For the development of the 2018 edition of the I-Codes, there will be three groups of code development committees and they will meet in separate years. Note that these are tentative groupings.

Group A Codes (Heard in 2015, Code Change Proposals Deadline: January 12, 2015)	**Group B Codes (Heard in 2016, Code Change Proposals Deadline: January 11, 2016)**	**Group C Codes (Heard in 2017, Code Change Proposals Deadline: January 11, 2017)**
International Building Code – Fire Safety (Chapters 7, 8, 9, 14, 26) – Means of Egress (Chapters 10, 11, Appendix E) – General (Chapters 2-6, 12, 27-33, Appendices A, B, C, D, K)	Administrative Provisions (Chapter 1 of all codes except IRC and IECC, administrative updates to currently referenced standards, and designated definitions)	International Green Construction Code
International Fuel Gas Code	International Building Code – Structural (Chapters 15-25, Appendices F, G, H, I, J, L, M)	
International Existing Building Code	International Energy Conservation Code	
International Mechanical Code	International Fire Code	
International Plumbing Code	International Residential Code – IRC-B (Chapters 1-10, Appendices E, F, H, J, K, L M, O, R, S, T, U)	
International Private Sewage Disposal Code	International Wildland-Urban Interface Code	
International Property Maintenance Code		
International Residential Code – IRC-Mechanical (Chapters 12-24) – IRC-Plumbing (Chapter 25-33, Appendices G, I, N, P)		
International Swimming Pool and Spa Code		
International Zoning Code		

Note: Proposed changes to the ICC *Performance Code* will be heard by the code development committee noted in brackets [ ] in the text of the code.

~~Code change proposals submitted for code sections that have a letter designation in front of them will be heard by the respective committee responsible for such code sections. Because different committees hold code development hearings in different years, proposals for this code will be heard by committees in both the 2015 (Group A) and the 2016 (Group B) code development cycles.~~

~~For example, every section of Chapter 1 of this code is designated as the responsibility of the Administrative Code Development Committee, and that committee is part of the Group B code hearings. This committee will conduct its code development hearings in 2016 to consider all code change proposals for Chapter 1 of this code and proposals for Chapter 1 of all I-Codes except the *International Energy Conservation Code*, the ICC *Performance Code* and the *International Residential Code*. Therefore, any proposals received for Chapter 1 of this code will be deferred for consideration in 2016 by the Administrative Code Development Committee.~~

~~Another example is Section 606.4 of this code which is designated as the responsibility of the International Fire Code Development Committee. This committee will conduct its code development hearings in 2016 to consider code change proposals in its purview, which includes any proposals to Section 606.4.~~

~~In some cases, another committee in Group A will be responsible for a section of this code. For example, Section 607 has a [BF] in front of the numbered sections, indicating that these sections of the code are the responsibility of one of the International Building Code Development Committees. The International Building Code is in Group A; therefore, any code change proposals to this section will be due before the Group A deadline of January 2015, and these code change proposals will be assigned to the appropriate International Building Code Development Committee for consideration.~~

~~It is very important that anyone submitting code change proposals understand which code development committee is responsible for the section of the code that is the subject of the code change proposal. For further information on the code development committee responsibilities, please visit the ICC website at www.iccsafe.org/scoping.~~

Appendix B Recommended Permit Fee Schedule. Deleted. ~~Appendix B provides a sample permit fee schedule for mechanical permits. The local jurisdiction can adopt this appendix and fill in the dollar amounts in the blank spaces to establish their official permit fee schedule. The ICC does not establish permit fees because the code is adopted throughout the country and there are vast differences in operating budgets between different parts of the country, as well as between large and small municipalities within the same region.~~

LEGISLATION

Jurisdictions wishing to adopt the 2015 *International Mechanical Code* as an enforceable regulation governing mechanical systems should ensure that certain factual information is included in the adopting legislation at the time adoption is being considered by the appropriate governmental body. The following sample adoption legislation addresses several key elements, including the information required for insertion into the code text. See NC Administrative code

SAMPLE LEGISLATION FOR ADOPTION OF
THE *INTERNATIONAL MECHANICAL CODE*
ORDINANCE NO._____

A**[N] [ORDINANCE/STATUTE/REGULATION]** of the **[JURISDICTION]** adopting the 2015 edition of the *International Mechanical Code*, regulating and governing the design, construction, quality of materials, erection, installation, alteration, repair, location, relocation, replacement, addition to, use or maintenance of mechanical systems in the **[JURISDICTION]**; providing for the issuance of permits and collection of fees therefor; repealing **[ORDINANCE/STATUTE/REGULATION]** No. _____ of the **[JURISDICTION]** and all other ordinances or parts of laws in conflict therewith.

The **[GOVERNING BODY]** of the **[JURISDICTION]** does ordain as follows:

Section 1. That a certain document, three (3) copies of which are on file in the office of the **[TITLE OF JURISDICTION'S KEEPER OF RECORDS]** of **[NAME OF JURISDICTION]**, being marked and designated as the *International Mechanical Code*, 2015 edition, including Appendix Chapters **[FILL IN THE APPENDIX CHAPTERS BEING ADOPTED]**, as published by the International Code Council, be and is hereby adopted as the Mechanical Code of the **[JURISDICTION]**, in the State of **[STATE NAME]** regulating and governing the design, construction, quality of materials, erection, installation, alteration, repair, location, relocation, replacement, addition to, use or maintenance of mechanical systems as herein provided; providing for the issuance of permits and collection of fees therefor; and each and all of the regulations, provisions, penalties, conditions and terms of said Mechanical Code on file in the office of the **[JURISDICTION]** are hereby referred to, adopted, and made a part hereof, as if fully set out in this legislation, with the additions, insertions, deletions and changes, if any, prescribed in Section 2 of this ordinance.

Section 2. The following sections are hereby revised:

Section 101.1. Insert: **[NAME OF JURISDICTION]**

Section 106.5.2. Insert: **[APPROPRIATE SCHEDULE]**

Section 106.5.3. Insert: **[PERCENTAGES IN TWO LOCATIONS]**

Section 108.4. Insert: **[OFFENSE, DOLLAR AMOUNT, NUMBER OF DAYS]**

Section 108.5. Insert: **[DOLLAR AMOUNT IN TWO LOCATIONS]**

Section 3. That **[ORDINANCE/STATUTE/REGULATION]** No. _____ of **[JURISDICTION]** entitled **[FILL IN HERE THE COMPLETE TITLE OF THE LEGISLATION OR LAWS IN EFFECT AT THE PRESENT TIME SO THAT THEY WILL BE REPEALED BY DEFINITE MENTION]** and all other ordinances or parts of laws in conflict herewith are hereby repealed.

Section 4. That if any section, subsection, sentence, clause or phrase of this legislation is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance. The **[GOVERNING BODY]** hereby declares that it would have passed this law, and each section, subsection, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and phrases be declared unconstitutional.

Section 5. That nothing in this legislation or in the Mechanical Code hereby adopted shall be construed to affect any suit or proceeding impending in any court, or any rights acquired, or liability incurred, or any cause or causes of action acquired or existing, under any act or ordinance hereby repealed as cited in Section 2 of this law; nor shall any just or legal right or remedy of any character be lost, impaired or affected by this legislation.

Section 6. That the **[JURISDICTION'S KEEPER OF RECORDS]** is hereby ordered and directed to cause this legislation to be published. (An additional provision may be required to direct the number of times the legislation is to be published and to specify that it is to be in a newspaper in general circulation. Posting may also be required.)

Section 7. That this law and the rules, regulations, provisions, requirements, orders and matters established and adopted hereby shall take effect and be in full force and effect **[TIME PERIOD]** from and after the date of its final passage and adoption.

[A] 101.1 Title.
These regulations shall be known as the *Mechanical Code* of [NAME OF JURISDICTION], hereinafter referred to as "this code."
101.1 Title. These regulations shall be known as the *North Carolina Mechanical Code* as adopted by the North Carolina Building Code Council on XXXXXXXX, 2XXX, to be effective September XX, 2XXX. References to the *International Codes* shall mean the North Carolina Codes. The North Carolina amendments to the *International Codes* are underlined.

[A] 101.2.1 Appendices.
Provisions in the appendices shall not apply unless specifically adopted or referenced in this code.

101.5 Requirements of other State agencies, occupational licensing boards or commissions. The North Carolina State Building Codes do not include all additional requirements for buildings and structures that may be imposed by other State agencies, occupational licensing boards and commissions. It shall be the responsibility of a permit holder, registered design professional, contractor or occupational license holder to determine whether any additional requirements exist.

[A] 102.3 Maintenance.
Mechanical systems, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition.

Devices or safeguards that are required by this code shall be maintained in compliance with the edition of the code under which they were installed. The owner or the owner's authorized agent shall be responsible for maintenance of mechanical systems. To determine compliance with this provision, the code official shall have the authority to require a mechanical system to be reinspected.

~~The inspection for maintenance of HVAC systems shall be performed in accordance with ASHRAE/ACCA/ANSI Standard 180.~~

SECTION 103
DEPARTMENT OF MECHANICAL INSPECTION

Deleted. See North Carolina Administrative Code and Policies.

~~[A] 103.1 General.~~

~~The department of mechanical inspection is hereby created and the executive official in charge thereof shall be known as the code official.~~

~~[A] 103.2 Appointment.~~

~~The code official shall be appointed by the chief appointing authority of the jurisdiction.~~

~~[A] 103.3 Deputies.~~

~~In accordance with the prescribed procedures of this jurisdiction and with the concurrence of the appointing authority, the code official shall have the authority to appoint a deputy code official, other related technical officers, inspectors and other employees. Such employees shall have powers as delegated by the code official.~~

~~[A] 103.4 Liability.~~

~~The code official, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally, and is hereby relieved from personal liability for any damage accruing to persons or property as a result of an act or by reason of an act or omission in the discharge of official duties.~~

~~[A] 103.4.1 Legal defense.~~

~~Any suit or criminal complaint instituted against any officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by the legal representatives of the jurisdiction until the final termination of the proceedings. The code official or any subordinate shall not be liable for costs in an action, suit or proceeding that is instituted in pursuance of the provisions of this code.~~

SECTION 104
DUTIES AND POWERS OF THE CODE OFFICIAL

~~[A] 104.1 General.~~

~~The code official is hereby authorized and directed to enforce the provisions of this code. The code official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.~~

[A] 104.2 Applications and permits.
The code official shall receive applications, review *construction documents* and issue permits for the installation and *alteration* of mechanical systems, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

[A] 104.3 Inspections.
The code official shall make all of the required inspections, or shall accept reports of inspection by *approved* agencies or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such *approved* agency or by the responsible individual. The code official is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

[A] 104.4 Right of entry.
Where it is necessary to make an inspection to enforce the provisions of this code, or where the code official has reasonable cause to believe that there exists in a building or upon any premises any conditions or violations of this code that make the building or premises unsafe, insanitary, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official has recourse to every remedy provided by law to secure entry.

Where the code official has first obtained a proper inspection warrant or other remedy provided by law to secure entry, an owner, the owner's authorized agent or occupant or person having charge, care or control of the building or premises shall not fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

[A] 104.5 Identification.
The code official shall carry proper identification when inspecting structures or premises in the performance of duties under this code.

[A] 104.6 Notices and orders.
The code official shall issue all necessary notices or orders to ensure compliance with this code.

[A] 104.7 Department records.
The code official shall keep official records of applications received, permits and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official records for the period required for retention of public records.

Deleted. See North Carolina Administrative Code and Policies.

[A] 106.1.1 Annual permit.
Instead of an individual construction permit for each alteration to an already *approved* system or equipment or application installation, the code official is authorized to issue an

annual permit upon application therefor to any person, firm or corporation regularly employing one or more qualified tradespersons in the building, structure or on the premises owned or operated by the applicant for the permit.

[A] 106.1.2 Annual permit records.
The person to whom an annual permit is issued shall keep a detailed record of alterations made under such annual permit. The code official shall have access to such records at all times or such records shall be filed with the code official as designated.

[A] 106.2 Permits not required.
Permits shall not be required for the following:

1. Portable heating appliances.

2. Portable ventilation appliances and *equipment*.

3. Portable cooling units.

4. Steam, hot water or chilled water piping within any heating or cooling *equipment* or appliances regulated by this code.

5. The replacement of any minor part that does not alter the approval of *equipment* or an *appliance* or make such *equipment* or *appliance* unsafe.

6. Portable evaporative coolers.

7. Self-contained refrigeration systems that contain 10 pounds (4.5 kg) or less of refrigerant, or that are actuated by motors of 1 horsepower (0.75 kW) or less.

8. Portable fuel cell appliances that are not connected to a fixed piping system and are not interconnected to a power grid.

Exemption from the permit requirements of this code shall not be deemed to grant authorization for work to be done in violation of the provisions of this code or other laws or ordinances of this jurisdiction.

[A] 106.3 Application for permit.
Each application for a permit, with the required fee, shall be filed with the code official on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or the owner's authorized agent. The permit application shall indicate the proposed *occupancy* of all parts of the building and of that portion of the site or lot, if any, not covered by the building or structure and shall contain such other information required by the code official.

[A] 106.3.1 Construction documents.
Construction documents, engineering calculations, diagrams and other data shall be submitted in two or more sets with each application for a permit. The code official shall require *construction documents*, computations and specifications to be prepared and designed by a *registered design professional* where required by state law. Where special conditions exist, the code official is authorized to require additional *construction documents*

to be prepared by a *registered design professional*. *Construction documents* shall be drawn to scale and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that the work conforms to the provisions of this code. *Construction documents* for buildings more than two stories in height shall indicate where penetrations will be made for mechanical systems, and the materials and methods for maintaining required structural safety, fireresistance rating and fireblocking.

Exception: The code official shall have the authority to waive the submission of *construction documents*, calculations or other data if the nature of the work applied for is such that reviewing of *construction documents* is not necessary to determine compliance with this code.

[A] 106.3.2 Preliminary inspection.
Before a permit is issued, the code official is authorized to inspect and evaluate the systems, *equipment*, buildings, devices, premises and spaces or areas to be used.

[A] 106.3.3 Time limitation of application.
An application for a permit for any proposed work shall be deemed to have been abandoned 180 days after the date of filing, unless such application has been pursued in good faith or a permit has been issued; except that the code official shall have the authority to grant one or more extensions of time for additional periods not exceeding 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

[A] 106.4 Permit issuance.
The application, *construction documents* and other data filed by an applicant for a permit shall be reviewed by the code official. If the code official finds that the proposed work conforms to the requirements of this code and all laws and ordinances applicable thereto, and that the fees specified in Section 106.5 have been paid, a permit shall be issued to the applicant.

[A] 106.4.1 Approved construction documents.
When the code official issues the permit where *construction documents* are required, the *construction documents* shall be endorsed in writing and stamped "*APPROVED*." Such *approved construction documents* shall not be changed, modified or altered without authorization from the code official. Work shall be done in accordance with the *approved construction documents*.

The code official shall have the authority to issue a permit for the construction of part of a mechanical system before the *construction documents* for the entire system have been submitted or *approved*, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holder of such permit shall proceed at his or her own risk without assurance that the permit for the entire mechanical system will be granted.

[A] 106.4.2 Validity.
The issuance of a permit or approval of *construction documents* shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or of other ordinances of the jurisdiction. A permit presuming to give authority to violate or cancel the provisions of this code shall be invalid.

The issuance of a permit based upon *construction documents* and other data shall not prevent the code official from thereafter requiring the correction of errors in said *construction documents* and other data or from preventing building operations from being carried on thereunder where in violation of this code or of other ordinances of this jurisdiction.

[A] 106.4.3 Expiration.
Every permit issued by the code official under the provisions of this code shall expire by limitation and become null and void if the work authorized by such permit is not commenced within 180 days from the date of such permit, or if the work authorized by such permit is suspended or abandoned at any time after the work is commenced for a period of 180 days. Before such work recommences, a new permit shall be first obtained and the fee therefor shall be one-half the amount required for a new permit for such work, provided that changes have not been made and will not be made in the original *construction documents* for such work, and provided further that such suspension or abandonment has not exceeded one year.

[A] 106.4.4 Extensions.
A permittee holding an unexpired permit shall have the right to apply for an extension of the time within which the permittee will commence work under that permit when work is unable to be commenced within the time required by this section for good and satisfactory reasons. The code official shall extend the time for action by the permittee for a period not exceeding 180 days if there is reasonable cause. A permit shall not be extended more than once. The fee for an extension shall be one-half the amount required for a new permit for such work.

[A] 106.4.5 Suspension or revocation of permit.
The code official shall have the authority to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

[A] 106.4.6 Retention of construction documents.
One set of *approved construction documents* shall be retained by the code official for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws. One set of *approved construction documents* shall be returned to the applicant, and said set shall be kept on the site of the building or job at all times during which the work authorized thereby is in progress.

[A] 106.4.7 Previous approvals.
This code shall not require changes in the *construction documents*, construction or designated *occupancy* of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

[A] 106.4.8 Posting of permit.
The permit or a copy shall be kept on the site of the work until the completion of the project.

[A] 106.5 Fees.
A permit shall not be issued until the fees prescribed in Section 106.5.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, due to an increase of the mechanical system, has been paid.

[A] 106.5.1 Work commencing before permit issuance.
Any person who commences work on a mechanical system before obtaining the necessary permits shall be subject to 100 percent of the usual permit fee in addition to the required permit fees.

[A] 106.5.2 Fee schedule.
The fees for mechanical work shall be as indicated in the following schedule.

[JURISDICTION TO INSERT APPROPRIATE SCHEDULE]

[A] 106.5.3 Fee refunds.
The code official shall authorize the refunding of fees as follows.

1. The full amount of any fee paid hereunder which was erroneously paid or collected.

2. Not more than **[SPECIFY PERCENTAGE]** percent of the permit fee paid where work has not been done under a permit issued in accordance with this code.

3. Not more than **[SPECIFY PERCENTAGE]** percent of the plan review fee paid where an application for a permit for which a plan review fee has been paid is withdrawn or canceled before any plan review effort has been expended.

The code official shall not authorize the refunding of any fee paid, except upon written application filed by the original permittee not later than 180 days after the date of fee payment.

Deleted. See North Carolina Administrative Code and Policies.

[A] 107.1 General.
The code official is authorized to conduct such inspections as are deemed necessary to determine compliance with the provisions of this code. Construction or work for which a permit is required shall be subject to inspection by the code official, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid.

[A] 107.2 Required inspections and testing.
The code official, upon notification from the permit holder or the permit holder's agent, shall make the following inspections and other such inspections as necessary, and shall either release that portion of the construction or shall notify the permit holder or the permit holder's agent of violations that must be corrected. The holder of the permit shall be responsible for the scheduling of such inspections.

1. Underground inspection shall be made after trenches or ditches are excavated and bedded, piping installed, and before backfill is put in place. Where excavated soil contains rocks, broken concrete, frozen chunks and other rubble that would damage or break the piping or cause corrosive action, clean backfill shall be on the job site.

2. Rough-in inspection shall be made after the roof, framing, fireblocking and bracing are in place and all ducting and other components to be concealed are complete, and prior to the installation of wall or ceiling membranes.

3. Final inspection shall be made upon completion of the mechanical system.

Exception: Ground-source heat pump loop systems tested in accordance with Section 1210.10 shall be permitted to be backfilled prior to inspection.

The requirements of this section shall not be considered to prohibit the operation of any heating *equipment* or appliances installed to replace existing heating *equipment* or appliances serving an occupied portion of a structure provided that a request for inspection of such heating *equipment* or appliances has been filed with the department not more than 48 hours after such replacement work is completed, and before any portion of such *equipment* or appliances is concealed by any permanent portion of the structure.

[A] 107.2.1 Other inspections.
In addition to the inspections specified in Section 107.2, the code official is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced.

[A] 107.2.2 Inspection requests.
It shall be the duty of the holder of the permit or their duly authorized agent to notify the code official when work is ready for inspection. It shall be the duty of the permit holder to provide *access* to and means for inspections of such work that are required by this code.

[A] 107.2.3 Approval required.
Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the code official. The code official, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the code official.

[A] 107.2.4 Approved inspection agencies.
The code official is authorized to accept reports of *approved* agencies, provided that such agencies satisfy the requirements as to qualifications and reliability.

[A] 107.2.5 Evaluation and follow-up inspection services.
Prior to the approval of a prefabricated construction assembly having concealed mechanical work and the issuance of a mechanical permit, the code official shall require the submittal of an evaluation report on each prefabricated construction assembly, indicating the complete details of the mechanical system, including a description of the system and its components, the basis upon which the system is being evaluated, test results and similar information, and other data as necessary for the code official to determine conformance to this code.

[A] 107.2.5.1 Evaluation service.
The code official shall designate the evaluation service of an *approved* agency as the evaluation agency, and review such agency's evaluation report for adequacy and conformance to this code.

[A] 107.2.5.2 Follow-up inspection.
Except where ready access is provided to mechanical systems, service *equipment* and accessories for complete inspection at the site without disassembly or dismantling, the code official shall conduct the in-plant inspections as frequently as necessary to ensure conformance to the *approved* evaluation report or shall designate an independent, *approved* inspection agency to conduct such inspections. The inspection agency shall furnish the code official with the follow-up inspection manual and a report of inspections upon request, and the mechanical system shall have an identifying label permanently affixed to the system indicating that factory inspections have been performed.

[A] 107.2.5.3 Test and inspection records.
Required test and inspection records shall be available to the code official at all times during the fabrication of the mechanical system and the erection of the building; or such records as the code official designates shall be filed.

[A] 107.3 Testing.
Mechanical systems shall be tested as required in this code and in accordance with Sections 107.3.1 through 107.3.3. Tests shall be made by the permit holder and observed by the code official.

[A] 107.3.1 New, altered, extended or repaired systems.
New mechanical systems and parts of existing systems, which have been altered, extended, renovated or repaired, shall be tested as prescribed herein to disclose leaks and defects.

[A] 107.3.2 Apparatus, material and labor for tests.
Apparatus, material and labor required for testing a mechanical system or part thereof shall be furnished by the permit holder.

[A] 107.3.3 Reinspection and testing.
Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the code official for inspection and testing.

[A] 107.4 Approval.
After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the code official.

[A] 107.4.1 Revocation.
The code official is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the notice is issued in error, on the basis of incorrect information supplied, or where it is determined that the building or structure, premise or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

[A] 107.5 Temporary connection.
The code official shall have the authority to authorize the temporary connection of a mechanical system to the sources of energy for the purpose of testing mechanical systems or for use under a temporary certificate of *occupancy*.

[A] 107.6 Connection of service utilities.
A person shall not make connections from a utility, source of energy, fuel or power to any building or system that is regulated by this code for which a permit is required, until authorized by the code official.

Deleted. See North Carolina Administrative Code and Policies.

SECTION 108
VIOLATIONS

[A] 108.1 Unlawful acts.
It shall be unlawful for a person, firm or corporation to erect, construct, alter, repair, remove, demolish or utilize a mechanical system, or cause same to be done, in conflict with or in violation of any of the provisions of this code.

[A] 108.2 Notice of violation.
The code official shall serve a notice of violation or order to the person responsible for the erection, installation, *alteration*, extension, repair, removal or demolition of mechanical work in violation of the provisions of this code, or in violation of a detail statement or the *approved construction documents* thereunder, or in violation of a permit or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

[A] 108.3 Prosecution of violation.
If the notice of violation is not complied with promptly, the code official shall request the legal counsel of the jurisdiction to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful *occupancy* of the structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

[A] 108.4 Violation penalties.
Persons who shall violate a provision of this code or shall fail to comply with any of the requirements thereof or who shall erect, install, alter or repair mechanical work in violation of the *approved construction documents* or directive of the code official, or of a permit or certificate issued under the provisions of this code, shall be guilty of a [SPECIFY OFFENSE], punishable by a fine of not more than [AMOUNT] dollars or by imprisonment not exceeding [NUMBER OF DAYS], or both such fine and imprisonment. Each day that a violation continues after due notice has been served shall be deemed a separate offense.

[A] 108.5 Stop work orders.
Upon notice from the code official that mechanical work is being performed contrary to the provisions of this code or in a dangerous or unsafe manner, such work shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, or to the owner's authorized agent, or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work on the system after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable for a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

[A] 108.6 Abatement of violation.

The imposition of the penalties herein prescribed shall not preclude the legal officer of the jurisdiction from instituting appropriate action to prevent unlawful construction or to restrain, correct or abate a violation, or to prevent illegal *occupancy* of a building, structure or premises, or to stop an illegal act, conduct, business or utilization of the mechanical system on or about any premises.

[A] 108.7 Unsafe mechanical systems.

A mechanical system that is unsafe, constitutes a fire or health hazard, or is otherwise dangerous to human life, as regulated by this code, is hereby declared as an unsafe mechanical system. Use of a mechanical system regulated by this code constituting a hazard to health, safety or welfare by reason of inadequate maintenance, dilapidation, fire hazard, disaster, damage or abandonment is hereby declared an unsafe use. Such unsafe *equipment* and appliances are hereby declared to be a public nuisance and shall be abated by repair, rehabilitation, demolition or removal.

[A] 108.7.1 Authority to condemn mechanical systems.

Whenever the code official determines that any mechanical system, or portion thereof, regulated by this code has become hazardous to life, health, property, or has become insanitary, the code official shall order in writing that such system either be removed or restored to a safe condition. A time limit for compliance with such order shall be specified in the written notice. A person shall not use or maintain a defective mechanical system after receiving such notice.

Where such mechanical system is to be disconnected, written notice as prescribed in Section 108.2 shall be given. In cases of immediate danger to life or property, such disconnection shall be made immediately without such notice.

[A] 108.7.2 Authority to order disconnection of energy sources.

The code official shall have the authority to order disconnection of energy sources supplied to a building, structure or mechanical system regulated by this code, where it is determined that the mechanical system or any portion thereof has become hazardous or unsafe. Written notice of such order to disconnect service and the causes therefor shall be given within 24 hours to the owner, the owner's authorized agent and occupant of such building, structure or premises, provided, however, that in cases of immediate danger to life or property, such disconnection shall be made immediately without such notice. Where energy sources are provided by a public utility, the code official shall immediately notify the serving utility in writing of the issuance of such order to disconnect.

[A] 108.7.3 Connection after order to disconnect.

A person shall not make energy source connections to mechanical systems regulated by this code which have been disconnected or ordered to be disconnected by the code official, or the use of which has been ordered to be discontinued by the code official until the code official authorizes the reconnection and use of such mechanical systems.

Where a mechanical system is maintained in violation of this code, and in violation of a notice issued pursuant to the provisions of this section, the code official shall institute appropriate action to prevent, restrain, correct or abate the violation.

Deleted. See North Carolina Administrative Code and Policies.

SECTION 109
MEANS OF APPEAL

[A] 109.1 Application for appeal.
A person shall have the right to appeal a decision of the code official to the board of appeals. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction is proposed. The application shall be filed on a form obtained from the code official within 20 days after the notice was served.

[A] 109.1.1 Limitation of authority.
The board of appeals shall not have authority relative to interpretation of the administration of this code nor shall such board be empowered to waive requirements of this code.

[A] 109.2 Membership of board.
The board of appeals shall consist of five members appointed by the chief appointing authority as follows: one for 5 years; one for 4 years; one for 3 years; one for 2 years; and one for 1 year. Thereafter, each new member shall serve for 5 years or until a successor has been appointed.

[A] 109.2.1 Qualifications.
The board of appeals shall consist of five individuals, one from each of the following professions or disciplines.

1. *Registered design professional* who is a registered architect; or a builder or superintendent of building construction with not less than 10 years' experience, 5 of which shall have been in responsible charge of work.

2. *Registered design professional* with structural engineering or architectural experience.

3. *Registered design professional* with mechanical and plumbing engineering experience; or a mechanical contractor with not less than 10 years' experience, 5 of which shall have been in responsible charge of work.

4. *Registered design professional* with electrical engineering experience; or an electrical contractor with not less than 10 years' experience, 5 of which shall have been in responsible charge of work.

5. *Registered design professional* with fire protection engineering experience; or a fire protection contractor with not less than 10 years' experience, 5 of which shall have been in responsible charge of work.

[A] 109.2.2 Alternate members.
The chief appointing authority shall appoint two alternate members who shall be called by the board chairman to hear appeals during the absence or disqualification of a member. Alternate members shall possess the qualifications required for board membership and shall be appointed for 5 years, or until a successor has been appointed.

[A] 109.2.3 Chairman.
The board shall annually select one of its members to serve as chairman.

[A] 109.2.4 Disqualification of member.
A member shall not hear an appeal in which that member has a personal, professional or financial interest.

[A] 109.2.5 Secretary.
The chief administrative officer shall designate a qualified clerk to serve as secretary to the board. The secretary shall file a detailed record of all proceedings in the office of the chief administrative officer.

[A] 109.2.6 Compensation of members.
Compensation of members shall be determined by law.

[A] 109.3 Notice of meeting.
The board shall meet upon notice from the chairman, within 10 days of the filing of an appeal, or at stated periodic meetings.

[A] 109.4 Open hearing.
Hearings before the board shall be open to the public. The appellant, the appellant's representative, the code official and any person whose interests are affected shall be given an opportunity to be heard.

[A] 109.4.1 Procedure.
The board shall adopt and make available to the public through the secretary procedures under which a hearing will be conducted. The procedures shall not require compliance with strict rules of evidence, but shall mandate that only relevant information be received.

[A] 109.5 Postponed hearing.
When five members are not present to hear an appeal, either the appellant or the appellant's representative shall have the right to request a postponement of the hearing.

[A] 109.6 Board decision.
The board shall modify or reverse the decision of the code official by a concurring vote of three members.

[A] 109.6.1 Resolution.
The decision of the board shall be by resolution. Certified copies shall be furnished to the appellant and to the code official.

[A] 109.6.2 Administration.
The code official shall take immediate action in accordance with the decision of the board.

[A] 109.7 Court review.
Any person, whether or not a previous party of the appeal, shall have the right to apply to the appropriate court for a writ of certiorari to correct errors of law. Application for review shall be made in the manner and time required by law following the filing of the decision in the office of the chief administrative officer.

Deleted. See North Carolina Administrative Code and Policies.

[A] APPROVED. Acceptable to the code official, or other authority having jurisdiction, for compliance with the provisions of the applicable code or referenced standard.

BATHROOM. A room containing a bathtub, shower, spa or similar bathing fixture. (see *toilet room* also).

BOILER. A closed heating *appliance* intended to supply hot water or steam for space heating, processing or power purposes. Low-pressure boilers operate at pressures less than or equal to 15 pounds per square inch (psi) (103 kPa) for steam and 160 psi (1103 kPa) for water. High-pressure boilers operate at pressures exceeding those pressures. See NC GS 95-69.8, 95-69.9 and 69.10 for specific requirements on boilers and references to the NC Department of Labor.

CLOSET. An enclosed or recessed area used to store clothing, linens or other household items.

CONDITIONED SPACE. For purposes of this code, an ~~An~~ area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling.

DUCT. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts. Does not include compressed air or vacuum systems.

EXTRA-HEAVY-DUTY COOKING APPLIANCE. Extra-heavy-duty cooking appliances are those utilizing open flame combustion of solid fuel at any time.

Shall not use solid fuel to provide source of heat for cooking. Pellets and chips if used as flavoring shall not be in a state of open flame combustion at any time. Smoldering chambers shall not introduce embers into the flue at any time.

~~**FLEXIBLE AIR CONNECTOR.** A conduit for transferring air between an air duct or plenum and an air terminal unit or between an air duct or plenum and an air inlet or air outlet. Such conduit is limited in its use, length and location.~~

JOINT, MECHANICAL

1. A connection between pipes, fittings, or pipes and fittings that is not welded, brazed, caulked, soldered, solvent cemented or heat fused.

2. A general form of gas or liquid-tight connections obtained by the joining of parts through a positive holding mechanical construction such as, but not limited to, flanged, screwed, clamped or flared connections. These joints include both the press-type and push-fit joining systems. Also see *press joint* and *push-fit joint*.

[A] LABELED. Appliances, equipment, ~~*Equipment*~~, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the appliances, *equipment*, material or product meets identified standards

or has been tested and found suitable for a specified purpose. (Laboratories, agencies or organizations that have been identified by approval and accreditation bodies, such as ANSI, IAS, ICC or OSHA, are acceptable.)

MECHANICAL JOINT. (see joint, mechanical)

~~1. A connection between pipes, fittings, or pipes and fittings that is not welded, brazed, caulked, soldered, solvent cemented or heat fused.~~

~~2. A general form of gas or liquid-tight connections obtained by the joining of parts through a positive holding mechanical construction such as, but not limited to, flanged, screwed, clamped or flared connections.~~

MODULAR BOILER. A steam or hot-water-heating assembly consisting of a group of individual boilers called modules intended to be installed as a unit without intervening stop valves. Modules are under one jacket or are individually jacketed. The individual modules shall be limited to a maximum input rating of 400,000 Btu/h (117 228 W) gas, 3 gallons per hour (gph) (11.4 L/h) oil, or 115 kW (electric). See NC GS 95-69.8, 95-69.9 and 69.10 for specific requirements on boilers and references to the NC Department of Labor.

[A] REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed. A design by a registered design professional is not required where exempt under the registration or licensure laws.

301.3 Identification.
Each length of pipe and tubing and each pipe fitting utilized in a mechanical system shall bear the identification of the manufacturer as required by the listing or standard for the piping or tubing.

301.4 Plastic pipe, fittings and components. - deleted
~~Plastic pipe, fittings and components shall be *third-party certified* as conforming to NSF 14.~~

301.7 Listed and labeled.
Appliances regulated by this code shall be *listed* and *labeled* for the application in which they are installed and used, unless otherwise *approved* in accordance with Section 105.

Exception:
1. Listing and labeling of *equipment* and appliances used for refrigeration shall be in accordance with Section 1101.2.
2. Field erected equipment shall be deemed acceptable, provided it is assembled using listed components and parts, if the design thereof is by a *registered design professional*.

301.17.1 Foundation and exterior wall sealing. Annular spaces around pipes, electric cables, conduits or other openings in the walls shall be protected against the passage of rodents by closing such opening with cement mortar, concrete masonry, silicone caulking or noncorrosive metal.

303.4 Protection from damage.
Appliances shall not be installed in a location where subject to mechanical damage unless protected by *approved* barriers. Protection is not required for appliances located out of the vehicle's normal travel path.

304.3.1 Parking garages.
Connection of a parking garage with any room in which there is a fuel-fired *appliance* shall be by means of a vestibule providing a two-doorway separation, except that a single door is permitted where the sources of ignition in the *appliance* are elevated in accordance with Section 304.3.

Exception: ~~This section shall not apply to *appliance* installations complying with Section 304.6.~~
1. This section shall not apply to *appliance* installations complying with Section 304.6.

304.10 Under-floor and exterior grade installations

304.10.1 Exterior grade installations. Equipment and appliances installed above grade level shall be supported on a solid base or approved material a minimum of 2 inches (51 mm) thick.

304.10.2 Under-floor installation. Suspended equipment shall be a minimum of 6 inches (152 mm) above the adjoining grade. See section 603.14 for ductwork support heights.

304.10.3 Crawl space supports. A support shall be provided at each corner of the unit not less than 8 inches by 8 inches (203.2 mm by 203.2 mm). The unit shall be supported a minimum of 2 inches (51 mm) above grade. When constructed of brick, the bricks shall be mortared together. All units stacked shall be mortared together. Fabricated units, formed concrete, or other approved materials shall be permitted.

304.10.4 Drainage. Below-grade installations shall be provided with a natural drain or an automatic lift or sump pump. For pit requirements, see Section 303.7

[BE] 304.11 Guards.
Guards shall be provided where ~~various components~~ appliances, equipment, fans or other components that require service and roof hatch openings are located within ~~10 feet~~ 6 feet (1829 mm)~~(3048 mm)~~ of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof, or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of appliances, equipment, fans ~~components~~ and roof hatch openings. ~~that require service.~~ The top of the guard shall be located not less than 42 inches (1067 mm) above the elevated surface adjacent to the guard. The guard shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*.
Exceptions:
~~Exception:~~ Exception 1: Guards are not required where permanent fall arrest/restraint anchorage connector devices that comply with ANSI/ASSE Z 359.1 are affixed for use during the entire lifetime of the roof covering. The devices shall be re-evaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed not

more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from roof edges and the open sides of walking surfaces.

Exception 2: Guards not required at the time of original installation are not required by this section for equipment repaired or replaced.

306.1.1 Central furnaces. Deleted.
~~Central furnaces within compartments or alcoves shall have a minimum working space *clearance* of 3 inches (76 mm) along the sides, back and top with a total width of the enclosing space being not less than 12 inches (305 mm) wider than the furnace. Furnaces having a firebox open to the atmosphere shall have not less than 6 inches (152 mm) working space along the front *combustion* chamber side. *Combustion air* openings at the rear or side of the compartment shall comply with the requirements of Chapter 7.~~

~~**Exception:** This section shall not apply to replacement appliances installed in existing compartments and alcoves where the working space clearances are in accordance with the *equipment* or *appliance* manufacturer's installation instructions.~~

306.3 Appliances in attics and above hard ceilings.
Attics containing appliances shall be provided with an opening and unobstructed passageway large enough to allow removal of the largest component of the *appliance*. The passageway shall be not less than 30 inches (762 mm) high and 22 inches (559 mm) wide and not more than 20 feet (6096 mm) in length measured along the centerline of the passageway from the opening to the *appliance*. The passageway shall have continuous solid flooring not less than 24 inches (610 mm) wide. A level service space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present at the front or service side of the *appliance*. The clear access opening dimensions shall be not less than 20 inches by 30 inches (508 mm by 762 mm), and large enough to allow removal of the largest component of the *appliance*.

Exceptions:

1. The passageway and level service space are not required where the *appliance* is capable of being serviced and removed through the required opening.

2. ~~Where the passageway is unobstructed and not less than 6 feet (1829 mm) high and 22 inches (559 mm) wide for its entire length, the passageway shall be not greater than 50 feet (15 250 mm) in length.~~
2. Where the passageway is not less than 6 feet (1829 mm) high for its entire length, the passageway shall not be limited in length.

306.3.1 Electrical requirements. Lighting outlet and receptacle.
~~A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the *appliance* location in accordance with NFPA 70.~~ For reference and coordination purposes only, refer to North Carolina Electrical Code article 210.63 for receptacle, and Article 210.70 (3) for lighting outlet and switch location.

306.4 Appliances under floors.
Underfloor spaces containing appliances shall be provided with an access opening and unobstructed passageway large enough to remove the largest component of the *appliance*. The

passageway shall be not less than 22 inches high and 36 inches wide, ~~30 inches (762 mm) high and 22 inches (559 mm) wide~~, nor more than 20 feet (6096 mm) in length measured along the centerline of the passageway from the opening to the *appliance*. A level service space not less than 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present at the front or service side of the *appliance*. If the depth of the passageway or the service space exceeds 12 inches (305 mm) below the adjoining grade, the walls of the passageway shall be lined with concrete or masonry. Such concrete or masonry shall extend not less than 4 inches (102 mm) above the adjoining grade and shall have sufficient lateral-bearing capacity to resist collapse. The clear access opening dimensions shall be not less than 22 inches high by 30 inches wide (559 mm by 762 mm), and large enough to allow removal of the largest component of the *appliance*.

Exceptions:

1. The passageway is not required where the level service space is present when the access is open and the *appliance* is capable of being serviced and removed through the required opening.

~~3. Where the passageway is unobstructed and not less than 6 feet high (1929 mm) and 22 inches (559 mm) wide for its entire length, the passageway shall not be limited in length.~~

2. Where the passageway is not less than 6 feet (1829mm) high unobstructed and not less than 6 feet high(1929 mm) for its entire length, the passageway shall not be limited in length.

306.4.1 Electrical requirements. Lighting outlet and receptacle.
A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be provided at or near the *appliance* location in accordance with NFPA 70. For reference and coordination purposes only, refer to North Carolina Electrical Code article 210.63 for receptacle, and Article 210.70 (3) for lighting outlet and switch location.

306.5 Equipment and appliances on roofs or elevated structures.
Where *equipment* and appliances requiring periodic maintenance are installed on ~~access or appliances~~ are located on ,or suspended from, an elevated structure or the roof of a building such that personnel will have to climb higher than 16 feet (4877 mm) above grade or finished floor to access such equipment or appliances, an interior or exterior means of access shall be provided. Such access shall not require climbing over obstructions greater than 30 inches (762 mm) in height or walking on roofs having a slope greater than 4 units vertical in 12 units horizontal (33-percent slope). Such access shall not require the use of portable ladders. Where access involves climbing over parapet walls, the height shall be measured to the top of the parapet wall.

Permanent ladders installed to provide the required access shall comply with the following minimum design criteria:

9. Ladders shall be protected against corrosion. ~~by *approved* means~~.

10. Access to ladders shall be provided at all times. This requirement does not preclude the owner from securing the ladder from unauthorized access.

306.5.1 Sloped roofs.
Where appliances, *equipment*, fans or other components that require ~~service~~ periodic maintenance are installed on a roof having a slope of three units vertical in 12 units horizontal (25-percent slope) or greater and having an edge more than 30 inches (762 mm) above grade at such edge, a level platform shall be provided on each side of the *appliance* or *equipment* to which access is required for service, repair or maintenance. The platform shall be not less than 30 inches (762 mm) in any dimension and shall be provided with guards. The guards shall extend not less than 42 inches (1067 mm) above the platform, shall be constructed so as to prevent the passage of a 21-inch-diameter (533 mm) sphere and shall comply with the loading requirements for guards specified in the *International Building Code*. Access shall not require walking on roofs having a slope greater than four units vertical in 12 units horizontal (33-percent slope). Where access involves obstructions greater than 30 inches (762 mm) in height, such obstructions shall be provided with ladders installed in accordance with Section 306.5 or stairways installed in accordance with the requirements specified in the *International Building Code* in the path of travel to and from appliances, fans or *equipment* requiring service.

306.5.2 Electrical requirements. Receptacle.
~~A receptacle outlet shall be provided at or near the *equipment* location in accordance with NFPA 70.~~ For reference and coordination purposes only, refer to North Carolina Electrical Code article 210.63 for receptacle.

307.2 Evaporators, condensing furnaces and cooling coils.
Condensate drain systems shall be provided for *equipment* and appliances containing evaporators, cooling coils or condensing furnaces. Condensate drain systems shall be designed, constructed and installed in accordance with Sections 307.2.1 through 307.2.5.

307.2.1 Condensate disposal.
Condensate from all condensing furnaces, cooling coils and evaporators shall be conveyed from the drain pan outlet to an *approved* place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than one-eighth unit vertical in 12 units horizontal (1-percent slope).Where pumps are used, they shall be installed with a factory-equipped auxiliary high-level switch and shall shut off equipment served upon activation of the auxiliary high-level switch. Where damage to any building components will occur as a result of overflow from the pump, the pump shall also be located in the auxiliary drain pan or in a separate drain pan equipped with a separate drain line or water-level detection device.

307.2.2 Drain pipe materials and sizes.
Components of the condensate disposal system shall be cast iron, galvanized steel, copper, cross-linked polyethylene, polyethylene, ABS, CPVC, PVC, or polypropylene pipe or tubing. Components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 7 of the *International Plumbing Code* relative to the material type. Condensate waste and drain line size shall be not less than $^{3}/_{4}$-inch (19.1 mm) internal diameter and

shall not decrease in size from the drain pan connection to the place of condensate disposal. ~~Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with Table 307.2.2.~~

Provisions shall be made to prevent the formation of condensation on the exterior of primary condensate drain piping if condensate dripping off the pipe could cause damage to any building component.

TABLE 307.2.2
CONDENSATE DRAIN SIZING

Deleted.

~~EQUIPMENT CAPACITY~~	~~MINIMUM CONDENSATE PIPE DIAMETER~~
~~Up to 20 tons of refrigeration~~	~~3/4 inch~~
~~Over 20 tons to 40 tons of refrigeration~~	~~1 inch~~
~~Over 40 tons to 90 tons of refrigeration~~	~~1 1/4 inches~~
~~Over 90 tons to 125 tons of refrigeration~~	~~1 1/2 inches~~
~~Over 125 tons to 250 tons of refrigeration~~	~~2 inches~~

~~1 inch = 25.4 mm, 1 ton = 3.517 kW.~~

307.2.3 Auxiliary and secondary drain systems.
In addition to the requirements of Section 307.2.1, where damage to any building components could occur as a result of overflow from the *equipment* primary condensate removal system one of the following auxiliary protection methods shall be provided for each cooling coil or fuel-fired *appliance* that produces condensate:

1. An auxiliary drain pan with a separate drain shall be provided under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a minimum depth of $1^1/_2$ inches (38 mm), shall be not less than 3 inches (76 mm) larger than the unit, or the coil dimensions in width and length and shall be constructed of corrosion-resistant material. Galvanized sheet steel pans shall have a minimum thickness of not less than 0.0236 inch (0.6010 mm) (No. 24 gage). Nonmetallic pans shall have a minimum thickness of not less than 0.0625 inch (1.6 mm).

    a. Appliances with primary condensate pans above appliance components.
    Cooling coils mounted above the air handler or furnace shall have a secondary drain piped to auxiliary pan under air handler to avoid condensate migrating through appliance components before reaching the auxiliary drain pan.

3. A water-level detection device conforming to UL 508 shall be provided that will shut off the *equipment* served in the event that the primary drain is blocked. The device shall be installed in the primary drain line~~,~~ upstream of the primary drain line trap, the overflow drain line, or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.

308.4.1 Labeled assemblies.

~~The allowable clearance reduction shall be based on an approved reduced clearance protective assembly that is listed and labeled in accordance with UL 1618.~~

The allowable clearance reduction shall be based on an approved reduced clearance protective assembly that has been tested and bears the label of an approved agency.

312.1 Load calculations.

Heating and cooling system design loads for the purpose of sizing systems, appliances and *equipment* shall be determined in accordance with the procedures described in the ASHRAE/ACCA Standard 183. Alternatively, design loads shall be determined by an *approved* equivalent computation procedure, using the design parameters specified in Chapter 3 [CE] of the *International Energy Conservation Code*.

For one- and two-family dwellings and townhouses, heating and cooling equipment shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J, or other approved heating and cooling calculation methodologies.

For permitting, inspections, certificate of compliance or certificate of occupancy, verification of Calculations for HVAC Systems - ACCA Manual D, ACCA Manual J nor ACCA Manual S calculation submittals and review shall not be required.

(Commentary-reference 21 NCAC 50 .0505 GENERAL SUPERVISION AND STANDARD OF COMPETENCE)

SECTION 313
CARBON MONOXIDE ALARMS

313.1 Carbon monoxide alarms. In new construction, one-and two-family dwellings and townhouses within which fuel-fired appliances or fireplaces are installed or that have attached garages shall be provided with an approved carbon monoxide alarm installed outside of each separate sleeping area in the immediate vicinity of the bedroom(s) as directed by the alarm manufacturer.

313.2 Where required-existing dwellings. In existing dwellings, where interior alterations, repairs, or additions requiring a building permit occur, or where one or more sleeping rooms are added or created, or where fuel-fired appliances or fireplaces are added or replaced, carbon monoxide alarms shall be provided in accordance with Section 313.1.

Exception: Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, or the installation of a fuel-fire appliance that cannot introduce carbon monoxide to the interior of the dwelling, are exempt from the requirements of this section.

313.3 Alarm requirements. The required carbon monoxide alarms shall be audible in all bedrooms over background noise levels with all intervening doors closed. Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions. Battery powered, plug-in, or hard-wired alarms are acceptable for use.

401.2 Ventilation required.
Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. ~~Where the air infiltration rate in a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2 inch water column (50 Pa) in accordance with Section R402.4.1.2 of the *International Energy Conservation Code*, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403.~~ Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.

401.5 Intake opening protection.
Air intake openings that terminate outdoors shall be protected with corrosion-resistant screens, louvers or grilles. Openings in louvers, grilles and screens shall be sized in accordance with Table 401.5, and shall be protected against local weather conditions. ~~Louvers that protect air intake openings in structures located in hurricane-prone regions, as defined in the International Building Code, shall comply with AMCA 550. Outdoor air intake openings located in exterior walls shall meet the provisions for exterior wall opening protectives in accordance with the International Building Code.~~

401.5.1 Louvers that protect air intake openings in structures located in hurricane-prone regions, as defined in the International Building Code, shall comply with AMCA 550.

(Exception: one and two-family dwellings)

401.5.2 Outdoor air intake openings located in exterior walls shall meet the provisions for exterior wall opening protectives in accordance with the International Building Code.

403.2.1 Recirculation of air.
The outdoor air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:

2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where ~~more than~~ 10 percent or more of the resulting supply airstream consists of air recirculated from these spaces.
4. Where mechanical exhaust is required by Note g in Table 403.3.1.1, mechanical exhaust is required and recirculation from such spaces is prohibited where ~~more than~~ 10 percent or more of the resulting supply airstream consists of air recirculated from these spaces. Recirculation of air that is contained completely within such spaces shall not be prohibited.

TABLE 403.3.1.1
MINIMUM VENTILATION RATES

OCCUPANCY CLASSIFICATION	OCCUPANT DENSITY #/1000 FT^2 [a]	PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON	AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT^2 [a]	EXHAUST AIRFLOW RATE CFM/FT^2 [a]
Correctional facilities				
Booking/waiting	50	7.5	0.06	—
Cells				
without plumbing fixtures	25	5	0.12	—
with plumbing fixtures [g]	25	5	0.12	1.0
Day room	30	5	0.06	—
Dining halls (see food and beverage service)	—	—	—	—
Guard stations	15	5	0.06	—
Dry cleaners, laundries				
Coin-operated dry cleaner	20	15	—	—
Coin-operated laundries	20	7.5	0.06	—
Commercial dry cleaner	30	30	—	—
Commercial laundry	10	25	—	—
Storage, pick up	30	7.5	0.12	—
Education				
Art classroom [~~g~~]	20	10	0.18	~~0.7~~ –
Auditoriums	150	5	0.06	—
Classrooms (ages 5-8)	25	~~10~~ 7.5	~~0.12~~ --	—
Classrooms (age 9 plus)	35	~~10~~ 7.5	~~0.12~~ --	—
Computer lab	25	10	0.12	—
Corridors (see public spaces)	—	—	—	—
Day care (through age 4)	25	10	0.18	—
Lecture classroom	65	7.5	0.06	—
Lecture hall (fixed seats)	150	7.5	0.06	—
Locker/dressing rooms [g]	—	—	—	0.25
Media center	25	10	0.12	—
Multiuse assembly	100	7.5	0.06	—
Music/theater/dance	35	10	0.06	—
Science laboratories [~~g~~ i]	25	10	0.18	~~1.0~~ --
Smoking lounges [b]	70	60	—	—
Sports locker rooms [g]	—	—	—	0.5
Wood/metal shops [g]	20	10	0.18	0.5
Food and beverage service				
Bars, cocktail lounges	100	7.5	0.18	—
Cafeteria, fast food	100	7.5	0.18	—
Dining rooms	70	7.5	0.18	—
Kitchens (cooking) [b]	—	—	—	0.7

(continued)

b. Mechanical exhaust required and the recirculation of air from such spaces to other spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Item 3).

g. Mechanical exhaust is required and recirculation to other spaces ~~from such spaces~~ is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Items 2 and 4).

i. Commentary: Refer to design guidelines, NC Department of Public Instruction School Planning, Z9.5 American National Standard for Laboratory Ventilation

403.3.1.1.1.3 Zone outdoor airflow.
The zone outdoor airflow rate (V_{oz}), shall be determined in accordance with Equation 4-2.

$$V_{oz} = \frac{V_{bz}}{E_z} \qquad \text{(Equation 4-2)}$$

Exception: K-12 schools shall be exempt from use of this effectiveness factor ($V_{oz}=V_{bz}$)

403.3.1.1.2.3.4 Outdoor air intake flow rate.
The outdoor air intake flow rate (V_{ot}) shall be determined in accordance with Equation 4-8.

$$V_{ot} = \frac{V_{ou}}{E_v} \qquad \textbf{(Equation 4-8)}$$

Exception: K-12 schools shall be exempt from use of this efficiency factor ($V_{ot}=V_{ou}$)

405.2 Fan shutdown controls. In Group I-2 and I-3 occupancies, each air distribution system shall be equipped with a manual emergency control to stop supply and return air in an emergency. The control device shall be mounted in a readily accessible location and be identified.

Exception: Air-handling equipment serving a single space.

406.1 General.
Uninhabited spaces, such as crawl spaces and attics, shall be provided with *natural ventilation* openings as required by the *International Building Code* or shall be provided with a mechanical exhaust and supply air system. The mechanical exhaust rate shall be not less than 0.02 cfm per square foot (0.00001 $m^3/s \cdot m^2$) of horizontal area and shall be automatically controlled to operate when the relative humidity in the space served exceeds 60 percent.

Exception: As otherwise permitted in the *North CarolinaBuilding Code*.

408 Indoor Firing Ranges

408.1 Indoor firing ranges. See Section 502.19.

501.3 Exhaust discharge.
The air removed by every mechanical exhaust system shall be discharged outdoors ~~at a point where it will not cause a public nuisance~~ and is not less than the distances specified in Section 501.3.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic, crawl space, or be directed onto walkways~~.~~, balconies, decks, breezeways, covered walkways and similar horizontal projections.

501.3.2 Exhaust opening protection.
Exhaust openings that terminate outdoors shall be protected with corrosion resistant screens, louvers or grilles. Openings in screens, louvers and grilles shall be sized not less than $^{1}/_{4}$ inch (6.4 mm) and not larger than $^{1}/_{2}$ inch (12.7 mm). Openings shall be protected against local weather conditions. Louvers that protect exhaust openings in structures located in hurricane-prone regions as defined in the International Building Code, shall comply with AMCA Standard 550. (Exception: one and two family dwellings). Outdoor openings located in exterior walls shall meet the provisions for exterior wall opening protectives in accordance with the International Building Code.

501.4 Pressure equalization.
Mechanical exhaust systems shall be sized to remove the quantity of air required by this chapter to be exhausted. The system shall operate when air is required to be exhausted. Where mechanical exhaust is required in a room or space in other than occupancies in R-3 and *dwelling units* in R-2, such space shall be maintained with a neutral or negative pressure. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust for a room, adequate means shall be provided for the natural or mechanical exhaust of the excess air supplied. If only a mechanical exhaust system is installed for a room or if a greater quantity of air is removed by a mechanical exhaust system than is supplied by a mechanical ventilating supply system for a room, adequate *makeup air* shall be provided to satisfy the deficiency.

Exception: Domestic exhaust systems in residential occupancies and similar uses (domestic clothes dryer, domestic range hood, domestic bathroom exhaust).

[F] 502.9.1 Compressed gases—medical gas systems.
Rooms for the storage of compressed medical gases in amounts exceeding the permit amounts for compressed gases in the *International Fire Code*, and that do not have an exterior wall, shall be exhausted through a duct to the exterior of the building. Both separate airstreams shall be enclosed in a 1-hour-rated shaft enclosure from the room to the exterior. *Approved* mechanical ventilation shall be provided at a minimum rate of 1 cfm/ft^2 [0.00508 m^3/(s • m^2)] of the area of the room.

Gas cabinets for the storage of compressed medical gases in amounts exceeding the ~~permit amounts for~~ the maximum allowable quantity per control area for compressed gases in the *International Fire Code* shall be connected to an exhaust system. The average velocity of ventilation at the face of access ports or windows shall be not less than 200 feet per minute (1.02 m/s) with a minimum v

504.4 Exhaust installation.
Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper. Screens shall not be installed at the duct or weathercap termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent or *chimney*. Clothes dryer exhaust ducts shall not extend into or through ducts or plenums.

504.6 Makeup air.

~~Installations exhausting more than 200 cfm (0.09 m^3/s) shall be provided with *makeup air*.~~
Where a closet is designed for the installation of a clothes dryer, an opening having an area of not less than 100 square inches (0.0645 m^2) shall be provided in the closet enclosure or *makeup air* shall be provided by other *approved* means.

504.8.1 Material and size.
Exhaust ducts shall have a smooth interior finish and shall be constructed of metal a minimum ~~0.016~~ 0.0157 inch (0.4 mm) thick (28 ga galv. 26 ga Al). With the exception of the transition duct, flexible ducts are prohibited. The exhaust duct size shall be 4 inches (102 mm) nominal in diameter.

504.8.2 Duct installation.
Exhaust ducts shall be supported at 4-foot (1219 mm) intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. ~~Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch (3.2 mm) into the inside of the duct.~~ Ducts shall not be joined with screws or similar fasteners that protrude into the inside of the duct. Ducts shall be sealed in accordance with 603.9.

a. Nonmetallic mechanical fasteners (tie-straps) shall be listed to UL 181B
b. Metal band duct clamps are not required to be listed.

504.8.3 Transition ducts.
Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is *listed* and *labeled* in accordance with UL 2158A. Transition ducts shall be not greater than 8 feet (2438 mm) in length and shall not be concealed within construction, and must remain entirely within the room in which the appliance is located.

504.8.5 Length identification.
Where the exhaust duct equivalent length exceeds 35 feet (10 668 mm), the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.

- Label shall be permanently stenciled, laminated, or commercially available plastic or metal tags.
- Labels shall state, at a minimum (fill in the blank):
  - Caution: Equivalent length _____ ft. Any installed dryer must be equipped with exhaust system that meets or exceeds this equivalent length requirement.
- Labels can be attached to wall or vent receptor.

504.8.6 Exhaust duct required.
Where space for a clothes dryer is provided, an exhaust duct system shall be installed. ~~Where the clothes dryer is not installed at the time of occupancy, the exhaust duct shall be capped at the location of the future dryer.~~

504.8.7 Duct termination
Exhaust duct shall terminate not less than 12 inches (305 mm) above finished grade.

Exception: Where the duct termination is less than 12 inches (305 mm) above finished grade an areaway shall be provided with a cross-sectional area not less than 200 square inches (1290 cm2). The bottom of the duct termination shall be no less than 12 inches (305 mm) above the areaway bottom.

505.2 Makeup air required.

~~Exhaust hood systems capable of exhausting in excess of 400 cfm (0.19 m^3/s) shall be provided with *makeup air* at a rate approximately equal to the *exhaust air* rate. Such *makeup air* systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.~~

505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m3/s) shall be provided with makeup air at a rate approximately equal to the exhaust air rate that is in excess of 400 cubic feet per minute (0.19 m3/s). Such makeup air systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

Exception: Where all appliances in the house are direct-vent, power-vent, unvented, or electric, makeup air shall be provided where exhaust fans are capable of exhausting more than 600 cubic feet per minute (0.28 m3/s). Exhaust hood systems capable of exhausting more than 600 cubic feet per minute shall be provided with makeup air at a rate approximately equal to the exhaust air rate that is in excess of 600 cubic feet per minute.

505.3 Common exhaust systems for domestic kitchens located in multistory structures.
Where a common multistory duct system is designed and installed to convey exhaust from multiple domestic kitchen exhaust systems, the construction of the system shall be in accordance with all of the following, or other *approved* method:

505.4 Other than Group R.
In other than Group R occupancies, where domestic cooking appliances are utilized for domestic purposes, such appliances ~~shall be~~ may be provided with domestic range hoods. Hoods and exhaust systems shall be in accordance with Sections 505.1 and ~~505.2.~~ 505.2 if the makeup air required in 505.2 is not already provided via the buildings ventilation system. Also see Exception to 507.1.2.

506.3.2.5 Grease duct test.
Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed.in the presence of the code official. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary *equipment* and perform the grease duct leakage

test. A light test shall be performed to determine that all welded and brazed joints are liquid tight.

506.3.11 Grease duct enclosures.
A commercial kitchen grease duct serving a Type I hood that penetrates a ceiling, wall, floor or any concealed space shall be enclosed from the point of penetration to the outlet terminal. In-line exhaust fans not located outdoors shall be enclosed as required for grease ducts. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the *International Building Code*. The duct enclosure shall serve a single grease duct and shall not contain other ducts, piping or wiring systems. Duct enclosures shall be a shaft enclosure in accordance with Section 506.3.11.1, a field-applied enclosure assembly in accordance with Section 506.3.11.2 or a factory-built enclosure assembly in accordance with Section 506.3.11.3. Duct enclosures shall have a fire-resistance rating of not less than that of the assembly penetrated and not less than 1 hour. Fire dampers and smoke dampers shall not be installed in grease ducts.

Exception: A duct enclosure shall not be required for a grease duct or hood that penetrates only a nonfire-resistance rated roof/ceiling assembly.

506.5.1.2 In-line fan location.
Where enclosed duct systems are connected to in-line fans not protected by fire-rated enclosures or field applied grease duct enclosure, and not located outdoors, ~~the~~ then the fan shall be located in a room or space having the same fire-resistance rating as the duct enclosure. Access shall be provided for servicing and cleaning of fan components. Such rooms or spaces shall be ventilated in accordance with the fan manufacturer's installation instructions.

507.1.2 Domestic cooking appliances used for commercial purposes.
Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or Type II hoods as required for the type of appliances and processes in accordance with Sections 507.2 and 507.3. Domestic cooking appliances utilized for domestic purposes shall comply with Section 505.

Exception: A maximum of two domestic ranges installed in dwelling units, churches, schools, day care centers, break areas and similar installations.

507.2 Type I hoods.
Type I hoods shall be installed where cooking *appliances* produce grease or smoke. ~~as a result of the cooking process.~~ Type I hoods shall be installed over ~~*medium-duty*~~, *heavy-duty* and *extra-heavy-duty cooking appliances*. Type I hoods shall be installed over *light-duty cooking appliances* and *medium-duty cooking appliances* that produce grease or smoke

507.2.7 Type I hoods penetrating a ceiling.
Type I hoods or portions thereof penetrating a ceiling, wall or furred space shall comply with Section 506.3.11. ~~Field-applied grease duct enclosure systems, as addressed in Section 506.3.11.2, shall not be utilized to satisfy the requirements of this section~~. Field applied enclosure systems shall be listed and labeled for use in the configuration required to meet this code section.

507.2.9 Grease gutters for Type I hood.
Grease gutters shall drain to an *approved* collection receptacle that is fabricated, designed and installed to allow access for cleaning. The container shall have a maximum capacity not exceeding 1 gallon(3.8 L) unless otherwise approved by the mechanical official.

507.3 Type II hoods.
Type II hoods shall be installed above dishwashers and ~~appliances~~ light duty appliances and medium duty appliances that produce heat or moisture and do not produce grease or smoke as a result of the cooking process, except where the heat and moisture loads from such appliances are incorporated into the HVAC system design or into the design of a separate removal system. Type II hoods shall be installed above all light duty appliances and medium duty appliances ~~appliances~~ that produce products of combustion and do not produce grease or smoke as a result of the cooking process. ~~Spaces containing cooking appliances that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00033 m^3/s).For the purpose of determining the floor area required to be exhausted, each individual appliance that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m^2). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [.00356 m^3/(s × m^2)].~~ Spaces containing cooking appliances that do not require Type II hoods shall be ventilated in accordance with section 403.3.

507.6.2 Certification. These tests shall be witnessed by the code official, or by a professional engineer who shall provide certification of performance to the code official.

510.6.1 Balancing.
Systems conveying explosive or radioactive materials shall be prebalanced by duct sizing. Other systems ~~shall~~ may be balanced by duct sizing or with balancing devices, such as dampers. Dampers provided to balance airflow shall be provided with securely fixed minimum-position blocking devices to prevent restricting flow below the required volume or velocity.

510.9 Duct construction.
Ducts used to convey hazardous exhaust shall be constructed of materials *approved* for installation in such an exhaust system and shall comply with one of the following:

1. Ducts shall be constructed of *approved* G90 galvanized sheet steel, with a minimum nominal thickness as specified in Table 510.9.

2. Non-metallic ~~Ducts~~ ducts used in systems exhausting nonflammable corrosive fumes or vapors shall ~~be constructed of nonmetallic materials that~~ exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 and that are *listed* and *labeled* for the application.

514.4 Recirculated air.
Air conveyed within energy recovery systems shall not be considered as recirculated air where the energy recovery ventilation system is constructed to limit cross-leakage between air streams to ~~less than~~ 10 percent or less of the total airflow design capacity.

601.5 Return air openings.
Return air openings for heating, ventilation and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another appliance located in the same room or space.

2. Return air shall not be taken from a hazardous or insanitary location or a refrigeration room as defined in this code.

3. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.

4. Return and transfer openings shall be sized in accordance with the appliance or equipment manufacturer's installation instructions, ACCA Manual D or the design of the registered design professional.

5. Return air taken from one dwelling unit shall not be discharged into another dwelling unit.

~~6. Taking return air from a crawl space shall not be accomplished through a direct connection to the return side of a forced air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.~~

~~7.~~ 6. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen and are located not less than 10 feet (3048 mm) from the cooking appliances.

3. Dedicated forced air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

7. A room or space containing a fuel-burning *appliance* or fireplace where such room or space serves as the sole source of return air.

7.1. This shall not apply where the fuel-burning *appliance* is a direct-vent *appliance*.

7.2. This shall not apply where the room or space complies with the following requirements:

7.2.1. The return air shall be taken from a room or space having a volume exceeding 1 cubic foot for each 10 Btu/h (9.6 L/W) of combined input rating of all fuel-burning appliances therein.

7.2.2. The volume of supply air discharged back into the same space shall be approximately equal to the volume of return air taken from the space.

7.2.3. Return-air inlets shall not be located within 10 feet (3048 mm)of any *appliance* firebox or draft hood in the same room or space.

7.3. This shall not apply to rooms or spaces containing solid-fuel-burning appliances, provided that return-air inlets are located not less than 10 feet (3048 mm) from the firebox of the appliances.

7.4. This shall not apply to rooms and spaces containing a fireplace provided that return air inlets are located not less than 10 feet (3048 mm) from the fireplace opening.

602.2.1 Materials within plenums.
Except as required by Sections 602.2.1.1 through 602.2.1.7, materials within plenums shall be noncombustible or shall be listed and labeled as having a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.

Exceptions:

7. This section shall not apply to materials exposed within equipment rooms and furnace rooms in dwelling units.

TABLE 603.4
DUCT CONSTRUCTION MINIMUM SHEET METAL THICKNESS FOR SINGLE DWELLING UNITS[a]

ROUND DUCT DIAMETER (inches)	STATIC PRESSURE			
	1 1/2-inch water gage		1-inch water gage	
	Thickness (inches)[gage]		Thickness (inches)[gage]	
	Galvanized	Aluminum	Galvanized	Aluminum
< 12	0.013 [30 ga]	0.018 0.0159 [26 ga]	0.013	0.018
12 to14	0.013 [30 ga]	0.018 0.0159 [26 ga]	0.016	0.023
15 to 17	0.016 [28 ga]	0.023 0.020 [24 ga]	0.019	0.027
18	0.016 [28ga]	0.023 0.020 [24 ga]	0.024	0.034
19 to 20	0.019 0.016 [28 ga]	0.027 0.020 [24 ga]	0.024	0.034
RECTANGULAR DUCT DIMENSION (inches)	**STATIC PRESSURE**			
	1 1/2-inch water gage		1-inch water gage	
	Thickness (inches)		Thickness (inches)	
	Galvanized	Aluminum	Galvanized	Aluminum

~~≤ 8~~	~~0.013 [30 ga]~~	~~0.018~~	~~0.013~~	~~0.018~~
~~9 to10~~	~~0.013 [30 ga]~~	~~0.018~~	~~0.016~~	~~0.023~~
~~11 to 12~~	~~0.016~~	~~0.023~~	~~0.019~~	~~0.027~~
~~13 to16~~	~~0.019~~	~~0.027~~	~~0.019~~	~~0.027~~
~~17 to 18~~	~~0.019~~	~~0.027~~	~~0.024~~	~~0.034~~
~~19 to 20~~	~~0.024~~	~~0.034~~	~~0.024~~	~~0.034~~

Duct Size	Minimum thickness (in.)	Equivalent gage (galvanized)	Aluminum minimum thickness (inches) [gage]
Round Ducts and Enclosed rectangular ducts			
14 inches or less	0.013 in.	30 ga	0.0159 in [26ga]
Over 14 inches	0.016 in.	28 ga	0.0201 in [24 ga]
Exposed rectangular ducts			
14 inches or less	0.016 in	28 ga	0.0201 in [24 ga]
Over 14 inches	0.019 in	26 ga	0.0253 in [22 ga]

For SI: 1 inch = 25.4 mm, ~~1-inch water gage = 249 Pa.~~

~~a. Ductwork that exceeds 20 inches by dimension or exceeds a pressure of 1-inch water gage shall be constructed in accordance with SMACNA *HVAC Duct Construction Standards—Metal and Flexible.*~~

603.7 Rigid duct penetrations.
Duct system penetrations of walls, floors, ceilings and roofs and air transfer openings in such building components shall be protected as required by Section 607. Ducts in a private garage that penetrate a wall or ceiling that separates a dwelling unit from a private garage shall be continuous, shall be constructed of sheet steel having a thickness of not less than 0.0187 inch (0.4712 mm) (No. 26 gage) or other approved noncombustible material of equivalent durability and shall not have openings into the garage. Fire and smoke dampers are not required in such ducts passing through the wall or ceiling separating a dwelling unit from a private garage except where required by Chapter 7 of the *International Building Code*.

603.9 Joints, seams and connections.
All longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA *HVAC Duct Construction Standards—Metal and Flexible* and NAIMA *Fibrous Glass Duct Construction Standards*. All joints, longitudinal and transverse seams and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes. Tapes and mastics used to seal fibrous glass ductwork shall be listed and labeled in accordance with UL 181A and shall be marked “181 A-P” for pressure-sensitive tape, “181 A-M” for mastic or “181 A-H” for heat-sensitive tape. Tapes and mastics used to seal metallic and flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181 B-FX” for pressure-sensitive tape or “181 B-M” for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked “181 B-C.” Closure systems used to seal all ductwork shall be installed in accordance with the manufacturer's instructions. Unlisted duct tape is not permitted as a sealant on any metal ducts.

~~**Exception:** For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and buttonlock types.~~

Exceptions:
1. Continuously welded joints and seams in ducts.
2. Ducts exposed within the conditioned space that the ducts serve shall not be required to be sealed.

603.10 Supports.
Ducts shall be supported in accordance with SMACNA *HVAC Duct Construction Standards—Metal and Flexible.* Flexible and other factory-made ducts shall be supported in accordance with the manufacturer's instructions.

603.10.1 For one- and two-family dwellings and townhouses.
Metal ducts shall be securely supported. Where hung or suspended, metal straps a minimum of 1 inch (25 mm) in width and equivalent to or heavier gage than the duct being supported shall be used. Straps, when used, shall be at maximum 64-inch (1626 mm) intervals and shall be securely attached to the building structure. Straps shall be attached to the duct at a minimum of two points with screws or rivets. Hanger systems shall comply with this section or other approved means.

Nonmetallic or listed duct systems shall be supported in accordance with the manufacturer's installation instructions.

All equipment shall be supported independently of the duct system except when the duct is used as a support base. When used as a support base, the duct shall be of sufficient strength and designed to support the weight of the unit. Listed bases shall be installed in accordance with the manufacturer's installation instructions.

603.12 Condensation.
Provisions shall be made to prevent the formation of condensation on the exterior of any new duct. Ducts installed in attics, crawl spaces or outdoors, insulated in accordance with Section 403.2.1, or Section 503.2.7 of the *North Carolina Energy Code* shall be deemed to meet the intent of this Section.

603.17 Air dispersion systems. (flexible fabric duct systems)
Air dispersion systems shall:

603.18 Return-air intake (nonengineered systems). If only one central return-air grille is installed, it shall be of a size sufficient to return a volume of air compatible with the CFM requirements and the temperature rise limitations specified bythe equipment manufacturer. The face velocity of return air grilles shall not exceed 450 feet per minute (fpm) (2.3 m/s). At least one separate return shall be installed on each level of a multi-level structure. For split-level and split-foyer structures, one return may serve more than one level if located within the split area and the total area of the levels does not exceed 1,600 square feet (148.6 m2). Return-air grilles shall not be located in bathrooms. The return air from one residential living unit shall not be mixed with the return air from other living units. In dwellings with 1,600 square feet (148.6m2) or less of conditioned area, a central return is permitted. When the dwelling contains more than 1,600 square feet (148.6m2) of conditioned area, additional returns shall be provided. Each

return shall serve not more than 1,600 square feet (148.6 m2) of area and shall be located in the area it serves. Return air may travel through the living space to the return-air intake if there are no restrictions, such as solid doors, to the air movement. Undercut doors are allowed. When panned joists are used for return air, the structural integrity shall be maintained. Air capacity for joists 16 inches (406 mm) on center shall be a maximum of 375 cubic feet per minute (0.177 m3/s) for 8-inch (203 mm) joists and 525 cubic feet per minute (0.248 m3/s) for 10-inch (254 mm) joists. Wiring located in spaces used for return-air ducts shall comply with the *North Carolina Electrical Code*.

603.19 Under-floor furnace plenums. Under-floor furnace plenums shall be prohibited in new structures. modification or repairs to existing under-floor furnace plenums in existing structures shall conform to the requirements of this section.

603.19.1 General. The space shall be cleaned of loose combustible materials and scrap, and shall be tightly enclosed. The ground surface of the space shall be covered with a moisture barrier having a minimum thickness of 4 mils (0.1 mm). Plumbing waste cleanouts shall not be located within the space.

603.19.2 Materials. The under-floor space, including the sidewall insulation, shall be formed by materials having
flame spread ratings not greater than 200 when tested in accordance with ASTM E 84.

603.19.3 Furnace connections. A duct shall extend from the furnace supply outlet to not less than 6 inches (152 mm) below the combustible framing. This duct shall comply with the provisions of Section 603. A noncombustible receptacle shall be installed below any floor opening into the plenum in accordance with the following requirements:
1. The receptacle shall be securely suspended from the floor members and shall not be more than 18 inches
(457 mm) below the floor opening. 2. The area of the receptacle shall extend 3 inches (76 mm) beyond the opening on all sides.
3. The perimeter of the receptacle shall have a vertical lip at
least 1 inch (25 mm) high at the open sides.

603.19.4 Access. Access to an under-floor furnace plenum shall be provided through an opening in the floor with minimum dimensions of 18 inches by 24 inches (457mmby 610 mm).

603.19.5 Furnace controls. The furnace shall be equipped with an automatic control that will start the air-circulating fan when the air in the furnace bonnet reaches a temperature not higher than 150°F (66°C). The furnace shall additionally be equipped with an approved automatic control that limits the outlet air temperature to 200°F (93°C).

604.1 General.
Duct insulation shall conform to the requirements of Sections 604.2 through 604.13 and the *International Energy Conservation Code*. Replacement or addition of cooling equipment to existing ductwork located in an attic shall require the ductwork to be insulated. Replacement of heating or the addition of cooling equipment in a crawl space or conditioned basements shall not require the existing ductwork to be insulated. Unconditioned basement ductwork shall require insulation with the addition of cooling.

604.4 Foam plastic insulation.
Foam plastic used as duct coverings and linings shall conform to the requirements of Section 604.

Exception: Spray application of polyurethane foam to the exterior of ducts in *attics* and crawl spaces shall be permitted in one-and-two family dwellings subject to all of the following:

1. The flame spread index is not greater than 25 and the smoke-developed index is not greater than 450 at the specified installed thickness.

2. The foam plastic is protected in accordance with the ignition barrier requirements of Sections R316.5.3 and R316.5.4.

3. The foam plastic complies with the requirements of Section R316.

604.9 Thermal continuity.
Where a duct liner has been interrupted, a duct covering of equal thermal performance shall be installed.

Exception: See Section 604.6.

606.2.2 Common supply and return air systems.
Where multiple air-handling systems share common supply or return air ducts or plenums with a combined design capacity greater than 2,000 cfm (0.9 m^3/s), the return air system shall be provided with smoke detectors in accordance with Section 606.2.1.

~~**Exception:** Individual smoke detectors shall not be required for each fan-powered terminal unit, provided that such units do not have an individual design capacity greater than 2,000 cfm (0.9 m^3/s) and will be shut down by activation of one of the following:~~
Exceptions:
1. Individual smoke detectors shall not be required for any fan-powered unit serving only one space.
~~1~~.
2.Individual smoke detectors shall not be required for each fan-powered terminal unit, provided that such units do not have an individual design capacity greater than 2,000 cfm (0.9 m^3/s) and will be shut down by activation of one of the following:

~~2.1~~.2.1Smoke detectors required by Sections 606.2.1 and 606.2.3.

~~2.~~2.2 An *approved* area smoke detector system located in the return air *plenum* serving such units.

~~3.~~2.3 An area smoke detector system as prescribed in the exception to Section 606.2.1.

[BF] 607.5 ~~Where required.~~ Location and installation
Fire dampers, smoke dampers, combination fire/smoke dampers, ceiling radiation dampers and corridor dampers shall be provided at the locations prescribed in Sections 607.5.1 through 607.5.7. and shall be shown and identified on the building plans by the designer. Where an assembly is required to have both fire dampers and smoke dampers, combination fire/smoke dampers or a fire damper and smoke damper shall be provided.

801.2 General.
Every fuel-burning *appliance* shall discharge the products of *combustion* to a vent, factory-built *chimney* or masonry *chimney*, except for *appliances* vented in accordance with Section 804. The *chimney* or vent shall be designed for the type of *appliance* being vented.

Exception: Commercial cooking *appliances* vented by a Type I hood installed in accordance with Section 507. Residential appliances installed per their listing.

801.20 Plastic vent joints.
Plastic pipe and fittings used to vent appliances shall be installed in accordance with the *appliance* manufacturer's installation instructions. Solvent cement joints between ABS pipe and fittings shall be cleaned. Solvent cement joints between CPVC pipe and fittings or PVC pipe and fittings shall be primed. The primer shall be a contrasting color, or an ultraviolet primer may be used.

TABLE 803.9(1)
MINIMUM CHIMNEY CONNECTOR
THICKNESS FOR LOW-HEAT APPLIANCES

DIAMETER OF CONNECTOR (inches)	MINIMUM NOMINAL THICKNESS (galvanized) (inches)
~~5 and smaller~~ Less than 6	0.022 (No. 26 gage)
~~Larger than 5 and up to 10~~ 6 to 10	0.028 (No. 24 gage)
~~Larger than 10 and up to 16~~Over 10 through 16	0.034 (No. 22 gage)
Larger than 16	0.064 (No. 16 gage)

For SI: 1 inch = 25.4 mm.

SECTION 911
DUCT FURNACES (Duct Heaters)

911.1 General.
Duct furnaces shall be installed in accordance with the manufacturer's instructions. Electric duct furnaces shall comply with UL 1996.

917.3 Installation of microwave oven over a cooking appliance.
The installation of a listed and labeled cooking appliance or microwave oven over a listed and labeled cooking appliance shall conform to the terms of the upper appliance's listing and label and the manufacturer's installation instructions.

918.7 Refrigeration coils in warm-air furnaces. When a cooling coil is located in the supply plenum of a warm-air furnace, the furnace blower shall be rated at not less than 0.5-inch water column (124 Pa) static pressure unless the furnace is listed and labeled for use with a cooling coil. Cooling coils shall not be located upstream from heat exchangers unless listed and labeled for such use. Conversion of existing furnaces for use with cooling coils shall be permitted provided the furnace will operate within the temperature rise specified for the furnace.

SECTION 929
BASEBOARD CONVECTORS

929.1 Baseboard convectors. Electric baseboard convectors shall be installed in accordance with the manufacturer's installation instructions and the *North Carolina Electrical Code*.

SECTION 930
DUCT HEATERS

930.1 General. Electric duct heaters shall be installed in accordance with the manufacturer's installation instructions and the *North Carolina Electrical Code*. Electric furnaces shall be tested in accordance with UL 1996.

930.2 Installation. Electric duct heaters shall be installed so they will not create a fire hazard. Class I ducts, duct coverings and linings shall be interrupted at each heater to provide the clearances specified in the manufacturer's installation instructions. Such interruptions are not required for duct heaters listed and labeled for zero clearance to combustible materials. Insulation installed in the immediate area of each heater shall be classified for the maximum temperature produced on the duct surface.

930.3 Installation with heat pumps and air conditioners. Duct heaters located within 4 feet (1219 mm) of a heat pump or air conditioner shall be listed and labeled for such installations. The heat pump or air conditioner shall additionally be listed and labeled for such duct heater installations.

930.4 Access. Duct heaters shall be accessible for servicing, and clearance shall be maintained to permit adjustment, servicing and replacement of controls and heating elements.

930.5 Fan interlock. The fan circuit shall be provided with an interlock to prevent heater operation when the fan is not operating.

1001.1 Scope.
This chapter shall govern the installation, *alteration* and repair of boilers, water heaters and pressure vessels.

Exceptions:

7. Any boiler or pressure vessel subject to inspection by federal or state inspectors. See North Carolina General Statute Chapter 95, Article 7A,Section 95-69.10 for a complete list of equipment that is exempt from this code but under the jurisdiction of the NC Department of Labor.

1006.1 Safety valves for steam boilers.
Steam boilers shall be protected with a safety ~~valve~~. valve(s).

1006.2 Safety relief valves for hot water boilers.
Hot water boilers shall be protected with a safety relief ~~valve~~. valve(s).

1009.2 Closed-type expansion tanks.
Closed-type expansion tanks shall be installed in accordance with the manufacturer's instructions. Expansion tanks for systems designed to have an operating pressure in excess of 30 psi (207 kPa) shall be constructed and certified in accordance with the ASME *Boiler and Pressure Vessel Code*. The size of the tank shall be based on the capacity of the hot-water-heating system. The minimum size of the tank shall be determined in accordance with the following equation ~~where all necessary information is known~~:

$$V_t = \frac{(0.00041T - 0.0466)V_s}{\left(\frac{P_a}{P_f}\right) - \left(\frac{P_a}{P_o}\right)}$$ **(Equation 10-1)**

For SI:

$$V_t = \frac{(0.000738T - 0.03348)V_s}{\left(\frac{P_a}{P_f}\right) - \left(\frac{P_a}{P_o}\right)}$$

where:

V_t = Minimum volume of tanks (gallons) (L).
V_s = Volume of system, not including expansion tanks (gallons) (L).
T = Average operating temperature (ºF) (ºC).
P_a = Atmospheric pressure (psi) (kPa).
P_f = Fill pressure (psi) (kPa).
P_o = Maximum operating pressure (psi) (kPa).

Where all necessary information is not known, the minimum size of the tank shall be determined from Table 1009.2.

TABLE 1009.2
CLOSED-TYPE EXPANSION TANK SIZING

SYSTEM VOLUME IN GALLONS	TANK CAPACITIES IN GALLONS	
	Pressurized Diaphragm Type	Nonpressurizd Type
100	9	15
200	17	30
300	25	45
400	33	60
500	42	75
1,000	83	150
2,000	165	300

For SI: 1 gallon = 3.795 L.

1101.10 Locking access port caps. Deleted
Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

Exception: This section shall not apply to refrigerant circuit access ports on equipment installed in controlled areas such as on roofs with locked access hatches or doors.

1102.3 Access port protection. Deleted
Refrigerant access ports shall be protected in accordance with Section 1101.10 whenever refrigerant is added to or recovered from refrigeration or air-conditioning systems.

1107.2 Piping location.
Refrigerant piping that crosses an open space that affords passageway in any building shall be not less than 7 feet 3 inches (2210 mm) above the floor unless the piping is located against the ceiling of such space. Refrigerant piping shall not be placed in any elevator, dumbwaiter or other shaft containing a moving object or in any shaft that has openings to living quarters or to means of egress. Refrigerant piping shall not be installed in an enclosed public stairway, stairway landing or means of egress.vertical or horizontal exit enclosure.

1108.3.1 Test gauges.
Gauges used for testing shall be as follows:
1. Tests requiring a pressure of 10 pounds per square inch (psi) (69 kPa) or less shall utilize a testing gauge having increments of 0.10 psi (0.69 kPa) or less. 2. Tests requiring a pressure of greater than 10 psi (69 kPa) but less than or equal to 100 psi (689 kPa) shall utilize a testing gauge having increments of 1 psi (6.9 kPa) or less. 3. Tests requiring a pressure of greater than 100 psi (689 kPa) shall utilize a testing gauge having increments of 2 psi (14 kPa) or less.

[F] 1109.1 Testing required. Deleted

~~The following emergency devices and systems shall be periodically tested in accordance with the manufacturer's instructions and as required by the code official:~~

~~1. Treatment and flaring systems.~~

~~2. Valves and appurtenances necessary to the operation of emergency refrigeration control boxes.~~

~~3. Fans and associated *equipment* intended to operate emergency pure ventilation systems.~~

~~4. Detection and alarm systems.~~

1201.4 Test gauges.
Gauges used for testing shall be as follows:
1. Tests requiring a pressure of 10 pounds per square inch (psi) (69 kPa) or less shall utilize a testing gauge having increments of 0.10 psi (0.69 kPa) or less. 2. Tests requiring a pressure of greater than 10 psi (69 kPa) but less than or equal to 100 psi (689 kPa) shall utilize a testing gauge having increments of 1 psi (6.9 kPa) or less. 3. Tests requiring a pressure of greater than 100 psi (689 kPa) shall utilize a testing gauge having increments of 2 psi (14 kPa) or less.

1301.2 Storage and piping systems.
Fuel-oil storage systems shall comply with Section 603.3 of the *International Fire Code*. Fuel-oil piping systems shall comply with the requirements of this code.

> **Exception:** Fuel-oil storage tanks for one- and two-family dwellings and townhouses shall comply with Section 1309.

1301.3 Fuel type. See Section 301.12.

1308.1 Testing required.
Fuel oil piping shall be tested in accordance with NFPA 31.

1308.1.1 Test gauges.
Gauges used for testing shall be as follows:
1. Tests requiring a pressure of 10 pounds per square inch (psi) (69 kPa) or less shall utilize a testing gauge having increments of 0.10 psi (0.69 kPa) or less. 2. Tests requiring a pressure of greater than 10 psi (69 kPa) but less than or equal to 100 psi (689 kPa) shall utilize a testing gauge having increments of 1 psi (6.9 kPa) or less. 3. Tests requiring a pressure of greater than 100 psi (689 kPa) shall utilize a testing gauge having increments of 2 psi (14 kPa) or less

SECTION 1309
OIL TANKS FOR ONE- AND TWO-FAMILY DWELLINGS AND TOWNHOUSES

1309.1 Materials.
Supply tanks shall be listed and labeled and shall conform to UL 142 for above-ground tanks, UL 58 for underground tanks, and UL 80 for inside tanks.

1309.2 Above-ground tanks.
The maximum amount of fuel oil stored above ground or inside of a building shall be 660 gallons (2498 L). The supply tank shall be supported on rigid noncombustible supports to prevent settling or shifting.

1309.2.1 Tanks with buildings.
Supply tanks for use inside of buildings shall be of such size and shape to permit installation and removal from dwellings as whole units. Supply tanks larger than 10 gallons (38 L) shall be placed not less than 5 feet (1524 mm) from any fire or flame either within or external to any fuel-burning appliance.

1309.2.2 Outside above-ground tanks.

Tanks installed outside above ground shall be a minimum of 5 feet (1524 mm) from an adjoining property line. Such tanks shall be protected from the weather and from physical damage.

1309.3 Underground tanks.
Excavations for underground tanks shall not undermine the foundations of existing structures. The clearance from the tank to the nearest wall of a basement, pit or property line shall not be less than 1 foot (305 mm). Tanks shall be set on and surrounded with noncorrosive inert materials such as clean earth, sand or gravel well tamped in place. Tanks shall be covered with not less than1 foot (305 mm) of earth. Corrosion protection shall be provided in accordance with Section 1309.8.

1309.4 Multiple tanks.
Cross connection of two supply tanks shall be permitted in accordance with Section 1309.7.

1309.5 Oil gauges.
Inside tanks shall be provided with a device to indicate when the oil in the tank has reached a predetermined safe level. Glass gauges or a gauge subject to breakage that could result in the escape of oil from the tank shall not be used.

1309.6 Flood-resistant installation.
In areas prone to flooding as established by Table R301.2(1) of the *International Residential Code*, tanks shall be installed at or above the design flood elevation established in Section R324 of the *International Residential Code* or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the design flood.

1309.7 Cross connection of tanks.
Cross connection of supply tanks, not exceeding 660 gallons (2498 L) of aggregate capacity, with gravity flow from one tank to another, shall be acceptable provided that the two tanks are on the same horizontal plane.

1309.8 Corrosion protection.
Underground tanks and buried piping shall be protected by corrosion-resistant coatings or alloys or fiberglass-reinforced plastic.

Appendix B

Recommended Permit Fee Schedule

Deleted.

~~**(This appendix is informative and is not part of the code.)**~~

~~**B101**~~

~~**MECHANICAL WORK, OTHER THAN GAS PIPING SYSTEMS**~~

B101.1 Initial Fee
For issuing each permit $___

B101.2 Additional Fees

B101.2.1
Fee for inspecting heating, ventilating, ductwork, air-conditioning, exhaust, venting, *combustion* air, pressure vessel, solar, fuel oil and refrigeration systems and *appliance* installations shall be $___ for the first $1,000.00, or fraction thereof, of valuation of the installation plus $___ for each additional $1,000.00 or fraction thereof.

B101.2.2
Fee for inspecting repairs, alterations and additions to an existing system shall be $_plus $___ for each $1,000.00 or fraction thereof.

B101.2.3
Fee for inspecting boilers (based upon Btu input):

33,000 Btu (1 bhp) to 165,000 (5 bhp)	$___
165,001 Btu (5 bhp) to 330,000 (10 bhp)	$___
330,001 Btu (10 bhp) to 1,165,000 (52 bhp)	$___
1,165,001 Btu (52 bhp) to 3,300,000 (98 bhp)	$___
Over 3,300,000 Btu (98 bhp)	$___

For SI:1 British thermal unit = 0.2931 W, 1 bhp = 33,475 Btu/hr

B102

FEE FOR REINSPECTION

If it becomes necessary to make a reinspection of a heating, ventilation, air-conditioning or refrigeration system, or boiler installation, the installer of such *equipment* shall pay a reinspection fee of $_.

B103

TEMPORARY OPERATION INSPECTION FEE

When preliminary inspection is requested for purposes of permitting temporary operation of a heating, ventilating, refrigeration, or air-conditioning system, or portion thereof, a fee of $_shall be paid by the contractor requesting such preliminary inspection. If the system is not *approved* for temporary operation on the first preliminary inspection, the usual reinspection fee shall be charged for each subsequent preliminary inspection for such purpose.

B104

~~SELF-CONTAINED UNITS LESS THAN 2 TONS~~

~~In all buildings, except one- and two-family dwellings, where self-contained air-conditioning units of less than 2 tons (7.034 kW) are to be installed, the fee charged shall be that for the total cost of all units combined (see B101.2.1 for rate).~~