, including transcripts, references, and educational coursework (including ethics and supplemental information), must be postmarked no later than February 1 for the Spring examination or August 1 for the Fall examination. Your application packet will be valid for four test windows, which is equal to two years.

Evaluation

BGC will evaluate all applicants using the criteria established for CIH eligibility and will not discriminate on the basis of race, creed, national origin, religion, age, disability, political affiliation, sex, sexual orientation, or marital, parental, military, or any other legally protected status.

We may ask you for additional documentation when initial review of your application (or reapplication) indicates that pertinent information is missing or unclear. In that case, review of your application or reapplication will not proceed until we receive the requested information.



Tip

Submitting your application well in advance of deadlines may give you sufficient time to provide additional information without delaying your approval to sit for the exam.

Confidentiality

Original applications and supporting documentation are treated by the BGC Board of Directors and staff as confidential information. As noted in the *BGC Privacy Policy*, all reasonable precautions are taken to prevent unauthorized access to individual information. BGC does not disclose personal information obtained from you or any other applicant to third parties except when authorized in writing by you or if necessary to complete the process – for example, arranging for you to sit for the exam.

Record Retention

In accordance with the BGC record-retention policy, paper files and electronic documents provided by applicants that have been inactive for three years will be destroyed. Prior to destroying a file, the staff will attempt to notify you using your last known address.



Tip

BGC Director Assessment of Your Eligibility

A Director of the Board is not authorized to give you a determination on your eligibility, either before or after your application is filed.

Academic Requirements

You must have a bachelor's degree in biology, chemistry, physics, or engineering from a regionally accredited college or university or from another college that is acceptable to the Board (see details below). An ABET-accredited program in industrial hygiene or safety also is accepted.

The Board will consider, and may accept, any other bachelor's degree from an acceptable college or university, provided that the degree is based upon appropriate coursework and represents at least 60 semester hours of creditable subjects, with at least 15 of those hours at the upper level (beyond intermediate, such as U.S. 3rd-year (Junior), 4th-year (Senior), or Graduate level). Creditable subjects are undergraduate or graduate-level courses in science, mathematics, engineering, and science-based technology.

Unacceptable Academic Degrees or Credit

Remedies. If you have an unacceptable bachelor's degree, you may remedy the situation with additional academic science coursework from an acceptable college or university or by completion of an acceptable cognate graduate degree.

Nonrelevant Courses. Academic credit granted by a college or university that is unrelated to appropriate coursework will not be accepted by BGC. Examples are the completion of:

- the Graduate Record Examination (GRE)
- College Level Examination Program (CLEP) examinations
- DANTES Subject Standardized Tests (DSSTs)
- and similar equivalency credits granted by an institution for work/life experience

These are not considered educational courses that satisfy BGC's academic certification eligibility requirements.

The social sciences are not considered to be qualifying sciences. Evaluation of the science content of your bachelor's degree will be made from the official transcripts. When evaluators need more information about the content of your degree, such as course descriptions or content, we will ask you to provide the information. Review of your degree will not proceed until the information is received.

U.S. and Canadian Degrees

Official transcripts must be submitted for each degree. An "official" transcript is one sent directly to BGC by your college or university through mail or as secure e-transcripts. Alternatively, you may submit official transcripts if they are in a sealed envelope with the registrar's stamp across the seal. When a degree includes credits that were transferred from another college or university, official transcripts for those course credits must be sent upon request.

The Board will consider a U.S. college or university to be acceptable when it holds institutional accreditation from one of the six U.S. Regional Accrediting Bodies or the Distance Education Accrediting Commission (DEAC), which are recognized by the Council for Higher Education Accreditation (CHEA) and the U.S. Department of Education. Your degree must be awarded during the time that the institutional accreditation is in effect. A Canadian college or university will be considered acceptable if it is recognized under applicable provincial standards, depending on where the school is located. In addition, it may hold specialized program accreditation as noted by membership in the Association of Universities and Colleges of Canada (AUCC).

If you have an international degree(s) along with one from the United States or Canada, a transcript evaluation may not be required if the U.S. or Canadian degree(s) meets the STEM (Science, Science-based Technology, Engineering, and Mathematics) coursework requirement. In some cases, a report may also be required for a Canadian degree. Please contact the office (applications@GoBGC.org) for advice.

International Degrees

A degree from a college or university that is located outside the United States or Canada will be considered for acceptability based on the institution's accreditation status in the education system that has jurisdiction. Applicants with international degrees will be required to submit their transcript(s) for a credential evaluation unless the academic program is authorized by BGC or through a BGC-recognized accreditation agency to issue BGC verification statements.¹

A member of the National Association of Credential Evaluation Services, Inc. (<http://www.naces.org/members.htm>) or a member of the Association of International Credential Evaluators (<http://www.aice-eval.org>) must be used to prepare a credential evaluation report. You must request that the report be forwarded to BGC.

If your degree is in biology, chemistry, engineering, or physics, a General/Document-by-Document report must be provided. Any other degree requires a Comprehensive/Course-by-Course report. A Divisional Analysis may be necessary to identify upper-level courses.

Industrial Hygiene Coursework

The Board requires you to document completion of 180 academic contact hours or 240 continuing education contact hours of specific industrial hygiene courses.

At least half of the required coursework (90 academic or 120 continuing education contact hours) must cover the broad subjects of industrial hygiene: **toxicology**, **fundamentals** of industrial hygiene, and **measurements**

¹ BGC verification statements streamline and shorten the review for applicants. Please contact your program director to find out if verification statements are available for you.

and **controls**. Conference-related professional development courses can be counted, but attendance at a conference cannot be counted as a training course.

- Acceptable toxicology courses will cover the essential aspects of toxicology (adverse effects of chemicals on living systems) with an emphasis on humans. Topics covered are likely to include dose response relationships; absorption, distribution, metabolism, and excretion of toxic substances in the body; biotransformation; organ systems; and chemical carcinogenesis and mutagenesis.
- Fundamentals courses are likely to address the recognition of hazards/stressors found in the work environment. Included are chemical, physical (noise, radiation, thermal), biological, and ergonomic stressors.
- Measurement courses and control (engineering, substitution, administrative, PPE) courses will address the same four broad stressor categories as fundamentals, above.
- The remaining coursework may be in industrial hygiene subjects that are narrower in scope (e.g., asbestos, lead, mold, and confined space entry). The same course or training, if taken multiple times, will only be counted once toward eligibility. (This includes regulatory refresher courses such as HAZWOPER, asbestos training, or even a repeat of the same academic course.)

Stand-alone, industrial hygiene-related specialty exams for other professional certifications, as well as many other non-certification exams used for licensing and registration, can be used as narrow-scope continuing education contact hours. Stand-alone exams are those offered independently from any other educational activities such as classes or workshops.

- The exam must be at least 1 hour in duration and must align with one of the IH Subject Areas (Rubrics) or the IH Job Analysis.
- One continuing education contact hour can be counted for each hour of IH content in the exam.
- The exam must be offered by the organization responsible for overseeing exam development and administration.
- You must provide documentation of successfully passing the exam and of exam duration to claim the equivalent continuing education contact hours.
- You must also provide the exam blueprint for the version of the exam taken.

You can satisfy the IH coursework requirement if your required contact hours were completed as part of your academic degree.

If you took additional coursework to meet this requirement, you may submit academic courses, continuing education courses, or a combination, as follows:

- One semester hour equals 15 academic contact hours or 20 continuing education contact hours.
- One quarter hour equals 10 academic contact hours or 13 continuing education contact hours.
- One CEU equals 10 continuing education contact hours.

For documentation of continuing education contact hours, you must upload copies of certificates to CAPS with your application. **If the number of contact hours or CEUs is not stated on the certificate, you must include a course agenda or official supporting information that shows the time spent on IH topics.**

Coursework Ethics Requirement

Applicants must document that they have completed at least two contact hours of coursework in ethics. Acceptable ethics courses include academic courses dealing with ethics, company training on business conduct, or other ethics-related subjects, or continuing education courses that present ethics topics. Please note that ethics contact hours do not count towards the 240 hours of IH coursework.

Experience Requirements

To be eligible for the examination, you must (a) have 48 months (four years) of employment in the professional practice of industrial hygiene and (b) currently be engaged in active practice at the time of application. If your industrial hygiene career has been interrupted for one year or less (because of unemployment, medical leave, or so on), we will consider you to be “in practice” for up to one year following your last position for the purpose of determining examination eligibility. Time outside of employment, however, cannot be counted toward experience credit.

Professional-Level Experience

To be recognized as “**professional-level**” work acceptable to the Board, your experience must meet the following four criteria:

- **Independence of actions.** This relates to the amount of planning, self-direction, decision-making, and autonomy involved in your work experience.
- **Depth of work.** This relates to the extent to which your work experience requires data-gathering, analysis, and interpretation.
- **Level of interaction.** This relates to the degree to which you interact with a broad spectrum of contacts, including decision-makers.
- **Responsibility for work outcome.** This relates to accuracy and the extent to which you are held accountable for your work and decisions.

Experience credit may be given for research, teaching, or industrial hygiene program administration if you have done them at a professional level.

Broad-Scope Industrial Hygiene

You must also be practicing “broad-scope” industrial hygiene. Two dimensions are evaluated in judging the scope of experience:

- **Work function.** This includes the continuum of the process of industrial hygiene practice, which encompasses anticipation, recognition, evaluation, control, and management of occupational health hazards. Although we do not prescribe a proportion of time devoted to each of these aspects, your experience must exhibit broad-scope practice throughout the entire process.
- **Stressor category.** This includes four generic categories of occupational health stressors: chemical, physical, biological, and ergonomic. You must document work experience in at least **two** of these four stressors.

We consider professional-level experience that does not meet the broad-scope criteria to be narrow-scope experience. For example, practice focused on lead, asbestos, mold, or focused on only one stressor (only chemical). A maximum of one year of narrow-scope experience may be credited toward eligibility.

Experience Equivalency

A **maximum** of one year of **experience equivalency** may be credited for certain industrial hygiene degrees from institutions acceptable to the Board. Only the completed degree will be credited toward experience equivalency.

- For bachelor’s level industrial hygiene degrees, six months’ experience credit will be awarded only when the program is accredited by the Accreditation Board for Engineering & Technology (ABET).
- For master’s level industrial hygiene degrees, one year of experience credit will be awarded only when the program is accredited by ABET.
- One year may be granted for an acceptable doctoral degree, provided that the degree is in industrial hygiene, that all academic requirements have been completed, and that the degree has been conferred.

Internships (not receiving university credit) where you performed professional-level activities and where you can provide a supervisory reference may be counted toward the work experience requirement.



Tip

Ineligible Experience

The following do not count toward the work experience requirement:

- Pre-professional level experience
- Courses or research done for academic credit
- Teaching course content that is pre-professional level

Documentation of Work Experience in Industrial Hygiene

You must provide a *minimum* of two professional references for your application.

- **Supervisor.** A reference from an applicant's current supervisor is required to document current industrial hygiene practice. You must have a reference from your immediate supervisor(s) covering the entire period which you are claiming as professional IH practice. If you are (or were) a principal in a business, then we will accept references from major clients.
- **Certified Industrial Hygienist.** You must also have a reference from a CIH who is familiar with your industrial hygiene work and can describe, from firsthand experience, the nature of your industrial hygiene responsibilities. The CIH reference may also serve as a supervisory reference; however, you still must have a minimum of two supervisory references.

Alternatives to a Reference from a CIH Who Is Familiar With Your IH Work

In the event that no CIH is available who is familiar with your industrial hygiene work, you have two options:

- (1) You may substitute a reference from an individual certified at the professional level by an organization whose industrial/occupational hygiene certification scheme has been recognized by the International Occupational Hygiene Association (IOHA).

The following list was current as of October 2019. Please refer to the following link for the most up-to-date information: <https://www.ioha.net/ioha-activities/national-accreditation-recognition-nar/>:

- Australian Institute of Occupational Hygienists (AIOH)
- British Occupational Hygiene Society (BOHS)
- Canadian Registration Board of Occupational Hygienists (CRBOH)
- Dutch-Occupational-Hygiene-Society-NVVA
- French Occupational Hygienists Society (SOFHYT). Document in French and document in English.
- German Society for Occupational Hygiene (DGAH)
- Hong Kong Institute of Occupational and Environmental Hygiene
- Institute of the Certification of the Figures of Prevention (Italy) (ICFP)
- Japan Association for Working Environment Measurement (JAWE)
- Malaysian Industrial Hygiene Association (MIHA)
- Norwegian Occupational Hygiene Association (NYF)
- Swedish Occupational and Environmental Certification Board (SOECB)
- Southern African Institute for Occupational Hygiene (SAIOH)
- Swiss Society of Occupational Hygiene (SSOH)

- (2) If none of your references is a CIH or holds a credential from an IOHA-NAR recognized organization, then your only remaining alternative is for you to provide three written work samples.

- Work samples must demonstrate a range of broad-scope industrial hygiene activities (Safety or environmental work samples cannot be accepted.)
- They must reflect anticipation, recognition, evaluation, and control of at least 2 different stressor categories.
- Work samples may include reports with analysis of results and recommendations; written programs/procedures; or other documents that help to establish the scope, content, and professional level of the work. A work sample can also be supplemented with peripheral documents such as internal memos dealing with your industrial hygiene activities.
- The samples must span the time period being claimed as professional level experience, include the original creation date, and have been prepared by you as the sole author.

Documents are kept confidential; however, you are allowed to redact proprietary information provided that the redactions do not obscure information required for the evaluation. Documents must be sent in electronic format through CAPS. Hardcopy work samples will not be accepted.

Submitting References

References are required to document, from firsthand experience, your abilities, achievements, and the nature of your environmental practice using a CIH [Professional Reference Questionnaire](#) form

(PRQ). A PRQ must comply with the requirements of this section. Each PRQ will remain confidential between the author and BGC.

- You must initiate communication with your references to request that they submit completed CIH *Professional Reference Questionnaire (PRQ)* electronic form that you will send them. BGC does not initiate communication with references for you.
- Each reference must be provided on the Board's CIH [Professional Reference Questionnaire \(PRQ\)](#) form, have a hand-written signature (not a typed or script font) or a digital signature, and be prepared only by the person giving the reference.
- It is *unacceptable* for you to provide the response on the form and then have it signed by your reference. We may use the contact information provided to verify authenticity of the reference and confirm who prepared the text.
- Each PRQ must be emailed, faxed, or sent by certified or registered mail directly to BGC by the person writing the reference.

It is your responsibility to communicate with your reference(s) as frequently as needed to ensure that the PRQ is submitted in time to meet BGC application deadlines.

Unqualified and Suspicious Documentation

PRQs that appear to have been prepared by any of the following individuals may result in your application being rejected or delayed:

- Your spouse or other relative
- A person whom you supervise
- Yourself, preparing your own PRQ (even when it is for someone else to sign)

Ethics Requirement

Regardless of any other professional affiliation, the *BGC Code of Ethics* applies to each individual seeking certification (candidates) and each individual certified by BGC credentialing programs or holding a BGC designation (certificants). The Code serves as the minimum ethical standards for your professional behavior and is designed to provide both appropriate ethical practice guidelines and enforceable standards of conduct. The Code also serves as a professional resource for EHS professionals, as well as for those served by BGC candidates and certificants. Consequently, you are required to adhere to the *BGC Code of Ethics* and to be governed by the *BGC Ethics Case Procedures*. Both documents are available at <https://GoBGC.org/ethics>.



Tip

Avoid Investigations about the Validity of Your Reference and Documents

When references from different people have identical wording, they will be investigated to determine who actually prepared the PRQs. This can cause delays that may cause you to be prevented from taking the exam or being blocked permanently if you are found to have prepared the content of the PRQ. Sometimes your supervisors and CIH colleagues who are providing your references may need a memory jog about the work that you have done for them so provide it verbally, not in writing or from a written job description, so that they are not tempted to cut and paste. Make sure that what you tell them is unique to the job that you did to avoid giving exactly the same information to other references and employers.

Reapplicants

An application is considered to be active for four consecutive exam windows, which equals two years. After the second year, your application expires. You must update the description of your current practice, provide an updated supervisory reference, and pay a reapplication fee to reactivate an expired application in order to sit for the exam. The application deadlines of February 1 or August 1 apply to all materials and fees that must be submitted by reapplicants. To reactivate an expired application and sit for the exam, you must complete the following steps:

- Submit a *Reapplication Form* (choose the Education Pathways for Reapplicants in CAPS, which says "I have already been approved")
- Have a *Professional Reference Questionnaire (PRQ)* submitted to BGC by a work supervisor that is no more than 12 months old (see the [Documentation of Work Experience in Industrial Hygiene](#) section)
- Update your work experience information in CAPS to document your current practice
- Meet all current application requirements
- Pay the \$150 reapplication fee (non-refundable)



Tip

Don't lose your application!

If your application file is inactive for more than three years without being approved for the exam, it will be automatically purged, and you will have to follow the procedure as a new applicant if you wish to apply again. Please notify us in writing before three years of inactivity to keep your file open and contact information up to date.

Application/Reapplication Deadlines

All documentation required for the review and approval of your application or reapplication must be postmarked, faxed, or emailed by February 1 when applying for the Spring examination or by August 1 for the Fall examination.

Examinations are held each year at Prometric testing centers during two testing windows:

- Examinees approved for the Spring examination can make an appointment with Prometric for either April or May.
- Examinees approved for the Fall examination can schedule for either October or November.

You are only allowed to schedule one examination in a test window.

CIH Fees

The application, examination, and credential maintenance processes require you to pay fees on or before the due dates. The fees are listed in the table below. Fees may be subject to change, so please check the BGC website to obtain the most current fee schedule.

| Fee | Amount | Description |
|-------------------------------|--------------|---|
| Application/Reapplication Fee | \$150 | The fee to have your documents reviewed and to maintain your file. Your application/reapplication fee is valid for 4 exam windows, which is equivalent to two years. You must pay a reapplication fee and submit updated documents every two years to keep your file active until you pass the exam. |
| Examination (Scheduling) Fee | \$350 | The payment to schedule an exam and reserve a seat at the testing center. |
| Annual (Maintenance) Fee | \$150 (\$75) | The yearly fee to maintain your credential after it is awarded. Normally your annual fee is paid by the beginning of each year. If you pass the exam in the spring, your first annual fee will be prorated to \$75 for the remainder of the current year. |



Tip

Refund information!

Application or reapplication fees are not refundable or transferrable.

Your examination fee is not refundable either, but if you cancel your examination with the testing center at least 48 hours in advance of the exam time, the fee will be carried over to the next exam window. If your cancellation is made less than 48 hours in advance, your fee is forfeited.

Examination Information

BGC conducts a Job Task Analysis (JTA) study, also known as the Role Delineation Study (RDS) or Practice Audit, and prepares supporting documentation and reports consistent with ISO/ANSI17024, NCCA, and CESB accreditation standards.

A panel of professionals is selected and convened who must represent a variety of practice settings, geographic regions, educational levels, gender, ethnicity, and years of experience. A BGC board member is also included on the panel to assist in documenting the credibility of the process for the BGC board.

Panel members must identify the domains, tasks, knowledge, and skills essential to performing the work of the practitioner. A large sample of professionals who were not involved in the JTA meetings are asked to review and validate the information and to ensure that the certification exam reflects the essential knowledge necessary for competent practice as a professional. The results are analyzed from the context to become the basis of the final Examination Blueprint, the document, which lists the domains and elements for the credential. The subject matter experts also determine eligibility requirements and recertification requirements for the credential. As an additional validation step, participants can compare and contrast their work against documents prepared by other groups (if available), which identify tasks and supporting knowledge and skills in practice.

In order to ensure that credentialed practitioners protect the public through their work, BGC conducts a JTA every five to seven years so that eligibility, domains, tasks, knowledge, skills, examination, recertification, and ethical requirements reflect current, real-world practice.

Examination Purpose and Format

The examination is designed to test your knowledge across the broad general practice of industrial hygiene. You should expect questions in all subject areas (rubrics).

The exam contains 180 (150 questions plus 30 pilot questions) multiple choice questions that are selected to match the job analysis. The questions are not grouped by subject area in the examinations. The job analysis and subject area (rubric) definitions currently in use by the Board can be found under in the [CIH® Exam Blueprint](#) section.

The examination is conducted in two sections. You may go back and review questions at any time during a section. The test is 2.5 hours for the first section, with an optional thirty-minute break, and then 2.5 hours for the second section. There is a short tutorial prior to the examination and a short survey following the exam. Instructions for the exam also explain how you can submit comments about the content of specific questions during the exam. BGC staff will review your comments; however, for exam security reasons, staff will not be able to discuss your comments with you.

If you choose to take a thirty-minute break, you will have 30 minutes and no more. In other words, the second section of the exam will begin after 30 minutes, regardless of when you return from your break.

Also see the section [Examination Scoring](#) below.

Examination Scheduling

The Board for Global EHS Credentialing's certification examinations are delivered at Prometric Test Centers located throughout the United States and internationally. The examinations are administered by appointment only, Monday through Saturday.

Your eligibility to take the examination is valid for two years from the last day of the month when your application was approved and will expire after that time. If you fail to schedule an appointment for this examination within the two-year period, you will forfeit the application and all fees paid to take the examination. A complete application and examination fee are required to reapply for the examination.

Scheduling Your Appointment

Your examination fee must be paid before you will be allowed to schedule your examination. You will not appear in Prometric's computer file of approved examinees until you have paid your examination fee. When your fee has been processed, you will receive an Authorization to Test (ATT) letter.

To ensure that you obtain your preferred location and date, you should call Prometric immediately or go online to schedule an appointment. You must schedule your exam at least 9 calendar days prior to the end of the testing window to be able to sit for the exam.

You will need to provide the following information when scheduling your appointment:

- Your name
- Your identification number (listed in the Authorization to Test letter)
- A daytime telephone number
- The name of the examination sponsor (BGC) and the examination you are taking (CIH)

Online Scheduling

We recommend that you schedule your appointment online because it is faster and more efficient. Go to www.prometric.com/abih. You must have an email address to schedule online.

If you schedule online, you will receive email confirmation of your appointment.

Telephone Scheduling

If you are scheduling by phone in North America, call Prometric's Customer Service Contact Center (CSCC) at (800) 800-1123. Operators are available from 8 a.m. to 8 p.m. (Eastern Time) Monday through Friday. Please note that you will not receive written notification concerning your appointment if you schedule via telephone. If you are an international examinee, please check the Prometric website for the country-specific telephone numbers:

Confirmation Number

When you schedule your appointment, either by telephone or online, you will receive a confirmation number. Make sure you keep a record of your confirmation number and appointment information. You will need your confirmation number if you want to confirm, reschedule, or cancel your appointment. BGC will not have your confirmation number in our records.

Test Site Location

You may take your examination at Prometric Testing Centers (PTC) in the United States, Canada, Puerto Rico, Guam, U.S. Samoa, the Virgin Islands, and internationally.

Determine the best PTC location for taking your examination by selecting Locate a Test Center on Prometric's website www.prometric.com/abih.

- When scheduling your appointment, you should confirm the address of your test center and obtain directions.
- You may obtain directions to the PTC at Prometric's website or by calling Prometric's Customer Service Contact Center.

Examination Window

You must test during the window for which you were approved.

- The Spring testing window opens on April 1 and closes on May 31.
- The Fall testing window opens October 1 and closes on November 30.

Confirming Your Appointment

It is your responsibility to verify that you have been scheduled for the date, time, and place you have requested.

You may confirm your appointment in two ways.

- Call (800) 800-1123 or the applicable international number and select the option for confirming your appointment.
- Confirm your appointment online at www.prometric.com/abih.

You can confirm your appointment on-line even if you scheduled your appointment by telephone.

Special Arrangements for Candidates with Disabilities

Prometric and the Board for Global EHS Credentialing comply with the Americans with Disabilities Act and strive to ensure that no individual with a disability (as defined by the ADA as a person who has a physical or mental impairment that substantially limits one or more major life activities, a person who has a history or record of such an impairment, or a person who is perceived by others as having such an impairment) is deprived of the opportunity to take the examination solely by reason of that disability. Prometric will provide reasonable accommodations for candidates with disabilities. Candidates requesting special accommodations must call Prometric at 800-967-1139 to schedule their examination.

1. Wheelchair access is available at all established Test Centers. Candidates must advise Prometric at the time of scheduling that wheelchair access is necessary.
2. Candidates with visual, sensory, physical, or learning disabilities that would prevent them from taking the examination under standard conditions may request special accommodations and arrangements.
3. A full list of the services and accommodations Prometric provides can be accessed by reading their *Testing Accommodations* brochure.

Verification of the disability and a statement of the specific type of assistance needed **MUST BE MADE IN WRITING TO the Board for Global EHS Credentialing** by completing the *Test Accommodation Request Form* (<https://GoBGC.org/testing-accommodations>). This form is due by the application deadline. BGC will review the submitted forms, consult with the vendor, and contact you regarding the decision for accommodations.

Missed Appointments/Forfeitures

You will forfeit the examination registration and all fees paid under the following circumstances:

- You wish to reschedule an examination but fail to contact Prometric at least two business days prior to the scheduled testing session.
- You wish to reschedule a second time.
- You appear more than 15 minutes late for an examination.
- You fail to report for an examination appointment.

A completed application form and examination fee are required to reapply for examination.

Inclement Weather/Power Failure/Other Emergency

In the event of inclement weather or unforeseen emergencies on the day of an examination, Prometric will determine whether circumstances warrant the cancellation, and subsequent rescheduling, of an examination. The examination will usually not be rescheduled if the Test Center personnel are able to open the Test Center.

You may visit <https://live-prometric.pantheonsite.io/closures> prior to the examination to determine if Prometric has been advised that any Test Centers are closed. Every attempt is made to administer the examination as scheduled; however, should an examination be canceled at a Test Center, all scheduled candidates will receive notification following the examination regarding rescheduling or reapplication procedures.

If power to a Test Center is temporarily interrupted during an administration, your examination will be restarted. The responses provided up to the point of interruption will be intact.

Examination Day

Plan to arrive at the test center at least 30 minutes prior to your scheduled exam time. If you arrive more than 15 minutes after the scheduled testing time, you will not be admitted. You may bring a non-programmable calculator to the examination. Calculators built into cellular/smart phones are not permitted in the Test Center.

What to Bring

The test center will provide materials for working out calculations. In addition, the BGC Equation Sheets and plates from the ACGIH Ventilation Manual will be available on the computer on which you are taking your exam by clicking the Reference button. You must bring these three items:

- Your Authorization to Test (ATT) letter from the Board.
- Your current, valid, government-issued photo identification document with a signature (e.g., driver's license or passport). Security measures, including the capture of a digital fingerprint and information from your identification (including an image of your photo), will be implemented.
- Your confirmation number.
- An approved calculator from the list below.

Approved Calculators for the Exam

Examinees may bring one or two **nonprogrammable** calculators selected from the approved list below. Any calculator within the series listed in the information provided to candidates is acceptable. Not all models within a series are listed because of the variety and the model changes that take place. For example, the listing of a Texas Instruments TI-30 as "approved" means that such models as the TI-30X, TI-30Xa, TI-30XII, and TI-30XII S are all acceptable. The Prometric instructions to their staff indicate this, so the person checking you in at the Prometric test center will be aware that these are acceptable calculators.

Approved Calculator List

Casio – Models FX-115, FX-250, FX-260, FX-300, FX-350, and FX-991.

Hewlett-Packard – Models hp-9S, hp-10S, hp-30S, and hp-300S. **Note: hp-9G is not acceptable.**

Texas Instruments – Models TI-30, TI-34, TI-35, and TI-36.



Tip

Avoid Identification Headaches

The name on your government-issued photo identification document must match the name that you used to register for the exam. If you have a name change, such as by marriage, please email BGC at Info@EHSCredentialing.org and notify Prometric (prometric.com/contact-us) immediately. If you do not provide the required identification or fully participate in the identity validation process during check-in and breaks, you will not be permitted to test, and you will forfeit your testing fees.

Examination Restrictions

You are prohibited from bringing items into the examination room except for the items specified above. Banned items include, but are not limited to, the following:

- Pencils and pens will be provided during check-in.
- You will be provided with one piece of scratch paper at a time to use during the examination, unless noted on the sign-in roster for a particular candidate. You must return the scratch paper to the proctor at the completion of testing, or you will not receive your score report.
- The use of reference materials is not allowed.
- No documents or notes of any kind may be removed from the Test Center.
- No questions concerning the content of the examination may be asked during the examination.
- Eating, drinking, or smoking is not permitted in the Test Center.
- You may take a break whenever you wish, but you will not be allowed additional time to make up for time lost during breaks.

Security

Prometric administration and security standards are designed to ensure all candidates are provided the same opportunity to demonstrate their abilities. The Test Center is continuously monitored by audio and video surveillance equipment for security purposes.

The following security procedures apply during the examination:

- Examinations are proprietary. No cameras, notes, tape recorders, pagers or cellular/smart phones are allowed in the testing room. Possession of a cellular/smart phone or other electronic devices is strictly prohibited and will result in dismissal from the examination.
- Only silent, non-programmable calculators without alphabetic keypads or printing capabilities are allowed in the testing room.
- No guests, visitors, or family members are allowed in the testing room or reception areas.

Personal Belongings

No personal items, valuables, or weapons should be brought to the Test Center. Personal items must be left outside the testing room. You will be provided a locker to store your personal items. You will not have access to these items until after the examination is completed. Please note the following items will not be allowed in the testing room and must be kept in the secured locker:

- Watches
- Hats
- Wallets
- Keys
- Cellphones
- Pagers
- Books and manuals
- Notes or reference materials
- PDAs or other electronic devices
- Food or drinks
- Jewelry
- Jackets

If all personal items will not fit in the locker, you will not be able to test. The site will not be responsible for any personal belongings.

Once you have placed your personal items into the locker, you will be asked to do the following to ensure that no prohibited items enter the testing center:

- If your test center has one, you will be asked to walk through a metal detector

- The test center administrator will perform a visual inspection of your person
 - You will be required to take off your glasses to check for camera devices
 - Pull up your sleeves and show your forearms for full visibility of your wrists
 - Turn your pockets completely inside out to ensure they are empty
 - Raise your pantlegs for full visibility of your ankles
 - Depending on the exam you are taking, there may be a test-day photo taken

If any personal items are observed or heard (cellular/smart phones, alarms) in the testing room after the examination is started, you will be dismissed, and the administration will be forfeited.

Cancellation and Rescheduling of Exams

If you need to cancel, delay, or change your examination location, you must do so at least 48 hours in advance of your scheduled exam. You may cancel or reschedule by calling (800) 800-1123 or the applicable [international number](#). You will need to provide your confirmation number.

If you miss your examination appointment, you will not be rescheduled, and you will forfeit the testing fees.

If you are late for your examination appointment, you may not be admitted. Late admission is at the discretion of the Prometric testing center.

If you decide to delay your examination to a future examination window, please consult your Authorization to Test letter for reapplication details.

Problems with Prometric Scheduling and Testing

You should call the BGC office at (517) 853-5763 (between 8:00 AM to 5:00 PM, Monday through Friday, U.S. Eastern Time) if you encounter either of the following problems:

- You cannot schedule an exam because the Prometric operator does not have a file with your name and identification number.
- You arrive at your scheduled examination appointment but are unable to test due to Prometric technical or personnel difficulties.

Examination Scoring

Your passing score is based on the total number of questions that you answer correctly in the entire examination. It will be to your advantage to answer all questions.

- All questions have the same point value.
- There is no penalty for incorrect answers (such as “number correct minus a percentage of the number of incorrect answers”).
- A “passing” score is **not** required in each of the individual subject areas (rubrics).

A criterion-referenced passing score has been established by a panel of Certified Industrial Hygienists using appropriate standard-setting procedures under the guidance of Scantron. The passing score for each subsequent administration of the certification examination is based on a statistical equating process, which adjusts for fluctuations in difficulty levels across different versions of the examination. Equating is performed to help ensure that candidates are evaluated according to the same competency standard from year to year.

Examinees may request a review of their exam score by filling out the [Review of the Exam Score Form](#), which will be forwarded to our testing vendor who will conduct a score verification. The examinee should consider that, given the quality control procedures that are in place, it is highly unlikely that the score will change.

Notification of Examination Results

You will be informed of your preliminary pass/fail status immediately after completing the examination.

- We will verify your results and send your official results in writing approximately four weeks later.
- If you fail your examination, we will inform you of your overall score.
- All examinees will receive a performance report indicating their scores in the individual subject areas (rubrics).

- All examinees can access their score report via CAPS.

Confidentiality

As noted in the *BGC Privacy Policy*, examination reports, scores, and failures are not released outside of BGC without your authorization. Studies and reports concerning candidates will contain no information identifiable with any candidate, unless authorized by the candidate. The names of those who pass the examination will be listed on the BGC website and entered in the web Rosters.

Re-Examination

If you are not successful in your examination attempt, you must wait until the next available window before you may retake the examination.

Obligations of Credential Holders

After you pass the exam and are issued your credential, you are required to meet several obligations, not limited to:

- paying your fees on or before the due date,
- continually updating your knowledge and skills,
- documenting knowledge and skills through the Certification Maintenance Process, and
- upholding the *BGC Code of Ethics*.

Please be aware that if the requirements for certification and recertification change, you will be required to meet them in order to hold your certification.

Examination Preparation

The BGC Board encourages you to consider your knowledge and experience in the light of the examination subject areas (rubrics) and to assess your recognized strengths and weaknesses.

Self-study, specific training, and group discussions are recognized methods of improving perceived weaknesses. However, the Board does not endorse or support specific training courses, study guides, or other activities that are intended or purported to be preparation for its examinations.

Sample Questions

The following are provided to familiarize you with the nature and form of questions that may be found in the Board's examinations. Their subject matter and level of difficulty do not necessarily reflect the content of BGC examinations.

1. A mixture contains:
50 mL benzene (m.w.=78) v.p.= 75 mm, Hg; sp. gr.= 0.879.
25 mL carbon tetrachloride (m.w. = 154), v.p. = 91 mm, Hg; sp. gr. = 1.595
25 mL trichloroethylene (m.w. = 131.5), v.p. = 58 mm, Hg;
sp. gr. = 1.455.
2. Assuming Raoult's Law is obeyed, what will be the concentration of benzene in air at 760 mm Hg saturated with vapor of the above mixture?
 1. 3.5%
 2. 4.5%
 3. 5.1%
 4. 9.9%
3. Which one of the following health effects may be manifested by chronic overexposure to benzene?
 1. Abdominal colic
 2. Bladder tumors
 3. Cholinesterase depression
 4. Leukemogenic cancer
4. What is the ACGIH Threshold Limit Value for hydrogen fluoride primarily intended to guard against?
 1. delayed lung edema
 2. mottling of tooth enamel
 3. respiratory tract irritation
 4. tubular kidney injury
5. Under usual operating conditions, what is the static pressure at the discharge side of a fan with 10' length of discharge duct?
 1. equal to the velocity pressure
 2. less than the atmospheric pressure
 3. equal to the total pressure
 4. greater than the atmospheric pressure
6. 1,000 cfm is to be drawn into a round, freely suspended duct of 6" diameter. What is the expected centerline velocity at 4" outside the duct opening?
 1. 286 fpm
 2. 534 fpm
 3. 765 fpm
 4. 915 fpm
7. Two separate noise sources of 98 dBA and 96 dBA respectively are installed and operated together. What is the combined noise level?
 1. 99 dBA
 2. 100 dBA
 3. 101 dBA
 4. 194 dBA

8. A maintenance worker must enter an empty reactor vessel for cleaning, inspection, and lining repair. In the absence of continuous ventilation and testing of the air in the vessel, what should an industrial hygienist recommend?
1. an organic vapor respirator for the worker and a helper with a lifeline within earshot
 2. performance of the work at night with prior notice to the city's Emergency Response Unit
 3. flushing the tank with a suitable organic solvent before the worker enters
 4. a SCBA and fixed lifeline for the worker and a helper directly outside the tank
9. Workers in a brass foundry complain of a fever and general malaise on Mondays following a weekend respite from work. What should an industrial hygienist be equipped to obtain upon arriving at the foundry?
1. blood samples to detect carbon monoxide exposures
 2. air samples to measure exposures to zinc fume
 3. potable water samples to detect PCB concentration
 4. urine samples to measure exposures to lead
10. What do the radioisotopes ^{238}U , ^{40}K , ^{226}Ra , and ^{235}U have in common?
1. Each is an alpha emitter
 2. Each is a neutron emitter
 3. Each occurs in nature
 4. Each has an analogue normally found in the human body
11. Why is stack sampling for particulate aerosols done in an isokinetic manner?
1. to avoid size discrimination of collected particles
 2. to minimize particle deposition in the sampling tube
 3. to collect the respirable size particles only
 4. to collect samples suitable for direct analysis
12. Theoretically, what is the minimum number of sound pressure level measurements needed to determine the sound power output from a non-directional noise source in a free field?
1. one
 2. two
 3. four
 4. eight
13. What are too many levels of management, chronic and recurring internal problems, and numerous meetings attended by many people typically symptoms of?
1. poor communications
 2. lack of management training
 3. poor employee morale
 4. a flawed organizational structure

Publications and References

BGC examination questions are supported by many sources that reflect the underlying purposes and principles of industrial hygiene, as well as the current knowledge that is expected of the industrial hygienist.

The Board suggests that candidates refer to the publications areas of the websites of ACGIH (<http://www.acgih.org>), AIHA (<https://www.aiha.org>), and NIOSH (<http://cdc.gov/niosh/pubs.html>). Candidates also may consult relevant books by such publishers as CRC Press, Lewis Publishers, McGraw Hill, and John Wiley & Sons for lists of available resources.

CIH® Exam Blueprint

Based on the 2021 Job Analysis. (Effective April 1, 2022)

The test specifications below identify three domains of performance and nine tasks. A domain is a major area of responsibility that defines the role of a Certified Industrial Hygienist® (CIH®) practitioner. A task is an activity performed within a performance domain. Knowledge and skills candidates should possess to perform the tasks are also included.

Domain I: Exposure Assessment Principles and Practice

This section comprises 50% of the exam.

Task 1. Anticipate and recognize potential health hazards by studying environments, tasks, and people to identify risks associated with stressors, products, and processes.

Knowledge of:

1. Basic math and sciences
2. Biological/chemical/physical/ergonomic hazards
3. Industry/work environments (e.g., raw materials/products, intermediates, final products, and waste streams)
4. Industrial processes and systems (e.g., welding, foundry operations)
5. Toxicology
6. Standards and guidelines
7. Epidemiology and statistics
8. Environmental health sciences
9. Public health (i.e., community health)
10. Health hazards with no existing OEL

Skill in:

1. Extracting critical information from literature, standards, guidelines, and other resources
2. Recognizing known potential hazards
3. Prioritizing hazards for evaluation
4. Anticipating exposure scenarios
5. Surveying tasks, materials/products, operations, and sites
6. Communicating with affected parties
7. Reconstructing exposures and conducting forensic investigations

Task 2. Assess the relationship between exposure and the potential adverse health effects to determine if further action is warranted using recognized scientific principles, literature, standards, and guidelines.

Knowledge of:

1. Basic math and sciences
2. Biological/chemical/physical/ergonomic hazards
3. Industry/work environments (e.g., raw materials/products, intermediates, final products, and waste streams)
4. Industrial processes and systems (e.g., welding, foundry operations)
5. Toxicology
6. Epidemiology and statistics
7. Environmental health sciences
8. Public health (i.e., community health)
9. Risk assessment
10. Health hazards with no existing OEL

Skill in:

1. Applying principles and concepts of toxicology (e.g., dose response, acute/chronic, latency, routes of entry)
2. Applying principles and concepts of epidemiology (e.g., study design, measures of disease, and statistics)
3. Assessing information source credibility
4. Communicating with affected parties

Task 3. Design and recommend/implement an exposure assessment strategy (qualitative and/or quantitative) to determine the extent and magnitude of exposure using principles to ensure scientific validity.

Knowledge of:

1. Basic math and sciences
- CIH Candidate Handbook

2. Statistics
3. Biological/chemical/physical/ergonomic hazards
4. Industrial/work environments (e.g., raw materials/products, intermediates, final products, and waste streams)
5. Industrial processes and systems (e.g., welding, foundry operations)
6. Sampling methods and instrumentation
7. Analytical chemistry
8. Study design
9. Standards and guidelines
10. Medical surveillance
11. Exposure monitoring techniques (e.g., personal, area, biological)

Skill in:

1. Designing exposure assessment strategies
2. Applying statistical principles to study design
3. Identifying similar exposure group(s)
4. Selecting and using appropriate sampling methods (e.g., instrumentation, analysis, strengths, and limitations)
5. Reviewing pertinent information (e.g., historical sampling data, existing controls, material/product inventory, process review, work practices)
6. Considering route(s) of exposure
7. Implementing exposure assessment strategies
8. Operating instruments, including calibration
9. Keeping field records
10. Communicating with affected parties
11. Identifying appropriate analytical methods

Task 4. Formulate conclusions, prioritize risks, and communicate findings and recommendations based on analysis and evaluation of data using literature, standards, guidelines, and ethical professional judgment.

Knowledge of:

1. Basic math and sciences
2. Biological/chemical/physical/ergonomic hazards
3. Industry/work environments (e.g., raw materials/products, intermediates, final products, and waste streams)
4. Industrial processes and systems (e.g., welding, foundry operations)
5. Toxicology
6. Analytical chemistry
7. Standards and guidelines
8. Epidemiology and statistics
9. Risk communication
10. Hierarchy of controls
11. Environmental health sciences
12. Public health (i.e., community health)

Skill in:

1. Analyzing sample data
2. Comparing sampling results to known standards/guidelines
3. Evaluating the quality of data
4. Evaluating potential risks of previously unrecognized hazards
5. Identifying potential risks of complex/complicated exposure scenarios
6. Evaluating business impacts
7. Characterizing risk for affected parties
8. Communicating risk

Domain II: Control Selection, Recommendation/Implementation, and Validation

This section comprises 35% of the exam.

Task 1. Assess and select options to eliminate or mitigate exposure using the hierarchy of controls and recognized scientific principles, literature, standards, guidelines, and design and performance criteria.

Knowledge of:

1. Hierarchy of controls
2. Ventilation design (e.g., local exhaust, dilution, and HVAC)
3. Basic math and sciences
4. Aerosol science
5. Industrial processes and systems (e.g., welding, foundry operations)
6. Controls of biological, chemical, physical, and ergonomic hazards
7. Hazardous material and remediation response
8. Principles of radiation and other physical energy protection (e.g., time, distance, shielding)
9. Principles of noise and noise abatement
10. Principles of thermal stressor control
11. PPE (e.g., protection factors, protective clothing, permeability/degradation, NRR)
12. Toxicology and routes of exposure
13. Physiology and anatomy
14. Physical properties and chemical incompatibility
15. Work routines and environments
16. Education and training
17. Work practices
18. Community exposure
19. Business impacts
20. Exposure guidelines
21. Impact of the environment and people on the controls selected

Skill in:

1. Assessing effectiveness of existing controls (e.g., ventilation, noise abatement, radiation shielding, PPE)
2. Designing hazard controls (e.g., ventilation, noise abatement, radiation shielding, PPE)
3. Measuring air flow parameters (e.g., static pressure, face velocity)
4. Applying hierarchy of controls
5. Defining the relevant physical properties of chemical and biological materials
6. Selecting proper PPE based on strengths and limitations
7. Evaluating the environment in which the control is to be used
8. Evaluating business impacts
9. Determining frequency, probability, and severity of exposure
10. Considering individual differences in workers (e.g., anthropometric information for ergonomic hazards, PPE effectiveness)
11. Interpreting building specifications

Task 2. Develop and recommend/implement appropriate controls designed to eliminate or mitigate exposure using literature, standards, guidelines, and ethical professional judgement.

Knowledge of:

1. Hazard controls (e.g., ventilation, noise abatement, radiation shielding, PPE)
2. Requirements for writing performance specifications
3. Resource management (e.g., financial, staff)
4. Training requirements and methods
5. Industrial processes and systems (e.g., routine and emergency)

6. Hierarchy of controls
7. Communication strategies and tools
8. PPE selection and limitations
9. Reporting structures, roles, and responsibilities
10. Emergency response programs and principles

Skill in:

1. Designing control systems
2. Training strategies and tools
3. Coordinating resources
4. Applying exposure elimination and mitigation techniques
5. Remediating biological, chemical, physical, and ergonomic hazards
6. Responding to chemical hazard emergencies
7. Applying ergonomic interventions
8. Interpreting engineering instructions and specifications
9. Developing policies

Task 3. Validate the effectiveness of controls to eliminate or mitigate exposure using recognized scientific principles, literature, standards, guidelines, and design and performance criteria.

Knowledge of:

1. Basic math and sciences
2. Aerosol science
3. Statistics
4. Principles of radiation and other physical energy protection (e.g., time, distance, shielding)
5. Principles of noise and noise abatement
6. Principles of thermal stressor control
7. Air sampling (e.g., chemical and biological agents)
8. Measurement techniques (e.g., ventilation, radiation, noise, thermal stress, vibration)
9. Microbiology
10. Ergonomic risk factors
11. Industrial processes and systems (e.g., routine and emergency)
12. Application of exposure guidelines
13. Application of acceptable ventilation criteria
14. Hierarchy of controls
15. Control specifications
16. Equipment and technology used to validate control effectiveness
17. Auditing and quality assurance procedures
18. Basic research techniques

Skill in:

1. Selection and use of appropriate sampling methods (e.g., instrumentation, analysis, strengths, and limitations)
2. Performing ventilation surveys (e.g., measurement, calculation, analysis)
3. Performing noise and vibration surveys (e.g., measurement, calculation, analysis)
4. Performing radiation surveys (e.g., measurement, calculation, analysis)
5. Performing thermal stress surveys (e.g., measurement, calculation, analysis)
6. Comparing air sampling and measurement data to recognized criteria
7. Troubleshooting control technology
8. Reading and interpreting design drawings and specifications
9. Evaluating business impacts
10. Auditing programs/systems

Domain III: Risk Management

This section comprises 15% of the exam.

Task 1. Develop and recommend/implement programs/systems that address health risks using recognized risk-based methods, ethical professional judgment, and effective communication strategies.

Knowledge of:

1. Industrial hygiene program/system management principles and best practices
2. Risk assessment principles
3. Standards and guidelines
4. Audit and quality assurance procedures
5. Communication strategies and tools
6. Emergency response programs and principles
7. Procedures for training personnel
8. BGC Code of Ethics

Skill in:

1. Developing programs/systems
2. Communicating and interpreting regulatory requirements and communicating with regulatory agencies
3. Communicating industrial hygiene program/system components (e.g., report writing, presentation)
4. Interpreting standards and guidelines
5. Managing program/system resources
6. Integrating industrial hygiene program/system needs into business plans
7. Prioritizing program/system needs
8. Identifying appropriate target audiences
9. Identifying appropriate program/system performance measurements
10. Communicating risk to affected parties
11. Auditing of programs/systems
12. Understanding rationale for and application of occupational and environmental exposure limits (e.g., BEIs, TLVs)
13. Training strategies and tools
14. Applying ethical decision-making

Task 2. Evaluate and maintain the effectiveness of programs/systems designed to eliminate or mitigate risk using recognized scientific principles, literature, standards, and guidelines.

Knowledge of:

1. Industrial hygiene program management principles and best practices
2. Risk assessment principles
3. Standards and guidelines
4. Communication strategies and tools
5. Procedures for training personnel
6. Resource management (e.g., financial, staff)
7. Audit techniques and quality assurance procedures
8. Data management systems and record keeping requirements
9. Program/system performance measurements and metrics

Skill in:

1. Communicating industrial hygiene program/system components (e.g., report writing, delivering presentations)
2. Communicating standards and guidelines
3. Managing program/system resources
4. Prioritizing program/system needs
5. Training strategies and tools
6. Auditing programs/systems

7. Collecting and analyzing performance data
8. Performing program/system management analysis

Subject Area (Rubric) Definitions

Examination questions are categorized in the following subject areas (rubrics):

Air Sampling and Instrumentation

Selection, use, and limitations of field air-sampling instruments, full-shift and grab samples, including direct-reading instruments. Also included are the set-up, calibration, and use (including quality assurance practices) of air-sampling apparatus and direct-reading instruments, as well as sampling strategy considerations and calculations related to sampling and calibration. Measurement of exposures to noise, ionizing radiation, nonionizing radiation, and thermal stressors are included in the subject areas (rubrics) dealing with those specific subject areas.

Analytical Chemistry

Laboratory analytical procedures for workplace environmental samples and related calculations. Included are gas chromatography, infrared, visible and ultraviolet spectrophotometry, high performance liquid chromatography, mass spectroscopy, atomic absorption spectrophotometry, wet chemical methods, and microscopy and laboratory quality assurance and chain of custody.

Basic Science

General scientific concepts, chemistry, biochemistry, biology, anatomy and physiology, general physics, and mathematics. Properties of flammable, combustible, and reactive materials (compatibility) are included as are calculations such as those relative to gas laws, airborne concentrations, and unit-of-measure conversions and conditions of non-standard pressure.

Biohazards

Principles of sanitation, personal hygiene, the recognition, evaluation, and control of biological agents or materials having the capacity to produce deleterious effects upon other biological organisms - particularly humans (virus, bacteria, fungi, molds, allergens, toxins, recombinant products, bloodborne pathogens, etc.) - and infectious diseases that appear in workplaces including industry, agriculture, homes, offices, and health care facilities.

Biostatistics & Epidemiology

Principles of epidemiology, techniques used to study the distribution of occupationally induced diseases and physiological conditions in workplaces, and factors that influence their frequency. It includes concepts of prospective and retrospective studies, morbidity and mortality, and animal experimental studies, data and distribution of data, as well as basic biostatistics and statistical and non-statistical interpretation of data in the evaluation of hazards.

Community Exposure

Air pollution, air cleaning technology, ambient air quality considerations, emission source sampling, atmospheric dispersion of pollutants, ambient air monitoring, health and environmental effects of air pollutants, and related calculations. Also included are other IH-related environmental subjects such as emergency planning and response, water pollution, hazardous waste, and environmental fate and transport.

Engineering Controls/Ventilation

Control of chemical and physical exposures through engineering measures such as local exhaust ventilation, dilution ventilation, isolation, containment, and process change. Also included are mechanics of airflow, ventilation measurements, design principles, and related calculations as well as in-plant recirculation air-cleaning technology.

Engineering control of ionizing and nonionizing radiation, thermal stressors, and noise and vibration sources including principles of isolation, enclosure, absorption, and damping are included in the subject areas (rubrics) dealing with those specific subject areas.

Ergonomics

Application of principles from anthropometry, human factors engineering, biomechanics, work physiology, human anatomy, occupational medicine, and facilities engineering to the design and organization of the workplace for the purpose of preventing injuries and illnesses.

Health Risk Analysis and Hazard Communication

Understanding of principles and requirements for the interpretation and use of guidelines for the assessment of health hazards, including American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values (TLVs), Biological Exposure Indices (BEIs) and industrial ventilation guidelines, American National Standards Institute (ANSI) standards, American Society for Heating, Refrigeration, Air Conditioning Engineers (ASHRAE) guidelines, American Society for Testing and Materials (ASTM) standards, and National Institute for Occupational Safety and Health (NIOSH) Criteria Documents and recommendations. Understanding of the risk reduction process including the hierarchy of controls, control banding, and hazard communication, and training of employees are included. Communication of recommendations by appropriate techniques to implement control actions is also included.

IH Program Management

Acquisition, allocation, and control of resources to accomplish industrial hygiene anticipation, recognition, evaluation, and control objectives in an effective and timely manner. Included are such topics as auditing, investigation methods, data management and integration, establishment of policy, planning, delegation of authority, accountability, risk communication, organizational structure, decision making, and the *BGC Code of Ethics*.

Noise

Health effects resulting from exposure to noise and vibration. Computations related to combining noise sources and octave band measurements are included as are audiometric testing programs. Includes exposure measurement, evaluation, and control.

Non-Engineering Controls

Personal protective equipment, including the principles governing selection, use, and limitations of respirators and protective clothing. Included are respirator fit testing, breathing air specifications, glove permeability, eye protection, and the use of administrative controls.

Radiation/Ionizing

Physical characteristics and health and biological effects associated with alpha, beta, gamma, neutron, and x-radiation, including source characteristics. Includes exposure measurement, evaluation, and control.

Radiation/Nonionizing

Physical characteristics and health effects associated with electromagnetic fields, static electric and magnetic fields, lasers, radio frequency, microwaves, ultraviolet, visible, infrared radiation, and illumination. Includes exposure measurement, evaluation, and control.

Thermal Stressors

Adverse health effects associated with heat and cold, symptoms of temperature-related health effects, exposure control techniques, and first-aid/medical response.

Toxicology

Health effects resulting from exposure to chemical substances including single agents and mixtures and natural and synthetic agents. Included are symptomatology, pharmacokinetics, mode of action, additive, synergistic and antagonistic effects, routes of entry, absorption, metabolism, excretion, target organs, toxicity testing protocols and aerosol deposition, and clearance in the respiratory tract. Also included are carcinogenic, mutagenic, teratogenic, and reproductive hazards.

Work Environments and Industrial Processes

Included are the hazards associated with specific industrial or manufacturing processes. Topics include, but are not limited to, confined space entry, spray-painting, welding, abrasive-blasting, vapor-degreasing, foundry operations, and hazardous waste site remediation, as well as general indoor environmental issues.

Equation Sheets

The following pages of equations and conversions will be available on the computer on which the exams are given for use during the examinations. The following plates from the 29th Edition of the ACGIH® “Ventilation Manual” will also be available on the computer for use during the examinations: Figures 9-a, 9-e, 9-f, and Table 6-3.

USEFUL EQUATIONS FOR THE ABIH EXAMINATIONS

This list of equations is offered as assistance in taking the ABIH examinations. No assurance is given that this list is complete or that the use of this list will assure the successful completion of any examination. The variables used are the same as found in the reference source for the equation. No attempt has been made to standardize variables.

[Metric (SI) equations are in brackets]

VENTILATION

$$Q = VA \quad V_1A_1 = V_2A_2 \quad TP = VP + SP \quad SP_1 + VP_1 = SP_2 + VP_2 + \sum \text{losses}_{1-2} \quad SP_h = -\left((F_h + 1)VP_d\right)$$

$$V = 4005 \sqrt{\frac{VP}{df}} \quad \left[V = 1.29 \sqrt{\frac{VP}{df}} \right] \quad VP = \left(\frac{V}{4005}\right)^2 df \quad \left[VP = \left(\frac{V}{1.29}\right)^2 df \right] \quad \text{hood entry loss} = F_h x VP_d$$

$$C_e = \sqrt{\frac{VP}{|SP_h|}} \quad VP_r = \left(\frac{Q_1}{Q_3}\right)VP_1 + \left(\frac{Q_2}{Q_3}\right)VP_2 \quad Q = 4005(Ce) \sqrt{\frac{|SP_h|}{df}} (A) \quad \left[Q = 1.29(Ce) \sqrt{\frac{|SP_h|}{df}} (A) \right]$$

$$Q = 4005C_eA\sqrt{|SP_h|} \quad Q_{corr} = Q_{lower} \sqrt{\frac{SP_{gov}}{SP_{lower}}} \quad Q' = \frac{Q}{m_i} \quad t_2 - t_1 = -\frac{V_r}{Q'} \ln\left(\frac{C_{g2}}{C_{g1}}\right)$$

$$\ln\left(\frac{G - Q'C_{g2}}{G - Q'C_{g1}}\right) = -\frac{Q'(t_2 - t_1)}{V_r} \quad Q = \frac{(403)(SG)(ER)(m_i)(10^6)}{(MW)(C_g)} \quad \left[Q = \frac{(24)(SG)(ER)(m_i)(10^6)}{(MW)(C_g)} \right]$$

$$N_{changes} = \frac{60Q}{V_r} \quad C_{g2} = \frac{G\left(1 - e^{-\left(\frac{Q'\Delta t}{V_r}\right)}\right)}{Q'} \quad C_{g2} = C_{g1}e^{-\left(\frac{Q'\Delta t}{V_r}\right)} \quad Q_2 = Q_1\left(\frac{d_2}{d_1}\right)^3 \left(\frac{RPM_2}{RPM_1}\right)$$

$$P_2 = P_1\left(\frac{d_2}{d_1}\right)^2 \left(\frac{RPM_2}{RPM_1}\right)^2 \quad PWR_2 = PWR_1\left(\frac{d_2}{d_1}\right)^5 \left(\frac{RPM_2}{RPM_1}\right)^3 \quad FSP = SP_{out} - SP_{in} - VP_{in} \quad FTP = TP_{out} - TP_{in}$$

NOISE

$$SPL \text{ or } L_p = 20 \log\left(\frac{P}{P_0}\right) \quad L_I = 10 \log\left(\frac{I}{I_0}\right) \quad SPL_2 = SPL_1 + 20 \log\left(\frac{d_1}{d_2}\right) \quad L_w = 10 \log\left(\frac{W}{W_0}\right)$$

$$W_0 = 10^{-12} \text{watts} \quad L_{eq} = 10 \log\left(\frac{1}{T} \sum_{i=1}^N \left(10^{\frac{L_i}{10}} t_i\right)\right) \quad L_{PT} = 10 \log\left(\sum_{i=1}^N 10^{\frac{L_{Pi}}{10}}\right) \quad TL = 10 \log\left(\frac{1}{\tau}\right)$$

$$L_p = L_w - 20 \log r - 0.5 + DI + CF \quad [L_p = L_w - 20 \log r - 11 + DI + CF] \quad DI = 10 \log Q$$

$$\%D = 100\left(\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_i}{T_i}\right) \quad T_p = \frac{T_c}{2^{(L_{AS}-L_c)/ER}} \quad TWA_{eq} = 10 \log\left(\frac{\%D}{100}\right) + 85dBA$$

$$TWA = 16.61 \log\left(\frac{\%D}{100}\right) + 90dBA \quad f = \frac{(N)(RPM)}{60} \quad f = \frac{c}{\lambda} \quad f_2 = 2f_1 \quad f_c = \sqrt{f_1 f_2} \quad f_2 = \sqrt[3]{2} f_1$$

USEFUL EQUATIONS FOR THE ABIH EXAMINATIONS

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GENERAL SCIENCES, STATISTICS, STANDARDS

$$ppm = \frac{V_{contam}}{V_{air}} \times 10^6 \quad ppm = \frac{P_v}{P_{atm}} \times 10^6 \quad ppm = \frac{mg/m^3 \times 24.45}{m.w.} \quad \frac{P_1 V_1}{nRT_1} = \frac{P_2 V_2}{nRT_2} \quad V_{TS} = \frac{gd_p^2 (\rho_p - \rho_a)}{18\eta}$$

$$R_e = \frac{\rho dv}{\eta} \quad \log \frac{I_o}{I} = abc \quad pH = -\log_{10}[H^+] \quad K_a = \frac{[H^+][A^-]}{[HA]} \quad K_b = \frac{[BH^+][OH^-]}{[B]}$$

$$P_{total} = X_1 P_1 + X_2 P_2 + \dots + X_i P_i \quad \text{vapor/hazard ratio} = \frac{\text{sat. concentration}}{\text{exposure guideline}} \quad TLV_{mix} = \frac{C_1}{TLV_1} + \frac{C_2}{TLV_2} + \dots + \frac{C_n}{TLV_n}$$

$$TLV_{mix} = \frac{1}{\frac{F_1}{TLV_1} + \frac{F_2}{TLV_2} + \dots + \frac{F_n}{TLV_n}} \quad RF = \frac{8}{h} \times \frac{24-h}{16} \quad RF = \frac{40}{h_w} \times \frac{168-h_w}{128} \quad C_{asb} = \frac{(C_s - C_b)A_c}{1000A_f V_s}$$

$$C_{asb} = \frac{EA_c}{1000V_s} \quad E_{fiber\ density} = \frac{\frac{f}{N_f} - \frac{B}{N_b}}{A_f} \quad d = \frac{0.61\lambda}{\eta \sin \alpha} \quad SD = \sqrt{\frac{\sum(\bar{x} - x_i)^2}{n-1}} \quad GM = \sqrt[n]{(x_1)(x_2)\dots(x_n)}$$

$$GM = 10^{\frac{\sum(\log x)}{n}} \quad GSD = \frac{84.13\% \text{ tile value}}{50\% \text{ tile value}} \quad GSD = \frac{50\% \text{ tile value}}{15.87\% \text{ tile value}} \quad SAE = 1.645 CV_{total} \quad CV = \frac{SD}{\bar{X}}$$

$$E_c = \sqrt{E_1^2 + E_2^2 + \dots + E_n^2} \quad t = \frac{\bar{x}_1 - \bar{x}_2}{SD_{pooled} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \quad SD_{pooled} = \sqrt{\frac{(n_1 - 1)SD_1^2 + (n_2 - 1)SD_2^2}{n_1 + n_2 - 2}}$$

$$LCL = \frac{C_A}{PEL} - \frac{SAE \sqrt{T_1^2 C_1^2 + T_2^2 C_2^2 + \dots + T_n^2 C_n^2}}{PEL(T_1 + T_2 + \dots + T_n)} \quad RWL = LCxHMxVMxDMxAMxFMxCM \quad LI = \frac{L}{RWL}$$

$$90\% \text{ Conf Interval} = \bar{X} \pm 1.645 \frac{SD}{\sqrt{n}} \quad \text{One-sided 95\% UCL on mean} = \bar{X} + 1.645 \frac{SD}{\sqrt{n}}$$

HEAT STRESS

$$WBGT = 0.7t_{nwb} + 0.2t_g + 0.1t_{db} \quad WBGT = 0.7t_{nwb} + 0.3t_g \quad \Delta S = (M - W) \pm C \pm R - E$$

USEFUL EQUATIONS FOR THE ABIH EXAMINATIONS

This list of equations is offered as assistance in taking the ABIH examinations. No assurance is given that this list is complete or that the use of this list will assure the successful completion of any examination. The variables used are the same as found in the reference source for the equation. No attempt has been made to standardize variables.

RADIATION

$$I_2 = I_1 \left(\frac{d_1}{d_2} \right)^2 \quad \text{Rem} = (\text{RAD})(QF) \quad D = \frac{\Gamma A}{d^2} \quad A = A_i (0.5)^{\frac{t}{T_{1/2}}} \quad A_i = \frac{0.693}{T_{1/2}} N_i \quad A = A_i e^{-\frac{0.693t}{T_{1/2}}}$$

$$I = (1/2)^A I_0 \quad I = (1/10)^B I_0 \quad I_2 = \frac{I_1}{2^{\frac{x}{HVL}}} \quad I_2 = \frac{I_1}{10^{\frac{x}{TVL}}} \quad X = 3.32 \log \left(\frac{I_1}{I_2} \right) (\text{HVL}) \quad I = I_0 B e^{-ux}$$

$$\frac{1}{T_{1/2\text{eff}}} = \frac{1}{T_{1/2\text{rad}}} + \frac{1}{T_{1/2\text{bio}}} \quad T_{1/2\text{eff}} = \frac{(T_{1/2\text{rad}})(T_{1/2\text{bio}})}{T_{1/2\text{rad}} + T_{1/2\text{bio}}} \quad S = \frac{E^2}{3770} \quad S = 37.7H^2 \quad S = \frac{4P}{A}$$

$$r = \left(\frac{PG}{4\pi EL} \right)^{1/2} \quad r_{\text{NHZ}} = \frac{1}{\phi} \left(\frac{4\Phi}{\pi EL} - \alpha^2 \right)^{1/2} \quad r_{\text{NHZ}} = \frac{f_0}{b_0} \left(\frac{4\Phi}{\pi EL} \right)^{1/2} \quad r_{\text{NHZ}} = \left(\frac{\rho\Phi \cos\theta}{\pi EL} \right)^{1/2}$$

$$D_s = \frac{1}{\phi} \left(\frac{4\Phi}{\pi TL} - \alpha^2 \right)^{1/2} \quad \text{spatial ave} = \left(\frac{\sum_{i=1}^N FS_i^2}{N} \right)^{1/2} \quad t = \frac{0.003J/cm^2}{E_{\text{eff}}} \quad t = \frac{EL}{ML} \times 0.1h \quad O.D. = \log \frac{I_0}{I}$$

$$D_L = \sqrt{\alpha^2 + \phi^2 r^2} \quad G = 10^g / 10$$

CONSTANTS AND CONVERSIONS

$$^{\circ}\text{F} = 9/5(^{\circ}\text{C}) + 32 \quad ^{\circ}\text{R} = ^{\circ}\text{F} + 460 \quad \text{K} = ^{\circ}\text{C} + 273.15 \quad \text{molar volume at } 25^{\circ}\text{C, 1 atm} = 24.45\text{L} \quad 1\text{ft}^3 = 28.32\text{L}$$

$$1\text{ft}^3 = 7.481\text{ U.S. gal} \quad 1\text{L} = 1.0566\text{ qt} \quad 1\text{inch} = 2.54\text{ cm} \quad 1\text{lb} = 453.6\text{ grams} \quad 1\text{gram} = 15.43\text{ grains}$$

$$1\text{ atm} = 14.7\text{ psi} = 760\text{ mm Hg} = 29.92\text{ in Hg} = 33.93\text{ ft water} = 1013.25\text{ mbar} = 101,325\text{ pascals}$$

$$1\text{ Curie} = 3.7 \times 10^{10}\text{ disint/sec (Becquerel)} = 2.2 \times 10^{12}\text{ dpm} \quad 1\text{ Gray} = 100\text{ Rad} \quad 1\text{ Sievert} = 100\text{ Rem}$$

$$1\text{ Tesla} = 10,000\text{ Gauss} \quad 1\text{ BTU} = 1054.8\text{ joules} = 0.293\text{ watt hr} \quad 1\text{ cal} = 4.184\text{ joules}$$

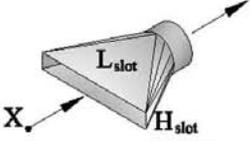
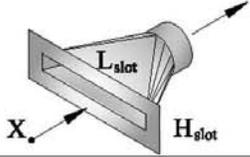
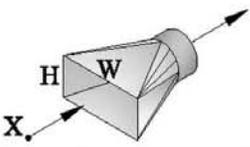
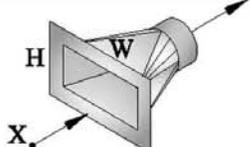
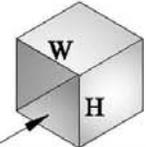
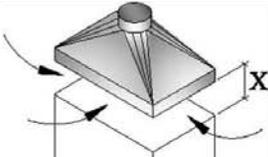
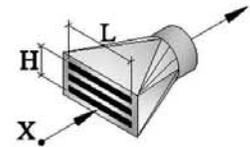
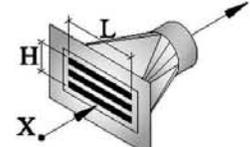
$$\text{speed of sound in air at } 68^{\circ}\text{F (} 20^{\circ}\text{C)} = 1130\text{ fps (} 344\text{ m/s)} \quad \text{speed of light} = 3 \times 10^8\text{ m/s}$$

$$\text{Planck's constant} = 6.626 \times 10^{-27}\text{ erg sec} \quad \text{Avogadro's number} = 6.024 \times 10^{23}$$

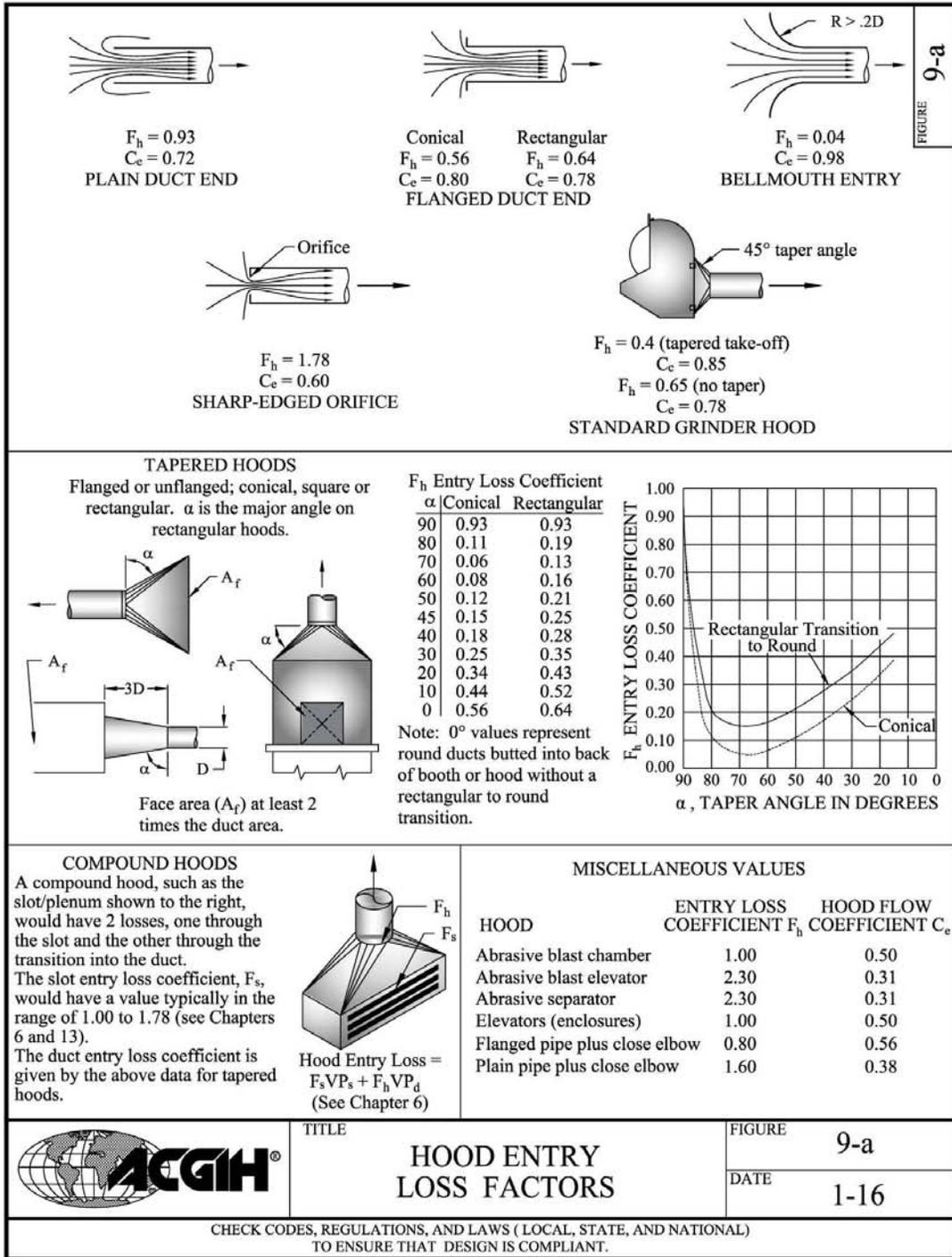
$$\text{gas constant, R} = 8.314\text{ J/mole K} = 0.082\text{ L atm/mole K} \quad \text{density of air} = 1.29\text{ g/L at atm, } 0^{\circ}\text{C}$$

$$g = 981\text{ cm/sec}^2 = 32\text{ ft/sec}^2 \quad A_c = 385\text{ mm}^2\text{ for } 25\text{ mm filter} \quad A_f = 0.00785\text{ mm}^2$$

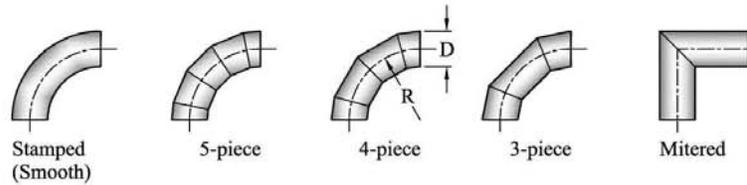
TABLE 6-3. Summary of Hood Airflow Equations

| HOOD TYPE | DESCRIPTION | ASPECT RATIO, H/L | AIRFLOW |
|---|---|--------------------------|---|
|  | Slot | 0.2 or less | $Q = 3.7 LV_x X$ |
|  | Flanged slot | 0.2 or less | $Q = 2.6 LV_x X$ |
|  | Plain opening | 0.2 or greater and round | $Q = V_x(10X^2 + A_f)$ $A_f = WH$ |
|  | Flanged opening $W_f \geq \sqrt{A_f}$ | 0.2 or greater and round | $Q = 0.75V_x(10X^2 + A_f)$ $A_f = WH$ |
|  | Booth | To suit work | $Q = VA = V_f WH$ |
|  | Canopy | To suit work | $Q = 1.4 PVX$ P = Perimeter of work or tank X = Height above work |
|  | Plain multiple slot opening (2) or more slots | 0.2 or greater | $Q = V_x(10X^2 + A_s)$ $A_s = HL$ |
|  | Flanged multiple slot opening (2) or more slots | 0.2 or greater | $Q = 0.75V_x(10X^2 + A_s)$ $A_s = HL$ |

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| | R / D | | | | |
|---------|-------|------|------|------|-------|
| | 0.75 | 1.00 | 1.50 | 2.00 | 2.50 |
| Stamped | 0.33 | 0.22 | 0.15 | 0.13 | 0.12 |
| 5-piece | 0.46 | 0.33 | 0.24 | 0.19 | 0.17* |
| 4-piece | 0.50 | 0.37 | 0.27 | 0.24 | 0.23* |
| 3-piece | 0.54 | 0.42 | 0.34 | 0.33 | 0.33* |

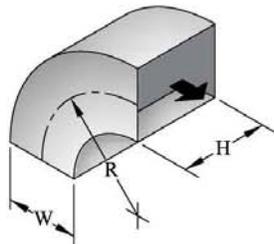
* extrapolated from published data

OTHER ELBOW LOSS FACTORS

| | |
|------------------------|-----------------------------------|
| Mitered, no vanes | 1.2 |
| Mitered, turning vanes | 0.6 |
| Flatback (R/D = 2.5) | 0.05 (see Chapter 5, Figure 5-18) |

NOTE: Loss factors are assumed to be for elbows of "zero length." Friction losses should be included to the intersection of centerlines.

ROUND ELBOW LOSS FACTORS



| R/W | Aspect Ratio, H/W | | | | | |
|---------------|-------------------|------|------|------|------|------|
| | 0.25 | 0.5 | 1.0 | 2.0 | 3.0 | 4.0 |
| 0.0 (Mitered) | 1.50 | 1.32 | 1.15 | 1.04 | 0.92 | 0.86 |
| 0.5 | 1.36 | 1.21 | 1.05 | 0.95 | 0.84 | 0.79 |
| 1.0 | 0.45 | 0.28 | 0.21 | 0.21 | 0.20 | 0.19 |
| 1.5 | 0.28 | 0.18 | 0.13 | 0.13 | 0.12 | 0.12 |
| 2.0 | 0.24 | 0.15 | 0.11 | 0.11 | 0.10 | 0.10 |
| 3.0 | 0.24 | 0.15 | 0.11 | 0.11 | 0.10 | 0.10 |

SQUARE & RECTANGULAR ELBOW LOSS FACTORS

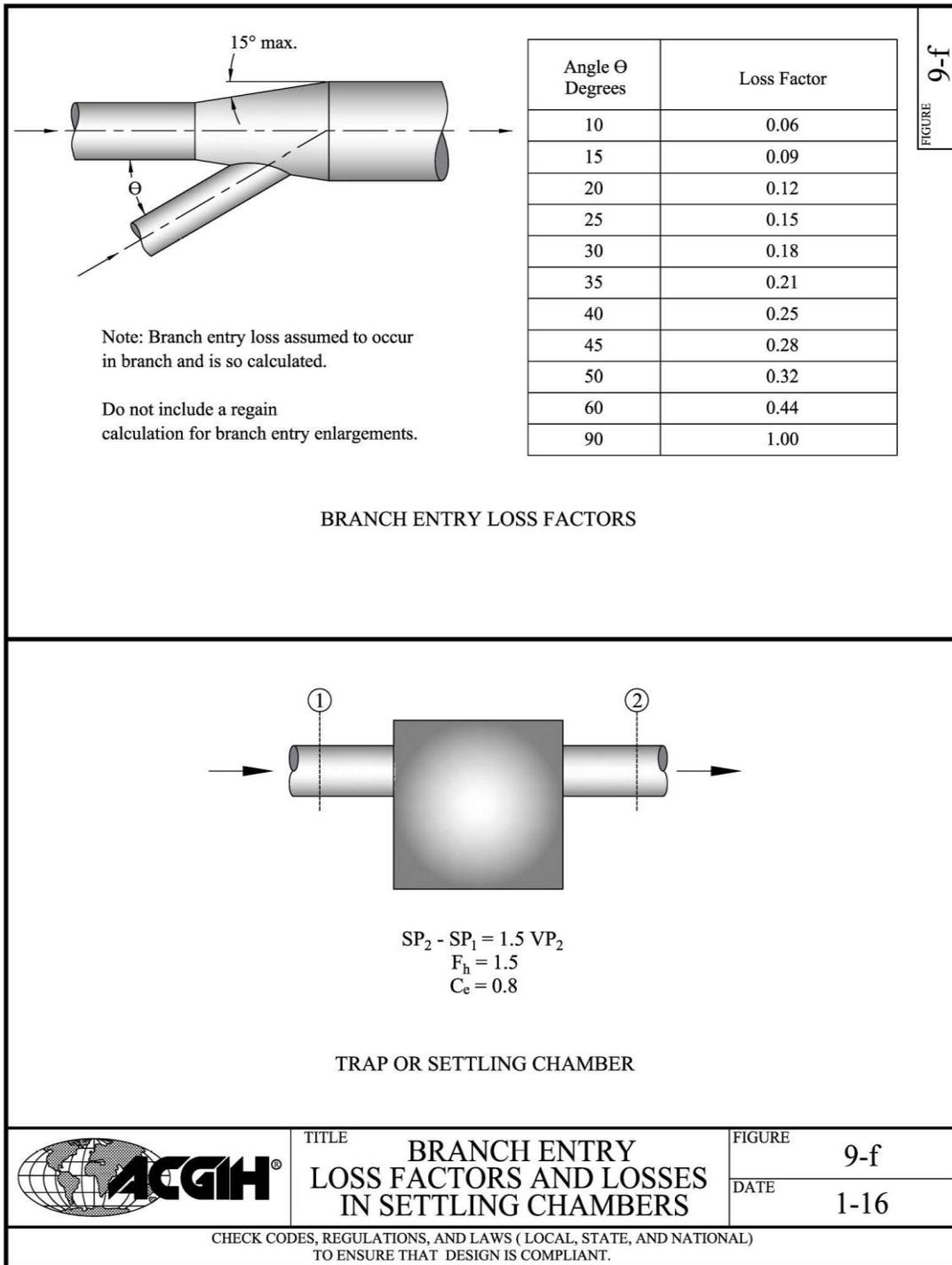


TITLE
**DUCT DESIGN DATA
 ELBOW LOSS FACTORS**

FIGURE
9-e
 DATE
1-16

CHECK CODES, REGULATIONS, AND LAWS (LOCAL, STATE, AND NATIONAL)
 TO ENSURE THAT DESIGN IS COMPLIANT.

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Other Information

Included in this section are the CIH Eligibility checklist and important dates. Also included is the current BGC Board of Directors as well as information on the staff at BGC.

CIH Eligibility Checklist

This is a simple checklist of eligibility requirements for people interested in pursuing the CIH® credential. Please complete this form before contacting BGC™ so that we can better assist you. If you are unable to check all the boxes below, it may mean that you have an eligibility gap that must be closed.

| Academic Degree | |
|--|--|
| <input type="checkbox"/> | A. I have at least a U.S. bachelor's degree or equivalent from a college/university that is accredited by an organization recognized by the U.S. Department of Education (USDE), Association of Universities and Colleges of Canada (AUCC) or a nationally- or regionally authorized agency. (Non-U.S./Canadian graduates may require evaluation reports from a NACES or AICE member organization.) |
| <input type="checkbox"/> | B. I had at least 60 U.S. academic semester credits/900 contact hours ¹ of college or university coursework in science, science-based technology, engineering, or math (STEM). |
| <input type="checkbox"/> | C. At least 25% of my STEM coursework hours above (15 U.S. academic semester credits/225 contact hours) are at the upper level (beyond intermediate: 3 rd -year (Junior), 4 th -year (Senior), or Graduate level.) |
| IH Specific Coursework (Academic or Continuing-Education) | |
| <input type="checkbox"/> | D. I had at least 12 U.S. academic semester credits/180 contact hours of Industrial Hygiene (IH) coursework from a college or university or 240 contact hours from a continuing-education provider. |
| <input type="checkbox"/> | E. At least 50% of my IH coursework hours (6 U.S. academic semester credits/90 contact hours from a college or university or 120 contact hours from a continuing-education provider) are in Fundamentals of IH, Toxicology, Measurements, and Controls. |
| <input type="checkbox"/> | F. I had at least 2 contact hours of ethics training from a college, university, or a continuing-education provider. |
| Professional Practice Experience | |
| <input type="checkbox"/> | G. I have at least 4 years of professional-level, comprehensive, industrial hygiene practice. <ul style="list-style-type: none">• Bachelors graduates from an ABET-accredited IH program may receive 6 months of experience credit.• Masters graduates from an ABET-accredited IH program or Doctoral graduates from an IH program may receive 1 year of experience credit. |
| <input type="checkbox"/> | H. I have broad-scope, professional-level IH experience in at least two of the following occupational health stressor categories: Chemical, Physical, Biological, or Ergonomic. |
| <input type="checkbox"/> | I. I am currently practicing industrial hygiene at the professional level. |
| Professional References for Your Application | |
| <input type="checkbox"/> | J. At least two supervisors will provide references for the duration of my professional practice experience. |
| <input type="checkbox"/> | K. I will take one of the following actions to document my professional-level IH/OH work: <ul style="list-style-type: none">• Request a reference from a CIH• Request a reference from someone certified at the professional level by an organization whose IH/OH certification scheme is recognized by the International Occupational Hygiene Association (IOHA)• Provide three work samples demonstrating a range of broad-scope industrial hygiene activities covering the duration of my professional practice experience being claimed |
| Ethical Practice | |
| <input type="checkbox"/> | L. I have not been involved in any unethical behavior, and I will adhere to the <i>BGC Code of Ethics</i> . |

¹ One U.S. academic semester credit = 15 contact hours from a U.S. college or university

Important Dates

The table, below, shows the dates for the Spring and Fall Examination Windows.

| CIH Test Window | Application Deadline | Examination Dates |
|-----------------|----------------------|-------------------------|
| Spring | February 1 | April 1 – May 31 |
| Fall | August 1 | October 1 – November 30 |

BGC's Decision-Making Body and Committees

BGC is governed by a board of 13 voting members. New board members are elected by the current board. The BGC chair appoints members of the BGC Board to the following standing committees: Nominations, Quality Improvement, Financial Oversight/Audit, Bylaws/Policies (ANSI), and Awards.

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Volunteer Opportunities

If you are interested in serving on a BGC committee or the BGC Board of Directors, please contact us at applications@GoBGC.org.

BGC Staff, Services, and Information

Staff members of the Board for Global EHS Credentialing are available to provide consultation, guidance, and support for you to achieve eligibility to sit for BGC credentialing examinations and maintain your credential. Please email applications@GoBGC.org or call (517) 321-2638. Normal business hours are 8:00 AM to 5:00 PM Eastern Time, Monday through Friday.

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Certifications Coordinator

Yvette-M. Smith, PhD
Application Director

Pamela J. Trim
Certification Director

More Information

For more information or access to documents and forms for obtaining and maintaining your BGC certifications, please visit our website: <http://www.GoBGC.org>.

