



Effective August 15, 2023

## **IMPORTANT NOTICE REGARDING CHANGES TO THE FIRE AND SMOKE DAMPER (FSD) CERTIFICATIONS**

ICB certifications are periodically reviewed to ensure content is relevant to current industry practice, including the guiding documents used to develop exam content.

### **What has changed?**

- *The certification scope, knowledge base, and exam content for the FSD Supervisor and FSD Technician.*
- *A new certification was created from two knowledge domains removed from the FSD Technician scope. The new certification is named FSD Technician Stairwell Endorsement.*

**What is the scope of certification for the FSD Technician Stairwell Endorsement?** *The Fire and Smoke Damper Technician with the Stairwell Endorsement performs limited periodic testing of a single stairwell pressurization system, measures pressure differences and door-opening forces, understands the differences between dedicated and non-dedicated systems and how ambient conditions affect stairwell pressurization systems, documents the results of testing, and submits a report to the employer.*

**Who is eligible to take the FSD Technician Stairwell Endorsement certification exam?** *An ICB certified professional who holds an ICB-certified FSD Technician certification.*

**Am I required to obtain the FSD Technician Stairwell Endorsement certification?** *Only if you are performing work as described in the scope of the certification and the certification is required in the jurisdiction where you are working.*

**How do these changes affect my current FSD Supervisor and FSD Technician certifications?** *The scope of certification has changed for each one and becomes effective upon the date when you renew your certification. See examples below:*

- *For the FSD Technician:*
  - *If certified (including renewal) **before** August 15, 2023, the certification scope is: the Fire and Smoke Damper Technician is knowledgeable of periodic inspection procedures for fire, smoke and combination fire/smoke dampers, including procedures to conduct differential pressure measurements across, and force testing of stairwell egress doors.*
  - *If certified (including renewal) **after** August 15, 2023, the certification scope is: the Fire and Smoke Damper Technician performs the testing and inspection of fire dampers, smoke dampers, and combination fire/smoke dampers in HVAC systems. The Fire and Smoke Damper Technician maintains an awareness of the requirements for installation, testing, and maintenance of dampers as specified in NFPA 80 and NFPA 105.*
- *For the FSD Supervisor:*
  - *If certified (including renewal) **before** August 15, 2023, the certification scope is: the Fire and Smoke Damper Supervisor oversees and coordinates the work of the Fire and Smoke Damper Technician, plans and directs testing and inspection projects from inception through completion, and ensures procedures follow requirements of applicable codes and standards.*
  - *If certified (including renewal) **after** August 15, 2023, the certification scope is: The Fire and Smoke Damper Supervisor oversees, coordinates, and directs the Fire and Smoke Damper Technician in the method of procedure for testing and inspection of fire dampers, smoke dampers, and combination fire/smoke dampers in HVAC systems in accordance with applicable codes and standards.*

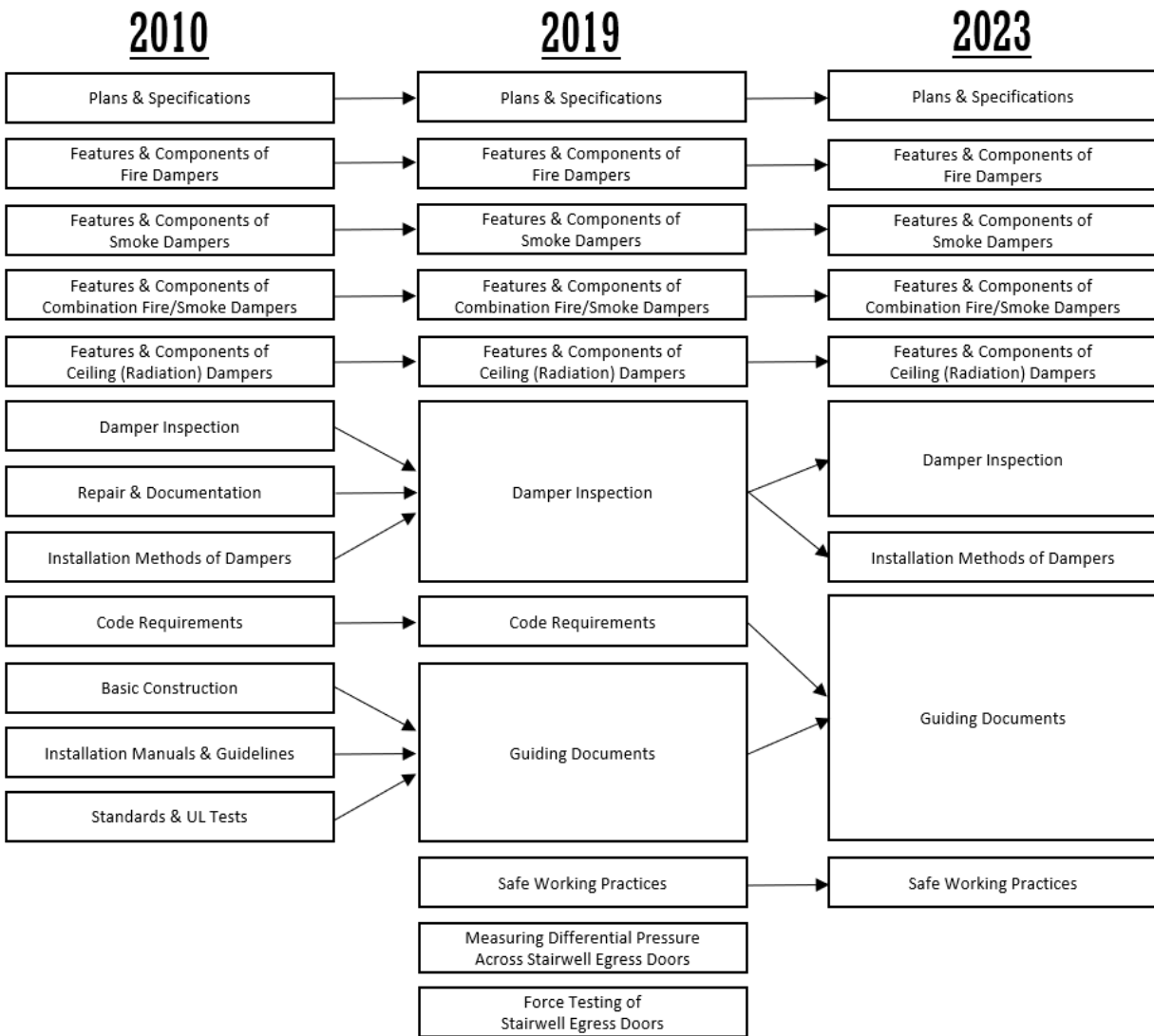
Will upgrade training be required when I renew my current FSD certification? No.

Were the certification exams revised? Yes.

How may I prepare for the revised exams? Follow these steps:

- Become familiar with all subjects defined in the knowledge base (see Attachment 1).
- For the FSD Technician and FSD Technician Stairwell Endorsement: complete the Fire and Smoke Damper Technician online course at [Sheetmetal-iti.org](http://Sheetmetal-iti.org).
- For the FSD Supervisor: complete the Fire and Smoke Damper Supervisor online course at [Training.nemionline.org](http://Training.nemionline.org).
  - Note: You must first apply for the FSD Supervisor certification, then an enrollment code will be provided to you for the course. Apply for certification by visiting [ICBcertified.org](http://ICBcertified.org).

### Evolution of the FSD Certifications



Attachment 1: FSD Knowledge Base

## Fire and Smoke Damper Technician

### Certification Exam

The certification exam consists of 80 questions – 70 are scored, with 10 unscored (beta) to evaluate for possible inclusion on future exam versions. A minimum score of 51 out of 70 is required to pass. The percentage of the certification exam dedicated to each domain is identified in the knowledge base below.

### Scope of Certification

The FSD Technician performs the testing and inspection of fire dampers, smoke dampers, and combination fire/smoke dampers in HVAC systems. The FSD Technician maintains an awareness of the requirements for installation, testing, and maintenance of dampers as specified in NFPA 80 and NFPA 105.

### Codes and Standards References Disclaimer

The codes and standards listed in the knowledge base below were selected for the purpose of this knowledge base. They are not exhaustive and may not include all codes and standards in your jurisdiction for the scope of work. It is the duty of the technician and/or supervisor to verify with the AHJ the applicable codes and standards in the jurisdiction where the work is being performed.

### Knowledge Base

1. Plans and Specifications (10% of exam)
  - a. The FSD Technician performs the following job tasks:
    - i. Reads plans and specifications for HVAC, architectural, and life safety systems
    - ii. Confirms that the appropriate documents are available to perform testing and inspection
  - b. The FSD Technician is knowledgeable of the following elements:
    - i. Responsibilities of the HVAC contractor, architect, mechanical engineer, and fire protection engineer
    - ii. Purpose of fire and smoke dampers for life safety and protection of property
    - iii. Symbols, definitions, and abbreviations commonly used on plans for HVAC and life safety systems
    - iv. As-built drawings
2. Guiding Documents (12% of exam)
  - a. The FSD Technician is knowledgeable of the following elements:
    - i. Fundamental difference between a code and a standard
    - ii. Duties and powers of the Authority Having Jurisdiction (AHJ)
    - iii. Scope and purpose of the following codes:
      1. International Fire Code – 2021
      2. International Mechanical Code – 2021
      3. International Building Code – 2021
      4. NFPA 101 Life Safety Code – 2021
      5. National Fire Code of Canada – 2020
      6. Uniform Mechanical Code – 2021
    - iv. Requirements for installation, testing, and maintenance of dampers in the following standards:
      1. NFPA 80-2022, Chapters 3 and 19
      2. NFPA 105-2022, Chapters 3 and 7
    - v. SMACNA Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems, 6<sup>th</sup> Edition, 2022
    - vi. AMCA Publication 503-08 Fire, Ceiling (Radiation), Smoke and Fire/Smoke Dampers Application Manual, 2008
    - vii. International Building Code - 2021, Chapter 6:

1. Types of construction (I, II, III, IV, and V)
    2. Fire resistance ratings for building elements (hours)
  - viii. Which UL testing and rating standard applies to damper type:
    1. UL 555 - fire dampers
    2. UL 555S - smoke dampers
    3. UL555C - ceiling dampers
  - ix. How codes and standards reference the manufacturer's instructions
3. Features and Components of Fire Dampers (9% of exam)
  - a. The FSD Technician is knowledgeable of the following elements:
    - i. Process of fire damper selection including:
      1. Hourly fire resistance rating
      2. Operability
      3. Dynamic closure
      4. Mounting orientation
      5. Pressure drop
      6. Space envelope
    - ii. Function of fire damper accessories:
      1. Sleeves
      2. Heat responsive devices
      3. Duct access doors
      4. Locking quadrants
      5. Mullions
      6. Blade position indicator
      7. Retaining angles
      8. Solenoid release
      9. Carbon dioxide (CO2) release
4. Features and Components of Smoke Dampers (9% of exam)
  - a. The FSD Technician is knowledgeable of the following elements:
    - i. Process of smoke damper selection including:
      1. Leakage rating
      2. Temperature rating
      3. Operability under heat
      4. Flow and pressure
      5. Control function
      6. Actuating device
5. Features and Components of Combination Fire/Smoke Dampers (9% of exam)
  - a. The FSD Technician is knowledgeable of the following elements:
    - i. Process of combination fire/smoke damper selection including:
      1. Hourly fire resistance rating
      2. Leakage
      3. Temperature and operational ratings
      4. Blade styles
      5. Space envelope
    - ii. Various combination fire/smoke and smoke (leakage rated) damper accessories available including:
      1. Actuator

2. Override package
  3. EP switch (electro-pneumatic or solenoid valve)
6. Features and Components of Ceiling (Radiation) Dampers (7% of exam)
- a. The FSD Technician is knowledgeable of the following elements:
    - i. Process of ceiling (radiation) damper selection including:
      1. Floor/ceiling or roof/ceiling assembly design
      2. Types of ceiling dampers
      3. Space envelope
      4. Mounting configuration
    - ii. Function of ceiling (radiation) damper accessories:
      1. Thermal blanket
      2. Volume control/balancing devices
      3. Fusible links
7. Installation Methods of Dampers (17% of exam)
- a. The FSD Technician is knowledgeable of the following elements:
    - i. Proper installation of dampers:
      1. Using illustrations provided by manufacturer
      2. Type of damper appropriate for the location
      3. Fire resistance rating of the wall or floor assembly and damper selection
      4. Appropriate approvals that comply with the construction documents
      5. Appropriate fire separation clearances
      6. Importance and function of annular space
      7. Sleeves:
        - a. Sleeve length
        - b. Sleeve thickness
        - c. Sleeve connection to duct
        - d. Damper attachment to sleeve
        - e. Rigid connection
        - f. Breakaway connection
      8. Actuators
      9. Retaining (mounting) angles
      10. Damper types - rectangular, round, flat oval
      11. Airflow direction
      12. Access doors
8. Damper Inspection (21% of exam)
- a. The FSD Technician performs the following job tasks:
    - i. Performs inspection and testing of all HVAC FLS safety dampers in accordance with the applicable codes and standards
    - ii. Documents all damper inspections performed
    - iii. Submits report to FSD Supervisor for review
  - b. The FSD Technician is knowledgeable of the following elements:
    - i. Proper application of dry lubricants to damper components
    - ii. Previous inspection and testing reports
    - iii. Documentation procedures
    - iv. Damper inspection failures and how to proceed
    - v. Acceptable replacement parts, e.g., fusible links and actuators

- vi. How to perform damper testing and inspection
- vii. Scope of certification for the FSD Technician
- viii. Details of the Method of Procedure (MOP)

9. Safe Working Practices (6% of exam)

- a. The FSD Technician performs the following job task:
  - i. Follows industry safety standards when performing the job
- b. The FSD Technician is knowledgeable of the following elements:
  - i. Safe working practices while inspecting and testing fire, smoke, and combination fire/smoke dampers
  - ii. OSHA regulations related to inspecting and testing fire, smoke, and combination fire/smoke dampers

## Fire and Smoke Damper Technician Stairwell Endorsement

### Prerequisites

A qualified applicant for the FSD Technician Stairwell Endorsement shall hold the ICB Fire and Smoke Damper Technician certification.

### Certification Exam

The certification exam consists of 35 questions – 30 are scored, with 5 unscored (beta) to evaluate for possible inclusion on future exam versions. A minimum score of 22 out of 30 is required to pass. The percentage of the certification exam dedicated to each domain is identified in the knowledge base below.

### Scope of Certification

The FSD Technician with the Stairwell Endorsement performs limited periodic testing of a single stairwell pressurization system, measures pressure differences and door-opening forces, understands the differences between dedicated and non-dedicated systems and how ambient conditions affect stairwell pressurization systems, documents the results of testing, and submits a report to the employer.

### Codes and References Disclaimer

The codes and standards listed in the knowledge base below were selected for the purpose of this knowledge base. They are not exhaustive and may not include all codes and standards in your jurisdiction for the scope of work. It is the duty of the technician and/or supervisor to verify with the AHJ the applicable codes and standards in the jurisdiction where the work is being performed.

### Job Tasks

The FSD Technician with the Stairwell Endorsement performs the following tasks:

1. Measures and records differential pressure across stairwell egress doors
2. Measures and records the force required to open stairwell egress doors
3. Documents ambient conditions, system operating conditions, and system mode of operation as activated for testing
4. Compares recorded measurements to acceptance testing pass/fail criteria
5. Writes a report and submits it to the employer for review

### Knowledge Base

The FSD Technician with the Stairwell Endorsement is knowledgeable of the following elements:

1. General Construction of Stairwell and Door Operations (15% of exam)
  - a. NFPA 92-2021:
    - i. 4.6.1 Minimum and maximum pressure differences
    - ii. A.4.6.1 Effect of doors on pressure differences
    - iii. Location of supply air source
    - iv. A.4.6.4.2 Multiple injection systems
    - v. Annex F Types of stairwell pressurization systems
  - b. Purpose of pressure differential across stairwell egress doors:
    - i. Handbook of Smoke Control Engineering - 2012, Chapter 9:
      1. Page 218:
        - a. Pressurization Concept
        - b. Opening and Closing Doors
        - c. Figure 9.1 Pressure differential across a barrier can control smoke flow
      2. Page 221:
        - a. Figure 9.6 Pressure differential at boundary of a smoke control system
  - c. Door sweeps:
    - i. Purpose
    - ii. Problems (including but not limited to) affecting stairwell pressurization:
      1. Excessive leakage due to omitted or poorly installed door sweep



2. Inability to achieve the required pressure differential due to excessive leakage around the door sweep
  3. Measuring differential pressure with a process that affects the proper operation of the door sweep
2. Pressure Measurements (25% of exam)
    - a. International Training Institute Fire and Smoke Damper Technician Student Manual, 2nd Edition, P612-2:
      - i. Static (positive and negative), Velocity, and Total
      - ii. External forces that affect measurements:
        1. Temperature effects
        2. Ambient conditions
        3. System effect
        4. Frictional force
        5. Tensional force
        6. Air resistance
  3. Instrumentation Types and Uses (23% of exam)
    - a. International Training Institute Fire and Smoke Damper Technician Student Manual, 2nd Edition, P612-2:
      - i. Including but not limited to:
        1. Measuring differential pressure:
          - a. Magnehelic gauge
          - b. Digital manometer
          - c. Sensing probes:
            - i. Tubes (standard, flexible, and pitot)
        2. Measuring ambient conditions:
          - a. Thermometer
          - b. Hygrometer
        3. Measuring door force:
          - a. Spring-type scales (analog and digital)
  4. Testing Requirements for the System (24% of exam)
    - a. Running conditions of the stairwell that are required for an accurate test
    - b. Roles of other parties for complete stairwell acceptance and how the Technician interfaces (including but not limited to) with the following:
      - i. General contractor; building operating personnel; TAB technician
    - c. NFPA 92-2021:
      - i. 4.4.2.1 Pressure differences across spaces
      - ii. Table 4.4.2.1.1 Minimum design pressure differences across smoke barriers
      - iii. 4.4.2.2 Pressure differences across doors
      - iv. Table A.4.4.2.2 Maximum pressure differences across doors
      - v. 4.10 Vestibules
      - vi. A.4.10.1 Stairwells without vestibules
      - vii. A.4.10.2 Nonpressurized vestibules
      - viii. 4.11 Doors
      - ix. 7.3 Operations and maintenance manual
      - x. 8.4.6.1 Pressure testing
      - xi. A.8.4.6.1.4 Number and location of doors opened for testing
      - xii. 8.4.6.2 Force testing
      - xiii. A.8.4.6.2 Door opening forces
      - xiv. 8.4.6.3 Stairwell pressurization systems
    - d. NFPA 101-2021:

- i. 7.2.1.4.5 Door leaf operating forces
  - e. Conditions under which the Technician conducts limited testing:
    - i. Testing is performed only when acceptance testing procedures are specified
    - ii. Acceptance test procedures and pass/fail criteria are obtained from the employer
    - iii. All testing is performed in the presence of building operating personnel knowledgeable in system operation
    - iv. The system is activated by building operating personnel knowledgeable in system operation. The Technician does **NOT** activate the system for testing
    - v. The Technician does **NOT** make adjustments to the system
- 5. Code References (13% of exam)
  - a. International Fire Code - 2021:
    - i. 909.6 Pressurization method
    - ii. 909.22.4 Dedicated smoke control systems
    - iii. 909.22.5 Nondedicated smoke control systems
    - iv. 1010.2.9.3 Installation of panic or fire exit hardware
  - b. International Building Code - 2021:
    - i. 909.6 Pressurization method
    - ii. 909.20.4.4 Stairway or ramp shaft air movement system
    - iii. 909.20.5 Stairway and ramp pressurization alternative
    - iv. 1010.2.9.3 Installation of panic or fire exit hardware
  - c. NFPA 101-2021:
    - i. Chapter 7

## Fire and Smoke Damper Supervisor

### Prerequisites

In addition to the eligibility requirements in Section 3.2 of this manual, the Fire and Smoke Damper (FSD) 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 90 questions – 80 are scored, with 10 unscored (beta) to evaluate for possible inclusion on future exam versions. A minimum score of 57 out of 80 is required to pass. The percentage of the certification exam dedicated to each domain is identified in the knowledge base below.

### Scope of Certification

The FSD Supervisor oversees, coordinates, and directs the FSD Technician in the method of procedure for testing and inspection of fire dampers, smoke dampers, and combination fire/smoke dampers in HVAC systems in accordance with applicable codes and standards.

### Codes and Standards References Disclaimer

The codes and standards listed in the knowledge base below were selected for the purpose of this knowledge base. They are not exhaustive and may not include all codes and standards in your jurisdiction for the scope of work. It is the duty of the technician and/or supervisor to verify with the AHJ the applicable codes and standards in the jurisdiction where the work is being performed.

### Knowledge Base

1. Plans and Specifications (9% of exam)
  - a. The FSD Supervisor performs the following job tasks:
    - i. Reviews applicable construction and design documents
    - ii. Locates and documents fire and smoke barriers
  - b. The FSD Supervisor is knowledgeable of the following elements:
    - i. Responsibilities of the HVAC contractor, architect, mechanical engineer, and fire protection engineer
    - ii. Purpose of fire and smoke dampers for life safety and protection of property
    - iii. Symbols, definitions, and abbreviations commonly used on plans for HVAC and life safety systems
    - iv. As-built drawings
    - v. How to read plans and specifications for HVAC and life safety systems
    - vi. Methods to identify and locate fire and smoke barriers
    - vii. How to identify the specifications used when the building was constructed/remodeled
2. Guiding Documents (17% of exam)
  - a. The FSD Supervisor performs the following job task:
    - i. Reviews applicable codes and standards
  - b. The FSD Supervisor is knowledgeable of the following elements:
    - i. Fundamental difference between a code and a standard
    - ii. Duties and powers of the Authority Having Jurisdiction (AHJ)

- iii. Scope and purpose of the following codes:
  - 1. International Fire Code - 2021
  - 2. International Mechanical Code - 2021
  - 3. International Building Code - 2021
  - 4. NFPA 101 Life Safety Code - 2021
  - 5. National Fire Code of Canada - 2020
  - 6. Uniform Mechanical Code - 2021
- iv. Requirements for installation, testing, and maintenance of dampers in the following standards:
  - 1. NFPA 80-2022, Chapters 3 and 19
  - 2. NFPA 105-2022, Chapters 3 and 7
- v. SMACNA Fire, Smoke, and Radiation Damper Installation Guide for HVAC Systems, 6<sup>th</sup> Edition, 2022
- vi. AMCA Publication 503-08 Fire, Ceiling (Radiation), Smoke and Fire/Smoke Dampers Application Manual, 2008
- vii. International Building Code - 2021, Chapter 6:
  - 1. Types of construction (I, II, III, IV, and V)
  - 2. Fire resistance ratings for building elements (hours)
- viii. Which UL testing and rating standard applies to damper type:
  - 1. UL 555 - fire dampers
  - 2. UL 555S - smoke dampers
  - 3. UL555C - ceiling dampers
- ix. How codes and standards reference the manufacturer's instructions

3. Features and Components of Fire Dampers (7% of exam)

- a. The FSD Supervisor is knowledgeable of the following elements:
  - i. Process of fire damper selection including:
    - 1. Hourly fire resistance rating
    - 2. Operability
    - 3. Dynamic closure
    - 4. Mounting orientation
    - 5. Pressure drop
    - 6. Space envelope
  - ii. Function of fire damper accessories:
    - 1. Sleeves
    - 2. Heat responsive devices
    - 3. Duct access doors
    - 4. Locking quadrants
    - 5. Mullions
    - 6. Blade position indicator
    - 7. Retaining angles
    - 8. Solenoid release
    - 9. Carbon dioxide (CO<sub>2</sub>) release

4. Features and Components of Smoke Dampers (7% of exam)

- a. The FSD Supervisor is knowledgeable of the following elements:
  - i. Process of smoke damper selection including:
    - 1. Leakage rating
    - 2. Temperature rating

3. Operability under heat
  4. Flow and pressure
  5. Control function
  6. Actuating device
5. Features and Components of Combination Fire/Smoke Dampers (7% of exam)
- a. The FSD Supervisor is knowledgeable of the following elements:
    - i. Process of combination fire/smoke damper selection including:
      1. Hourly fire resistance rating
      2. Leakage
      3. Temperature and operational ratings
      4. Blade styles
      5. Space envelope
    - ii. Various combination fire/smoke and smoke (leakage rated) damper accessories available including:
      1. Actuator
      2. Override package
      3. EP switch (electro-pneumatic or solenoid valve)
6. Features and Components of Ceiling (Radiation) Dampers (7% of exam)
- a. The FSD Supervisor is knowledgeable of the following elements:
    - i. Process of ceiling (radiation) damper selection including:
      1. Floor/ceiling or roof/ceiling assembly design
      2. Types of ceiling dampers
      3. Space envelope
      4. Mounting configuration
    - ii. Function of ceiling (radiation) damper accessories:
      1. Thermal blanket
      2. Volume control/balancing devices
      3. Fusible links
7. Installation Methods of Dampers (10% of exam)
- a. The FSD Supervisor is knowledgeable of the following elements:
    - i. Proper installation of dampers:
      1. Using illustrations provided by manufacturer
      2. Type of damper appropriate for the location
      3. Fire resistance rating of the wall or floor assembly and damper selection
      4. Appropriate approvals that comply with the construction documents
      5. Appropriate fire separation clearances
      6. Importance and function of annular space
      7. Sleeves:
        - a. Sleeve length
        - b. Sleeve thickness
        - c. Sleeve connection to duct
        - d. Damper attachment to sleeve
        - e. Rigid connection
        - f. Breakaway connection
      8. Actuators
      9. Retaining (mounting) angles

10. Damper types - rectangular, round, flat oval
11. Airflow direction
12. Access doors

8. Damper Inspection (15% of exam)

- a. The FSD Supervisor performs the following job tasks:
  - i. Oversees, coordinates, and directs the work of the FSD Technician
  - ii. Coordinates with FLS controls contractor and/or building engineer
  - iii. Reviews FSD Technician report and submits to AHJ for approval
- b. The FSD Supervisor is knowledgeable of the following elements:
  - i. Proper application of dry lubricants to damper components
  - ii. Previous inspection and testing reports
  - iii. Documentation procedures
  - iv. Damper inspection failures and how to proceed
  - v. Acceptable replacement parts, e.g., fusible links and actuators
  - vi. How to perform damper testing and inspection
  - vii. Scope of certification for the FSD Technician
  - viii. Scope of certification for the FSD Supervisor
  - ix. Details of the Method of Procedure (MOP)
  - x. Integration of damper actuator with electrical circuits and/or fire alarm panels

9. Safe Working Practices (7% of exam)

- a. The FSD Supervisor performs the following job task:
  - i. Assesses field conditions and provides safety procedures
- b. The FSD Supervisor is knowledgeable of the following elements:
  - i. Safe working practices while inspecting and testing fire, smoke, and combination fire/smoke dampers.
  - ii. OSHA regulations related to inspecting and testing fire, smoke, and combination fire/smoke dampers.
  - iii. Requirements in NFPA 70E - 2021 to reduce exposure to electrical hazards:
    1. Chapter 1 - Articles 105, 110, 120, 130.1, 130.2(A)
    2. Informative Annexes I and K

10. Method of Procedure (MOP) (14% of exam)

- a. The FSD Supervisor performs the following job tasks:
  - i. Identifies how operational, acceptance and periodic testing apply
  - ii. Identifies who the AHJ is for the local jurisdiction
  - iii. Writes a Method of Procedure (MOP)
  - iv. Submits MOP to AHJ and customer
- b. The FSD Supervisor is knowledgeable of the following elements:
  - i. Scope of work related to testing and inspection
  - ii. Building code requirements related to HVAC FLS inspection
  - iii. Process of identifying testing requirements based on the applicable code(s) under which the building was permitted
  - iv. Site-specific testing and inspection procedures
  - v. Special access needs