



CERTIFICATION MANUAL

Version 210504

Approved by the International Certification Board on May 4, 2021

© Copyright 2021

The Sheet Metal Industry International Certification Board

3180 Fairview Park Drive, Suite 400

Falls Church, VA 22042

All rights reserved.

DISCLAIMER

The Sheet Metal Industry International Certification Board (ICB) has compiled this certification manual with care, but the ICB has not investigated, and expressly disclaims any duty to investigate any product, process, procedure, design or like that may be described in this manual. The ICB does not warrant that the information contained in this manual is free of errors. The user assumes the entire risk of the use of this manual.

NO PART OF THIS MANUAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING, SCANNING OR OTHERWISE WITHOUT PERMISSION IN WRITING FROM THE ICB OR FROM THE ORIGINAL HOLDER OF THE COPYRIGHT AS INDICATED IN THE TEXT.

Document Profile Table

Title	ICB Certification Manual, Version 210504
Class	DOC
Category	Policy
Owner	The National Energy Management Institute Committee
Type	Original: MS Word 2016; Final: Adobe Acrobat with Password Security
Comments	Current Version: 210504 supersedes Version 200512
Access Rights	Read only pdf

Document Version Control Table

Title	Purpose / Changes	Author	Date
120914	Original release	Davor Novosel	09/14/2012
150901	Updated to match with the most current version of the ICB Policies & Procedures; match terms to ISO 17000; added Mechanical Acceptance Test Employer certification scheme; changed renewal date to 3/31; add section 2.7 Information Release Policy	Davor Novosel	09/01/2015
161101	Reviewed and updated by Marc Rifkind, counselor to NEMIC (document 20354167v1 - 0758.01 151216 ICB Certification Manual); Added language on certification status of retired TABB technician and TABB-certified Supervisors (see new Section 2.8). No CEU's will be granted for development of certification exam questions as this is the sole responsibility of the ICB Technical Committee; certifications expire 2 years from the last day of the quarter in which the applicant obtained certification.	Marc Rifkind Davor Novosel	11/01/2016

170501	Per ICB request, Section 1.5 clarifies that a PHYSICAL stamp will only be issued upon request. Updated language in Section 2.5 indicating that certification can be withdrawn at any time as well as added language with regard to number of required CEUs when holding multiple certifications (Section 2.4) Add newly approved TAB Stamp Agreement (Attachment 2) and Retiree Certificate of Recognition (Attachment 3)	Davor Novosel Marc Rifkind	05/01/2017
181002	ICB approved name change of HVAC Fire Life Safety Level One to <u>Fire and Smoke</u> , and Level Two to <u>Smoke Control Systems</u> . Revised <u>Section 2.4</u> Renewal of Certification. Removed IAQ Contractor scheme. Revised <u>ICB-certified Stamp Agreement</u> .	Davor Novosel	10/02/2018
200512	ITI Certification Manual for Technicians merged into the ICB Certification Manual	Soph Davenberry; Duane Smith	05/12/2020
210504	Updated business address. Revised 3.5.4 to include additional waiting periods for exam re-tests.	Soph Davenberry; Duane Smith	05/04/2021

Table of Contents

Document Profile Table	1
Document Version Control Table	1
Table of Contents	3
PART 1: General Procedures and Requirements	5
1 Introduction to ICB Certification.....	6
1.1 Definitions and Abbreviations	6
1.2 Purpose and Overview.....	6
1.3 Amendment and Interpretation	6
1.4 The Meaning of Certification	6
1.5 Impartiality	7
1.6 Contact Information	7
2 General Rules.....	8
2.1 Claim to Certification	8
2.2 Suspension or Withdrawal of Certification.....	8
2.3 Procedures for Resolution of an Appeal or a Complaint	8
2.3.1 Exclusivity	8
2.3.2 General Rules on Required Deliveries and Time Limits	8
2.3.3 Procedure for Resolution of an Appeal	9
2.3.4 Procedure for Resolution of a Complaint	11
2.3.5 ICB Decisions and Sanctions	14
3 The Certification Process	16
3.1 Application	16
3.2 Eligibility.....	16
3.3 Contractor with Multiple Locations	16
3.4 Certification Fees	16
3.5 Certification Exam.....	16
3.5.1 Administering the Written Exam	17
3.5.2 Exam Reference Materials	17
3.5.3 Scoring the Written Exam.....	17
3.5.4 Time Limits on Testing and Re-Testing	17
3.5.5 Administering the Practical Exam	17
3.6 Information Release Policy	18
3.7 Confidential Exam Materials.....	19
3.8 Duration of Certification	19

3.9 Certification Documents	19
3.10 Supervisor Certificate	19
3.11 Qualifying Employment	19
3.12 Retiree Status	19
3.13 Renewal of Certification	20
3.14 Acceptable CEUs	20
3.15 ICB Code of Conduct	20
PART 2: Certification Schemes.....	23
Building Envelope Installer Technician (BEI-T).....	BEI-T 1
Duct Air Leakage Testing Technician (DALT-T)	DALT-T 1
Fire and Smoke Damper Technician (FSD-T).....	FSD-T 1
Fire and Smoke Damper Supervisor (FSD-S)	FSD-S 1
Fire and Smoke Damper Contractor (FSD-C)	FSD-C 1
Fume Hood Performance Testing Technician (FHPT-T)	FHPT-T 1
Indoor Air Quality Technician (IAQ-T).....	IAQ-T 1
Indoor Air Quality Supervisor (IAQ-S)	IAQ-S 1
Infection Control Awareness (ICA).....	ICA 1
Mechanical Acceptance Test (MAT) Certifications	MAT 1
Smoke Control Systems Technician (SCS-T).....	SCS-T 1
Smoke Control Systems Supervisor (SCS-S)	SCS-S 1
Smoke Control Systems Contractor (SCS-C)	SCS-C 1
TABB Commissioning Supervisor (TABB Cx-S)	TABB Cx-S 1
TABB Commissioning Contractor (TABB Cx-C).....	TABB Cx-S 1
TABB Sound and Vibration Supervisor (TABB SV-S).....	TABB SV-S 1
TABB Sound and Vibration Contractor (TABB SV-C)	TABB SV-C 1
TABB Technician (TABB-T)	TABB-T 1
TABB Supervisor (TABB-S).....	TABB-S 1
TABB Contractor (TABB-C)	TABB-C 1
Independent TABB Contractor	TABB-C 1
TABB Customer Satisfaction Procedure.....	TABB-C 1
Total Building Energy Audit Technician (TBEA-T)	TBEA-T 1
Attachment 1. ICB Conformity Assessment Vocabulary.....	ICB Conformity Assessment Vocabulary 1
Attachment 2. ICB Certified Stamp Agreement.....	ICB Certified Stamp Agreement 1
Attachment 3. Retiree Certificate of Recognition	Retiree Certificate of Recognition 1

PART 1: General Procedures and Requirements

1 Introduction to ICB Certification

1.1 Definitions and Abbreviations

This manual contains terminology defined in the *ICB Conformity Assessment Vocabulary* document (see Attachment 1). Each person using this manual is strongly encouraged to become familiar with the definitions listed in the document.

1.2 Purpose and Overview

This manual describes the process of how to become an ICB-certified contractor, supervisor or technician. Any questions regarding the certification process should be directed to the ICB. Contact information is provided in Section 1.6.

This manual is divided in two major parts:

- **Part 1**, General Procedures and Requirements, describes the basic procedures and requirements for all certification schemes.
- **Part 2**, Certification Schemes, provides additional information for the certification scheme, which may include prerequisites or competencies that must be met in addition to basic procedures and requirements for all certification schemes.

Note: Mechanical Acceptance Test certifications are provided by the NEMIC Acceptance Test Technician Certification Provider (ATTCP). For complete details about the NEMIC ATTCP certification process, consult the NEMIC ATTCP Certification Manual available online at www.attcp.org.

1.3 Amendment and Interpretation

The ICB may at any time and without prior notice amend any part of this manual and standards, procedures, competency requirements, application forms, lists, and other items to which this manual refers. An amendment may change certification requirements, and may affect current certifications, renewals and/or new applications for certification.

The ICB alone will interpret and administer its standards and procedures, including those set forth in this manual. Except as provided, however, decisions of the ICB are not subject to review.

The ICB may at any time and without prior notice adopt, change or discard rules and guidelines for the ICB's internal processes with respect to various certification-related activities, and/or set standards for the certification process.

1.4 The Meaning of Certification

ICB certification is a statement that a contractor, supervisor or technician has met ICB requirements for certification. The purpose of ICB certification is to demonstrate that ICB-certified contractors, supervisors or technicians are knowledgeable and skilled professionals.

Maintaining ICB certification requires continued compliance with the ICB Code of Conduct, which states:

Each person certified by the International Certification Board (ICB) shall practice their profession consistent with the standards and procedures applicable to the certification, and the highest quality work.

See Section 3.15 of this manual for the full text of the ICB Code of Conduct.

1.5 Impartiality

The ICB understands the importance of impartiality in operating its certification programs, manages conflicts of interest, and safeguards objectivity in all functions related to its certification activities. The ICB is further dedicated to ensuring policies and procedures are fair and impartial to all applicants, candidates, and certified persons.

1.6 Contact Information

Director of Certification

International Certification Board

3180 Fairview Park Drive, Suite 400

Falls Church, VA 22042

Telephone: (800) 458-6525 (toll free)

(703) 299-5646

Email: info@icbcertified.org

Website: www.icbcertified.org

2 General Rules

2.1 Claim to Certification

If granted certification, the certified professional will not claim to have certification beyond the scope that has been granted nor claim to have certification when said certification has expired, been suspended or revoked by the ICB, or otherwise use the certification in a misleading manner.

During the certification period, the certified professional will inform the ICB, without delay, of matters that can affect their capability to continue to fulfill the certification requirements.

2.2 Suspension or Withdrawal of Certification

The ICB reserves the right to suspend or withdraw certification for any of the following reasons at any time:

- Violation of the ICB Code of Conduct.
- A false or incomplete statement in the application for certification.
- Failure to meet eligibility requirements of one or several certification schemes in which the technician, supervisor or contractor is certified.
- Other cause as determined by the ICB.

If the ICB has reason to believe that any of the circumstances listed above existed when considering an application for renewal of certification, the ICB may deny the renewal of certification.

Upon suspension or withdrawal of certification, the individual will return any certificates issued by the ICB and discontinue all claims to certification that contain any reference to the ICB or the certification.

2.3 Procedures for Resolution of an Appeal or a Complaint

2.3.1 Exclusivity

When applying for ICB certification, each applicant agrees that any appeal or complaint will be resolved solely in accordance with the procedures as stated in this manual.

2.3.2 General Rules on Required Deliveries and Time Limits

In the following, certain items, such as an appeal or complaint, must be in writing, i.e., they must be typed, printed or legibly handwritten.

Whenever a delivery-time limit is given, namely the period within which a document must have been physically delivered to the ICB, the time limit requirement will be met by any of the following conditions:

- The document has been delivered in person or by a courier service, such as the United Parcel Service (UPS) before the applicable period expired; or
- The document has been delivered by the U.S. Postal Service and postmarked within the applicable period.

Electronic submission of an appeal, complaint or any other document requested by the ICB is not permitted.

An appeal must be made to the proctor or any other ICB personnel or representative at the examination site. Proctors can only resolve issues which are not related to the content of the examination, e.g., room conditions, missing examination items, and similar matters. If the appeal is not addressed and resolved there, the applicant must submit the appeal in writing to the ICB within ten days after the examination date. Appeals that are not made within the said time limit will not be considered and will be dismissed.

The appeal must state in writing, in reasonable detail, the pertinent circumstances of and reasons for the appeal, and must be signed by the applicant.

A complaint must be filed by the claimant within 30 days after the activities by the subject which caused the claimant to file the complaint. The complaint must state in writing, in reasonable detail, the pertinent circumstances of and reasons for the complaint, and must be signed by the claimant.

2.3.3 Procedure for Resolution of an Appeal

The ICB will resolve any appeal in accordance with the following procedure. The ICB reserves the right to modify any procedure. The ICB will notify any materially affected party of any modification in a timely manner but no later than 10 business days after its adoption.

The NEMIC Director of Certification or their representative will act for the ICB on all matters concerning the appeal, including the conduct of a hearing, unless the ICB determines otherwise.

Figure 1 outlines the basic procedure.

1. **Applicant Appeals to Proctor at Examination Site.** The proctor may resolve any appeal that is not related to the content of the examination, e.g., room conditions, missing examination items, and similar matters.
2. **The Appeal Was Resolved by the Proctor.** After the appeal is successfully resolved at the examination site, the proctor must file a record of the appeal with the ICB.
3. **The Appeal Was NOT Resolved by the Proctor.** The applicant must submit the appeal in writing to the Director of Certification within ten days after the applicant made the initial appeal to the proctor. The written appeal must be mailed to the Director of Certification at the address stated in Section 1.6 of this manual. Do not submit the appeal electronically. The written appeal should be labeled "NOTICE OF APPEAL".
4. **Initial Review of the Appeal.** The Director of Certification or their designated representative will review the appeal to determine if it merits investigation or further action. An ICB representative may contact the applicant to clarify any aspects of the written appeal or to obtain further information. The Director of Certification will review the appeal within 14 days after its receipt.
5. **Initial Review by Director of Certification Resolves Appeal.** If the Director of Certification determines that no further review is warranted, the decision will be reported back to the applicant in writing.
6. **Reconsideration of Director of Certification's Decision by Applicant.** The applicant may resubmit their appeal for reconsideration by the ICB. If the applicant does not resubmit the appeal for review by the ICB, the appeal is considered resolved and closed.
7. **Resubmittal of the Appeal for Review by the ICB.** The applicant must submit their written appeal to the Director of Certification within ten days after the applicant was notified by the Director of Certification that no further review was warranted by the ICB. The written appeal must be mailed to the Director of Certification at the address stated in Section 1.6 of this manual. Do not submit the appeal electronically.
8. **Review by the ICB.** The ICB will review the appeal within 30 days after receiving the appeal from the Director of Certification.
9. **ICB Hearing.** A hearing may be called by the ICB to resolve questions of fact. The hearing may be held in a face-to-face meeting with the applicant or electronically as a teleconference. The meeting date, time and the format of the hearing are determined solely by the ICB.
10. **ICB Decision.** The ICB will report its decision in writing to the applicant no later than 45 days after receiving the appeal from the Director of Certification. The decisions of the ICB are final and binding on the applicant.
11. **Document Retention.** All written documents shall be scanned, and electronic copies of the documents shall be stored on the ICB server. Copies of the appeal(s) and applicable decisions by the proctor, Director of Certification and the ICB shall be stored in the applicant's record as part of the ICB portal data base.

The appeal is considered resolved if one of the following conditions is met:

- a) The appeal has been resolved by the proctor at the examination site.
- b) The appeal has been resolved by the Director of Certification after initial review and the applicant did not resubmit the appeal for review by the ICB.
- c) The appeal has been resolved by the ICB after being resubmitted by the applicant.

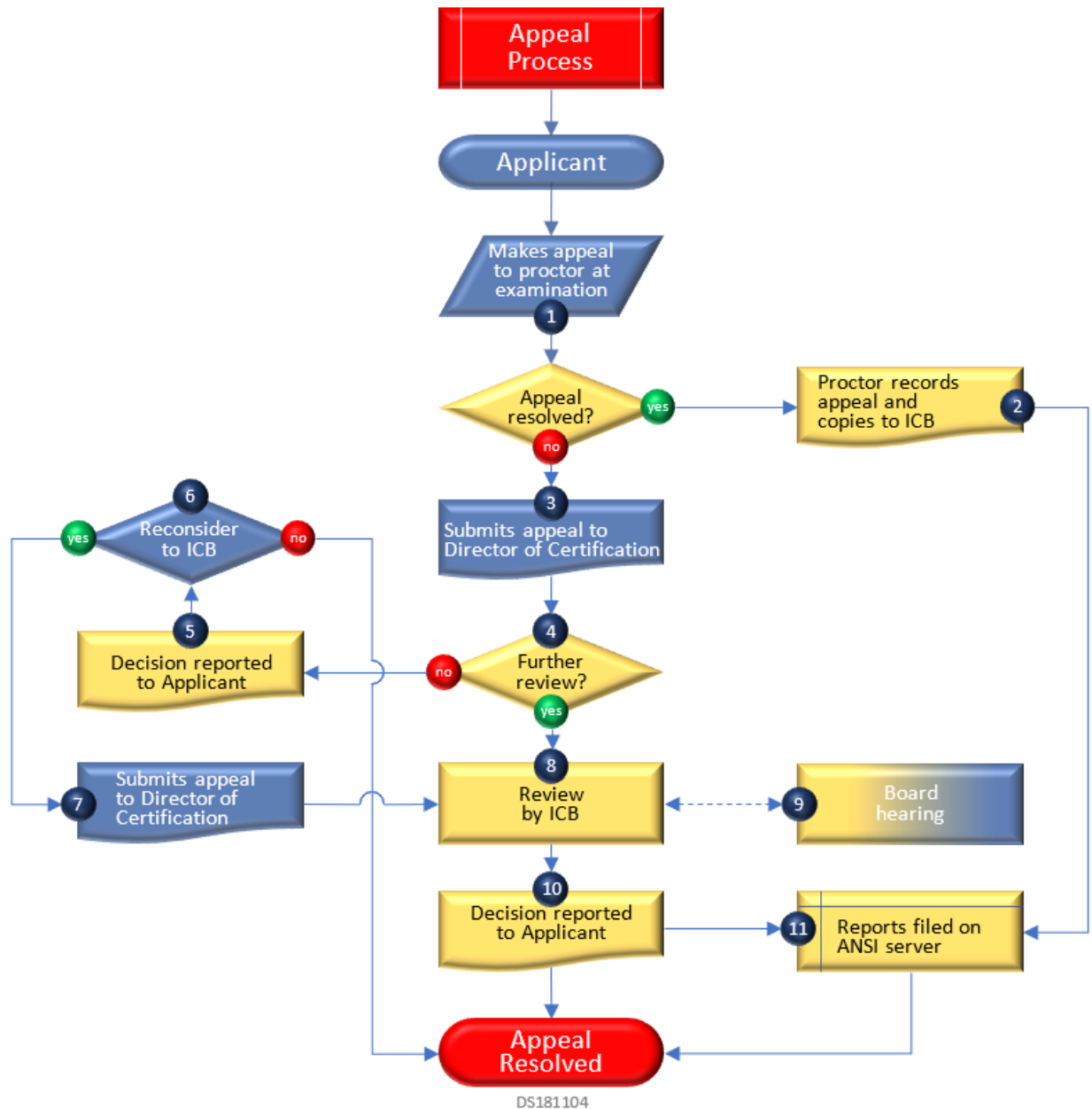


Figure 1. The basic process of resolving an appeal.

2.3.4 Procedure for Resolution of a Complaint

The ICB will resolve any complaint in accordance with the following procedure. ICB reserves the right to modify any procedure at any time. The ICB will notify any materially affected party of such a modification in a timely manner but no later than 10 business days after the change is adopted.

The Director of Certification or their representative will act for ICB on all matters concerning a complaint, including the conduct of a hearing, unless the ICB determines otherwise.

Figure 2 outlines the basic procedure.

1. **Initial Submittal of Complaint.** The claimant must file the complaint in writing with the Director of Certification. The written claim must be mailed to the Director of Certification at the address listed in Section 1.6 of this manual. Do not submit a claim electronically. The written claim should be labeled "NOTICE OF COMPLAINT".
2. **Receipt Acknowledgement.** The Director of Certification notifies the claimant of the receipt of the complaint. The Director of Certification will acknowledge the receipt of the complaint in writing within five days of receiving the complaint.
3. **Complaint Filed on ICB Server.** The Director of Certification or their representative will scan the complaint and save the electronic copies on the ICB server.
4. **Initial Review of Complaint.** The Director of Certification will review the complaint to determine if it merits further action. An ICB representative may contact the claimant to clarify any aspects of the written complaint or to obtain further information. The Director of Certification will review the complaint within 10 days after its receipt.
5. **Initial Decision.** If the Director of Certification determines that no further review is warranted, the decision will be reported back to the claimant and the subject in writing.
6. **Reconsideration by Claimant.** The claimant may submit their complaint for reconsideration by the ICB.
7. **Reconsideration by Subject.** The subject may request a reconsideration of the Director of Certification decision by the ICB.
8. **Request for Review by the ICB.** If the claimant or the subject request a review by the ICB, the request must be submitted in writing within 10 days after the claimant and the subject receive the initial decision by the Director of Certification. The request must be mailed to the Director of Certification at the address listed in Section 1.6 of this manual. Do not submit a claim electronically. The written request should be labeled "NOTICE OF RECONSIDERATION". If neither party timely requests a reconsideration of the Director of Certification's findings, then the complaint is considered resolved, and the Director of Certification's decision is considered final and binding on both the claimant and the subject of the complaint.
9. **Review by the ICB.** The ICB will review the complaint within 30 days after receiving the complaint from the Director of Certification.
10. **Administrative Hearing.** A hearing may be called by the ICB to resolve questions of fact. The hearing may be held in a face-to-face meeting with the claimant and/or subject or electronically as a teleconference. A hearing may be called for any of the following purposes:
 - To determine if any part or all of the complaint can be resolved to the satisfaction of the claimant and the subject without need for an investigation.
 - To determine if questions of fact can be resolved without need for an investigation.
 - To determine if the scope of the investigation can be agreed upon, and/or
 - If a hearing is to occur, to determine the place, date and time of the hearing; set the amount of time allotted for the hearing; set the number of witnesses and/or exhibits that will be permitted at the hearing; determine what evidence must be submitted in advance of the hearing (and set the time limit for doing so); determine if written statements of position should be submitted in

advance of the hearing (and to determine the time limit for doing so); and determine specific procedures and rules for a fair and efficient conduct of the hearing.

- To determine any other matters that may expedite the resolution of the complaint.

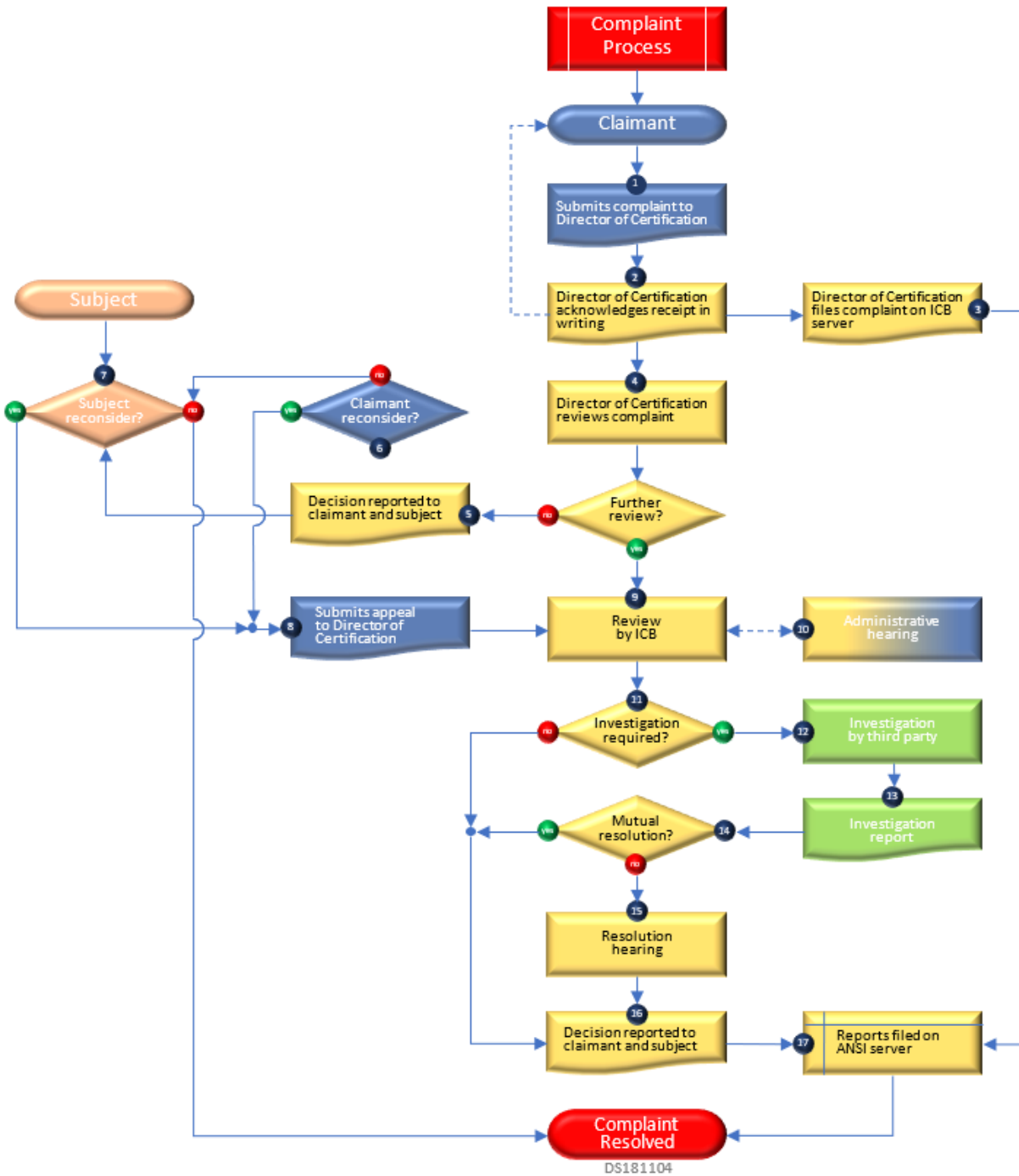


Figure 2. The basic process of resolving a complaint.

11. **Determination of Investigation.** The ICB will determine if an investigation is warranted.
12. **Investigation by Third Party.** If the ICB has determined that an investigation is warranted, the ICB will designate an investigator. The investigator shall contact the claimant and the subject. The investigator may inspect (or have inspected by a designated representative) the work which forms the basis of the complaint. Reasonable notice of the date and time of any worksite investigation shall be given both to the claimant and any subject. Both shall have an opportunity to be present at the investigation. The inspector(s) can terminate the inspection if either the claimant or the subject interferes in any detrimental manner with the investigation. The investigator will prepare and submit a report of the investigation to the ICB, and in the event of termination including any and all reasons for the termination.
13. **Investigation Report.** The ICB reserves the right not to release any or all parts of the report to the claimant and/or to the subject. Generally, the ICB will release to those persons all pertinent provisions of the report. However, the ICB may not release any or all portions of the report if, for example, the ICB believes that such a release may jeopardize confidential information or trade secrets or may constitute publication of possibly defamatory statements.
14. **Mutual Resolution.** Following receipt of the report, the ICB shall give the claimant and the subject an opportunity to agree on a resolution. If a resolution is reached, the agreement shall be documented in writing and signed by both parties. With their respective signature the parties acknowledge that the complaint has been resolved and no further action may be taken by the claimant.
15. **Resolution Hearing.** Absent an agreement, the ICB shall conduct a hearing on the complaint. The hearing will be held at a place of ICB's determination. At the hearing, the claimant and the subject will be given an opportunity to state their respective positions and to present evidence, all within the framework as described below.
 - A party and any witness shall be allowed to be present by telephonic or video conference, if requested, and if the ICB determines that practical arrangements can be made for telephonic or video conferencing.
 - The ICB may make a recording of the hearing.
 - The ICB shall determine who may attend a hearing.
 - The ICB shall determine all questions of procedure at the hearing. It may require witnesses to testify under oath administered by any duly qualified person. The ICB shall determine the order of proceeding. The ICB may limit the time anyone can speak or give evidence at a hearing and may limit the number of persons who may testify at a hearing.
 - Evidence. The ICB reserves the right to solely determine which evidence to be relevant and material to the complaint. The ICB may accept evidentiary statements by affidavit and may require that any evidence submitted by affidavit be provided in advance of any hearing.
 - Waiver of Rules. A party who participates in any conference or attends a hearing and fails to object at the time of an action or omission, shall be deemed to have waived any and all objections to the action or omission in question.
 - General Principles. The ICB shall seek to ensure that the investigation and the hearing are conducted fairly and impartially, and in a manner that gives the claimant and the subject a reasonable opportunity to state their positions and to present relevant and material evidence in support of their positions. All proceedings (informal interviews or questions, conferences, investigations, hearings and any other proceedings) are to proceed in a civil and respectful manner, within time limitations and constraints as specified by the ICB. A person who is disruptive, defamatory or insulting, or who hinders the proceedings, may be excluded from further participation in the proceedings. The ICB may set time limits for a party to submit written statements of position, evidence or other material prior to or after a hearing, may require one or more pre-hearing conferences to settle procedural or other questions in advance of a hearing, and may reopen a hearing to consider further evidence or other information. Any decision by the ICB

on procedural questions with respect to an investigation, hearing or any other proceeding shall be final, conclusive and binding to all parties participating in the matter which is under investigation.

16. **ICB Decision.** The ICB will report its decision in writing to the claimant and the subject no later than 10 days after a) it has determined that no further investigation is required; or b) the conclusion of the resolution hearing. The decisions of the ICB are final and binding.

17. **Document Retention.** All written documents shall be scanned, and electronic copies of the documents shall be stored on the ICB server. Copies of the complaint and applicable decisions by the Director of Certification and the ICB shall be stored in the subject's record as part of the ICB portal data base.

The complaint is considered resolved if one of the following conditions is met:

- a) The complaint has been resolved by the Director of Certification after the initial review, and the claimant and the subject did not submit a request for review by the ICB.
- b) The claimant and the subject agree on a resolution.
- c) The complaint has been resolved by the ICB.

The ICB reserves the right to make the final determination with respect to any of the above matters.

2.3.5 ICB Decisions and Sanctions

The ICB may assess reasonable costs and expenses in connection with proceedings on an appeal or complaint (including a reasonable allocation of general overhead costs of ICB), as follows:

- Against the subject of a complaint if the ICB finds the subject to have been at fault or to have acted in a manner inconsistent with ICB standards or the ICB Code of Conduct, or
- Against any person who the ICB determines made or pursued an appeal or complaint without merit and in bad faith.

If a certification scheme has a quality assurance program, e.g. TABB, the ICB may direct a subject to perform remedial work and/or assess all reasonable costs and expenses of the work that the ICB determines to be appropriate to resolve the complaint.

Any assessment under the preceding provisions may be made even if ICB takes no action, or imposes no sanction, against or with respect to any person against whom costs, and expenses are assessed. Any such assessment shall be due upon demand and the person shall also pay all costs of collection of any such assessment, including reasonable attorney's fees. ICB shall have the right to recover any such assessment and all such costs of collection in an action in any court of competent jurisdiction, and ICB's costs in connection with any such action, including ICB's reasonable attorney's fees, also shall be paid by the person, as additional costs of collection.

Sanctions which the ICB may impose (in addition to an assessment of costs and expenses as stated above) may include one or more of the following:

- Verbal (informal) reprimand or warning.
- Written (formal) reprimand or warning.
- Limiting or conditioning the subject's use of ICB qualification or certification, such as (by way of example within the specialty of TABB certification):
 - Requiring the subject to perform some or all testing, adjusting and balancing work, only under the supervision of another supervisor or contractor.
 - Restricting the use of the subject's ICB Certification or identification stamp.
 - Imposing other limits or conditions on the subject with respect to testing, adjusting and balancing work, or
 - Requiring complete or limited re-testing.

- Withdrawal of the subject's ICB certification (decertification) with the right to re-apply for certification after a period of time set forth by the ICB.
- Permanent decertification.

By applying for ICB certification, each applicant agrees to pay any assessment of costs and expenses in the event of an appeal or complaint. The applicant further acknowledges that they may be subject to possible sanctions as stated above.

A decision on any appeal or complaint by the ICB shall be final, conclusive, and binding to all interested parties.

3 The Certification Process

3.1 Application

The whole application process is conducted online at www.icbcertified.org. When the application is submitted, the ICB reviews all information and determines eligibility. The ICB will notify the applicant of the action taken on the application. If the application is not accepted, the applicant may make an appeal as specified in Section 2.3 of this manual.

3.2 Eligibility

To apply for ICB Technician certification, the applicant must meet one of the following definitions:

1. An individual with respect to whom contributions are payable to NEMIC;
2. An individual performing sheet metal industry work under a building trades collective bargaining agreement negotiated by a local union, if the agreement is accepted by the International Association of SMART and contributions are payable to NEMIC with respect to the individual;
3. An individual who is temporarily unemployed (not retired), if last employed in a job for which contributions were payable to NEMIC, and if available to accept such a position or is temporarily unable to work because of sickness or disability;
4. An individual who is temporarily employed for purposes of organizing an employer in the sheet metal industry.

To apply for ICB Supervisor certification, the applicant must meet the following criteria:

1. Be employed by a contractor signatory to a collective bargaining agreement that provides for contributions directly to NEMIC, and the employer shall be current with all financial obligations under that collective bargaining agreement.
2. Meet all other ICB requirements and conditions of a supervisor, as reflected on the ICB supervisor application form.

To apply for ICB Contractor certification, the applicant must meet the following criteria:

1. Be signatory to a collective bargaining agreement that provides for contributions directly to NEMIC and is current with all financial obligations under that collective bargaining agreement.
2. Meet all other eligibility requirements for the certification scheme.

3.3 Contractor with Multiple Locations

A contractor is certified for one specific office location only. If a contractor has multiple office locations, it may be certified for each separate or branch office. To obtain certification for a separate or branch office, both an ICB-certified Technician and an ICB-certified Supervisor must be regularly employed by the contractor at each office location.

3.4 Certification Fees

The ICB sets a schedule of certification fees. An up-to-date fee schedule is located in the Certification section at www.icbcertified.org.

3.5 Certification Exam

The certification exam consists of a written test and, if applicable, a practical test. An applicant may not test until the ICB has determined eligibility.

3.5.1 Administering the Written Exam

The written exam is intended to gauge how well the candidate understands and applies the ICB proficiency requirements of the certification scheme.

- Upon receiving notice by the ICB that the applicant is eligible to sit for the exam, the candidate submits the eligibility notice to the JATC Coordinator.
- The JATC Coordinator makes a request to the ICB for an exam session.
- The exam will be administered by the ICB-designated proctor at sites designated by the ICB.
- The exam proctor will administer the exam according to the procedure outlined in the ICB Exam Proctors Policy.
- The exam will be in either online or paper format.
- The exam must be completed in one sitting in a designated room and within the specified time limit.

3.5.2 Exam Reference Materials

The candidate may use any approved reference materials during the exam. The JATC Coordinator will inform the candidate which reference materials are allowed. Electronic books shall only be accessed on the same device upon which the exam is being completed.

Personal computers, tablets or any other type of electronic device that stores and displays data, including smart phones, are not allowed to be used during the exam.

3.5.3 Scoring the Written Exam

- Online Format
 - The website will automatically score the exam and return an immediate result. The candidate will also be informed in writing or by electronic mail.
- Paper Format
 - The candidate will be notified of the score in writing or by electronic mail within 10 business days of the date exam materials are received in the ICB office from the proctor.

3.5.4 Time Limits on Testing and Re-Testing

The written exam must be completed within one year from ICB approval of the application, or the candidate must re-apply.

A candidate who fails an exam, including written and practical exams, may apply to re-test in a manner specified by the ICB but may re-test only after the waiting period set forth below:

Re-Test Attempt	Waiting Period Between Re-Test Attempts
First	30 days
Second	60 days
Third and all subsequent attempts	90 days

3.5.5 Administering the Practical Exam

When a practical exam is required by the certification scheme, upon passing the written exam, the ICB will notify the candidate either in writing or by electronic mail of their eligibility to take the practical exam. The notification will include the date and location where the practical exam is available.

Failure to attend a scheduled exam will be recorded as test incompleteness.

The practical exam will be given at an ICB-approved testing facility.

An orientation session will be given prior to the day of the exam at the exam site. Attendance is required (except for those candidates taking a retest in the same location as the previous exam. Candidates taking a retest may skip the orientation session on the first day). This orientation session will include all of the following elements:

- An explanation of exam procedures.
- A description of approved instrumentation.
- A discussion of the time schedule.
- An introduction of proctor and judges.
- A tour of the testing facility.
- Answers to questions the candidate may have.

Exam projects will be taken from the corresponding certification scheme as described in the respective Section in Part 2 of this manual.

Scoring:

- Two judges will observe and score each candidate at each task. The judges are at a minimum to be ICB-certified Technicians or recognized technical experts in the respective certification scheme. The proctor will be assigned by the ICB and will be responsible for the administration of the practical exam.

Exam Security:

- The proctor shall be responsible for security of the exam and all contents.

3.6 Information Release Policy

All candidate information is considered proprietary and confidential. Candidates participating in the ICB certification program agree that their certification exam result, i.e., pass/fail information only, may be released to their local union officers and/or their local JATC Coordinator.

The status of ICB-certified Technicians and Supervisors will be made public on the List of Certified Professionals found online at www.icbcertified.org. Public information provided will include:

- Name of certified professional
- Certification type
- Valid through date

The status of ICB-certified Contractors will be made public on the List of Certified Professionals found online at www.icbcertified.org. Public information will include:

- Name of certified company
- Certification type
- Street address
- State
- Zip code
- Phone number

The NEMIC ATTCP website at www.attcp.org publishes the names, certification numbers, city, state and zip code of residence of the NEMIC ATTCP-certified technicians and employers to comply with California Title 24 mandates.

3.7 Confidential Exam Materials

All applicants, exam candidates, proctors and ICB certified professionals have an ethical duty to report any incident of potential exam subversion. Failure of any applicant, candidate, registrant, proctor, or other parties to report subversion shall be deemed an ethics violation. Violations shall be subject to discipline by the ICB that may range from a verbal warning to de-certification and corresponding privileges revoked by the ICB.

3.8 Duration of Certification

ICB certification is valid for two full years from the last day of the quarter in which the candidate obtained the certification. For example, a certification issued on May 4, 2021 is valid through June 30, 2023.

3.9 Certification Documents

On certification, the ICB will issue the following:

- A certificate including:
 - Date of certification
 - Certification scheme
 - Other pertinent information
 - Name of the certified person
- For technicians and contractors, an electronic stamp card will be available for downloading providing that the technician or supervisor sign the ICB-certified Stamp Agreement (see Attachment 2).

Certification documents are available for download from the certified professional's ICB account.

An ICB-certified Technician or Contractor will be issued a physical identification stamp by request only. The cost of the stamp will be assessed to the Technician or Contractor. The Technician and the Contractor must hold and use the stamp in accordance with the ICB-certified Stamp Agreement (see Attachment 2). Each certificate and card are purchased by and remains the property of the ICB. A charge will be assessed to replace lost or damaged certification documents or stamps. Certification documents must be surrendered to the ICB whenever the ICB so demands. Misuse of, or misrepresentation concerning, any stamp or certificate may result in withdrawal of certification and repeal of the certificate, card or stamp.

3.10 Supervisor Certificate

ICB certification alone does not authorize a Supervisor to sign reports as an ICB-certified Supervisor, or otherwise use the certification. Signing reports or other use is authorized only during and in the course of qualifying employment (see Section 3.11).

3.11 Qualifying Employment

ICB-certified Supervisors may sign reports or otherwise use ICB certification only during and in the course of the Supervisor's employment by an ICB-certified Contractor and otherwise in compliance with ICB requirements. Loss of qualifying employment will result in indefinite suspension of the Supervisor's right to use the ICB certification, until the earlier of a) the Supervisor's return to qualifying employment; or b) expiration of the Supervisor's ICB certification.

3.12 Retiree Status

An ICB-certified Technician or Supervisor who retires from the active workforce in good standing shall be given a Certificate of Recognition listing all the certifications they held at the time of retirement. (see Attachment 3).

3.13 Renewal of Certification

The ICB will send a renewal notice to Technicians, Supervisors and Contractors approximately 90 days before the assigned valid through date. The renewal application forms, and all information required by those forms, must be submitted before the certification expires.

At time of renewal, the certified professional must meet all qualifications and requirements mandatory for initial certification. Continuing Education Units (CEUs) are required for renewal and must be earned during the certification period, i.e., between the date the certification was either obtained or renewed and the expiration date.

Table 3.13-1

CEUs Required for Renewal of Certification	
Certification Level	CEUs Required
Supervisor	8
Technician	4

An individual who holds one or more Technician certifications needs only to complete a total of four (4) acceptable CEUs to fully renew all Technician certifications held by the individual.

An individual who holds one or more Supervisor certifications needs only to complete a total of eight (8) acceptable CEUs to fully renew all Supervisor certifications held by the individual.

3.14 Acceptable CEUs

One hour of continuing education training equals one CEU.

CEUs submitted for renewal shall relate to the scope of the respective certification scheme.

CEUs will be accepted for the following:

- Any course endorsed by National SMACNA.
- Any course sponsored by a local SMACNA chapter.
- Attendance of any course/seminar at the Annual ICB/TABB Conference.
- Any course put on by either NEMI or the ITI.
- Any course sponsored by the local JATC.
- Any course put on by a professional association, e.g., ASHRAE, NFPA.
- Teaching a course for a local JATC for at least eight hours per year.
- Presenting a seminar – a copy of the agenda and the presentation must be provided to receive CEUs.
- Papers published – eight CEUs will be credited per paper.
- Any course or webinar – pertinent documentation must be submitted to receive credits.

3.15 ICB Code of Conduct

The ICB has adopted a Code of Conduct. Every Contractor, Supervisor or Technician must comply with the Code of Conduct as a requirement for maintaining certification. Violations of the ICB Code of Conduct are grounds for suspension, withdrawal, or non-renewal of certification.

The International Certification Board

Code of Conduct

Each person certified by the ICB shall practice their profession consistent with the standards and procedures applicable to the certification, and the highest quality work.

ICB-certified Technicians and Supervisors:

- Technicians will perform their work in an orderly, systematic, well-documented and repeatable manner.
- Technicians will document all findings in an accurate and professional manner so that a Supervisor can review a comprehensive and chronological history of the procedures followed.
- Technicians and Supervisors will not make any statements that cannot be substantiated and verified by field measurements or observations.
- Technicians and Supervisors should improve their technical competence through continuing education, peer counseling and interaction with professionals in their field of expertise.
- Technicians and Supervisors must meet the standards and procedures set by the ICB, applicable to their certification(s), and adhere to all rules, regulations and obligations of the certification program.
- Technicians will work in a professional manner as to ensure their own safety and the safety of their fellow workers, while being respectful to the property of their employers, building owners and their representatives.
- Technicians will observe proper protocol when noting contract or installation deficiencies, errors or omissions by others. Notification should first go to the Supervisor for review, then to the employer, unless the employer has established a different protocol.

ICB-certified Contractors:

- Contractors will ensure that a Supervisor oversees and coordinates projects involving work pertaining to the scope of the certification scheme, and that those projects are performed in accordance with applicable standards and procedures.
- Contractors must employ Technicians and Supervisors to the extent required for certification and should seek to employ enough Technicians and Supervisors to perform all work in the area of certification (e.g., TAB, Sound & Vibration, Commissioning, etc.).
- Supervisors and Contractors shall only certify projects where the work was performed by certified Technicians employed by their own firm.

Protocol:

- Violations of this Code of Conduct shall immediately be reported to the ICB.
- This Code of Conduct remains subject to change by the ICB.

[This page intentionally left blank]

PART 2: Certification Schemes

[This page intentionally left blank]

Building Envelope Installer Technician (BEI-T)

Standards of Proficiency

The Building Envelope Installer Technician must be proficient in all categories of this section, as demonstrated by passing the written exam.

1. Expansion and Contraction
 - a. Building expansion
 - i. Colors
 - ii. Location of panels
 - b. Causes
 - i. Thermal movement
 - ii. Solar factors
 - iii. Seismic movement
 - c. Solutions
 - i. Expansion joints
 - ii. Cleats
2. Field Installation
 - a. Planning
 - i. Measuring and checking
 - ii. Onsite inspection
 - b. Staging
 - i. Storage of materials
 1. Close to installation
 2. Safety
 3. Theft prevention
 4. Moisture control
 - c. Distributing
 - i. Distribution of job components
 1. Materials
 2. Fasteners
 3. Tools
 - d. Sectioning
 - i. Determine starting point
 - ii. Determine direction to continue installation
 - iii. Prepare base
 - e. Installing
 - i. Many cautions
 1. Improper fasteners, capillary attraction, rosin paper, soldered joints, sealants
 - f. Completing
 - i. Job clean up
 - ii. Protection of finished project
3. Fastening and Joining
 - a. Types
 - i. Nails
 - ii. Screws
 - iii. Rivets

- iv. Staples
 - v. Powder actuated
 - vi. Anchors
 - vii. Adhesives
 - viii. Welding
 - b. Material compatibility
 - i. Making sure fasteners are compatible with material being fastened
 - ii. Fasteners compatibility to substrate
- 4. Flashing
 - a. Purpose
 - i. Ridge and valley intersections
 - ii. Roof penetrations
 - iii. Roofing intersecting walls
 - iv. Controlling moisture from
 - 1. Gravity
 - 2. Capillary action
 - 3. Wind
 - b. Movement
 - i. Thermal movement in material or adjacent material
 - c. Types
 - i. Ridge
 - ii. Hip
 - iii. Valley
 - iv. Counter flashings
 - v. Base flashing
 - vi. Roof to wall
 - vii. Chimney
 - viii. Saddles
 - ix. Apron
 - x. Roof penetrations
 - xi. Thru wall flashing
 - d. Method of securement
 - i. Reglets
 - ii. Thru wall flashing
- 5. Shop Layout and Fabrication
 - a. Field layout and fabrication
- 6. Moisture Control
 - a. Water Movement
 - i. Types
 - 1. Wind and Ice dam
 - 2. Capillary Action
 - 3. Differential Pressure
 - 4. Gravity
 - 5. Adhesion
 - b. Systems installed to control moisture
 - i. Underlayments

1. Ice and water shield
 2. Asphalt saturated felt
 3. Synthetic felt
 4. Slip sheets
 - c. Roof and wall panels/siding
 - d. Solder
 - e. Sealants
 - f. Vapor retarders
 - g. Flashings
 - h. Roof drainage systems
 - i. Rain screens
 7. Measurements
 - a. Field measurements
 - i. Verify plumb/level/square of surfaces
 - ii. Line of sight
 - iii. Measuring angles
 1. Techniques
 - a. Sine, cosine, tangent
 - b. 3-4-5
 8. Material Handling
 - a. Controlling moisture
 - b. Storing safety
 - c. Distribution
 9. Materials
 - a. Characteristics of Metals
 - i. Steel
 - ii. Stainless steel
 - iii. Aluminum
 - iv. Copper
 - v. Lead
 - vi. Zinc
 - vii. Other
 10. Roof Drainage Systems
 - a. Gutter
 - b. Hangers
 - c. Scuppers
 - i. Overflows
 - d. Leader/conductor head
 - e. Downspouts
 - i. Sizing
 - f. Design factors
 - i. Expansion
 11. Roof Systems
 - a. Different slopes

- i. Low
 - ii. Medium
 - iii. High
 - b. Hydrostatic/hydrokinetic
 - c. Cold/warm
 - d. Types of seams
 - e. Structural
 - f. Nonstructural
 - i. Substrate
 - ii. Insulation
 - iii. Underlayment
 - iv. Slip sheet
 - g. Controlling condensation and ice damming
 - h. Fasteners
 - i. Metal panel types
 - i. Flat seam
 - ii. Standing seam
 - iii. Batten seam
 - iv. Bermuda
 - v. Mansard
 - vi. Domes and conical
 - vii. Brake shape/corrugated
 - j. Minimize oil canning
 - k. Roofing accessories

12. Special ASM

- a. Typical Misc work
- b. Restoration

13. Sealants

- a. Types
- b. Functions
- c. Uses
- d. Application
- e. Compatibility with the metal, glass or coatings

14. Soldering

- a. Solder types
- b. Flux and acids
- c. Irons
- d. Materials
- e. Safety
- f. Clean up

15. Seams, Locks and Edges

- a. Purpose
- b. Lap and Butt seams
- c. Interlocking
 - i. Standing seam

- ii. Flat lock
 - iii. Clips and cleats
- d. Edges
- e. Radius edges

16. Supports and Substrates

- a. Structure
 - i. Pre-inspection
- b. Underlayment
 - i. Must be compatible with panel and substrate
 - ii. Sheds moisture
 - iii. Slip sheets allow movement

17. Tools and Equipment

- a. Hand Tools
- b. Power tools

18. Wall Systems

- a. ACM (Aluminum Composite Material)
- b. Types
 - i. Typical wall panel system
 - ii. Pre-Engineered
- c. Handling
- d. Storing
 - i. Manufacturers recommendations
- e. Components
- f. Field cutting
- g. Materials and styles
- h. Installation
 - i. Plan order of installation
 - ii. Check structure for square, plumb and level
 - iii. Check manufacturers recommendations
 - iv. Fastener locations and types
 - v. Flashing installations
 - vi. Sealants

19. Safety

- a. Electrical
 - i. Overhead electrical power
 - ii. Power tools
 - iii. Lockout tagout
 - iv. Extension cords
- b. Personal protective equipment
- c. Ladders, scaffolding, lifts
- d. Fall hazards
- e. Fall protection
 - i. Lanyards
 - ii. Perimeter protections

[This page intentionally left blank]

Duct Air Leakage Testing Technician (DALT-T)

Certification Exam

The certification exam consists of 40 questions – 32 are scored, with eight unscored (beta) to evaluate for possible inclusion on future exam versions. 25 of 32 (79%) is required for passing.

Scope

The Duct Air Leakage Testing Technician (DALT) is knowledgeable in duct leakage standards, leakage testing preparation and procedures, gathering results and filling out reports, and can complete duct leakage testing in both new building construction and existing buildings.

Job Task Analysis

The JTA identifies the tasks and related knowledge and skills required to do a job. The job of the DALT Technician is divided into seven domains (broad areas of practice). The percentage of the certification exam dedicated to each domain is identified below.

1. Math (12% of exam)

The DALT Technician performs the following tasks:

- Uses math formulas related to duct leakage testing.
- Calculates perimeter of duct.
- Calculates surface area of duct and fittings.

The DALT Technician is proficient in applying the following functions:

- Addition
- Subtraction
- Multiplication
- Division
- Square Root
- Cubed Root
- Ratios
- Percentages
- Decimals

2. Fluid Flow (22% of exam)

The DALT Technician performs the following tasks:

- Applies Fan Laws.
- Determines static pressure in the duct during testing.
- Measures pressure differential across the orifice plate in the orifice tube used for testing.
- Determines the leakage rate from a calibration chart for the orifice tube used for testing.

The DALT Technician is proficient with the following basic principles of pressure:

- Static
- Velocity
- Total
- Density
- Quantity

3. Project Documents (12% of exam)

The DALT Technician performs the following tasks:

- Understands duct construction standards.
- Understands duct sealing methods.
- Understands duct sealing classifications.
- Understands duct leakage classifications.
- Understands duct pressure classifications.
- Identifies duct leakage allowance specified in the construction documents.
- Identifies the pressure test specifications in the construction documents.

The DALT Technician is proficient with interpreting the following documents:

- Mechanical blueprints
- Specifications
- Submittal data
- Addenda and alterations
- Shop drawings

4. Instrumentation (18% of exam)

The DALT Technician performs the following tasks:

- Uses a U-tube manometer.
- Uses a Magnehelic gauge.
- Uses a digital manometer.
- Understands the properties of manometric liquids.
- Uses a test fan to pressurize a duct section to be tested.
- Assembles the testing equipment for a leakage test.

The DALT Technician is proficient with gathering accurate, repeatable and reliable data:

- Using instruments properly as recommended by the instrument manufacturer
- Selecting the proper instrument for the task to be performed
- Properly caring for and using duct air leakage testing instrumentation

5. Preliminary DALT Procedures (9% of exam)

The DALT Technician performs the following tasks:

- Identifies responsibilities of the duct system designer.
- Identifies responsibilities of the duct system installer.
- Identifies amount of duct to be tested.

The DALT Technician is proficient in initial planning related to:

- Procurement of data
- Study of systems and data
- Report forms
- Inspection of the air distribution system
- Fans, air conditioning units and terminal devices

6. Specific Air Systems Procedures (15% of exam)

The DALT Technician performs the following tasks:

- Calculates duct leakage rate in CFM/100 ft² of duct surface.
- Isolates all equipment and accessories external to the duct section being tested.

The DALT Technician is proficient in testing the following duct systems:

- Supply, return, exhaust and relief air
- Constant volume, both single and dual duct
- Dual duct pressure dependent

- Variable air volume
- Pressure dependent
- Pressure independent
- Induction
- Fan-powered terminal units

7. Considerations for DALT (12% of exam)

The DALT Technician performs the following tasks:

- Enters test data in the duct leakage report forms.
- Uses proper personal protective equipment during testing.
- Conducts smoke testing when required.
- Locates and seals leaks in the duct system.
- Uses sealants as directed by the manufacturer.
- Analyzes data in leakage report to determine compliance with specifications.

The DALT Technician is proficient in applying the following functions in a professional manner:

- Safety
- Problem solving
- Data gathering
- Report writing
- Task scheduling
- Interaction with customers and others at the work site

[This page intentionally left blank]

Fire and Smoke Damper Technician (FSD-T)

Scope

The FSD Technician is knowledgeable about periodic inspection procedures for fire, smoke and combination fire/smoke dampers according to the guiding documents listed in the job task analysis. In addition, the FSD Technician is knowledgeable about procedures to conduct differential pressure measurements across, and force testing of stairwell egress doors.

Certification Exam

The certification exam consists of 62 questions – 50 are scored, with 12 unscored (beta) to evaluate for possible inclusion on future exam versions. 38 of 50 (75%) is required for passing.

Job Task Analysis

The Job Task Analysis identifies the tasks and related knowledge base required to perform a job. The job of a Fire and Smoke Damper (FSD) Technician is divided into 12 domains (broad areas of practice). The percentage of the certification exam dedicated to each domain is identified below.

1. Scope (4% of exam)

The FSD Technician performs the following task:

- Reviews and understands the scope of job for the FSD Technician.

The FSD Technician is knowledgeable of:

- All elements included in the scope of the job

2. Guiding Documents (4% of exam)

The FSD Technician performs the following task:

- Reviews and becomes familiar with the requirements for inspecting and testing life safety components identified in the job scope.

The FSD Technician is knowledgeable of:

- The specific sections identified below in the most recent editions of:
 - International Training Institute (ITI) – Fire and Smoke Damper Technician Student Manual (P612), First Edition, 2019
 - NFPA 80 – Standard for Fire Doors and Other Opening Protectives
 - Chapter 3: Definitions
 - Chapter 19: Installation, Testing, and Maintenance of Fire Dampers
 - NFPA 92 – Standard for Smoke Control Systems
 - Chapter 3: Definitions
 - Chapter 8: Testing – Sections 8.4.6.1.1, 8.4.6.1.2 and 8.4.6.2.1
 - NFPA 105 – Standard for Smoke Door Assemblies and Other Opening Protectives
 - Chapter 3: Definitions
 - Chapter 7: Installation, Testing, and Maintenance of Smoke Dampers

3. Design, Plans and Specifications (8% of exam)

The FSD Technician performs the following tasks:

- Gathers all data required as applicable to the project.
- Reads plans and specifications for HVAC systems and life safety systems.

The FSD Technician is knowledgeable of:

- As-built drawings
- Acceptance testing results

- Previous inspection and testing reports
- Responsibilities of the HVAC contractor, architect, mechanical engineer and fire protection engineer
- Purpose of fire and smoke dampers for life safety and protection of property
- Symbols, definitions and abbreviations commonly used on blueprints for HVAC systems

4. Code Requirements (8% of exam)

The FSD Technician performs the following task:

- Understands code requirements for fire and smoke dampers installed in HVAC systems.

The FSD Technician is knowledgeable of:

- Duties and powers of the Authority Having Jurisdiction (AHJ)
- The fundamental difference between a Code and a Standard
- The scope and purpose of the following codes:
 - International Fire Code
 - International Mechanical Code
 - International Building Code
 - NFPA 101 Life Safety Code

5. Features and Components of Fire Dampers (10% of exam)

The FSD Technician performs the following task:

- Assesses condition of fire damper features, components and accessories.

The FSD Technician is knowledgeable of:

- Hourly fire resistance rating of dampers
- Operability
- Dynamic closure
- Mounting orientation
- Pressure drop
- Space envelope
- Sleeves
- Heat responsive devices
- Duct access doors
- Locking quadrants
- Mullions
- Blade position indicator
- Retaining angles
- Solenoid releases

6. Features and Components of Smoke Dampers (10% of exam)

The FSD Technician performs the following task:

- Assesses condition of smoke damper features and components.

The FSD Technician is knowledgeable of:

- Leakage rating
- Temperature rating
- Operability under heat
- Flow and pressure
- Control function
- Actuating device

7. Features and Components of Combination Fire/Smoke Dampers (10% of exam)

The FSD Technician performs the following task:

- Assesses condition of combination fire/smoke damper features, components and accessories.

The FSD Technician is knowledgeable of:

- Hourly fire resistance rating
- Leakage
- Temperature and operational ratings
- Blade styles
- Space envelope
- Actuator
- Override package
- EP switch (electro-pneumatic or solenoid valve)

8. Features and Components of Ceiling Radiation Dampers (6% of exam)

The FSD Technician performs the following task:

- Assesses condition of ceiling radiation damper features, components and accessories.

The FSD Technician is knowledgeable of:

- Floor/ceiling or roof/ceiling assembly design
- Types of ceiling dampers
- Space envelope
- Mounting configuration
- Thermal blanket
- Volume control/balancing devices
- Fusible links

9. Damper Inspection (20% of exam)

The FSD Technician performs the following tasks:

- Inspection and testing of life safety dampers as required in NFPA 80 and NFPA 105.
- Documents all inspection and testing as required in NFPA 80 and NFPA 105.
- Submits report to FSD Supervisor for review.

The FSD Technician is knowledgeable of:

- Inspection and testing procedures required in NFPA 80 and NFPA 105 related to:
 - Periodic testing
 - Operational testing
 - Documentation procedures for inspection and testing as required in NFPA 80 and 105

10. Differential Pressure Across Stairwell Egress Doors (8% of exam)

The FSD Technician performs the following tasks:

- Verifies that the HVAC system operates as specified.
- Verifies that the stairwell egress doors are in the specified position.
- Measures and records differential pressure across stairwell egress doors.
- Documents and compares results of testing to acceptance testing pass/fail criteria.
- Submits report to FSD Supervisor for review.

The FSD Technician is knowledgeable of:

- The tools and equipment commonly used to measure differential pressure.
- The requirements in the following sections of the most recent version of NFPA 92:
 - Chapter 8 – 8.4.6.1.1, 8.4.6.1.2 and 8.4.6.2.1

- The following conditions under which the FSD Technician conducts limited testing of egress doors in stairwell pressurization systems:
 - Testing of stairwell pressurization systems is performed only when acceptance testing procedures are specified
 - Acceptance testing procedures and pass/fail criteria shall be obtained from the design documents
 - Activation of the stairwell pressurization system is performed by building operating personnel knowledgeable in the operation of the building smoke control system
 - All testing is to be performed in presence of building operating personnel knowledgeable in the operation of the building smoke control system

11. Force Testing of Stairwell Egress Doors (8% of exam)

The FSD Technician performs the following tasks:

- Verifies that the HVAC system operates as specified.
- Verifies that the stairwell egress doors are in the specified position.
- Measures and records the force necessary to open stairwell egress doors.
- Documents and compares results of testing to acceptance testing pass/fail criteria.
- Submits report to FSD Supervisor for review.

The FSD Technician is knowledgeable of:

- The tools and equipment commonly used to measure door opening force
- The requirements in the following sections of the most recent version of NFPA 92:
 - Chapter 8 – 8.4.6.1.1, 8.4.6.1.2 and 8.4.6.2.1
- The following conditions under which the FSD Technician conducts limited testing of egress doors in stairwell pressurization systems:
 - Testing of stairwell pressurization systems is performed only when acceptance testing procedures are specified
 - Acceptance testing procedures and pass/fail criteria shall be obtained from the design documents
 - Activation of the stairwell pressurization system is performed by building operating personnel knowledgeable in the operation of the building smoke control system
 - All testing is to be performed in presence of building operating personnel knowledgeable in the operation of the building smoke control system

12. Safe Working Practices (4% of exam)

The FSD Technician performs the following task:

- Follows industry safety standards when performing the job.

The FSD Technician is knowledgeable of:

- Safe working practices while inspecting and testing fire, smoke and combination fire/smoke dampers
- OSHA regulations related to inspecting and testing of fire, smoke and combination fire/smoke dampers

Fire and Smoke Damper Supervisor (FSD-S)

Scope

The ICB-certified FSD Supervisor oversees and coordinates the work of the FSD Technician and plans and directs testing and inspection projects from inception through completion – ensuring that procedures follow requirements of applicable codes and standards.

Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the Fire and Smoke Damper Supervisor must meet one of the following criteria:

- Hold a college/university degree in engineering with at least one year of experience in HVAC installation or design work,
- Hold a two-year associates degree in HVAC with at least three years of experience in HVAC installation or design work,
- Hold an ICB-certified Fire and Smoke Damper Technician certification, or
- Have at least three years of experience in HVAC installation or design work and is recommended in writing for the exam by the applicant's employer. The applicant's employer must be either an ICB-certified Contractor or be eligible to be an ICB-certified Contractor except only for the requirements that it employ an ICB-certified Technician and an ICB-certified Supervisor.

Certification Exam

The certification exam consists of 93 questions – 80 are scored, with 13 unscored (beta) to evaluate for possible inclusion on future exam versions. 60 of 80 (75%) is required for passing.

Job Task Analysis

The JTA identifies the tasks and related knowledge base required to perform a job. The job of an FSD Supervisor is divided into 6 domains (broad areas of practice). The percentage of the certification exam dedicated to each domain is identified below.

1. Codes and Standards

- a. The FSD Supervisor reviews applicable codes and standards (12% of exam).
 - Is knowledgeable of:
 - Requirements in local and state codes
 - Requirements in the International Fire Code
 - Differences in requirements of building codes and post-occupancy codes
 - How current and historical codes apply within a specific local jurisdiction
 - Requirements in specified sections of the following standards:
 - NFPA 1 – sections 12.4, 12.4.1 and 12.9.5.4
 - NFPA 80 – chapters 3 and 19
 - NFPA 92 – chapters 3, 7 and 8 (8.4.6.1.1, 8.4.6.1.2 and 8.4.6.2.1)
 - NFPA 101 – chapters 3, 7, 8 and 9
 - NFPA 105 – chapters 3 and 7
- b. The FSD Supervisor identifies who the AHJ is for the local jurisdiction (4% of exam).
 - Is knowledgeable of:
 - The authority who enforces the local codes
 - The code enforcement structure within a specific local jurisdiction
 - The FLS testing and inspection enforcement structure for the local jurisdiction

2. Construction and Design Documents

a. The FSD Supervisor reviews applicable construction and design documents (7% of exam).

- Is knowledgeable of:
 - Blueprints – mechanical, architectural and as-built conditions
 - Specifications used when the building was constructed/remodeled
 - Operations & maintenance manual of smoke control system
 - How fire compartmentalization plans are compared with HVAC mechanical blueprints
 - Blueprint reading and application of specifications

b. The FSD Supervisor locates and documents smoke and fire barriers (7% of exam).

- Is knowledgeable of:
 - Methods to identify and locate smoke and fire barriers
 - Identifiers used on blueprints for the following components:
 - Smoke and fire barriers
 - Fire doors
 - Smoke control zoning plans
 - Egress routes
 - Shelter in place vs evacuation
 - HVAC systems and symbols
 - Identifiers used in the field for smoke and fire barriers for the following components:
 - Fire doors
 - Posted egress routes
 - Requirements in the specific sections of the following standard:
 - NFPA 101 – sections 8.3 and 9.2

3. Method of Procedure (MOP)

a. The FSD Supervisor identifies how operational, acceptance and periodic testing apply (9% of exam).

- Is knowledgeable of:
 - Standards adopted by a specific local jurisdiction as law
 - Requirements for testing in these sections of the following standards:
 - NFPA 1 – sections 12.4, 12.4.1, 12.9.5.4
 - NFPA 80 – chapter 19
 - NFPA 92 – chapters 7 and 8 (8.4.6.1.1, 8.4.6.1.2, 8.4.6.2.1)
 - NFPA 105 – chapter 7
 - Requirements of the damper manufacturer for testing
 - Previous FLS testing and inspection reports
 - Scope of work related to inspecting and testing
 - Methods for interpreting codes and standards
 - State, county and city regulations related to FLS damper inspection

b. The FSD Supervisor determines logistics for the scope of work (8% of exam).

- Is knowledgeable of:
 - Building operations management
 - HVAC systems operations and types
 - FLS control operations and types
 - How to research permit records for a specific local municipality
 - Which building staff to interview for documentation procedures and previous testing and inspection reports
 - Documentation requirements of specified sections of the following standards:
 - NFPA 80 – Chapter 19
 - NFPA 92 – Chapter 8 (8.4.6.1.1, 8.4.6.1.2, 8.4.6.2.1).

- NFPA 105 – Chapter 7.
- c. The FSD Supervisor writes a Method of Procedure (MOP) (11% of exam).
 - Is knowledgeable of:
 - Building code requirements related to HVAC FLS testing and inspection.
 - Requirements for operational, acceptance and periodic testing and inspection procedures in the specific section of the following standards:
 - NFPA 80 – chapter 19
 - NFPA 92 – chapters 7 and 8 (8.4.6.1.1, 8.4.6.1.2, 8.4.6.2.1)
 - NFPA 105 – chapter 7
 - Periodic testing for fusible-link operated dampers
 - Periodic testing for dampers that do not use fusible link
 - Measuring the pressure differential across stairwell egress doors
 - Measuring the force required to open stairwell egress doors
 - FLS damper testing during the construction phase
 - FLS damper testing during the post-construction phase
- 4. Arranging for Testing and Inspection
 - a. The FSD Supervisor submits MOP to AHJ and customer (4% of exam).
 - Is knowledgeable of:
 - Document submission procedures specific to the local jurisdiction
 - Roles and responsibilities of the AHJ as required by the local jurisdiction
 - Contractual requirements for the project
 - b. The FSD Supervisor coordinates with FLS contractor and/or building engineer (7% of exam).
 - Is knowledgeable of:
 - Details of the MOP
 - Integration of damper actuator with electrical circuits and/or fire alarm panels
 - Existing job site conditions
 - Requirements for testing and inspection in specific sections of the following standards:
 - NFPA 1 – sections 12.4, 12.4.1, 12.9.5.4
 - NFPA 80 – chapter 19
 - NFPA 92 – chapters 7 and 8 (8.4.6.1.1, 8.4.6.1.2, 8.4.6.2.1)
 - NFPA 105 – chapter 7
 - Who is responsible for hiring the FLS contractor
 - Who is responsible for establishing testing and inspection dates/hours
 - The specific conditions under which the FSD Technician conducts limited testing and inspection of stairwell pressurization systems
 - Special access needs
 - Damper inspection and testing processes
 - Site-specific testing and inspection procedures
 - Contingency planning for failures and/or repairs
- 5. Supervising the FSD Technician
 - a. The FSD Supervisor verifies certification status of the FSD Technician (3% of exam).
 - Is knowledgeable of:
 - Scope of job for the FSD Technician as identified in the ICB Certification Manual
 - Requirements of the FSD Technician as identified in the ICB Code of Conduct
 - The ICBcertified.com portal to verify the technician certification is valid/current
 - How to access the ICB Certification Manuals online
 - b. The FSD Supervisor prepares and provides safety procedures (7% of exam).

- Is knowledgeable of:
 - OSHA regulations related to site-specific conditions
 - Requirements in NFPA 70E to reduce exposure to electrical hazards
 - Safety regulations and policies
 - Developing site-specific procedures to mitigate hazards
 - Methods for safely manipulating control signal for FLS components
 - c. The FSD Supervisor oversees the work of the FSD Technician (9% of exam).
 - Is knowledgeable of:
 - Details of the MOP
 - Proposed scope of work
 - Requirements for testing and inspection in specific sections of the following standards:
 - NFPA 1 – sections 12.4, 12.4.1, 12.9.5.4
 - NFPA 80 – chapter 19
 - NFPA 92 – chapters 7 and 8 (8.4.6.1.1, 8.4.6.1.2, 8.4.6.2.1)
 - NFPA 105 – chapter 7
 - Scope of job for the FSD Technician, as identified in the ICB Certification Manual
 - Responsibilities of the FSD Technician, as identified in the ICB Code of Conduct
6. Documentation
- a. The FSD Supervisor prepares the report and FLS blueprints for AHJ approval (12% of exam).
 - Is knowledgeable of:
 - Details of the MOP
 - Proposed scope of work
 - Commonly used symbols and abbreviations for FLS blueprints
 - Documentation and recordkeeping requirements of applicable codes and standards
 - The meaning of "Qualifying Employment", as defined in the ICB Certification Manual
 - Responsibilities of ICB-certified personnel, as identified in the ICB Code of Conduct
 - Methods to locate and research online documents

Fire and Smoke Damper Contractor (FSD-C)

ICB Fire and Smoke Damper certification is offered to contractors who meet the following requirements. To be certified the contractor must:

1. Be signatory to a collective bargaining agreement that provides for contributions directly to NEMIC and be current with all financial obligations under that collective bargaining agreement.
2. Employ ICB-certified FSD technicians and ICB-certified FSD supervisors to the extent required for the certification and employ enough ICB-certified FSD technicians and ICB-certified FSD supervisors to perform any and all work in the area related to fire and smoke dampers.
3. Complete at least three FSD projects.
4. Provide three references who can attest to the contractor's competence and integrity in FSD work.
5. Pay the application fee as specified by the ICB, and
6. Complete the certification process as outlined in Section 3 of this manual.

[This page intentionally left blank]

Fume Hood Performance Testing Technician (FHPT-T)

Scope

The Fume Hood Performance Testing Technician shall be knowledgeable about quantitative and qualitative test methods for evaluating the fume containment of chemical fume hoods as well as their limitations.

- This method of testing applies to conventional, bypass, auxiliary air, and VAV chemical fume hoods.
- This method of testing is intended primarily for manufacturer's testing but may be used as an aid in evaluating as-installed or as-used performance.

Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the Fume Hood Performance Testing Technician must meet the following criterion:

- Hold an ICB-certified TABB Technician certification.

Standards of Proficiency in Fume Hood Performance Testing

The Fume Hood Performance Testing Technician must be proficient in all of the categories of this Section, as demonstrated by passing the written exam.

Note: The guiding document for this knowledge base is the ANSI/ASHRAE Standard 110-1995 Method of Testing Performance of Laboratory Fume Hoods including the Foreword of the Standard and the appendices as well as ANSI/ASHRAE Standard 111-2008 Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.

1. Definitions

The Fume Hood Performance Testing Technician shall be knowledgeable about the following definitions and how they pertain to fume hood performance testing:

- Air supply fixtures: Grille; Register; Diffuser; Perforated Ceiling
- Auxiliary air
- Conditioned environment
- Control level
- Cross-drafts
- Face velocity
- Fume hood system
- Hood face
- Internal obstructions
- Lpm
- Laboratory fume hood
- Performance rating
- Positional sash movement effect
- Positional control level
- ppm
- Rate of response
- Release Rate
- Sash movement effect
- Sash movement performance rating
- Sash position

- Specified rating
- Thermal challenge
- Titanium tetrachloride
- Work procedures

2. Instrumentation and Equipment

The Fume Hood Performance Testing Technician shall be knowledgeable about all instruments and equipment necessary and required to conduct an “as-installed” or “as-used” fume hood performance test according to ANSI/ASHRAE Standard 110-1995.

a. Tracer Gas

The Fume Hood Performance Testing Technician shall be knowledgeable about the proper selection of the tracer gas for the performance test as well as any local, state or federal regulation pertaining to its use.

b. Ejector System

The Fume Hood Performance Testing Technician shall be knowledgeable about the proper ejector system, its set-up and operation.

c. Critical Orifice

The Fume Hood Performance Testing Technician shall be knowledgeable about the selection, calibration, installation, and operation of the proper critical orifice to accurately determine the flow rate of the tracer gas.

d. Detector Instruments

The Fume Hood Performance Testing Technician shall be knowledgeable about the selection, calibration, installation, and operation of the proper detector instruments to accurately measure and record the concentration of the tracer gas.

e. Recorder

The Fume Hood Performance Testing Technician shall be knowledgeable about the required accuracy of the recording equipment.

f. Manikin

The Fume Hood Performance Testing Technician shall be knowledgeable about the proper selection, installation and operation of the three-dimensional manikin to accurately measure and record the concentration of the tracer gas.

g. Face Velocity Measuring Instruments

The Fume Hood Performance Testing Technician shall be knowledgeable about the proper selection, calibration and application of anemometers for the purpose of measuring the face velocity. He or she shall be aware of Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air - Conditioning, and Refrigeration Systems according to ANSI/ASHRAE Standard 111-1988 Section 7 Air System Measurements.

h. Smoke

- Local Generation – The Fume Hood Performance Testing Technician shall be knowledgeable about the proper selection and application of smoke generating substances for the purpose of the local generation testing procedure in accordance with ANSI/ASHRAE Standard 110-1995.
- Volume Generation – The Fume Hood Performance Testing Technician shall be knowledgeable about the proper selection and application of smoke generating substances for the purpose of the large volume generation testing procedure in accordance with ANSI/ASHRAE Standard 110-1995.

3. Test Conditions

a. Room Ventilation

The Fume Hood Performance Testing Technician shall be knowledgeable about the required room conditions before and during the testing procedure in accordance with ANSI/ASHRAE Standard 110-1995.

b. Hood Condition

- Sash Position – The Fume Hood Performance Testing Technician shall be knowledgeable about the required sash position(s) during the testing procedure in accordance with ANSI/ASHRAE Standard 110-1995.
 - Auxiliary Air Hoods – The Fume Hood Performance Testing Technician shall be knowledgeable about the operation of auxiliary fume hoods during the testing procedure in accordance with ANSI/ASHRAE Standard 110-1995.
 - c. Other Activity

The Fume Hood Performance Testing Technician shall be knowledgeable about any other activity within the testing space during the testing procedure in accordance with ANSI/ASHRAE Standard 110-1995.
 - d. Background Level

The Fume Hood Performance Testing Technician shall be knowledgeable in determining the background level of any contaminants and any actions resulting from the presence of said contaminants.
 - e. Preliminary Data

The Fume Hood Performance Testing Technician shall be knowledgeable regarding the type of information and data that shall be recorded prior to testing of the fume hoods.
4. Flow Visualization and Velocity Procedure
- a. Flow Visualization

The Fume Hood Performance Testing Technician shall be knowledgeable regarding the purpose of the flow visualization procedure and the means and the processes by which it is carried out.

 - Local Visualization Challenge – The Fume Hood Performance Testing Technician shall be knowledgeable how to conduct the local visualization challenge and the associated pass/fail criterion.
 - Large-Volume Visualization Challenge – The Fume Hood Performance Testing Technician shall be knowledgeable how to conduct the large-volume visualization challenge and the associated pass/fail criterion.
 - b. Face Velocity Measurements

The Fume Hood Performance Testing Technician shall be knowledgeable how to conduct face velocity measurements and how to properly record and interpret the measurement results.
 - c. Test Method for Variable-Air-Volume (VAV) Fume Hoods

The Fume Hood Performance Testing Technician shall be knowledgeable how to conduct face velocity measurements for VAV fume hoods and how to properly record and interpret the measurement results.
 - d. VAV Response Test

The Fume Hood Performance Testing Technician shall be knowledgeable how to conduct the response test for VAV fume hoods, including selection of the proper instruments, and how to properly record and interpret the measurement results.
5. Tracer Gas Test Procedure
- a. Determining the Performance Rating

The Fume Hood Performance Testing Technician shall be knowledgeable how to prepare for, set-up and conduct the tracer gas test for fume hoods in accordance with ANSI/ASHRAE Standard 110-1995. The Technician shall be capable to determine the performance rating according to ANSI/ASHRAE Standard 110-1995.
 - b. Sash Movement Effect

The Fume Hood Performance Testing Technician shall be knowledgeable how to prepare for, set-up and conduct the procedure to determine the sash movement effect of fume hoods in accordance with ANSI/ASHRAE Standard 110-1995. The Technician shall be capable to determine the sash movement performance rating according to ANSI/ASHRAE Standard 110-1995.

[This page intentionally left blank]

Indoor Air Quality Technician (IAQ-T)

Scope

The IAQ Technician inspects the HVAC system and the building, takes measurements using specialized equipment, understands the function of HVAC systems and controls to the extent needed to take measurements, writes a report based on the results of inspection, and is knowledgeable of air contaminants associated with construction activities.

Certification Exam

The certification exam consists of 75 total items – 70 are scored; 5 are unscored (beta) to evaluate for possible inclusion on future exam versions. 53 of 70 (75%) is required for passing. Exam items assess candidate competence related to the tasks, knowledge, and skills identified in the Job Task Analysis.

Job Task Analysis

The Job Task Analysis identifies the tasks and related knowledge base required to perform a job. The job of the IAQ Technician is divided into 5 domains (broad areas of practice). The percentage of the certification exam dedicated to each domain is identified below.

1. HVAC Systems. (24% of exam)

The IAQ-T inspects the HVAC system and the building and demonstrates proficiency in the function of HVAC systems and controls to the extent needed to take measurements.

The IAQ-T performs the following tasks:

- Reviews building standards.
- Reviews specifications to identify inspection requirements.
- Verifies operation of HVAC system ventilation, filtration, and related components.
- Reviews and verifies HVAC design specification.
- Assesses safety concerns and addresses potential safety issues.
- Follows infection control protocols where applicable.
- Observes building enclosure conditions and total building airflow calculation, where applicable.
- Reviews operation and function of the HVAC system.
- Collects design data and operations and maintenance manuals, including general information, e.g., nameplate data.
- Reviews customer comments and concerns and creates a list of known complaint areas.
- Reviews proposed scope of work with the IAQ Supervisor.
- Verifies correct unit operation, including all internal components.
- Reviews schedules and sequences of operation for conditions contributing to IAQ issues.

The IAQ-T is knowledgeable of:

- How IAQ works in the HVAC system.
- Types and functions of HVAC systems and components, including how they interact:
 - Air Handler:
 - Heating coils
 - Velocity measurement
 - Dampers:
 - ✓ Outside
 - ✓ Return
 - Ventilation components:
 - ✓ Demand Controlled Ventilation (DCV)

- ✓ Economizer
 - Condensate pans:
 - ✓ Drain pitch
 - ✓ Determining P-trap height
 - Chilled water coils:
 - ✓ Temperature differential
 - Filters
 - Minimum OSA measurement
 - DX coils:
 - ✓ Temperature differential
 - ✓ Static pressure profiling
- Package Units:
 - DX coils:
 - ✓ Temperature differential
 - Condensate pans:
 - ✓ Drain pitch
 - ✓ Determining P-trap height
 - Filters
 - Dampers:
 - ✓ Outside
 - ✓ Return
 - Ventilation components:
 - ✓ Demand Controlled Ventilation (DCV)
 - ✓ Economizer
 - Velocity measurement
 - Minimum OSA measurement
 - Chilled water coils:
 - ✓ Temperature differential
 - Static pressure profiling
- Hydronics:
 - Chiller
 - Boiler
 - Pumps
 - Heat exchanger
 - Cooling tower
 - Control valves
 - Humidifiers
- Ductwork:
 - Leakage
 - Cleaning
- Psychrometrics:
 - Absolute humidity
 - Dew point
 - Psychrometric chart
 - Winter and summer operating conditions
- Ultraviolet Germicidal Irradiation (UVGI)
 - Maintenance requirements
 - Measurements and documentation required for an engineer to determine if UVGI can be installed within an existing system

- Cooling coil applications
 - Upper room UV applications
- HVAC maintenance requirements
- Basics of ventilation in non-traditional HVAC systems:
 - Heat Recovery Systems:
 - ✓ Heat pipes
 - ✓ Hydronic loops
 - ✓ Heat wheels
 - Chilled Beam Systems:
 - ✓ Source of ventilation
 - ✓ Humidity control
 - Variable Refrigerant Flow (VRF) systems
 - Radiant heating and cooling systems
 - Dedicated Outdoor Air Systems (DOAS)
- Variable flow systems for air, water, and refrigeration (heat pumps), including respective components such as DP sensors and VFDs
- Types of controls and sequence of operation:
 - CO2 monitors
 - Thermostat
 - Humidistat
 - Building Automated Systems (BAS):
 - Direct Digital Control (DDC)
 - Pneumatic
 - Energy management and metering
 - Operational controls - building flush
 - Building pressurization
 - Variable flow and constant volume systems with terminal units
 - Fault detection and diagnostics
 - Continuous commissioning control systems software
 - Pre-occupancy purge
 - Air changes
 - Minimum airflow control systems
- Building Automation Systems (BAS) trends, sensor calibration and performance.
- Construction documents:
 - Project plans and specifications
 - Operations and maintenance manuals
 - Sequence of operations
 - TAB report
 - As-built drawings
- Methods for identifying equipment type, model #, serial #, and nameplate data.

The IAQ-T is skilled in:

- Measuring and summarizing total building airflow:
 - Supply
 - Return
 - Exhaust
 - Outside air
- Reading plans and specifications.
- Calculating building flush.

- Verifying system operation time matches occupancy and flush.
- Determining if filtration efficiency can be increased, including steps for increasing.
- Determining if outside air can be increased, including steps for increasing.
- Interpreting air pressure, CFM, and velocity readings.
- Communicating effectively.

2. Instrumentation. (19% of exam)

The IAQ-T demonstrates proficiency in taking measurements using specialized equipment and instruments.

The IAQ-T performs the following task:

- Measures temperature, humidity, pressure (including room pressure), air volume, air velocity, CO₂, and electrical characteristics.

The IAQ-T is knowledgeable of:

- How to properly use equipment and instruments:
 - Voltage Meters:
 - Averaging
 - True RMS
 - Multi-meters
 - Electrical safety while using voltage meters:
 - ✓ NFPA 70E-2018 Standard for Electrical Safety in the Workplace:
 - ☐ Chapter 1 - Articles 105, 110, 120, 130.1, 130.2(A)
 - ☐ Informative Annexes I and K
 - Thermometers:
 - Infrared
 - Contact
 - Digital
 - Borescope:
 - Rigid
 - Flexible
 - CO₂ Meter:
 - Range
 - Accuracy
 - Resolution
 - Response time
 - Camera
 - Calibration Issues:
 - Sensor range
 - Accuracy
 - Drift
 - Calibration
 - Instruments for measuring air pressure
 - Instruments for measuring air flow
- Risks of using installed instrumentation, e.g., DDC sensors, air flow monitoring stations, VFDs, DP sensors (air & water), pressure gauges.

The IAQ-T is skilled in:

- Selecting and using the proper tools for the defined scope of work.

3. Testing and Visual Inspection. (27% of exam)

The IAQ-T performs operational testing and visual inspection of HVAC systems.

The IAQ-T performs the following tasks:

- Sets the HVAC system in the proper mode for measurements being taken, secures the HVAC system, and restores to operating mode.
- Identifies and documents areas with pressure relationships.
- Confirms installed equipment matches as-built information, including new and replaced equipment.
- Compares design and as-built data to current operating conditions, noting differences.
- Performs a walk-through of the jobsite - inside and outside.

The IAQ-T is knowledgeable of:

- OSHA Focus Four Hazards:
 - Falls
 - Struck-by
 - Electrocution
 - Caught-In or Between
- OSHA regulations related to site specific conditions.
- Communication chain of command:
 - Supervisor
- Methods for interpreting plans and specifications.
- Codes and standards:
 - Fundamental standards related to IAQ
 - The difference between a standard and a code
 - How a standard becomes adopted as a local code
- Testing guidelines:
 - Scope and purpose of the following references:
 - ASHRAE 62.1-2019 Ventilation for Acceptable Indoor Air Quality
 - ASHRAE 62.2-2019 Ventilation for Acceptable Indoor Air Quality in Residential Buildings
 - ASHRAE 55-2017 Thermal Environmental Conditions for Human Occupancy
 - ASHRAE 170-2017 Ventilation of Health Care Facilities
- Basic TAB math formulas.

The IAQ-T is skilled in:

- Performing operational testing of the HVAC system, including measuring temperature, humidity, pressure (including room pressure), air volume, air velocity, CO₂, and electrical characteristics.
- Calculating minimum OSA% and air changes per hour.
- Sketching as-built conditions.
- Communicating with controls contractor to set system up for testing.
- Verifying that controls and sequence of operation are operating as designed.
- Conducting full load, partial load, and minimum load tests of variable flow systems.
- Reading trends from BAS systems.
- Verifying sensor calibration and operation (is it what it says it is?).

4. Air Contaminants in Construction. (12% of exam)

The IAQ-T is knowledgeable of air contaminants associated with construction activities.

The IAQ-T is knowledgeable of:

- Sources of airborne contaminants.
- How airborne contaminants move through buildings.
- Potential impact of IAQ on the well-being of building occupants:
 - Productivity
 - Volatile Organic Compounds (VOCs)
 - Filtration:
 - ASHRAE 52.2-2017 Testing General Ventilation Air-Cleaning Devices:
 - ✓ Minimum Efficiency Rating Value (MERV) rating
 - ✓ Minimum Filter Efficiency
 - Sick Building Syndrome (SBS) vs. Building Related Illnesses (BRI)
 - Infectious disease engineering controls as they relate to HVAC

5. Documentation. (18% of exam)

The IAQ-T writes a report based on results of inspection.

The IAQ-T performs the following tasks:

- Documents testing and maintenance of the HVAC system.
- Prepares a report of the required maintenance, calibration and testing, adjusting and balancing deficiencies, including building usage changes discovered.
- Reviews the findings of the documentation with IAQ Supervisor.

The IAQ-T is knowledgeable of:

- How an IAQ report should be organized:
 - Executive Summaries
 - What information should NOT be in the report
 - Typical report sections
 - What clarifications should be in a complete report
 - Requirements in the TAB Procedural Guide and contract documents

The IAQ-T is skilled in:

- Reporting results of testing.
- Communicating in written and verbal forms.
- Documenting report findings as required in the TAB Procedural Guide and contract documents.

Indoor Air Quality Supervisor (IAQ-S)

Scope

The IAQ Supervisor oversees and coordinates the work of the IAQ Technician, reviews and submits the IAQ final report, develops a method of procedure for testing, ensures that all testing and measuring are performed according to industry standards, and remains current with codes and ordinances in the jurisdiction where they are working.

Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the Indoor Air Quality Supervisor must meet one of the following criteria:

- Hold a college/university degree in engineering with at least one year of experience in HVAC installation or design work,
- Hold a two-year associates degree in HVAC with at least three years of experience in HVAC installation or design work,
- Hold an ICB-certified IAQ Technician certification, or
- Have at least three years' experience in HVAC installation or design work and is recommended in writing for the exam by the applicant's employer. The applicant's employer must be an ICB-certified Contractor or be eligible to be an ICB-certified Contractor except only for the requirements to employ an ICB-certified Technician and an ICB-certified Supervisor.

Certification Exam

The certification exam consists of 75 total items – 70 are scored; 5 are unscored (beta) to evaluate for possible inclusion on future exam versions. 53 of 70 (75%) is required for passing. Exam items assess candidate competence related to the tasks, knowledge, and skills identified in the Job Task Analysis.

Job Task Analysis

The Job Task Analysis identifies the tasks and related knowledge base required to perform a job. The job of the IAQ Supervisor is divided into 5 domains (broad areas of practice). The percentage of the certification exam dedicated to each domain is identified below.

1. HVAC Systems. (25% of exam)

The IAQ-S demonstrates proficiency in the function of HVAC systems and controls.

The IAQ-S performs the following tasks:

- Assists IAQ-T in recognizing and understanding the buildings HVAC systems and controls.
- Understands the sequence of operation and relates it to the work of the IAQ-T.
- Reviews the ventilation requirements for each project.
- Compares current operation, occupancy and use to design and as-built operation, occupancy and use.

The IAQ-S is knowledgeable of:

- How IAQ works in the HVAC system.
- Types and functions of HVAC systems and components, including how they interact:
 - Air Handler:
 - Heating coils
 - Velocity measurement
 - Dampers:
 - ✓ Outside

- ✓ Return
 - Ventilation components:
 - ✓ Demand Controlled Ventilation (DCV)
 - ✓ Economizer
 - Condensate pans:
 - ✓ Drain pitch
 - ✓ Determining P-trap height
 - Chilled water coils:
 - ✓ Temperature differential
 - Filters
 - Minimum OSA measurement
 - DX coils:
 - ✓ Temperature differential
 - ✓ Static pressure profiling
- Package Units:
 - DX coils:
 - ✓ Temperature differential
 - Condensate pans:
 - ✓ Drain pitch
 - ✓ Determining P-trap height
 - Filters
 - Dampers:
 - ✓ Outside
 - ✓ Return
 - Ventilation components:
 - ✓ Demand Controlled Ventilation (DCV)
 - ✓ Economizer
 - Velocity measurement
 - Minimum OSA measurement
 - Chilled water coils:
 - ✓ Temperature differential
 - Static pressure profiling
- Hydronics:
 - Chiller
 - Boiler
 - Pumps
 - Heat exchanger
 - Cooling tower
 - Control valves
 - Humidifiers
- Ductwork:
 - Leakage
 - Cleaning
- Psychrometrics:
 - Absolute humidity
 - Dew point
 - Psychrometric chart
 - Winter and summer operating conditions
- Ultraviolet Germicidal Irradiation (UVGI)

- Maintenance requirements
 - Measurements and documentation required for an engineer to determine if UVGI can be installed within an existing system
 - Cooling coil applications
 - Upper room UV applications
- HVAC maintenance requirements
- Basics of ventilation in non-traditional HVAC systems:
 - Heat Recovery Systems:
 - ✓ Heat pipes
 - ✓ Hydronic loops
 - ✓ Heat wheels
 - Chilled Beam Systems:
 - ✓ Source of ventilation
 - ✓ Humidity control
 - Variable Refrigerant Flow (VRF) systems
 - Radiant heating and cooling systems
 - Dedicated Outdoor Air Systems (DOAS)
- Variable flow systems for air, water, and refrigeration (heat pumps), including respective components such as DP sensors and VFDs
- Types of controls and sequence of operation:
 - CO2 monitors
 - Thermostat
 - Humidistat
 - Building Automated Systems (BAS):
 - Direct Digital Control (DDC)
 - Pneumatic
 - Energy management and metering
 - Operational controls - building flush
 - Building pressurization
 - Variable flow and constant volume systems with terminal units
 - Fault detection and diagnostics
 - Continuous commissioning control systems software
 - Pre-occupancy purge
 - Air changes
 - Minimum airflow control systems
- Building Automation Systems (BAS) trends, sensor calibration and performance.
- Construction documents:
 - Project plans and specifications
 - Operations and maintenance manuals
 - Sequence of operations
 - TAB report
 - As-built drawings
- Methods for identifying equipment type, model #, serial #, and nameplate data.

The IAQ-S is skilled in:

- Explaining the advantages and disadvantages of different designs for HVAC equipment and control schemes.
- Developing an air balance schedule - summarizing supply, return, exhaust, and outside air.
- Calculating building flush and verifying system operation time matches occupancy and flush.

- Determining steps for increasing filtration efficiency, when applicable.
- Determining steps for increasing outside air, when applicable.
- Reviewing IAQ-T verification of controls and sequence of operations.
- Communicating to the IAQ-T how to determine the airflow of the system and troubleshoot areas that are deficient.
- Interpreting field data collected and comparing it to design/submittal data provided.
- Reviewing sequence of operations.
- Reviewing plans and specifications.
- Assessing BAS trends for faults, divergence from design/as-builts, and overrides.

2. Instrumentation. (15% of exam)

The IAQ-S demonstrates proficiency in the proper use of specialized equipment and instruments.

The IAQ-T performs the following tasks:

- Works with the IAQ-T to ensure that equipment and instruments remain functional and calibrated.
- Ensures equipment and instruments are used in accordance with manufacturer, industry, and site-specific guidelines.
- Ensures the IAQ-T is properly trained on equipment and instruments as needed.
- Coordinates availability of equipment and instruments when not in IAQ-T inventory.
- Coordinates materials needed for tool use, cleaning, and maintenance.

The IAQ-S is knowledgeable of:

- How to properly use equipment and instruments:
 - Voltage Meters:
 - Averaging
 - True RMS
 - Multi-meters
 - Electrical safety while using voltage meters:
 - ✓ NFPA 70E-2018 Standard for Electrical Safety in the Workplace:
 - Chapter 1 - Articles 105, 110, 120, 130.1, 130.2(A)
 - Informative Annexes I and K
 - Thermometers:
 - Infrared
 - Contact
 - Digital
 - Borescope:
 - Rigid
 - Flexible
 - CO2 Meter:
 - Range
 - Accuracy
 - Resolution
 - Response time
 - Camera
 - Calibration Issues:
 - Sensor range
 - Accuracy
 - Drift

- Calibration
 - Instruments for measuring air pressure
 - Instruments for measuring air flow
- Risks of using installed instrumentation, e.g., DDC sensors, air flow monitoring stations, VFDs, DP sensors (air & water), pressure gauges.

The IAQ-S is skilled in:

- Selecting and using the proper tools for the defined scope of work.
- Tracking and scheduling tool inventory.
- Assessing condition of equipment and instruments.

3. Supervising the IAQ Technician. (19% of exam)

The IAQ-S oversees and coordinates the work of the IAQ Technician.

The IAQ-S performs the following tasks:

- Safety:
 - Assesses safety concerns and addresses potential safety issues according to OSHA standards.
 - Promotes the proper use of PPE.
- Observes infection control protocols.
- Schedules the work to be completed by the IAQ-T.
- Verifies accuracy of measurements and observations of the IAQ-T.
- Prepares survey report templates for the IAQ-T.
- Schedules a walk-through inspection of the building.
- Provides contact information to IAQ-T for individuals or roles per MOP.
- Coordinates availability of specialized tools and PPE.
- Reviews project documents with the IAQ-T.
- Reviews scope of work with the IAQ-T and ensures the IAQ-T understands the MOP.
- Identifies with customer comments and concerns for the project.
- Reviews infection control protocols with the IAQ-T, where applicable.
- Reviews how adjustments to the system could affect equipment performance.
- Reviews how adjustments to the system could affect building pressurization.

The IAQ-S is knowledgeable of:

- OSHA Focus Four Hazards:
 - Falls
 - Struck-by
 - Electrocution
 - Caught-In or Between
- OSHA regulations related to site specific conditions.
- How to estimate time required for IAQ field testing.
- How to stay current on effective infection control procedures.
- Factors that impact estimating and scheduling crew size.

The IAQ-S is skilled in:

- Directing and delegating field work.
- Communicating effectively.

4. Method of Procedure. (23% of exam)

The IAQ-S develops a method of procedure and remains current with codes and ordinances in the jurisdiction where they are working.

The IAQ-S performs the following tasks:

- Identifies responsibilities of the IAQ contractor, supervisor, and technician.
- Identifies required testing procedures and scope of IAQ testing.
- Reviews operation and function of the HVAC system.
- Collaborates with the design professional to achieve specified requirements.
- Identifies the hierarchy for the chain of communication to the proper AHJ.
- Ensures testing and measuring are performed in accordance with industry standards.
- Identifies safety protocols for working in site-specific environments, e.g., hospitals, labs, containments. (IAQ-S is aware beforehand of issues).
- Identifies protocols for recognizing and reporting contaminants when encountered during the course of IAQ-T testing and inspection. (IAQ-S is not aware beforehand of issues, but these are encountered during work in progress).

The IAQ-S is knowledgeable of:

- Communication chain of command:
 - Industrial Hygienist, client, engineers, etc.
- Methods for interpreting plans and specifications.
- Codes and standards:
 - Fundamental standards related to IAQ
 - The difference between a standard and a code
 - How a standard becomes adopted as a local code
- Testing guidelines:
 - Scope and purpose of the following references:
 - ASHRAE 62.1-2019 Ventilation for Acceptable Indoor Air Quality
 - ASHRAE 62.2-2019 Ventilation for Acceptable Indoor Air Quality in Residential Buildings
 - ASHRAE 55-2017 Thermal Environmental Conditions for Human Occupancy
 - ASHRAE 170-2017 Ventilation of Health Care Facilities
- Basic TAB math formulas.
- Protocols for documentation:
 - Observation:
 - Occupant (workers, janitors, staff) complaints (interviewing, work orders)
 - Walk through:
 - Inside
 - Outside
- Infectious disease engineering controls as they relate to HVAC and pertain to writing the MOP.

The IAQ-S is skilled in:

- Identifying which code governs a specific activity.
- Communicating and interviewing.
- Writing procedures based on verbal or written discussion.
- Applying standards to field work.
- Documenting scope of work to reduce liabilities.

5. IAQ Final Report. (18% of exam)

The IAQ-S reviews and submits the IAQ final report.

The IAQ-S performs the following tasks:

- Interprets measurements and observations with the IAQ-T.
- Reviews the IAQ-T report prior to submission.
- Submits the IAQ final report.
- Confirms proper operation of HVAC system ventilation, filtration, and related components.
- Assigns projects to IAQ-T based on assessment of skills and capabilities.
- Relates communication chain of command to the IAQ-T.
- Ensures report meets requirements of the TAB Procedural Guide and contract requirements.
- Meets with the customer representative to explain the report details, when necessary.

The IAQ-S is knowledgeable of:

- Sources of airborne contaminants.
- How airborne contaminants move through buildings.
- Potential impact of IAQ on the well-being of building occupants:
 - Productivity
 - Volatile Organic Compounds (VOCs)
 - Filtration:
 - ASHRAE 52.2-2017 Testing General Ventilation Air-Cleaning Devices:
 - ✓ Minimum Efficiency Rating Value (MERV) rating
 - ✓ Minimum Filter Efficiency
 - Sick Building Syndrome (SBS) vs. Building Related Illnesses (BRI)
 - Infectious disease engineering controls as they relate to HVAC
- How an IAQ report should be organized:
 - Executive Summaries
 - What information should NOT be in the report
 - Typical report sections
 - What clarifications should be in a complete report
 - Requirements in the TAB Procedural Guide and contract documents
- Consequences of improperly functioning HVAC systems and components within the building systems that impact the IAQ of a building and the occupants.

The IAQ-S is skilled in:

- Reviewing report templates to ensure they meet project requirements and standards.
- Determining if the report provides the required information for the client/design professional.
- Reviewing the report data and determining if the readings are appropriate.

[This page intentionally left blank]

Infection Control Awareness (ICA)

The following documents shall serve as references:

- [1] Bartley, Judene Mueller (2000). *APIC State-of-the-Art Report: The role of infection control during construction in health care facilities*. Washington D.C.: The Association for Professionals in Infection Control and Epidemiology, Inc. Available from http://apic.org/Resource_/TinyMceFileManager/Education/EPI-201-resources/EPI201_2012_resource_Construction_and_Renovation.pdf
- [2] Centers for Disease Control and Prevention (2003). Guidelines for environmental infection control in health-care facilities: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). Available from http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf
- [3] Clair JD, Colatrella S (2013). Opening Pandora's (tool) Box: health care construction and associated risk for nosocomial infection. *Infect Disord Drug Targets*. 2013 Jun;13(3):177-83.
- [4] Facilities Guidelines Institute (2014). Guidelines for Design and Construction of Hospitals and Outpatient Facilities. Dallas, TX: Facilities Guidelines Institute. Available from <https://www.fgiguide.org/guidelines/2014-hospital-outpatient/>
- [5] Fairfield Medical Center (2008). Hospital Construction, Renovation, And Demolition. Infection Control Manual. Available from <http://www.decisionhealth.com/content/articles/facilities/infectioncontrolguidelinesforhospitalconstructionrenovationanddemolition.pdf>
- [6] Garvey DJ, Sobczak SC, Streifel AJ (2011). Medical Facility Renovation: Safety & Health Considerations for Construction Safety Professionals. *Professional Safety* 56 (6): 20-24. Available from <http://www.safetybok.org/FileDownload.aspx?D=4qgGkvKaOq%2bZ0uzjg3cu3rs1C3jTg2GHwGxgB7WnpTE%3d>
- [7] Hershey Medical Center (2011). Construction, Renovation, And Maintenance Infection Control Program. Infection Control Manual. Available from http://www.opp.psu.edu/planning-construction/design_and_construction_standards/documents/HMC%20Infection%20Control%20Policy
- [8] Infection Control Risk Assessment Matrix of Precautions for Construction & Renovation. Available from http://www.abatement.com/pdf/icra_matrix.pdf
- [9] Joint Commission Resources (2013). Interim Life Safety Measures Revisited: 6 Steps for an Effective Program. Available from <http://www.jcrinc.com/interim-life-safety-measures-revisited-6-steps-for-an-effective-program/>
- [10] Memarzadeh, Farhad (2011). The Environment of Care and Health Care-Associated Infections: An Engineering Perspective [Internet]. Chicago: The American Society for Healthcare Engineering of the American Hospital Association. Available from http://www.ashe.org/management_monographs/mg2011memarzadeh.shtml
- [11] National Institute for Occupational Safety and Health (1985). Chapter 5. Medical Program. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. Available from <https://www.osha.gov/Publications/complinks/OSHG-HazWaste/all-in-one.pdf>
- [12] San Francisco Department of Public Health (2005). Infection Control Precautions. Available from <http://www.sfcdcp.org/document.html?id=68>
- [13] Virginia Department of Health (2011). Chain of Infection [Internet]. Available from <https://www.vdh.virginia.gov/epidemiology/surveillance/hai/documents/pdf/Chain%20of%20Infection%20Fact%20Sheet.pdf>

Certification Exam

The certification exam consists of 60 questions – 50 are scored, with 10 unscored (beta) to evaluate for possible inclusion on future exam versions. 40 of 50 (80%) is required for passing.

Standards of Proficiency for Infection Control Awareness (ICA)

The Infection Control Awareness worker must be proficient in all of the categories of this section, as demonstrated by passing the written exam.

1. The Need for Infection Control [4] [10]
 - a. Understanding how infections are spread in a Hospital.
 - Patient to Patient
 - Visitor to Patient
 - Staff to Patient
 - Vendor to patient
 - Unsterile conditions
 - Airborne Pathogen
 - b. Who is at risk of infection?
 - Hospital Patients
 - Visitors
 - Staff
 - Vendors
 - c. Who is at highest risk of infection?
 - Transplant patients
 - Chemotherapy patients
 - Infants and Elderly
 - Other immuno-compromised patients
 - d. Why is the risk greater?
 - Immune systems of sick patients more susceptible
 - Hospital are treating formerly incurable conditions
 - e. How are infections acquired/ transmitted?
 - Contact
 - i. Direct
 - ii. Indirect
 - iii. Droplet
 - Non-contact
 - i. Airborne
 - ii. Vehicle
 - iii. Vector-borne
 - f. Understanding the benefits of a good Infection Control program
 - Better patient outcome
 - Lower recidivism
 - Reduction of infections
 - Economic benefits
 - g. Understanding who participates in Infection Control
 - Hospital Patients
 - Visitors
 - Staff

- Vendors
2. Application of Infection Control [1-3] [5] [12]
- a. Education
 - b. Patients
 - Limitations on where they can go in the hospital
 - Medical condition specific precautions
 - c. Visitors
 - PPE
 - i. Standard Precautions
 - ii. Contact Precautions
 - iii. Droplet Precautions
 - iv. Airborne Precautions
 - Signage
 - Hand Hygiene
 - Visitor Limitations
 - Patient Interaction
 - d. Staff
 - Patient Transport
 - Hand Hygiene
 - PPE
 - i. Standard Precautions
 - ii. Contact Precautions
 - iii. Droplet Precautions
 - iv. Airborne Precautions
 - Patient Interaction
 - Standard Precautions
 - Barrier Protocol
 - Continuing Education
 - e. Vendors
 - PPE
 - Precautions for patient areas
 - Standard Precautions
 - Contact Precautions
 - Droplet Precautions
 - Airborne Precautions
 - PPE for construction areas
 - Contaminate Control
 - Walk-off Mats
 - Construction specific PPE
 - Hand Hygiene
 - Barrier Protocol
 - Signage
 - Continuing Education
 - Interaction with others in the HCE
 - f. Policy and Procedure review and revisions
 - Required procedures are specific to the HCF
 - Policies and Procedures are 'living documents'

- g. Hospital's Responsible Party (Infection Control Officer)
 - Final decision maker related to infection control
 - Resource for education/ training
 - Establishes policy and protocol
 - h. Infection Control Risk Assessment
 - Pre-construction assessment
 - Construction oversight
 - Post-construction clean-up
 - i. Medical surveillance
 - Collecting and reviewing data associated with HAIs
 - Monitoring trends within the HCF
 - Establishing best-practices for prevention of HAIs
 - j. Outbreak investigation
 - Identifying infectious agent
 - Determining transmission path
 - Eliminating transmission paths
3. The Chain of Infection [1-2] [10] [13]
- a. Six links of the infection chain
 - Infectious Agent
 - Reservoir
 - Portal of Exit
 - Mode of Transmission
 - Portal of Entry
 - Susceptible Host
 - b. Breakable links
 - Portal of Exit
 - Mode of Transmission
 - Portal of Entry
 - c. Unbreakable links
 - Infectious Agent
 - Reservoir
 - Susceptible Host
 - d. The role of construction in the infection chain
 - Minimizing Reservoirs
 - Controlling portals of exit
 - Avoiding becoming a mode of transmission
 - e. Infectious Agents commonly related to construction activities
 - Fungus, e.g., Aspergillus, (mold)
 - Bacteria, e.g., Legionella
 - Viruses
4. Infectious Control Awareness [2][8]
- a. Understanding the Infectious Control Matrix
 - Type of Construction activities
 - Type A
 - Type B
 - Type C

- Type D
 - Related to patient Risk Groups
 - Low Risk
 - Medium Risk
 - High Risk
 - Highest Risk
 - b. Infection control classification based on combination of patient risk and construction
 - Class I
 - Class II
 - Class III
 - Class IV
 - c. Understanding the required precautions based on infection control level
 - Pre-construction
 - During Construction
 - Post-Construction
 - d. The principle of isolation and containment
 - Pressure Differential
 - Negative air machines
 - i. Identify
 - ii. Proper operation
5. Barriers [1-2] [8]
- a. Containment Barrier Types
 - Short-term (soft wall)
 - Long-term (hard wall)
 - Usage will be site and project specific
 - b. Working inside the barrier
 - Entry/Exit procedures
 - Dust control
 - Trash Control/Housekeeping
 - Build Clean Protocol
 - c. Barrier Maintenance
 - Barrier Inspection
 - Breach Repair
 - d. Ante Rooms
 - Purpose
 - Where required
 - Entry/Exit Procedures
 - Gowning/De-gowning Procedures
 - HEPA Vacuum
 - e. Understanding Barrier Pressurizations
 - Pressure Monitors/ Gauge
 - Soft Wall Visual Inspection
 - f. Portable Containment Units (Control Cube)
 - Site policy dictates usage
 - Can be used for dust control or containment
 - Used outside of the typical construction barrier
 - g. Erection and removal of barriers

- Stages of erection and removal
 - Determined by infection control classification and hospital policy
 - h. Means of pressurization
 - Negative air machines
 - 'In-house' HVAC systems
 - Modified systems
 - Additional filtration
 - Dedicated Systems
 - i. Barrier Breaches and risks involved
 - Unintended Breaches
 - Barrier Inspections
 - Planned Breaches
 - Permitting and communication
 - Scheduling and occupancy
 - Maintaining pressurization
 - Minimizing durations
 - Breach Repair
6. Healthcare Specific Project Conditions and Considerations [1][4][9]
- a. Health Insurance Portability and Accountability Act (HIPAA)
 - Protecting patient information
 - Protecting patient privacy
 - b. Chain of Command
 - Understanding who you are working for
 - Communicating through channels
 - Following hospital communication protocols
 - c. Permits
 - Above Ceiling Permits
 - Hot Work Permits
 - Breach Permit
 - Shutdown Permits
 - Confined Space Permits
 - d. Material Handling and Deliveries
 - Acceptable Hours
 - Minimizing interference with hospital operations
 - Routes
 - Delivery
 - Personnel
 - Staging of material
 - Loading Dock Schedules
 - e. Schedules and Hours
 - Non-traditional work hours
 - Aggressive project schedules
 - Shut-downs
 - f. Noise Policies
 - Scheduled loud work hours
 - Radios/Site noise
 - Alternative methods

- g. Productivity Expectations
 - Compliance with guidelines increases time requirements
 - Additional labor may be required to meet schedules
- h. Incident Reporting
 - All incidents, regardless of severity, need to be reported
 - Documentation should follow HCF protocols
- i. Site Health and Safety
 - Recognize how your personal health can impact others onsite
 - Recognize site requirements such as flu shots/ vaccinations before beginning work.
 - Recognize how you can avoid being a mode of transmission
- j. Interim Life Safety Measures (ILSM)
 - Exit Signs
 - Pathways to Egress
 - Fire Protection Systems
 - Smoke Detectors
 - Fire Suppression
 - Fire Extinguishers
 - Fire Alarm Systems
 - Smoke Barriers
 - Emergency Evacuation Plans

[This page intentionally left blank]

Mechanical Acceptance Test (MAT) Certifications

Mechanical Acceptance Test certifications are provided by the NEMIC Acceptance Testing Technician Certification Provider (ATTCP).

At this time, mechanical acceptance test certification is mandated by the State of California under California Code of Regulations Title 24, Part 1, Sections 10 -102 And 10-103.2, as well as Part 6, Section 120.5. For complete details about the NEMIC ATTCP certification process, please consult the NEMIC ATTCP Certification Manual available online at www.attcp.org.

[This page intentionally left blank]

Smoke Control Systems Technician (SCS-T)

Scope

The ICB-certified Smoke Control Systems Technician (SCS-T) performs the functional testing and general required maintenance of smoke control systems and is responsible for recognizing the proper installation, application, and usage of smoke control systems. The SCS Technician maintains an awareness of the testing requirements and procedures as specified in the 2018 Edition of NFPA 92.

Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the Smoke Control Systems Technician shall hold the following certifications:

- ICB-certified Fire and Smoke Damper Technician, and
- ICB-certified TABB Technician*.

**Prerequisite of ICB-certified TABB Technician will be effective on 10/01/2022. Visit ICBcertified.org for details.*

Certification Exam

The certification exam consists of 90 total items – 80 are scored; 10 are unscored (beta) to evaluate for possible inclusion on future exam versions. 56 of 80 (70%) is required for passing. Exam items assess candidate competence related to the tasks, knowledge, and skills identified in the Job Task Analysis.

Job Task Analysis

1. Design, Plans and Specifications for Smoke Control Systems (5% of exam)

The ICB-certified SCS Technician performs the following tasks:

- Locates smoke control components on plans.
- Reviews plans and specifications for the project.
- Requests copies of and reviews previous inspection reports.
- Reviews the MOP with the SCS Supervisor.

The ICB-certified SCS Technician is knowledgeable of:

- As-built drawings
- HVAC equipment submittals
- Previous inspection and testing reports
- Commonly used symbols and abbreviations for blueprints
- Purpose and format of the MOP

The ICB-certified SCS Technician is skilled in:

- Reading and interpreting previous inspection reports.
- Reading and interpreting blueprints for HVAC systems and life safety systems.

2. References for Smoke Control Systems (10% of exam)

The ICB-certified SCS Technician performs the following task:

- Identifies the references that are relevant to the project.

The ICB-certified SCS Technician is knowledgeable of:

- NFPA 92-2018, Chapters 1-3 and related Annex sections:
 - Scope and purpose as defined in Chapter 1
 - Scope and purpose of the referenced publications listed in Chapter 2
 - General definitions as listed in Chapter 3

The ICB-certified SCS Technician is skilled in:

- Researching applicable standards and codes for a specific project.

3. Design Fundamentals for Smoke Control Systems (15% of exam)

The ICB-certified SCS Technician performs the following tasks:

- Relates pressure differences across smoke barriers and doors.
- Identifies the design fundamentals of SCS as they relate to the project.
- Identifies the design approach of the smoke control system.
- Identifies the design criteria of the smoke control system.

The ICB-certified SCS Technician is knowledgeable of:

- NFPA 92-2018, Chapter 4 and related Annex Sections:
 - Design objectives
 - Design basis
 - Design approaches
 - Design criteria
 - System operation
 - Stairwell pressurization systems
 - Elevator pressurization systems
 - Zoned smoke control
 - Design objectives for combination systems
 - Requirements for vestibules
 - Types of doors located in smoke barriers

The ICB-certified SCS Technician is skilled in:

- Converting between pressure measurement scales.
- Identifying simple pressure cascades.

4. Building Equipment and Controls for Smoke Control Systems (15% of exam)

The ICB-certified SCS Technician performs the following task:

- Relates building equipment and controls to Fire Alarm and BMS systems.

The ICB-certified SCS Technician is knowledgeable of:

- NFPA 92-2018, Chapter 6 and related Annex sections:
 - Equipment and controls used for smoke control systems
 - Sequence of operation for the smoke control system
 - Automatic and manual activation/deactivation requirements
 - Automatic and manual activation/deactivation devices
 - Permitted location of HVAC equipment
 - Supply and return air requirements for pressurization

The ICB-certified SCS Technician is skilled in:

- Balancing the HVAC system for a smoke control event.

5. Documentation for Smoke Control Systems (10% of exam)

The ICB-certified SCS Technician performs the following tasks:

- Reads and interprets operations and maintenance manual.
- Identifies the purpose of the installed SCS.
- Reviews design to confirm the required components are installed prior to testing.
- Generates smoke control system documentation as required in NFPA 92-2018.
- Creates initial logs after commissioning in new construction.
- Identifies who is responsible for maintaining documentation.

The ICB-certified SCS Technician is knowledgeable of:

- NFPA 92-2018, Chapter 7 and related Annex sections:

- Documentation required
- Detailed design report
- Operations and maintenance manual
- Responsibilities of the building owner

The ICB-certified SCS Technician is skilled in:

- Communicating smoke control procedures to FLS team members.
- Assessing completeness of SCS operations and maintenance manuals for acceptance test procedures.
- Identifying alarm inputs required by SCS test procedures.
- Identifying expected outputs and acceptable parameters for SCS test procedures.

6. Testing of Smoke Control Systems (30% of exam)

The ICB-certified SCS Technician performs the following tasks:

- Tests each smoke control system against its individual design criteria.
- Verifies completeness of building construction.
- Operates HVAC equipment and controls for testing.
- Performs component, acceptance, and periodic testing of SCS.
- Documents results of measurements and testing.

The ICB-certified SCS Technician is knowledgeable of:

- NFPA 92-2018, Chapter 8 and related Annex sections:
 - Requirements for component system testing
 - Requirements for acceptance testing
 - Requirements for periodic testing
 - Requirements for testing after system modification
- ASHRAE 1.5-2017, Annex L:
 - Requirements related to testing SCS

The ICB-certified SCS Technician is skilled in:

- Completing preliminary building inspections.
- Comparing test results to design criteria.
- Adjusting for results outside allowable parameters.
- Identifying proper equipment to use for required measurements.
- Measuring pressures across smoke control zones and barriers.
- Measuring door opening forces.
- Measuring relief airflows.
- Adjusting barometric dampers.
- Adjusting door sweeps.
- Developing concise documentation to indicate test data points and results.
- Writing comprehensive reports.
- Communicating with FLS team members for fire alarm and SCS testing.

7. HVAC Systems for Smoke Control (10% of exam)

The ICB-certified SCS Technician performs the following task:

- Identifies types of HVAC systems used for smoke control purposes.

The ICB-certified SCS Technician is knowledgeable of:

- Handbook of Smoke Control Engineering 2012, Chapter 7, pp. 191-196

8. Responsibilities of FLS Team Members (5% of exam)

The ICB-certified SCS Technician performs the following tasks:

- Identifies FLS team members required to attend testing.

Smoke Control Systems Technician (SCS-T)

- Identifies the responsibilities of FLS team members.

The ICB-certified SCS Technician is knowledgeable of:

- The content and purpose of NFPA 3-2018, Annex C

[This page intentionally left blank]

Smoke Control Systems Supervisor (SCS-S)

Scope

The ICB-certified Smoke Control Systems Supervisor (SCS-S) is responsible for overseeing and coordinating the work of the SCS Technician and planning and directing the testing and maintenance of smoke control systems from inception through completion. The SCS Supervisor ensures all testing and maintenance of smoke control systems is performed in accordance with applicable codes and standards, including the ICB Code of Conduct.

Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the Smoke Control Systems Supervisor shall hold the following certifications:

- ICB-certified Fire and Smoke Damper Supervisor, and
- ICB-certified TABB Supervisor*.

**Prerequisite of ICB-certified TABB Supervisor will be effective on 10/01/2022. Visit ICBcertified.org for details.*

Certification Exam

The certification exam consists of 70 total items – 60 are scored; 10 are unscored (beta) to evaluate for possible inclusion on future exam versions. 42 of 60 (70%) is required for passing. Exam items assess candidate competence related to the tasks, knowledge, and skills identified in the Job Task Analysis.

Job Task Analysis

1. References for Smoke Control Systems (13% of exam)

The ICB-certified SCS Supervisor performs the following task:

- Identifies references applicable to the operation and testing of SCS.

The ICB-certified SCS Supervisor is knowledgeable of:

- NFPA 92-2018, Chapters 1-3 and related Annex sections:
 - Administration of NFPA 92 as described in Chapter 1
 - Scope and purpose of the referenced publications listed in Chapter 2
 - General definitions listed in Chapter 3

2. Design Fundamentals for Smoke Control Systems (20% of exam)

The ICB-certified SCS Supervisor performs the following task:

- Applies design fundamentals to confirm design objectives were achieved.

The ICB-certified SCS Technician is knowledgeable of:

- NFPA 92-2018, Chapter 4 and related Annex sections:
 - Design objectives
 - Design basis
 - Design approaches
 - Design criteria
 - System operation
 - Stairwell pressurization systems
 - Elevator pressurization systems
 - Zoned smoke control
 - Design objectives for combination systems
 - Requirements for vestibules
 - Types of doors located in smoke barriers

The ICB-certified SCS Supervisor is skilled in:

- Relating design fundamentals to results of testing to determine that design objectives were achieved.
3. Building Equipment and Controls for Smoke Control Systems (19% of exam)
- The ICB-certified SCS Supervisor performs the following task:
- Verifies equipment and controls used for SCS meet NFPA requirements.
- The ICB-certified SCS Supervisor is knowledgeable of:
- NFPA 92-2018, Chapter 6 and related Annex sections:
 - HVAC equipment
 - Smoke control systems
 - Materials
 - Electrical services installation
 - Handbook of Smoke Control Engineering – 2012, Chapter 7, pp. 191-196
 - International Building Code – 2018, Section 909.10.2
 - International Fire Code – 2018, Section 909.10.2
4. Documentation for Smoke Control Systems (13% of exam)
- The ICB-certified SCS Supervisor performs the following task:
- Writes a Method of Procedure (MOP) for testing SCS.
- The ICB-certified SCS Supervisor is knowledgeable of:
- NFPA 92-2018, Chapter 7 and related Annex sections:
 - Documentation Required
 - Detailed Design Report
 - Operations and Maintenance Manual
- The ICB-certified SCS Supervisor is skilled in:
- Developing a detailed MOP from information provided by the system designer.
5. Testing of Smoke Control Systems (27% of exam)
- The ICB-certified SCS Supervisor performs the following tasks:
- Verifies completeness of building construction.
 - Verifies all testing was performed according to NFPA requirements.
 - Manipulates HVAC equipment and controls as required for testing.
- The ICB-certified SCS Supervisor is knowledgeable of:
- NFPA 92-2018, Chapter 8 and related Annex sections:
 - General
 - Preliminary Building Inspections
 - Component System Testing
 - Acceptance Testing
 - Testing Documentation
 - Periodic Testing
 - Modifications
- The ICB-certified SCS Supervisor is skilled in:
- Identifying where adjustments are needed to bring the SCS in compliance with designed intent.
6. Coordinating SCS Technician Tasks with FLS Team Members (8% of exam)
- The ICB-certified SCS Supervisor performs the following task:
- Coordinates FLS team members in testing of SCS.
- The ICB-certified SCS Supervisor is knowledgeable of:
- NFPA 3-2018, Annex C, Responsibilities of FLS team members

[This page intentionally left blank]

Smoke Control Systems Contractor (SCS-C)

ICB Smoke Control Systems certification is offered to contractors who meet the following requirements. To be certified the contractor must:

1. Be signatory to a collective bargaining agreement that provides for contributions directly to NEMIC and be current with all financial obligations under that collective bargaining agreement.
2. Employ ICB-certified SCS technicians and ICB-certified SCS supervisors to the extent required for certification and employ enough ICB-certified SCS technicians and ICB-certified SCS supervisors to perform any and all work in the area of smoke control systems.
3. Complete at least three smoke control systems projects.
4. Provide three references who can attest to the contractor's competence and integrity in smoke control systems work.
5. Pay the application fee as specified by the ICB, and
6. Complete the certification process as outlined in Section 3 of this manual.

[This page intentionally left blank]

TABB Commissioning Supervisor (TABB Cx-S)

Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the TABB Commissioning Supervisor must meet one of the following criteria:

- Hold a college/university degree in engineering with at least one year of experience in HVAC installation or design work,
- Hold a two-year associates degree in HVAC with at least three years of experience in HVAC installation or design work,
- Hold an ICB-certified TABB Technician certification, or
- Have at least three (3) years of experience in HVAC installation or design work and is recommended in writing for the exam by the applicant's employer. The applicant's employer must be either an ICB-certified contractor or be eligible to be an ICB-certified contractor except only for the requirements that it employ an ICB-certified technician and an ICB-certified supervisor.

Knowledge Base

The TABB Commissioning Supervisor must be proficient in all categories of this section as demonstrated by passing the written exam.

The TABB Commissioning Supervisor must be knowledgeable about:

1. The various commissioning types, the associated processes and the commissioning steps.
2. The roles and responsibilities of the commissioning agent, the necessary skills and qualifications and the role and responsibilities of the commissioning authority.
3. The different levels of the commissioning process, including:
 - Level 1:
 - Preparation; Pre-Start Checks
 - Commissioning Plan
 - Functional Performance Test
 - Operations Instruction and Demonstration
 - Level 2:
 - Design, Acceptance and Construction Phases
 - Program or Pre-Design Phase
 - Level 3:
 - General
 - Level 3 Procedures
 - Critical Applications
 - Commissioning Organization
4. The re-commissioning process:
 - Analysis
 - Modifications
 - Re-commissioning Test
 - Preliminary Investigation
 - Documentation and Training
 - Survey and Documentation Phase
 - Surveys to Confirm Existing Documentation
 - Surveys to Produce New or Revised Documentation

[This page intentionally left blank]

TABB Commissioning Contractor (TABB Cx-C)

The TABB Commissioning Contractor certification is offered to contractors who meet the following requirements. To be certified the contractor must:

1. Be signatory to a collective bargaining agreement that provides for contributions directly to NEMIC and is current with all financial obligations under that collective bargaining agreement.
2. Employ ICB-certified TABB Technicians and ICB-certified TABB Commissioning Supervisors to the extent required for certification and should employ enough ICB-certified TABB Technicians and ICB-certified TABB Commissioning Supervisors to perform any and all work in the area of commissioning.
3. Complete at least three testing, adjusting and balancing projects.
4. Provide five references who can attest to the contractor's competence and integrity in testing, adjusting and balancing work.
5. Pay the application fee as specified by the ICB, and
6. Complete the certification process as outlined in Section 3 of this manual.

[This page intentionally left blank]

TABB Sound and Vibration Supervisor (TABB SV-S)

Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the TABB Sound and Vibration Supervisor must meet one of the following criteria:

- Hold a college/university degree in engineering with at least one year of experience in HVAC installation or design work,
- Hold a two-year associates degree in HVAC with at least three years of experience in HVAC installation or design work,
- Hold an ICB-certified TABB Technician certification with five or more years of experience in HVAC installation or design work (which may include apprenticeship), at least one of which must include sound and vibration work, or
- Have at least three years' experience in HVAC installation or design work and is recommended in writing for the exam by the applicant's employer. The employer must be an ICB-certified Contractor or be eligible to be an ICB-certified Contractor except only for the requirements to employ an ICB-certified Technician and/or an ICB-certified Supervisor.

Knowledge Base

The TABB Sound & Vibration Supervisor must be proficient in all categories of this section as demonstrated by passing the written exam.

1. The TABB Sound & Vibration Supervisor must be knowledgeable of the basics of sound and the assessment of sound, including:
 - Sound waves
 - Types of sound waves
 - Sound fields of spherical sound sources
 - Source, path, and receiver
 - Sound pressure, sound intensity, and sound power
 - Decibels and levels
 - Presence of background sound
 - Weighting networks and octave and third octave
 - Frequency bands
 - How the human ear responds to sound, and
 - Indoor sound criteria
2. The TABB Sound & Vibration Supervisor must be knowledgeable of the basics of mechanical vibration, including:
 - Vibration in buildings
 - Fundamentals of vibration
 - Vibration criteria
 - Vibration isolation: one-degree-of-freedom systems
 - Vibration isolation: two-degree-of-freedom systems
 - Vibration isolators
 - Structural isolations bases
 - Curb bases
 - Flexible connections
 - Floating floors
 - Floor constructions used to support mechanical equipment

- Equipment vibration isolation requirements
 - Vibration isolation systems
 - Vibration isolator selection
 - Investigation of vibration problems, and
 - Causes of structure-borne vibration problems
3. The TABB Sound & Vibration Supervisor must be knowledgeable of acoustical design of mechanical systems, including:
- Sound levels
 - System design guidelines
 - Sound path design procedures
 - Equipment sound data
 - Fans
 - Variable-air-volume (VAV) systems
 - Rooftop curb-mounted air-handlers
 - Airflow generated duct rumble, and
 - Aerodynamically generated sound in ducts
4. The TABB Sound & Vibration Supervisor must be knowledgeable of mechanical equipment sound, including:
- Fans; Pumps
 - Refrigeration equipment
 - Boilers and steam equipment
 - Cooling towers
 - Reciprocating engines
 - Gas turbine engines
 - Electric generators
 - Electric motors
 - Air compressors
 - Electrical transformers
5. The TABB Sound & Vibration Supervisor must be knowledgeable of sound generation and attenuations associated with ducts and fittings, including:
- Regenerated sound power associated with duct fittings
 - Sound attenuation associated with duct elements
 - Sound power breakout and breaking in ducts, and
 - Insertion loss of external lagging on rectangular ducts
6. The ICB-certified TABB Sound & Vibration Supervisor must be knowledgeable of sound transmission in indoor and outdoor spaces, including:
- Sound transmission through ceiling systems
 - Receiver room sound corrections
 - Sound transmission through mechanical room walls, floor, or ceiling, and
 - Sound transmission in outdoor environments
7. The TABB Sound & Vibration Supervisor must be knowledgeable of mechanical equipment sound and vibration specifications and inspections, including:
- Mechanical equipment sound and vibration specifications, and

- Mechanical equipment sound and vibration isolation inspections
8. The TABB Sound & Vibration Supervisor must be knowledgeable of sound instrumentation and measurements, including:
- Sound measurement instrumentation
 - Indoor sound measurements, and
 - Outdoor sound measurements
9. The TABB Sound & Vibration Supervisor must be knowledgeable of vibration instrumentation and measurements, including:
- Vibration measurement instrumentation
 - Indoor vibration measurements
 - Locations for the vibration measurements
 - Vibration measurements
 - Assessment of indoor vibration measurements
 - Report

[This page intentionally left blank]

TABB Sound and Vibration Contractor (TABB SV-C)

TABB Sound & Vibration certification is offered to contractors who meet the following requirements. To be certified the contractor must:

1. Be signatory to a collective bargaining agreement that provides for contributions directly to NEMIC and is current with all financial obligations under that collective bargaining agreement.
2. Employ ICB-certified TABB Technicians and ICB-certified TABB Sound & Vibration Supervisors to the extent required for certification and should employ enough ICB-certified TABB Technicians and ICB-certified TABB Sound & Vibration Supervisors to perform any and all work in the area of sound & vibration.
3. Complete at least three testing, adjusting and balancing projects.
4. Provide five references who can attest to the contractor's competence and integrity in testing, adjusting and balancing work.
5. Pay the application fee as specified by the ICB, and
6. Complete the certification process as outlined in Section 3 of this manual.

[This page intentionally left blank]

TABB Technician (TABB-T)

Standards of Proficiency in Testing, Adjusting and Balancing (TAB)

The TABB Technician must be proficient in all categories of this Section, as demonstrated by passing written and practical exams.

1. Mathematics

The TABB Technician must be able to perform the following functions:

- Addition
- Subtraction
- Multiplication
- Square root
- Cube root
- Ratios
- Percentages
- Equations
- Decimals

The TABB Technician must be able to apply and solve equations related to TAB work.

2. Fluid Flow

The TABB Technician must be able to apply the following basic principles of fluid flow to testing, adjusting and balancing work:

- Pressure (static, velocity and total)
- Resistance (friction and dynamic loss)
- Velocity
- Density
- Quantity

3. Heat Transfer

The TABB Technician must be able to apply the following basic principles of heat transfer to testing, adjusting and balancing work:

- Heat transfer including conduction, convection, and radiation
- Temperature
- Insulation
- Liquids and gasses
- Latent heat
- Specific heat
- Heat exchangers

4. Psychrometrics

The TABB Technician must be able to plot and understand the following properties of air:

- Dry bulb temperature
- Wet bulb temperature
- Dew point temperature
- Relative humidity
- Specific humidity
- Density
- Enthalpy

5. Project Documents

The TABB Technician will understand how systems are intended to perform and must be able to read and interpret contract drawings including:

- Mechanical drawings
- Specifications
- Submittal data
- Addenda and alterations
- Shop Drawings

6. Air Distribution Systems

The TABB Technician will be able to use the following items regarding air distribution systems in testing, adjusting and balancing air systems:

- Know the purpose for each component in an air system and how these components interact.
- Know the effect of duct leakage, friction loss and dynamic loss on balancing, as related to system operating pressure.
- Know the function of the following in air distribution systems:
 - Fan laws
 - Fans
 - V-belt drive
- Explain the function of each component in the following air distribution systems:
 - Supply
 - Return/exhaust
 - Single-zone
 - Multi-zone
 - Re-heat or re-cool systems
 - Induction boxes
 - Dual duct
 - Variable air volume
 - Terminal devices

7. Hydronic Distribution Systems

The TABB Technician will be able to explain the purpose of each component in a hydronic distribution system and how these components interact with each other.

The TABB Technician will be able to apply pump laws and the effect(s) on pumps when balancing a system.

The TABB Technician will be able to explain the function of each component in the following hydronic systems:

- Two-pipe
- Three-pipe
- Four-pipe
- Direct return
- Reverse return
- Hot water heating
- Chilled water
- Condensing water
- Variable flow system

The TABB Technician will be able to explain the purpose for each component in a steam system and how these components interact.

8. Automatic Control Systems

The TABB Technician will have the ability to understand the sequence of operation of the systems that are related to TAB.

9. Electrical Systems

The TABB Technician will be able to apply the basic principles of electricity to TAB problems including:

- Definitions of voltage, current, resistance, reactance and capacitance
- Ohm's Law
- Bhp

10. Instrumentation

The TABB Technician will be able to gather accurate, repeatable, and reliable data using the instruments listed in this section. For all the instruments listed in this section, the ITI Certified TAB Technician will be able to:

- Supervise other testing, adjusting and balancing technicians in the proper use of these instruments.
- Select the proper instrument for the task to be performed.
- Properly care for and use the Temperature, Electrical, Rotating, Air Pressure, Air Velocity, Air Volume, Humidity and Hydronic Pressure Measuring Instruments as covered in the ITI TAB curriculum.

11. Computer Skills

The TABB Technician will be proficient in the following computer skills:

- Direct Digital Controls – basic principles
- Analog In/Analog Out
- Digital In/Digital Out
- Proportional integral derivative loop sequence

12. Preliminary TAB Procedures

The TABB Technician will be able to perform preliminary TAB procedures including:

- Initial planning
- Preliminary procedures
 - Procurement of data
 - Study of systems and data
 - Report forms
- Air distribution system inspection
 - Fans
 - Air conditioning units
 - Terminal unit/devices
 - Duct systems
- Hydronic distribution system inspection
 - Pumps
 - Boilers
 - Coils and heat exchangers
 - Refrigeration equipment
 - Condenser and cooling towers
 - Piping systems
- Automatic control system

13. Air System TAB Procedures

The TABB Technician will be able to balance a system without on-the-job supervision. The Technician will be able to use both methods listed in this section. Regardless of the procedure used, the least possible resistance must be imposed on the balanced system to meet the design objectives. The two methods are:

- Proportional balancing
- Sequential balancing

14. Specific Air System Procedures

The TABB Technician will be able to balance the systems listed in this section, using the most appropriate procedures that will result in the least possible resistance imposed on the balanced system.

- Supply air systems
- Return, exhaust and relief air systems
- Dual duct and single duct (constant volume systems)
- Dual duct pressure dependent systems
- Variable air volume systems
 - Pressure dependent
 - Pressure independent
 - Induction
 - Fan powered terminals
- Induction systems

15. Hydronic System TAB Procedures

The TABB Technician will be able to balance the hydronic systems listed in this section, using the most appropriate procedures that will result in the least possible resistance imposed to meet the design objectives on the balanced system.

- Open system
- Closed system
- Two-pipe system
- Three-pipe system
- Primary-secondary system
- Primary-secondary-tertiary system

The TABB Technician will be able to balance hydronic systems using either of the two methods listed below:

- Differential pressure
- Temperature difference

16. Considerations for TAB

The TABB Technician will be able to perform the following functions in a professional manner:

- Problem solving
- Interaction with customer representatives and others on the work site
- Safety
- Data gathering
- Report writing
- Task scheduling

17. Reference Data

The TABB Technician will be able to locate and use all reference and submittal data required for TAB work

TABB Supervisor (TABB-S)

Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the TABB Supervisor must meet one of the following criteria:

- Hold a college/university degree in engineering with at least one year of experience in HVAC installation or design work,
- Hold a two-year associates degree in HVAC with at least three years of experience in HVAC installation or design work,
- Hold an ICB-certified TABB Technician certification with five or more years of experience in HVAC installation or design work (which may include apprenticeship), at least one of which must include testing, adjusting and balancing (TAB) work, or
- Have at least three years' experience in TAB work and is recommended in writing for the exam by the applicant's employer. The applicant's employer must be an ICB-certified Contractor or be eligible to be an ICB-certified Contractor except only for the requirements to employ an ICB-certified Technician and/or an ICB-certified Supervisor.

Knowledge Base

The TABB Supervisor must be proficient in all categories of this section as demonstrated by passing the written exam.

The TABB Supervisor is expected to be knowledgeable and capable in the standards of proficiency as outlined below. Each candidate seeking TABB Supervisor certification is expected to be knowledgeable in all areas for which the supervisor will have testing, adjusting, and balancing review and oversight responsibilities.

The TABB Supervisor should assure that the entire system has been tested, adjusted, and balanced within tolerances of the specifications, subject to the limitations of the installed HVAC system, and that all data submitted is accurate, using the most appropriate procedures that will result in the least possible resistance imposed on the balanced system.

Standards of Proficiency

Mathematics: Includes applicable math skills associated with the back of the TABB Air Duct Calculator, Cheat Sheet (commonly used equations and tables), and be able to apply and solve all equations related to testing, adjusting and balancing work. Math problems are included throughout the knowledge base domains.

1. Fluid Flow
 - Pressure profiling
 - Pressure (static, velocity, and total)
 - Resistance (friction and dynamic loss)
 - Fluid velocity, specific gravity and expansion
2. Heat Transfer
 - Conduction, convection, and radiation
 - Temperature
3. Psychrometrics
 - Dry bulb temperature
 - Wet bulb temperature
 - Dew point temperature

- Relative humidity
 - Specific humidity
 - Specific volume
 - Density
 - Enthalpy
 - Vapor pressure
 - Sensible heat ratio
 - Total, sensible, and latent heat
4. Systems in General
- Mechanical drawings
 - Specifications
 - Submittal data
 - Addenda and alterations (RFI's & Deltas)
 - Shop Drawings
 - Schematics
 - Sequence of operations
 - Building automation system (BAS) sequence of operation
5. Automatic Control Systems
- Pneumatic controls
 - Electrical controls
 - Electronic controls
 - Direct digital controls
6. Electrical Systems
- Principles of electricity to testing, adjusting and balancing problems including but not limited to:
- Ohm's Law
 - Power
 - Motors
 - Safety
 - Power factor
 - Basic Variable Frequency Drive
7. Instrumentation
- Proper instrument selection for the task to be performed
 - Care for and use of instruments used to perform tasks on the job
8. Preliminary TAB Procedures
- Initial planning
 - Preliminary procedures
 - Procurement of data
 - Study of systems and data
 - Report forms
 - Air distribution system inspection
 - Fans (supply, return, exhaust)
 - HVAC units
 - Terminal unit/devices

- Duct systems
- Hydronic distribution system
 - Pumps
 - Safety low water cut off
 - Pressure differential on heat exchanger
 - Coils and heat exchangers
 - Refrigeration equipment
 - Chilled water systems
 - Condenser and cooling towers pumps
 - Piping systems
- HVAC control system for committee

9. Air System TAB Procedures

- Proportional balancing
- Sequential balancing

10. Specific Air System TAB Procedures

- Supply air systems
- Return, exhaust and relief air systems
- Dual duct and single duct (constant volume systems)
- Multi-zone system
- Variable air volume systems
 - Pressure dependent
 - Pressure independent
 - Induction
 - Fan powered terminals
- Induction systems
- Special systems
 - Laboratory fume hoods
 - Kitchen hoods
 - Industrial hoods
 - Material handling systems
 - Ceiling and floor plenum systems
 - Cleanrooms
 - Smoke control systems
- Air systems with diversity

11. Consumer Relations for TAB

12. Reference Data

Location and use of all reference and submittal data required for performing TAB work

13. Air Distribution Systems Components

- Purpose for each component and how they interact
- Effect of duct leakage, resistance, and dynamic loss on balancing, as related to system operating pressure
- Functions of the following:
 - Fan laws

- System effect
 - V-belt drives
- Functions of each component:
 - Supply
 - Return/exhaust
 - Single-zone
 - Multi-zone
 - Reheat or recool systems
 - Induction boxes
 - Dual duct
 - Variable air volume
- Duct leakage testing
 - Pressure drop test (degradation)
 - SMACNA Leakage testing method

14. Hydronic Distribution Systems Components

- Purpose and function of each component in a hydronic distribution system and how the components interact
- Effect on balancing of system resistances, dynamic losses, system effects and foreign material in the system
- Application of pump laws
- Component functions
 - Hot water heating
 - Two-pipe; Three-pipe; Four-pipe
 - Direct return; Reverse return
 - Chilled water
 - Condensing water
 - Variable flow systems
 - Primary - secondary system
 - Primary - secondary - tertiary system
- Purpose for each component in a steam system and how these components interact
- Water treatment systems
- Make-up water system
- Fiddling water system
- Steam system
- Condense systems
- Domestic water systems

15. Hydronic System TAB Procedures

- Open system
- Closed system
- Two-pipe system
- Three-pipe system
- Primary-secondary system
- Primary-secondary-tertiary system
- Differential pressure
- Temperature difference
- Water systems with diversity

TABB Contractor (TABB-C)

TABB Contractor

TABB certification is offered to contractors that meet the following requirements. To be certified, the contractor must:

1. Be signatory to a collective bargaining agreement that provides for contributions directly to NEMIC and is current with all financial obligations under that collective bargaining agreement.
2. Employ ICB-certified TABB Technicians and ICB-certified TABB Supervisors to the extent required for certification, and should employ enough ICB-certified TABB Technicians and ICB-certified TABB Supervisors to perform any and all work in the area of TAB.
3. Own and maintain all TAB equipment and instruments per current TABB Instruments list and maintain the required calibration.
4. Perform any and all work according to the most current version of the SMACNA *HVAC Systems Testing, Adjusting and Balancing Manual* unless federal, state or local codes supersede it.
5. Approve and adopt the TABB Customer Satisfaction Procedure.
6. Complete a minimum of three testing, adjusting and balancing projects.
7. Provide five references from local architects, building owners, consulting engineers or contractors, who will vouch for the contractor's competence and integrity in testing, adjusting and balancing work.
8. Pay the application fee as specified by the ICB, and
9. Complete the certification process as outlined in Section 3 of this manual.

Independent TABB Contractor

Certification as an Independent TABB Contractor is available to a TABB Contractor who affirms their independence by means of a sworn affidavit in a format as required by the TABB. An independent contractor is one with no affiliation with an HVAC mechanical contractor, design engineer, a manufacturer of HVAC equipment or with other entity or person that interferes with the contractor's independence in any TABB-certified specialty work on HVAC systems and/or in preparation of reports.

TABB Customer Satisfaction Procedure

The TABB Contractor is required to follow the TABB Customer Satisfaction Procedure as outlined below.

PURPOSE: A formal procedure by which TAB customer complaints can be resolved promptly, fairly, and in a manner that preserves our reputation for integrity.

SCOPE: This procedure applies to any TAB customer complaints concerning TAB work done by our company. The Customer Contact is responsible for receiving and considering all TAB customer complaints, and for implementing this procedure. Any and all customer complaints about our TAB work should be referred to the Customer Contact (identified below.) Only the Customer Contact is authorized to address TAB customer complaints.

KEY TERMS:

- "Customer Contact" is the individual designated by our company to consider and respond to TAB customer complaints, and otherwise implement this procedure.
- "TAB" refers to testing, adjusting and balancing work.
- "TAB Customer" refers to the person (building owner or owner's agent, general contractor, or mechanical contractor) who has retained our company to perform TAB work. However, if our company has been engaged by a contractor, we also consider the building owner of the owner's agent as a "TAB customer" for purposes of this procedure.

NOTICE TO CUSTOMERS:

1. We will advise each person who hires our company for TAB work that we have a formal Customer Satisfaction Procedure. That notice shall be in writing. It may be by transmittal letter that returns the signed contract, or by specific reference in the contract or a contract addendum. The notice to the customer shall consist of the following (or equivalent):

Our company is dedicated to customer satisfaction. We maintain a formal Customer Satisfaction Procedure. If you have any complaint regarding our company's testing, adjusting and balancing work, please contact [current customer contact] at [phone number]. That individual will make every effort to respond to your complaint by at least the end of the next business day.

2. We will respond to each TAB customer complaint as follows:
 - a. If the complaint can be handled by telephone consultation, we will do so. Calls will be made promptly and courteously. There is no such thing as a "stupid question" from a customer - each and every question and complaint merits our attention and a respectful and complete answer.
 - b. Whenever appropriate, written confirmation of advice or direction given in a telephone consultation will be promptly sent to the customer (mailed by no later than the close of the business day after consultation).
 - c. If a customer complaint cannot be satisfactorily resolved over the telephone, a TAB technician designated by the Customer Contact will visit the customer's site at the earliest practical opportunity. Generally, a site visit will occur no later than the third business day after it is determined to be necessary. The Customer Contact may direct an earlier site visit to address urgent circumstances. In rare instances, a site visit may be postponed to a later time, if agreeable to the customer.
 - d. The technician will visit the site and assess the customer complaint(s). The technician will make every effort to be in touch with the Customer Contact (or the person designated by him or her) by telephone, from the site. If the customer's complaint can be resolved by adjustments, which the technician can perform while at the site, in a reasonable time frame, the technician will do so. If not, the technician will identify the problem(s) and make a complete report to the Customer Contact as soon as practical. Problems which cannot be resolved quickly, by the technician on site, must not be discussed with the customer at that time: rather, the technician will report those problems back to the Customer Contact for him or her to determine appropriate action.
 - e. If the visiting technician has corrected the problem, the Customer Contact will follow-up with the customer within three to five business days to ensure the customer's continuing satisfaction.
 - f. If the visiting technician has been unable to correct the problem, the Customer Contact will assess the technician's report, determine if any further testing or assessment is appropriate, and contact the customer with a complete response and/or recommendation. Normally that contact is to occur by the end of the next business day after the Customer Contact receives the visiting technician's report.
 - g. If the visiting technician's report indicates deficiencies in our TAB work, the Customer Contact will determine appropriate remedial work, determine how best to accomplish that remedial work in a prompt fashion, and will make appropriate arrangements with the customer. If our initial TAB work was faulty or inadequate, leading to the need for the remedial work, all remedial work will be without charge to the customer.
 - h. If the visiting technician's report indicates that customer action or error is the case if the customer's complaint, or that the cause is the system design, system installation, or other matter beyond our control, the Customer Contact will so advise the customer and offer reasonable assistance with appropriate follow-up. The Customer Contact will take care not to make disparaging remarks about the work of any others.
 - i. If our company does remedial TAB work, which is required because of system design, installation or other circumstance beyond our control, we will clearly inform the customer of the preparatory work that must be done, to enable us to perform high quality TAB work at a minimum additional cost to the customer.

- j. After any remedial TAB work, whether done with or without charge, the Customer Contact shall follow-up with the customer within a reasonable period (normally three to five business days) after completion of the work, to ensure continuing customer satisfaction.
- k. If the Customer Contact is unable to resolve a customer complaint, the Customer Contact will suggest a meeting between our [Chief Executive Officer or other appropriate officer] and a comparable representative of the customer, to attempt to resolve customer complaints short of any formal proceeding. If a resolution cannot be obtained, our company will then notify the customer in writing of the TABB Quality Assurance Program, and how to contact TABB.

VARIANCES: Although this Customer Satisfaction Procedure normally should be followed, it is not a contract. The Customer Contact is authorized to vary from this Procedure, in respect to any customer complaint. Variances should be rare exceptions, not the rule.

QUESTIONS: Questions concerning the Customer Satisfaction Procedure, and how it is implemented, should be addressed to the Customer Contact identified above.

LIMITS: No employee is to deal with any TAB customer complaints in a manner other than as described in this Customer Satisfaction Procedure.

CLOSING NOTES: All employees of this company are expected at all times to be courteous to and respectful of customers. All employees are to refrain from disparaging comments about work that may have been done by others. If any employee believes that any TAB work done by our company is deficient or defective in any respect that must not be discussed with the customer or anyone else. Instead, report that immediately to the Customer Contact for appropriate correction consistent with this Customer Satisfaction Procedure.

[This page intentionally left blank]

Total Building Energy Audit Technician (TBEA-T)

Purpose & Scope

The Total Building Energy Audit Technician shall be knowledgeable about the purpose and scope of measures and expressions of building energy performance.

1. Purpose

Provide commonality in reporting the energy performance of existing buildings to facilitate comparison, design and operation improvements as well as a consistent method of measuring, expressing, and comparing the energy performance of buildings.
2. Scope
 - Levels of Compliance
 - Basic Level: Only the total energy index of the building is determined
 - Intermediate Level: Additional energy performance indices and factors are determined
 - Data Summaries
 - Basic Building Characteristics
 - Energy Performance Summary

Reference

The guiding document for this knowledge base is the ANSI/ASHRAE Standard 105-2007 Standard Measures of Measuring, Expressing and Comparing Building Energy Performance.

Standards of Proficiency in Total Building Energy Audit

The Total Building Energy Audit Technician must be proficient in all categories of this section, as demonstrated by passing the written test.

1. Definitions

The Total Building Energy Audit Technician shall be knowledgeable about the following definitions as they pertain to building characteristics and building energy performance measures

- Conditioned
- Degree-day (Kelvin-day)
- Depletable (non-renewable) energy
- Energy
- Energy Form
- Energy Performance
- Existing Building
- Energy Intensity
- Gross Floor Area
- Gross Conditioned Floor Area
- Heating Value
- New Building
- Net Energy
- Non-depletable Energy
- Normalization Factors/Parameters
- Proposed Building
- Stored Purchased Energy
- Total Energy

2. Basic Measurements

The Total Building Energy Audit Technician shall be knowledgeable about the following measures as they pertain to building energy performance and must be able to obtain and record them.

- Data gathering to determine Total Annual Energy Costs
- Data gathering of Basic Building Characteristics
- Gross Floor Area
- Energy Consumption
- Source of Energy Data
 - Utility bill or meter
 - Installed Meter
 - Estimate
 - Other, e.g., photo voltaic, wind power, onsite renewable energy, coal, fuel oil
- Conversion Factors
 - The conversion factor to convert electricity from kWh to kBTU is 3.412 kBTU/kWh
 - Need to be versed in the conversion factors of other fuels such as:
 - Natural Gas
 - Fuel Oil
 - Coal
 - Liquid Petroleum (LPG)
 - Heat Supplied
- Energy Costs
 - Energy Costs and Indices
 - Ability to Adjust Energy Use to a 365-Day Year
- Water Usage
 - Sources of Water Usage
 - HVAC
 - Domestic Potable Water
 - Landscape

3. Data Recording and Reporting

- Recording
 - The Total Building Energy Audit Technician shall be able to properly use instruments to determine the energy performance of building subsystems, i.e., HVAC.
- Reporting
 - The Total Building Energy Audit Technician shall be able to properly document and report results.
 - The Total Building Energy Audit Technician shall be able to properly benchmark basic building energy performance.

Attachment 1. ICB Conformity Assessment Vocabulary

[This page intentionally left blank]



CONFORMITY ASSESSMENT VOCABULARY

Version 210504

Approved by the International Certification Board on May 4, 2021

© Copyright 2021

The Sheet Metal Industry International Certification Board

3180 Fairview Park Drive, Suite 400

Falls Church, VA 22042

All rights reserved.

DISCLAIMER

The Sheet Metal Industry International Certification Board (ICB) has compiled this certification manual with care, but the ICB has not investigated, and expressly disclaims any duty to investigate any product, process, procedure, design or that, that may be described in this manual. The ICB does not warrant that the information contained in this manual is free of errors. The user assumes the entire risk of the use of this manual.

NO PART OF THIS MANUAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING, SCANNING OR OTHERWISE WITHOUT PERMISSION IN WRITING FROM THE ICB OR FROM THE ORIGINAL HOLDER OF THE COPYRIGHT AS INDICATED IN THE TEXT.

Document Profile Table

Title	ICB Conformity Assessment Vocabulary, Version 210504
Class	DOC
Category	Policy
Owner	The National Energy Management Institute Committee
Type	Original: MS Word 2013; Final: Adobe Acrobat with Password Security
Comments	Current Version: 210504 supersedes Version 200512
Access Rights	Read only pdf

Document Version Control Table

Title	Purpose / Changes	Author	Date
151001	Original release	Davor Novosel	10/01/2015
181002	Added abbreviations FSD (Fire and Smoke Damper) and SCS (Smoke Control Systems)	Davor Novosel	10/02/2018
200512	Added three definitions: • Certification date • JATC Coordinator • Subversion Added "M" to ATE and ATT Revised four definitions under Certification Status.	Soph Davenberry; Duane Smith	05/12/2020
210504	Updated business address.	Soph Davenberry; Duane Smith	05/04/2021

1 Purpose

The National Energy Management Institute Committee in conjunction with the International Certification Board (ICB) has developed a number of policy and procedure documents dealing with various aspects of the ICB certification program. The ICB certification program is based on the principles of the IEC/ISO Standard 17024: 2012 Conformity assessment – General requirements for bodies operating certification of persons. In striving to achieve a high level of conformity with the standard, every effort has been made to include the same terminology across all ICB policy and procedure documents. This document supports those efforts.

The terminology in this document conforms to the ISO/IEC Standard 17000, Conformity assessment- Vocabulary and general principles. Exception to the definitions to the said standard are noted.

2 Definitions

The following definitions shall apply to ICB policy and procedure documents.

Appeal: request by applicant, candidate or certified person for reconsideration of any decision made by the ICB related to their desired certification status.

Applicant: person who has submitted an application to be admitted to the certification process.

Assessment: process that evaluates a person's fulfilment of the requirements of the certification scheme. The assessment may consist both of a written and a practical examination.

Candidate: applicant who has fulfilled specified prerequisites and has been admitted to the certification process.

Certificate: document issued by the ICB indicating that the named person has fulfilled the certification requirements.

Certification: in the context of the ICB certification program, refers to a valid certification.

Certification date: the date on which the ICB grants certification, including both new and renewal certification.

Certification period: the period of time between the certification date and the valid through date.

Certification process: the sum of all the activities by which the ICB determines that a person fulfills all the certification requirements.

Certification program: refers to the sum of all ongoing certification schemes and certification processes by the ICB.

Certification scheme: competence and other requirements related to a specific job.

Certification status: the current state of a certification held by a person, and may be one of the following:

- Valid – all requirements of the certification scheme have been fulfilled.
- Pending – the certification was not renewed on or before the assigned valid through date. The certified professional is given a 60-day grace period to complete the renewal.
- Expired – the certification was not renewed on or before the end of the 60-day grace period.
- Suspended – a certification revoked for one or more reasons listed in Section 2.2 of the ICB Certification Manual.

Claimant: a person, organization or an interested party that filed the complaint against the subject.

Competence: ability to apply knowledge and skills to achieve intended results.

Complaint: expression of dissatisfaction, other than an appeal, by any individual or organization to ICB, relating to the activities of a certified person, where a response is expected.

Conference: a meeting of the ICB with the interested party or parties as part of the complaint process.

Contractor: in the context of the ICB certification program it always refers to an ICB-certified contractor.

Decision: the written statement of the final resolution by the ICB on any or all parts of an appeal or a complaint.

Examination (Exam): mechanism that is part of the assessment which measures a candidate's competence by one or more means, such as written and/or practical, as defined in the certification scheme.

Examiner: person competent to conduct and score a practical examination, where the examination requires professional judgement; also referred to as judge.

Hearing: a meeting of the ICB with the interested party to a complaint or an appeal to render a decision on the complaint or appeal.

Interested party: an individual or entity effected by the performance of an ICB-certified person.

Investigation: a fact-finding study by the ICB to the physical place where the complaint or appeal occurred.

JATC Coordinator: the executive who is in charge of managing the local JATC.

Judge: refers to an examiner who conducts and scores a practical examination.

Proctor: person authorized by the ICB who administers or supervises an examination but does not evaluate the competence of the candidate.

Subject: the person or entity whose work, conduct or other action or omission is the subject of a complaint.

Subversion: using confidential and/or proprietary content for any reason other than its intended purpose.

Supervisor: in the context of the ICB certification program, it always refers to an ICB-certified supervisor. While employed by an ICB-certified contractor, a supervisor is the person responsible for overseeing, coordinating and ensuring that projects are performed by ICB-certified technicians in accordance with ICB procedures, including the ICB Code of Conduct and the specifications for each certification scheme.

Technician: in the context of the ICB certification program, it always refers to an ICB-certified technician.

3 Abbreviations

The following abbreviations shall apply to ICB policy and procedure documents.

CEUContinuing Education Unit

FLS.....Fire Life Safety

FSD.....Fire and Smoke Damper

HVAC.....Heating, Ventilating and Air Conditioning

IAQ.....Indoor Air Quality

ICB.....The Sheet Metal Industry International Certification Board

ITI.....The International Training Institute for the Sheet Metal and Air Conditioning Industry

JATCJoint Apprenticeship Training Center where generally the certification exams will be administered

MATEMechanical Acceptance Test Employer

MATTMechanical Acceptance Test Technician

NEMI.....The National Energy Management Institute

NEMIC.....The National Energy Management Institute Committee

SCSSmoke Control Systems

SMACNAThe Sheet Metal and Air Conditioning Contractors' National Association

SMARTThe International Association of Sheet Metal, Air, Rail and Transportation Workers

TABTesting, Adjusting and Balancing

TABBThe Sheet Metal Industry Testing, Adjusting and Balancing Bureau

[This page intentionally left blank]

Attachment 2. ICB Certified Stamp Agreement

[This page intentionally left blank]



ICB Certified Stamp Agreement

This agreement ("Agreement") is made between the National Energy Management Institute Committee for the Sheet Metal and Air Conditioning Industry ("NEMIC") and _____, (the "ICB Certified Professional"). The ICB/TABB Certified Professional shall be either an ICB-certified technician or supervisor.

Stamp	Mark
 [Certified Professional's Full Name] [Certification #] [Issue Date]	

- Ownership.** NEMIC owns the rights to the ICB Certified Professional stamp (the "Stamp") and to the ICB/TABB mark (the "Mark") as shown above. NEMIC is and will remain the owner of the Stamp and Mark. This Agreement does not give the ICB Certified Professional any right, title or interest in or to the Stamp and/or Mark (other than a right of use per the terms of this Agreement).
- Use of the Stamp.** The ICB Certified Professional will use the Stamp exclusively in conjunction with any work performed by him or her in accordance with the ICB Code of Conduct. Use of the Stamp by any person other than the ICB Certified Professional is not allowed and will result in immediate termination of this Agreement.
- Use of the Mark.** This Agreement does NOT permit use of the ICB/TABB Mark, except only as it is part of the Stamp.
- Extent of License.** This Agreement is (i) non-transferrable; (ii) nonexclusive; and (iii) revocable by NEMIC at any time either with or without cause. Upon revocation, the ICB/TABB Certified Professional shall cease to use the Stamp and shall return it to NEMIC.
- Surrender of the Stamp.** The ICB Certified Professional will surrender the Stamp to NEMIC upon demand, whether in connection with loss of certification, termination of this Agreement, or any other cause.
- Loss or Damage.** If the Stamp is lost or damaged, the ICB Certified Professional may request a replacement Stamp. The fee for the replacement Stamp is the same as the fee for the original Stamp.
- This Agreement is effective on the *Issue Date* shown below.

By signing below, I agree to the terms of this Agreement.

Signature	_____	Issue Date	___/___/___
Full Name	_____	Local Union #	___
Address	_____	City	_____
State	_____	Zip Code	_____
Phone #	_____	Certification #	_____
Email	_____@_____		

NATIONAL ENERGY MANAGEMENT INSTITUTE COMMITTEE

David Bernett, Administrator

[This page intentionally left blank]

Attachment 3. Retiree Certificate of Recognition

[This page intentionally left blank]



THE SHEET METAL INDUSTRY
INTERNATIONAL CERTIFICATION BOARD

CERTIFICATE OF RECOGNITION

AWARDED TO

Name

For being an Outstanding ICB-certified Professional holding the following ICB Certification on this
day ____ of ____, 20__ of their retirement.

[ICB Certification Scheme], [ICB Certification Scheme], [ICB Certification Scheme]

Awarded this day ____ of _____, 20__

David Bennett, Administrator
National Energy Management Institute Committee

Attachment 3. Retiree Certificate of Recognition

20954217v1