DISTRICT OF COLUMBIA
CONSTRUCTION CODES SUPPLEMENT OF 2008
DCMR 12E MECHANICAL CODE SUPPLEMENT

CHAPTER 4E VENTILATION

SECTION M-401E GENERAL

Add new Section M-401.4.1.1 to the Mechanical Code to read as follows:

> **M-401.4.1.1 Height Above Grade.** The bottom of outside air intake openings shall be a minimum of 2 feet (610 mm) above the adjacent grade or above the bottom of adjacent areaways. Where alleys, parking lots, loading docks, and other areas with vehicular access are located less than 10 feet (3048 mm) horizontally from the outside air intake opening, such opening shall be located a minimum of 10 feet (3048 mm) above the surface of those areas.

Add new Section M-401.4.2.1 to the Mechanical Code to read as follows:

> **M-401.4.2.1 Garage Exhaust.** Exhaust openings serving public garages shall be a minimum of 25 feet (7620 mm) from any operable window, door, or outside air intake opening. The bottom of exhaust openings serving public garages shall be a minimum of 15 feet (4572 mm) above streets alleys or other walkways. When exhaust is directed upwards, the code official is authorized to approve garage exhaust openings less than 15 feet (4572 mm) above streets, alleys, or other walkways, in accordance with Section 105.

CHAPTER 5E EXHAUST SYSTEMS

SECTION M-506E COMMERCIAL KITCHEN HOOD VENTILATION SYSTEM DUCTS AND EXHAUST EQUIPMENT

Delete Section 506.3.12 of the Mechanical Code in its entirety and add new Section M-506.3.12 to read as follows:

M-506.3.12 Type I Exhaust Duct Termination. Ducts shall run as directly to the roof as practical. The system termination shall be a minimum of 2 feet (610 mm) above the roof or any part of structures within 10 feet (3048 mm) of the termination, and not less than 25 feet (7620 mm) from any operable windows, intakes, doors or lot lines

Exceptions:

1. On narrow lots where a 25 foot distance from any operable windows, intakes, doors, or lot lines cannot be achieved, the code official is authorized to approve a smaller distance.

2. When an approved odor and grease removal system is installed, termination is permitted in accordance with the requirements of Sections 401.5 and 501.2 of the *Mechanical Cod*e.

Add new Section M-515 to read as follows:

SECTION M-515E LABORATORY HOODS

M-515.1 Laboratory Hoods. Laboratory hoods and ventilation system shall comply with NFPA 45-2004 listed in Chapter 15.

CHAPTER 6E DUCT SYSTEMS

SECTION M-607E DUCT AND TRANSFER OPENINGS

Delete Exceptions under Section 607.5.5 of the Mechanical Code and add new Exceptions to read as follows:

M-607.5.5 Shaft enclosures. Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with listed fire and smoke dampers installed in accordance with their listing.

Exceptions:

1. Fire and smoke dampers are not required where steel exhaust sub-ducts extend at least 22 inches (559 mm) vertically in exhaust shafts provided there is a continuous airflow upward to the outside and the fan is wired to the buildings emergency system.

2. Fire dampers are not required where penetrations are tested in accordance with ASTM E119 as part of the fire resistance rated assembly.

3. Fire and smoke dampers are not required where ducts are used as part of an approved smoke-control system in accordance with Section 909.

4. Fire and smoke dampers are not required where the penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour fire-resistance rated construction.

5. Smoke dampers are not required where the building is protected throughout with an automatic sprinkler system in accordance with Section 903.3.1 of the *Building Code*.

CHAPTER 8E CHIMNEYS AND VENTS

SECTION M-801E GENERAL

Add new Section M-801.21 to the Mechanical Code to read as follows:

M-801.21 Smoke Test. Before a new appliance is put into use, a new or existing chimney shall either be proved tight by a scented smoke test or provided with a certification of tightness by a licensed contractor.

CHAPTER 9E SPECIFIC APPLIANCES, FIREPLACES AND SOLID FUEL-BURNING EQUIPMENT

SECTION M-922E KEROSENE AND OIL-FIRED STOVES

Delete Section 922 of the Mechanical Code in its entirety.

CHAPTER 10E BOILERS, WATER HEATERS AND PRESSURE VESSELS

SECTION M-1004E BOILERS

Delete Section 1004.1 of the Mechanical Code in its entirety and add new Section M-1004.1 to read as follows.

M-1004.1 Standards. Boilers and their control systems shall be designed and constructed in accordance with the requirements of one or more of the following standards; ASME Boiler and Pressure Vessel Code Sections I to XI (2001 Edition), ASME CSD-1 (2002), NFPA 8501, NFPA 8502, NFPA 8504, UL 726, and the National Board Inspection Code (NBIC) 2001 ANSI/NB-23.

Add new Sections M-1012 to M-1020 to the Mechanical Code to read as follows.

SECTION M-1012E INSPECTION CRITERIA

M-1012.1 New Construction. The inspection of the design, construction, installation and operation of steam or hot water boilers and pressure vessels, and unfired pressure vessel in the District of Columbia, shall be performed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, the NBIC and Safety Control Device Standards as specified by the manufacturer's inspection instructions. Inspections for compliance with the D.C. local safety requirements shall be performed in accordance with the District of Columbia Municipal Regulations Criteria.

M-1012.2 Equipment Replacement. The inspection of boiler and pressure vessel equipment installed to replace inoperable equipment shall be performed in accordance with the inspection requirements for new construction as specified in Section M-1012.1.

M-1012.3 Existing Equipment. The inspection of boilers and pressure vessels installed and operating in existing facilities shall be performed at a frequency in accordance with the requirements in the NBIC, and the District of Columbia Municipal Regulations

SECTION M-1013E ADDITIONAL GENERAL & SPECIFIC REQUIREMENTS FOR BOILERS, WATER HEATERS AND PRESSURE VESSELS

M-1013.0 General. The intent of Sections M-1013.0 through M-1020.0 is to provide general and specific guidance to the code official and the consumer regarding the installation, maintenance and inspection of new and existing boilers, water heaters, and pressure vessels.

M-1013.1 Inspection of Boilers And Unfired Pressure Vessels

M-1013.1.1 Permit Requirement. A permit shall be obtained for each boiler or unfired

pressure vessel installed, erected, or moved and reinstalled, or re-erected in a new location in the District of Columbia before any work in connection with the equipment is performed.

M-1013.1.2 Inspection of Boilers. No person shall operate, or cause to be operated, any new boiler or unfired pressure vessel which has been installed or erected, or any used boiler or unfired pressure vessel which has been reinstalled or re-erected in the District until it has been inspected by the boiler Inspector and a certificate of inspection has been issued. The certificate must be displayed in the boiler or engine room.

M-1013.1.3 Certificate of Inspection. No person shall operate or cause to be operated any boiler or unfired pressure vessel requiring inspection under this title without a current certificate of inspection.

M-1013.1.4 Owner's Responsibility. The owner or user of each boiler or unfired pressure vessel which is not covered by a current certificate of inspection shall notify the code official in writing of the following information.

1. The location of each boiler or unfired pressure vessel not covered by a current certificate of inspection;

2. The date of the last inspection, if any;

3. Whether or not that equipment is insured and inspected by an insurance company; and

4. The name of the company insuring it.

M-1013.1.5 Operator's License Suspension/Revocation. The license of any engineer licensed by the District of Columbia shall be subject to suspension or revocation if he/she shall operate, or cause to be operated any boiler or unfired pressure vessel under his or her supervision without a certificate of inspection or with a certificate which has expired.

M-1013.1.6 Operating Pressure. No person shall operate or cause to be operated any boiler or unfired pressure vessel at a pressure in excess of the allowable pressure as stated on the certificate of inspection.

M-1013.1.7 Safety Devices. Boilers and unfired pressure vessels shall be equipped with all safety appliances and piping as prescribed in the ASME Code. No person shall operate or cause a boiler or unfired pressure vessel to be operated unless equipped with the prescribed safety appliances and piping, and no person shall remove or tamper with any safety appliance or piping, except for the purpose of making repairs. Any adjustments to safety valves shall be made only by direction of an inspector.

M-1013.1.7.1 Tests. When in the judgment of the boiler Inspector it is considered necessary to demonstrate the proper operation of the boiler safeties

and controls, or to demonstrate the licensed engineer's ability to properly operate the boiler, the safety-valve capacity of a boiler and/or the low water cutout shall be tested. An accumulation test shall be made by shutting off all other steam-discharge outlets from the boiler, and operating the fuel-burning equipment to produce the maximum steaming capacity of the boiler. An evaporation test shall be performed to demonstrate proper operation of the low water cutout.

M-1013.1.7.2 Safety-Valve. The safety-valve equipment shall be sufficient to prevent the pressure from rising more than (a) six (6) percent above the maximum allowable working pressures for power boilers, and (b) five (5) pounds per square inch (psi) above the maximum allowable working pressures for heating boilers. Provision shall be made for piping the safety valve discharge out of the boiler room during a test pursuant to Section M-1013.1.7.1.

M-1013.1.8 Portable Boiler/Unfired Pressure Vessel. No portable temporary boiler or unfired pressure vessel shall be used until it has been inspected by an authorized boiler Inspector and a certificate of inspection issued. Each owner or user of portable boilers or unfired pressure vessels shall furnish in writing to the code official, on or before the effective date of this title and yearly thereafter, the following information.

1. A list of his or her portable boilers and unfired pressure vessels;

2. A list of the location of each portable boiler and unfired pressure vessel; and

3. A statement indicating whether the portable boiler and unfired pressure vessel is insured and inspected by an insurance company.

M-1013.2 Annual Boiler Inspection Requirements

M-1013.2.1 Annual Inspection. All steam boilers including hot water boilers shall be inspected annually by the boiler Inspector, an assistant boiler Inspector, or by an Inspector of an insurance company.

M-1013.2.1.1 Steel Steam and Hot Water Boilers. The annual inspection of steel steam and hot water boilers shall consist of an internal inspection.

M-1013.2.1.2 Internal Inspection. The internal inspection shall consist of a thorough examination of all tubes, seams, rivets, drums, stay bolts, and other parts to insure that the boiler is in safe operating condition and able to carry the pressure allowed.

M-1013.2.1.3 External Inspection. The external inspection to determine the general condition of the boiler and its appurtenances as well as the adequacy of safety valves, pressure gages, apparatus for determining water level, and other appliances shall be made under normal operating conditions at which time the steam pressure carried shall be observed and the operation of all valves, gages,

safety devices, or other appliances shall be checked to insure that they are in proper working order.

M-1013.2.1.4 Hydrostatic Test. A hydrostatic test shall be required when, in the judgment of the Inspector, it is considered necessary in the interest of safety.

M-1013.3 Preparation of Boiler for Inspection

M-1013.3.1 Boiler Preparation. A steam or hot water boiler shall be prepared for internal inspection by the owner or user on a date specified by the inspector. Insofar as practicable the internal inspection shall he made within fifteen (15) days prior to the expiration of the certificate of inspection. In no case shall the internal inspection be deferred more than thirty (30) days after date of expiration of the current certificate of inspection. A steam boiler (or hot water) may be ordered discontinued from service until the inspection is made.

M-1013.3.2 Inspection Procedure. Preparation for internal inspection shall be made in the following manner.

1. Water shall be drawn off and the boiler thoroughly washed out;

2. All manhole and handhole plates, washout plugs and the water column connection plugs shall he removed and the furnace and combustion chambers thoroughly cooled and cleaned;

3. All grates or stoker dead plates of internally-fired boilers shall be removed; and

4. All leaks of steam or hot water into the boiler shall be stopped. The Inspector may also require the removal of brickwork and of insulation covering the seams of shell, drums or domes, sufficient to determine the size and pitch or rivets, their condition, and any other information as may be necessary to definitely determine the condition of the boiler and its fitness for safe operation.
   M-1013.3.2.1 Hydrostatic Test. A steam or hot water boiler shall be prepared for hydrostatic test by the owner or user, when required by the Inspector, by filling the boiler with water to the stop valve and blanking off the connections of the boiler to other boilers when that boiler is connected to other boilers that are under steam pressure. Arrangements shall be made with the Inspector for the protection of the safety valve and under no circumstances shall the safety valve spring be screwed down for making hydrostatic tests.

M-1013.4 Unfired Pressure Vessels Requiring Annual Inspection

M-1013.4.1 General. Each unfired pressure vessel operating at a pressure in excess of sixty (60) pounds per square inch and having a capacity in excess of fifteen (15) gallons shall be inspected annually by the boiler Inspector, an assistant boiler Inspector, or by an insurance company Inspector. Any unfired pressure vessel as described herein shall be

subjected to inspection if it is connected to a source of supply.

M-1013.4.2 Type of Inspection. The annual inspection of unfired pressure vessels shall consist of an external inspection including safety devices, and other appurtenances. When a vessel is provided with manholes an internal inspection shall also be made.

M-1013.4.2.1 Hydrostatic Test. A hydrostatic test may be required when, in the judgment of the Inspector, it is considered necessary in the interest of safety. This test shall consist of applying a pressure of one and one-half times the allowable pressure to the vessel to be prepared for inspection by the owner or user as directed by the Inspector.

M-1013.5 Annual Inspection by Insurance Companies

M-1013.5.1 General. Any steam or hot water boiler or unfired pressure vessel which is insured and inspected at least once annually by an insurance company licensed to operate in the District shall be exempt from inspection by the Department if the requirements of this section are satisfied.

M-1013.5.1.1 ASME Code. The insurance company shall apply the inspection provisions in Section I, Part PG, paragraph PG-90, "Inspection and Tests - General" in the ASME Boiler and pressure vessel code.

M-1013.5.1.2 Qualifications. Insurance company inspectors shall hold certificates of competency issued by the District of Columbia.

M-1013.5.2 Reports. Reports of inspections and other data relating to an insured boiler or unfired pressure vessel as may be required shall be filed with the Department within thirty (30) days after the inspection on the standard forms and in the manner as required; provided, that the internal-inspection report shall be filed in time to prevent the certificate of inspection from becoming more than thirty (30) days overdue. Each report shall be typewritten and signed in ink, and shall state definitely whether or not the certificate of inspection shall be issued, and the pressure allowed.

M-1013.5.2.1 Internal Inspection. Each annual internal-inspection report shall state the nature of all changes or repairs ordered or recommended. If the certificate of inspection is withheld because changes or repairs have been ordered or recommended, an additional report shall he filed within thirty (30) days stating whether the changes or repairs have been completed.

M-1013.5.3 Insurance Company Report. The insurance company shall immediately report to the Department the name of the owner or user and the location of every boiler and unfired pressure vessel on which insurance is refused, canceled, or discontinued and the reason therefore and also for each new object upon which the coverage is taken. Each insurance company report shall state the names of the licensed engineers working on all watches. The report shall state the grade of license held, and if there is none, the reports

shall so state.

M-1013.5.4 Fees. The fee of fifty dollars ($50.00) required to be paid by the owner or user for the issuance of a certificate of inspection shall be forwarded with the inspection report to the Department with a check made payable to the D.C. Treasurer.

M-1013.5.5 Licensed Engineer. The Inspector shall inform the owner or operator that licensed engineers are required by law and that the licenses must be posted under glass in the boiler or engine room with a daily log book of plant operations with all boiler safeties and controls tested daily for each tour of duty.

M-1013.6 Certificates or Competency For Insurance Company Inspectors

M-1013.6.1 Certificate of Competency. Inspectors of insurance companies authorized by the code official to inspect and insure steam boilers, hot water boilers unfired pressure vessels shall hold a Certificate of Competency issued by the Chief Boiler Inspector. The Certificate of Competency shall be for a period of two (2) years and may be renewed without further examination for an additional two (2) year period upon request. The fee for each period shall be two hundred dollars ($200.00).

M-1013.6.1.1 Application. Application for examination of insurance company inspectors for Certificates of Competency shall be made by the insurance company in writing to the Chief Boiler Inspector. The application shall state the name, age, qualifications, experience, and local address of each of the Inspectors proposed to be employed by the company in the inspection of steam boilers and unfired pressure vessels in the District of Columbia.

M-1013.6.1.2 National Board of Boiler and Pressure Vessel. A certificate issued by the National Board of Boiler and Pressure Vessel Inspectors may be accepted upon proper substantiation and a Certificate of Competency issued therefore.

M-1013.6.1.3 Cancellation. Whenever an Inspector holding a Certificate of Competency from the District shall leave the employ of an insurance company, the company shall give prompt written notice of the facts and the reasons for the Inspector leaving, to the Chief Boiler Inspector, who shall cause the Inspector's Certificate of Competency to be canceled.

M-1013.7 Certificates of Inspection

M-1013.7.1 General. No person shall use or cause to be used any steam boiler or unfired pressure vessel until a certificate of inspection has been issued and posted as required in this title.

M-1013.7.2 Certificate of Inspection. The certificate of inspection shall not be issued until it is determined that the boiler or unfired pressure vessel is in condition and in

conformity with the boiler code of the American Society of Mechanical Engineers, and this title, the Rules and Regulations Governing the Installation of Fuel Burning Equipment, and the Rules and Regulations Governing the Operation of Engines and Steam Boilers and the Machinery in and for the District of Columbia. A separate certificate of inspection shall be issued for each object inspected. Each certificate shall be enclosed in a glass covered frame to be supplied by the owner and shall be prominently displayed in the boiler or engine room near the equipment to which it pertains. Certificates for portable equipment shall be kept with the equipment at all times.

M-1013.7.2.1 Internal Inspection. In the case of boilers which can be internally inspected, certificates shall not be issued until after that inspection has been made.

M-1013.7.3 Installations. On all installations for which a permit has been issued, the contractor or person making the installation shall be responsible for notifying the Chief Boiler Inspector, in sufficient time so that the necessary inspections can be made.

M-1013.7.4 Operation. The contractor or person making the installation shall be responsible that no boiler or unfired pressure vessel shall be operated until final inspection has been made and permission given to operate the equipment. A licensed engineer shall be in-charge of the boiler if it is operated prior to being turned over to the owner.

M-1013.8 Notice to Make Repairs or Alterations

M-1013.8.1 General. If upon inspection it is found that repairs, alterations, or cleaning are necessary to insure the safe operation of a steam boiler or unfired pressure vessel, and its conformity to the ASME Code and this title, a written notice stating the work required to be done and time of completion shall be sent to the owner or user.

M-1013.8.1.1 Repairs, Alterations, or Cleaning. Any repairs, alterations, or cleaning, shall be made as directed. Upon completion of the work ordered, the Chief Boiler Inspector, shall be notified. If the work has not been completed within the time allowed, operation of the equipment may be ordered discontinued.

M-1013.9 Condemnation of Defective or Unsafe Equipment

M-1013.9.1 General. Whenever the boiler inspector finds that a boiler or unfired pressure vessel, or its necessary appurtenances, is in such a defective or unsafe condition that life or property is endangered, he or she shall immediately order its further use and operation discontinued. If, in his or her opinion, it cannot be repaired and made safe, he or she shall condemn it.

M-1013.9.2 Revocation/Suspension. The boiler inspector shall revoke or suspend the certificate of inspection pertaining to any boiler or unfired pressure vessel discontinued or condemned pursuant to Section M-1013.9.1, making a written report of the action taken with the reasons therefore to the Chief Boiler Inspector. The report shall contain a

detailed description of the unsafe condition of the boiler or unfired pressure vessel.

M-1013.9.3 Notification. A written notice of the revocation or suspension of certificate of inspection and the reasons therefore shall be served on the owner or user. In the case of an insured boiler or unfired pressure vessel where the certificate of inspection was issued on the certification of an insurance company, the notice shall be sent to the company.

M-1013.9.4 Unsafe Conditions. No person shall again operate or cause to be operated any boiler or unfired pressure vessel which is known to be unsafe or which has been condemned by the boiler inspector, nor shall any person operate or cause to be operated, any boiler or unfired pressure vessel, the further use and operation of which has been ordered discontinued by the boiler inspector, or where the certificate of inspection has been suspended, until the defective or unsafe condition which was the reason for that action has been corrected and a new certificate of inspection issued. A boiler or unfired pressure vessel which has been condemned by an inspector shall be distinctly labeled by the D.C. Boiler Inspector's Office. Numbers on condemned boilers shall not be reassigned.

M-1013.10 Numbering Boilers and Unfired Pressure Vessels

M-1013.10.1 General. Every boiler and unfired pressure vessel shall be given a District of Columbia number. Numbers assigned to cast-iron boilers shall be of metal not less than one inch (1") in height and shall be securely attached to a metal plate which in turn shall be securely attached to the front of the boiler. Miniature boilers shall have sufficient space provided so that the District of Columbia numbers can be stamped on the shell and be clearly visible when the insulating jacket is in place.

SECTION M-1014E CONSTRUCTION, INSTALLATION, AND OPERATION OF BOILERS AND UNFIRED PRESSURE VESSELS

M-1014.1 General Provisions. All steam boilers, except boilers which are exempted by Section 8 of the Boiler Inspection Act of June 25, 1936, shall bear the following information.

1. The ASME symbol;

2. The name of the manufacturer;

3. The maximum allowable working pressure;

4. The serial number and National Board Number;

5. The year built; and

6. Any other required data to indicate that it has been built in accordance with the ASME Boiler and Pressure Vessel Code.

M-1014.1.1 Identification Number. All boilers, except Low Pressure Heating Boilers and unfired pressure vessels as described in Section M-1014.1 shall bear a National Board Number to indicate that it has been inspected by an inspector holding a National Board Commission.

M-1014.1.2 Operating Pressure and Capacity. All unfired pressure vessel operated at a pressure in excess of sixty (60) pounds per square inch and having a capacity in excess of fifteen (15) gallons, shall bear the following information.

1. The ASME symbol;

2. The name of the manufacturer;

3. The maximum allowable working pressure;

4. The serial number and National Board Numbers;

5. The year built; and

6. Any other required data to indicate that it has been built in accordance with the provisions of Section VIII in the ASME Boiler and Pressure Vessel Code.

M-1014.2 Permits Required for Installation

M-1014.2.1 General. No person shall erect, install, re-erect, or reinstall or cause to be erected, installed, re-erected or any steam or hot water boiler or unfired pressure vessel until he or she shall have made application on the form provided and obtained an installation permit.

M-1014.2.2 Permit Applications. Applications for permits shall be accompanied by a form known as "Manufacturer's Data Report," properly filled out and signed by an Inspector licensed to insure Vessel Inspectors, showing that the boiler or unfired pressures vessel has been constructed and inspected in accordance with the requirements of the American Society of Mechanical Engineers Boiler and Unfired Pressure Vessel Code. When an application is made to install a used boiler or unfired pressure vessel definite information shall be furnished showing that the boiler or unfired pressure vessel has been built in accordance with all the requirements of the ASME Code and is so stamped. Upon approval of the application and the accompanying data a Permit for the installation, erection, reinstallation, or re-erection shall be issued by the Permit Branch, Licenses and Permit Division, after payment of the required fee to the D.C. Treasurer.

M-1014.2.3 Installation Permit. Before an installation permit for a used boiler or unfired pressure vessel shall be issued, the boiler Inspector shall carefully inspect the boiler or unfired pressure vessel in order to determine whether it is safe to operate, and any repairs or changes that may be necessary. The fee for that inspection shall be the

same as called for under annual inspection.

M-1014.2.4 Notification. When notification has been given to prepare a boiler or unfired pressure vessel for inspection or hydrostatic test on a definite date, or when a definite appointment for an inspection cannot be made by reason of the boiler or unfired pressure vessel not being properly prepared for inspection, so that an additional call or calls are thereby made necessary; or when additional inspections are required in order to secure compliance with orders previously issued, each additional call or inspection may be charged for at the same fee as prescribed under Annual Inspection Fees.

M-1014.2.5 Unscheduled Inspection. For an inspection made upon request or to determine the safety of an object not regularly inspected, the fee shall be as prescribed under Annual Inspection Fees.

M-1014.2.6 Inspection Fees. For the inspection of a boiler being retubed in a shop, the fee shall be the same as for the annual inspection. For an inspection to determine whether the condition of a boiler or unfired pressure vessel is such that it can be installed in the District, the fee shall be the same as prescribed under Annual Inspection Fees.

M-1014.2.7 Welding Fee. Fee for welding qualification test shall be one-hundred dollars ($100.00). For the inspection of pipe or boiler welding the fee shall be one-hundred dollars ($100.00) per day. If a welder license has expired for less than a period of six (6) months from its expiration date, a late fee shall be applied of fifty dollars ($50.00). Welding license renewal fees shall be the amount of one-hundred dollars ($100.00) for 2 years. If a welder license has expired for a period of six (6) months or more, the person must be retested.

M-1014.2.8 Certification Fee. The fee for certificate of competency for insurance company Inspectors for a two (2) year period shall be two hundred dollars ($200.00).

M-1014.3 Payment of Fees

M-1014.3.1 General. All fees shall be paid to the D.C. Treasurer, who shall issue a receipt for the payment of the following fees.

1. Fees for the installation permit and subsequent inspection of a boiler or unfired pressure vessel shall be paid prior to the issuance of a permit and before any work is started.

2. All fees for the inspection of boilers or unfired pressure vessels shall become due and payable immediately upon the making of the inspection and the certificate of inspection shall not be issued while there are any unpaid fees outstanding.

M-1014.4 Requirements for Power Boilers

M-1014.4.1 Steel Platform. On the top of every power boiler setting, a steel platform reached by means of a stationary steel stairway or ladder shall be provided. The platform

shall be provided with a four inch (4") toe guard, a steel railing not less than thirty-six inches (36") inches in height, and shall have a runway made of steel grating not less than thirty inches (30") in width.

M-1014.4.2 Platform Access. The stairway or ladder shall not be less than sixteen (16") inches in width and shall provide easy access to and from the platform. Where there is more than one boiler or where otherwise necessary a second stairway or ladder remote from the other shall be provided.

M-1014.4.2.1 Means of Egress. Two unobstructed and accessible exits remote from each other shall be provided in every room housing power boilers of seventy-five (75) horsepower total capacity and over and heating boilers having a total capacity of 2,400,000 BTU and over. Blow off pits, ash pits, alleyways, steam pipe tunnels, and other places where there would be danger of men being trapped shall have adequate ventilation, lighting, and a sufficient number of adequate means of egress.

M-1014.4.3 Blow-off Pits. Blow-off piping from power boilers shall not discharge directly into a sewer. A blow-off tank or sump shall be used where conditions do not provide an adequate and safe open discharge.

M-1014.4.4 Blow-off Tanks. Blow-off tanks shall be designed for at least fifty percent (50%) of the working steam pressure of the boiler to which it is connected and shall be built in accordance with the Unfired Pressure Vessel Code. The tanks shall have a discharge connection at least six inches (6”) above the maximum water level with a water seal, a vent from the top of the tank, and a cold-water connection to the top of the tank. The vent shall be routed to a safe point of discharge which shall be above the roof of the building of which it is a part or any adjoining building to which it may not constitute a hazard or nuisance, and shall be substantially supported and drained. The design of each tank and piping shall be submitted to the Department for approval. Sizes shall not be less than indicated in Table M-1014-1.

M-1014.5 Installation of Low Pressure Heating Boilers

M-1014.5.1 General. The return water connection to every low pressure steam or hot water heating boiler shall be arranged to form what is known as the "Hartford Loop" so that the water cannot be forced out of the boiler below the safe water level. This connection shall be installed on each boiler, with the inside bottom of the return pipe close nipple where it enters the equalizing loop being at the same level as the top of the bottom nut of the water gage glass.

M-1014.5.2 Equalizer Pipe. Each boiler shall have a separate equalizer pipe installed between the bottom opening of the boiler and the boiler stop valve, when used. The equalizer pipe shall not have a valve in it at any point and shall not be used as a means to connect two or more boilers together below the water line. Equalizer pipe sizes shall not

be less than the schedules indicated in Table M-1014-2.

M-1014.5.3 Stop Valve. When a stop valve is used in the return line of the loop it shall be located within six (6) feet of the floor. A drain valve shall be provided at the lower point of the return line. Galvanized pipe and fittings shall not be used in any part of the equalizer pipe or return**.**

M-1014.5.4 City Water Feed. Each boiler shall be provided with a city water feed line which shall not discharge directly into any part of a boiler exposed to the direct radiant heat from the fire. It shall be connected into the equalizing line between the boiler and the condensate return connection and shall have a check valve in the line as close to the boiler as possible.

M-1014.5.5 Boiler Feed Line. The boiler feed line shall be adequate to take care of the maximum demand of the boiler.

M-1014.5.6 City Water Shut-off Valve. All connections from the city water shut-off valve shall be made of brass pipe with screwed fittings. Tubing shall not be used.

M-1014.5.7 Condensate Return Pump. A condensate return pump shall have capacity to supply the boiler or boilers with sufficient water to maintain a normal water level when the boilers are operating at maximum capacity. When more than one boiler is installed the condensate return line shall be arranged to supply all boilers equally.

M-1014.5.8 Stop Valve. A stop valve shall be installed in each supply and return connection of two or more boilers connected to a common system. When a stop valve is used in the supply pipe connection of a single boiler, there shall be one used in the return pipe connection or vice versa. If there are multiple branch connections each one shall be valved. When stop valves over two inches (2") in size are used they shall be of the outside screw-and-yoke type.

> **M-1014.5.8.1 Stop Valve Location.** Stop valves shall be located as close to the boiler as possible and when over seven feet (7') above the floor shall be made accessible for operation by means of a permanent steel ladder and platform or by a chain or motor operated mechanism.

M-1014.5.9 Blow-off Connections. Each boiler shall have one or more blow-off connections fitted with straightway valves connected directly with the lowest water space. Plug or bob cocks shall not be used. A discharge pipe shall be run to the floor full size with an ell at the bottom to direct the water away from the operator or to a blow-off tank. A "tee" fitting shall be used at the boiler in order to provide for cleaning the line. Blow-off valves shall not be smaller than the schedule indicated in Table M-1014-3. If a surface blow down is used, it shall be run full size to the floor with an ell at the bottom or to a common drain.

M-1014.5.10 Wash-out and Hand-hole Openings. All wash-out and hand-hole

openings shall be accessible and shall not be obstructed or blocked by pipe or other obstacle. Capped pipe nipples and plugs shall be installed in wash-out openings.

M-1014.5.11 Cross Connections. There shall be no cross connection below the water line for any purpose between two or more boilers.

M-1014.6 Boiler Controls

M-1014.6.1 Steam Limit Control. Every steam boiler, when mechanically fired, shall be provided with a steam limit control (pressure regulator) which shall operate to prevent the steam pressure from rising above the allowable working pressure of the boiler. All connections shall be on non-ferrous pipe with screwed fittings. There shall not be any valve between the boiler and the control.

M-1014.6.2 Master Limit Control. When two or more boilers are connected to a common header, a master limit control connected into the main steam header shall be provided to control all boilers simultaneously.

M-1014.6.3 Low-Water Fuel Cut-Off. Each steam boiler, when mechanically fired, shall be equipped with an approved low-water fuel cut-off, so located as to automatically cut off the fuel supply in case the water-gage glass indicates low-water level.

M-1014.6.3.1 Cut-Off Operational Independence. The operation of the low-water fuel cut-off shall not be dependent upon the functioning of another device.

M-1014.6.3.2 Burner Cut-Off Location. When an oil burner is manually operated, the cut-off valve shall be located in the oil line close to the burner and shall have a manual re-set.

M-1014.6.3.3 Valve Location Restriction. No valves shall be permitted between the low-water fuel cut-off and the boiler.

M-1014.6.4 Water-Gage Glass Controls. Each steam boiler shall have one or more water-gage glasses attached to the water column or directly to the boiler by means of valved fittings, with the lower fitting provided with a drain valve of the straightway type with opening not less than one quarter inch (1/4") diameter. The gage glass shall be visible from the operating floor and without the removal of any cover or casing. There shall be no obstruction to interfere with visibility of the gage glass.

M-1014.6.5 Operating Elevated Gage Glass Controls. When gage cocks or gage glass shut off cocks are located seventy-eight inches (78") or more above the operating floor, they shall be of the quick opening type with chains or rods attached for operation from the floor. The gage glass and pressure gage shall be illuminated by a light with an approved type of reflector so that they can be easily read.

M-1014.6.6 Automatic Water Feeder. An automatic water feeder shall be installed on each mechanically fired steam heating boiler. It shall have sufficient capacity to take

care of the maximum boiler output.

M-1014.6.7 Feed Pump Capacity. A boiler feed pump, when used, shall have capacity to supply sufficient water to all boilers to maintain a normal water level when the boiler or boilers are operating at maximum capacity.

M-1014.6.8 City Water By-Pass. A city water by-pass valve, with the valve accessible from the floor, shall be installed around a feeder and shall have valved drain run to within six inches (6") of the floor. A mechanical city water feeder shall be installed with a bypass valve, inlet and outlet valves accessible from the floor with cross tees for inspection with the drain valve piping run to within six (6) inches of the floor.

M-1014.6.9 Feed-Water Level. A water feeder shall be installed so that it will not maintain the water level above the normal operating level as specified by the manufacturer of the boiler.

M-1014.6.10 Minimum Boiler Water Level. On low-pressure steam heating boilers, the water gage glass shall be located so that the lowest permissible water level in the glass shall be as follows.

> **M-1014.6.10.1 Multiple Fire-Tube Boilers.** For multiple fire-tube boilers at least one half inch (½") of water shall be maintained over the top row of tubes or the fusible plug, if issued, whichever is higher.
>
> **M-1014.6.10.2 Scotch Marine Boilers.** For package type Scotch Marine boilers at least one half inch (½") of water shall be maintained over the top row of tubes or the fusible plug, if used, whichever is the higher.
>
> **M-1014.6.10.3 Horizontal Tube Boilers**. For fire-box, horizontal water tube boilers at least one inch (1") of water shall be maintained over the highest point of the crown sheet.
>
> **M-1014.6.10.4 Miscellaneous Boilers**. For any other type boiler the minimum water level shall be maintained in accordance with the manufacturers' recommendations.

M-1014.6.11 Multiple Boiler Water Level. Two or more boilers shall be arranged so that the low water line of all boilers are at the same level; provided, that when each boiler is provided with an individual pump control and an automatically operated feed water control valve they may be approved for operation with different water levels.

M-1014.6.12 Boiler Pressure Gage. Every boiler shall have a pressure gage connected to its steam space, or to its water column, or to its steam connection by means of a siphon or equivalent device exterior to the boiler, and of sufficient capacity to keep the gage tube filled with water. The pressure gage shall be arranged so that the gage cannot be shut off from the boiler except by a cock with a "tee" or lever handle installed in the pipe near the gage.

M-1014.6.13 Cock Handle Position. The handle of the cock for the pressure gage shall

be parallel to the pipe in which it is located when the cock is open.

M-1014.6.14 Gage Scale Graduations. The scale on the dial of a gage on a low pressure boiler shall be graduated to not less than thirty (30 psi) in five (5 psi) graduations. Connections to steam gage siphons shall be of non-ferrous pipe. The gage shall be visible at all times without the removal of any cover or casing, and shall be of such size and so located as to be easily readable from the operating floor.

M-1014.6.15 Independent Controls. When two or more mechanically fired steam boilers are connected to the same system, each boiler shall have independent low-water fuel cut-offs, pressure controls, pressure gages and water feeders.

M-1014.6.16 Non-Ferrous Pipe and Fittings. All of the connections for the water column, water feeder, low-water fuel cut-out and make up water line to the boiler, shall be of non-ferrous pipe and screwed fittings, with a cross at each right angle turn and with a check valve in the fed line as close to the boiler as possible. High pressure boilers shall have a valve between the boiler and the check valve. Tubing shall not be permitted on boiler piping or fittings. All piping shall be firmly braced and supported.

M-1014.6.17 Drain Locations. Drains shall be located so that the discharge will not impinge on the boiler setting or electrical equipment. Water column, water feeder and low-water fuel cut-out shall have separate full size straight-way valve drains run to within six inches (6”) from the floor or to a common visible drain, with the valves located to be conveniently accessible for operation. Plug cocks shall not be used.

M-1014.7 Safety Valves

M-1014.7.1 General. Each steam boiler shall be provided with one or more safety valves of the spring-pop type and having side outlet discharge, adjusted and sealed to discharge at a pressure not to exceed fifteen (15) pounds per square inch. Seals shall be attached in a manner to prevent the valve from being taken apart or re-set to relieve at a higher pressure without breaking the seal.

M-1014.7.2 Lever-Lifting Device. Each valve shall have a substantial lever-lifting device which will positively lift the disk from its seat at least one-sixteenth inch (1/16") when there is no pressure on the boiler. Where the lever is more than seventy-eight inches (78") from the floor, a flexible chain or cable operating over a pulley shall be provided so that the valve can be tested.

M-1014.7.3 Identification. Each steam safety valve shall bear the ASME symbol to indicate that it complies with the requirements of the ASME Boiler Code in regard to construction, testing and rating, and shall be plainly and permanently marked by the manufacturer in such a way that the marking will be readable when the valve is installed and will not be obliterated in service.

M-1014.7.3.1 Marking. The marking shall include the following information.

1. The manufacturer's name;

2. The type and catalog number;

3. The pressure at which it is set to blow; and

4. The capacity in pounds of steam per hour as certified by the National Board of Boiler and Pressure Vessel Inspectors.

M-1014.7.4 Operating Capacity. The steam safety valve capacity for each steam boiler shall be such that with the fuel burning equipment installed and operating at maximum capacity, the pressure cannot rise more than five (5) psi above the maximum allowable working pressure of the boiler.

M-1014.7.5 Operating Conditions. When operating conditions are changed, such as when there is no stamping on a valve or it is not legible, or when a safety valve does not function properly, then a new safety valve or valves as required in this section shall be installed.

M-1014.7.6 Installation. It shall be the responsibility of the contractor making the installation or the changes, to provide and install the necessary safety valves.

M-1014.7.7 Test. In case of dispute over the safety valve capacity or when, in judgment of the Inspector, it is considered advisable to test the capacity of the safety valves, an accumulation test shall be made by the contractor or owner in the presence of the Inspector.

M-1014.7.7.1 Test Procedure. This test shall be made by closing off all other discharge outlets from the boiler and operating the fuel burning equipment at maximum capacity. The safety valves shall be sufficient to prevent the pressure from rising more than five (5) psi above the maximum allowable working pressure of the boiler. Provision shall be made for piping the steam discharge from the boiler room during the test.

M-1014.7.8 Minimum Capacity. The minimum capacity of the safety valve or valves in pounds of steam per hour shall be determined as follows:

1. For steel or cast iron boilers, multiply the square feet of heating surface, if available, by five (5) or use the maximum rating output of the boiler as given by the manufacturer, whichever is greater.
2. If the fuel burning equipment installed will produce a greater output than the minimum specified in Section M-1014.7.8(1), the capacity of the safety valve or valves shall be based on the maximum output obtainable. In any event the requirements of Section M-1014.7 shall be met.

M-1014.7.9 Safety Valves Connection. Safety valves shall be connected to boilers with

the spindle in a vertical position in any one of the following ways:

1. Either directly to a tapped or flanged opening in the boiler;

2. To a fitting connected to the boiler by a close nipple;

3. To a Y-base;

4. To a valveless steam pipe between the adjacent boilers; or

5. To a valveless header connecting steam outlets on the same boiler.

M-1014.7.9.1 Y-base Connection. When a Y-base is used pursuant to paragraph M-1014.7.9(3) above, the inlet area shall not be less than the combined outlet areas.

M-1014.7.9.2 Clearance. There shall be sufficient clearance above and around safety valves so that they can be removed and replaced without dismantling. The identification plate shall be located so as to be readable.

M-1014.7.10 Shut-off. No shut-off or connection of any description shall be placed between a safety valve and the boiler, nor on the discharge pipe between such valve and the atmosphere. A safety valve shall not be connected to an internal pipe in the boiler. Tubing or galvanized pipe shall not be used between the valve and boiler.

M-1014.7.11 Discharge Pipe. A discharge pipe shall not be used on safety valves on low pressure except where a boiler is located in a restricted space or where the discharge from the valve might constitute a hazard to persons or to equipment. A discharge opening of a single valve or the aggregate area of all valves based on the nominal diameter of the discharge openings of the valves with which it connects.

M-1014.7.11.1 Discharge Pipe Installation. The discharge pipe shall be fitted with an open drain to prevent water from lodging in the upper part of the valve or in the pipe. When an elbow is placed on a safety valve discharge pipe, it shall be located close to valve outlet. The pipe shall be supported so that no strain is placed on valve body. The discharge shall be arranged so there will be no danger of scalding attendants. A safety valve shall not be installed to discharge inside the casing of a self-contained boiler.

M-1014.7.11.2 Discharge Pipe Location. The safety valve or valves of each high-pressure boiler shall be provided with a full size discharge pipe leading to a safe point of discharge which shall be above the roof of the building of which it is a part, or any adjoining building to which it may constitute a hazard or nuisance. Any discharge pipe shall be braced and supported so that there is no weight or strain on the safety valve body. The area of the discharge pipe shall be equal to the area of all of the safety valves discharging into it and forty-five (45) degree turns, shall be used. Visible, non-valved drains shall be provided for that piping.

M-1014.7.11.3 Discharge Pipes not Required. Boilers of twenty-five (25) horsepower or less shall not be required to have discharge pipes if the discharge from the safety valve will not constitute a hazard.

M-1014.7.12 Connection of Two or More Boilers. When two or more boilers which are allowed different pressures are connected to a common steam main, all safety valves shall be set at a pressure exceeding the lowest pressure allowed, provided that when two or more boilers which are allowed different pressures are connected to a common steam main and all safety valves are set at a pressure not exceeding the lowest pressure allowed, the boiler allowed the lowest pressure shall be protected by a safety valve or valves placed on the connecting pipe to the steam main.

M-1014.7.12.1 Connecting Pipe. The area or combined area of the safety valve or valves placed on the connecting pipe to the steam main shall not be less than the area of the connecting pipe, except when the steam main is smaller than the connecting pipe the area of the safety valve or valves placed in the connecting pipe shall not be less than the area of the steam main. Each safety valve placed on the connecting pipe shall be set at the lowest allowable pressure of any of the boilers.

M-1014.8 Explosion Doors

M-1014.8.1 General. Each boiler burning fuel in suspended or gaseous form shall have one or more self-closing explosion doors located in the boiler setting and breeching as required. This shall apply not only to new installations but existing installations, if changed to burn such fuel.

M-1014.8.2 Explosion Doors. Explosion doors, when located in the walls of the boiler setting within seven feet (7') of the firing floor or of any platform or walkway, shall be provided with substantial deflectors to divert the blast of exploding gas so that it will not constitute a hazard.

M-1014.9 Installation of Miniature Boilers

M-1014.9.1 Miniature Boilers. The classification "miniature" shall apply to fired pressure vessels, and fired and unfired boilers which do not exceed the following limits.

1. Sixteen(16") inches inside diameter of shell;

2. Five (5) cu. ft. gross volume, exclusive of casing and insulation;

3. Twenty (20) square feet water heating surface;

4. One-Hundred (100) pounds per square inch maximum allowable working pressure.

M-1014.9.1.1 Limitation. Where any one of the limits specified in Section M-1014.9.1 is exceeded, the rules for power boilers shall apply.

M-1014.9.2 Clearance. Each boiler shall be located so that adequate space will be provided for the proper operation of the boiler and appurtenances and for the inspection of all surfaces and their necessary maintenance and repair. Each boiler shall have the following minimum clearances.

1. At least eighteen inches (18") on all sides;

2. At least three feet (3') clearance from electric meters and main-line switches; and

3. At least eighteen inches (18") clearance from all other switches and fuse boxes.

4. A boiler shall not be located closer than three feet (3') horizontally from any gas meter.

M-1014.9.3 Feed Pump. Each boiler operating at a pressure in excess of twenty-five (25) pounds per square inch shall be provided with at least one feed pump or other approved feeding device except where the steam generator is operated with no extraction of steam (closed system).

M-1014.9.4 Blow-off Connection. Each boiler shall be provided with a blow-off connection which shall not be reduced in size and shall be led to a safe point of discharge. Whenever, in the judgment of the boiler inspector a safe place of discharge cannot be provided, a blow-down tank shall be installed, and a one inch (1") vent leading to a safe point of discharge shall be provided on each of those tanks. The blow-off shall be fitted with a valve or cock in direct connection with the lowest water space practicable.
M-1014.9.5 Mechanically Fired Boilers. All boilers mechanically fired shall be provided with an automatic low-water fuel cut-out so located as to automatically cut off the fuel supply in case the water level falls to a point not lower than the bottom of the water glass.

M-1014.9.6 Gas-Fired Boilers. Where boilers are gas-fired, the burners used shall conform to the requirements of the *Fuel Gas Code*. The burner shall be equipped with a fuel-regulating governor which shall be automatic and regulated by the steam pressure. This governor shall be so constructed that in the event of its failure, there shall be no possibility of steam from the boiler entering the gas chamber or supply pipe. A manual stop or throttle valve shall be located in the inlet pipe ahead of the fuel-regulating governor. All requirements of the *Fuel Gas Code* shall be satisfied.

M-1014.9.7 Boiler Vent Installations. Each gas-fired boiler shall be connected to a vent or flue, or to a chimney, extended to an approved location outside of the building, all to

be of approved design, and in accordance with the boiler manufacturers' installation instructions.

M-1014.10 Installation of Unfired Pressure Vessels

M-1014.10.1 General. Each unfired pressure vessel shall be installed so that it is available for complete external inspection of shell and heads and shall be located so that wherever possible, there will be not less than twelve inches (12") between any floor, wall, ceiling, or other obstruction. There shall be no piping or other obstructions to prevent proper access; any manhole or inspection opening shall be located so that it is readily accessible. All stamping and longitudinal welded or riveted joints shall be located in a position as to be readily visible to the inspector. Where necessary to install a vessel underground, it shall be enclosed in a concrete or brick pit with a removable cover so that inspection of the entire shell and heads of the vessel can be made.

M-1014.10.2 Structural Supports. Each unfired pressure vessel shall be supported by masonry or structural supports of sufficient strength and rigidity to safely support the vessel and its contents. There shall be no vibration in either the vessel or its connecting piping.

M-1014.10.3 Piping and Connections. All piping and connections to an unfired pressure vessel shall be supported in a substantial and safe manner so that there is no strain placed upon the vessel. Provision shall be made for expansion, contraction, and drainage.

M-1014.10.4 Protection. Each unfired pressure vessel shall be painted with two coats of approved paint, so that it is protected from rust or corrosion. It shall not be in contact with any corrosive material or moisture.

M-1014.10.5 Drip Pipe. Each unfired pressure vessel shall have bottom drip pipe fitted with a valve or cock in direct connection with the lowest space practicable. The minimum size of pipe and fittings shall be three quarters of an inch (3/4") except for tanks twenty inches (20") in diameter or less in which the minimum of the pipe and fitting shall be one-quarter inch (1/4"). If a plug cock is used, the plug shall be held in place with a guard or gland. Globe valves and cocks shall not be used.

M-1014.10.6 Pressure Gage. Each unfired pressure vessel shall have a pressure gage connected in a manner that the gage cannot be shut off from the vessel, except by a cock with a "T" or lever handle which shall be placed on the pipe near the gage. Connections to gages shall be placed on the pipe near the gage. Connections to gages shall be made of non-ferrous pipe and fittings from the tank to the gage. Tubing shall not be used. The dial of the gage shall be graduated to not less than one and one-half times the maximum pressures allowed for the vessel. A one-quarter inch (1/4") test gage connection shall be provided for attaching the inspector's test gage.

M-1014.11 Safety Valves for Unfired Pressure Vessels

M-1014.11.1 General. Each unfired pressure vessel shall be protected by safety and relief valves and indicating and controlling devices to insure its safe operation. These valves and devices shall be so constructed, located, and installed that they cannot readily be rendered inoperative.

M-1014.11.2 Safety Valves. The relieving capacity of safety valves shall be such as to prevent a rise of pressure in the vessel of more than ten (10) percent above the maximum allowable working pressure, taking into account the effect of static head. Safety valve discharge shall be carried to a safe place.

M-1014.11.3 Type of Safety Valve. Each safety valve shall be of the direct spring-loaded type having a substantial lever-lifting device so that the disk can be lifted from its seat by the spindle not less than one-eighth (1/8th) the diameter of the valve when the pressure of the vessel is seventy-five percent (75%) of that at which the safety valve is set to blow.

M-1014.11.4 Marking. Every such valve shall be marked "ASME or National Board Standard," and shall give the following information.

1. The name or identifying mark of the manufacturer;

2. The pipe size of valve inlet;

3. The pressures of which the valve is set to blow; and

4. The relieving capacity.

M-1014.11.5 Prohibit & Safety Valves. Safety valves having either the seat or disk of cast iron shall not be used.

M-1014.11.6 Multiple Safety Valves. If more than one safety valve is used, the discharge capacity shall be taken as the combined capacity of all valves.

M-1014.11.7 Pressure Relief in Unfired Pressure Vessels. For vessels in which pressure is not generated but is derived from an outside source, each safety valve shall be so connected to the vessel, vessels, or system which it protects as to prevent a rise in pressures beyond the maximum allowable pressure in any vessel protected by the safety valve.

M-1014.11.8 Pressure Relief In. For vessels in which pressure may be generated, the safety valve or valves shall be connected directly to the vessel which is to be protected or to a pipe line leading to the vessel. The internal cross-sectional area of the pipe line shall be not less than the nominal area of the safety valve or valves used, and without any intervening valve between the vessel and the safety valve or valves protecting it.

M-1014.11.9 Pressure Relief Escape Pipe. When an escape pipe is used, it shall be full-

sized and fitted with an open drain to prevent liquid from lodging in the upper part of the-safety valve, and no valve of any description shall be placed on the escape pipe between the safety valve and the atmosphere.

M-1014.11.10 Escape Pipe Fittings. When an elbow is placed on an escape pipe, it shall be located close to the safety valve outlet or the escape pipe shall be securely anchored and supported. When two or more safety valves are placed on one connection, this connection shall have a cross-sectional area at least equal to the combined area of these safety valves.

M-1014.11.11 Freeze Protection. Each safety valve which is exposed to a temperature of thirty-two (32) degree F. or less shall have a drain at least three-eighths inch (3/8") in diameter at the lowest point where water can collect; provided, that safety valves three-quarters inch (3/4") in size and less may have drain holes as large as possible but not less than three-eighths inch (3/8") diameter.

M-1014.11.12 Spring Adjustment. Safety-valve springs shall not be adjusted to carry more than ten (10) percent greater pressure than that for which the springs were made.

M-1014.11.13 Valve Testing. Each safety valve shall be tested once every day or more often by raising the disk from its seat.

M-1014.11.14 Valve Sizing. Safety valves for compressed air tanks shall not exceed three inches (3") in diameter and shall be proportioned for the maximum number of cubic feet of free air that can be supplied per minute as determined in Section VIII, Division 1, Part UG, paragraph UG-133, “Determination of Pressure Relief Requirements” in the ASME Code.

M-1014.11.15 Use of Rupture Disks. Rupture disks or heads may be used for additional protection of pressure vessels but they shall be designed to fail at a pressure above the safety or relief valve setting.

M-1014.11.16 Multiple Vessels. When two or more unfired pressure vessels which are allowed different pressures are connected to a common source of pressure, all safety valves shall be set at pressure not exceeding the lowest pressure allowed.

M-1014.12 Penalties for Code Violations. Any person who violates or fails to comply with any one or more of the provisions of this chapter, shall upon conviction thereof in the District of Columbia Superior Court, on information filed by the Office of the Attorney General, be subject to a fine of not to exceed two thousand dollars ($2000.00) or to imprisonment for not more than 90 days, or both, for each and every violation thereof and each violation shall constitute a separate offense.

TABLE M-1014-1
REQUIREMENTS FOR POWER BOILERS
(see M-1014.4.4)

BOILER RATING	SIZE TANK	OUTLET	VENT
2 to 25 horsepower	24 in. diameter by 36 in. deep	2	2
26 to 75 horsepower	30 in. diameter by 48 in. deep	3	3
76 to 150 horsepower	36 in. diameter by 54 in. deep	5	4
151 to 250 horsepower	36 in. diameter by 60 in. deep	5	5
251 to 600 horsepower	42 in. diameter by 66 in. deep	5	6
601 to 1,000 horsepower	48 in. diameter by 72 in. deep	6	6

TABLE M-1014-2
EQUALIZER PIPE SIZES
(see M-1014.5.2)

GRATE AREA (square feet)	S.V.R.C. (pounds per hour)	PIPE SIZE (inches)
Under 4	250 or less	1 ½
4 to 15	251 or 2000	2 ½
Over 15	2001 or over	4

*Note. Safety Valve Relieving Capacity for this purpose shall be the capacity as stamped on a steel boiler or on the name plate of a cast iron boiler.

TABLE M-1014-3
BLOW-OFF VALVES
(see M-1014.5.9)

BOILER RATING (square feet E.D.R.)	Pipe Size (inches)
Under 1000	¾
1001 to 3500	1
3501 to 8500	1 ½
8501 to over	2

SECTION M-1015E WATER STORAGE TANKS, WATER HEATERS, HYDRO-PNEUMATIC TANKS

M-1015.1 General. Each hot water storage tank, range boiler, or automatic storage water heater, having a nominal water-containing capacity of one-hundred twenty (120) gallons or less shall be built for a minimum working pressure of one-hundred twenty-five (125) pounds per square inch and shall be tested hydrostatically to three-hundred (300) pounds per square inch. Each tank shall have clearly and indelibly stamped or stenciled thereon the name of the manufacturer, the maximum allowable working pressure for which it is built, and the test pressure.

M-1015.1.1 Tank Label. Each hot water tank shall be stamped with the ASME symbol to indicate that it is constructed in accordance with the Unfired Pressure Vessel Code of the American Society of Mechanical Engineers. It shall also be stamped with the name of the manufacturer, the maximum allowable working pressure, the year built, and the identifying number of the National Board of Boiler and Pressure Vessel Inspectors.

M-1015.1.2 Permit Application. Applications for permits for hot water storage tanks as described in Section M-1015.1 shall be accompanied by the Manufacturers' Data Report which shall be signed by an Inspector licensed to inspect boilers and pressure vessels by the National Board.

M-1015.1.3 Gas-fired Automatic Storage Water Heaters. Gas fired automatic storage water heaters shall bear a label indicating approval and listing in accordance with the *Fuel Gas Code*.

M-1015.1.4 Oil Fired or Electrically Heated Water Heaters. Oil fired or electrically heated automatic storage water heaters shall bear the U.L. label to indicate listing by Underwriters Laboratories, Inc.

M-1015.1.5 Storage Water Heater Label. Each storage water heater shall bear the manufacturer's trade name, if any, the catalog number, the firing rate (input), the output in gallons per hour at one-hundred degrees Fahrenheit (100 deg F.) rise in temperature, and the nominal capacity in gallons of the storage tank.

M-1015.1.6 Storage Tank Construction. Storage tanks shall be supported upon metal supports of pipe or structural steel resting upon the floor, or they may be hung from supports attached to structural steel or concrete beams, provided the beams have been determined to be of sufficient strength to support the additional weight; or they may be installed upon concrete saddles. Provision shall be made to take care of expansion. Tanks shall not be supported by their piping system. Manhole openings shall be kept clear of all walls, pipes, or other obstructions.

M-1015.1.7 Installation-Gas-Fired Water Heaters. Each gas-fired water heater shall be provided with an approved draft diverter installed in accordance with the manufacturer's design, and shall be connected to an effective chimney shall be above the entrance of other vent connectors or breechings.

M-1015.1.8 Commercial and Industrial Installation. In commercial and industrial establishments when a connection to a chimney is impracticable, the installation of an automatic water heater may be approved by the Director if the following requirements are met. The maximum flow of gas shall be limited by fixed orifices to values in relation to the net cubical contents of the space in which the heater is located as specified in Table M-1015. In no case shall the maximum input rate exceed 10,000 BTU per hour; and the heater shall otherwise conform to these regulations.

M-1015.1.9 Prohibited Use. No water from a hot water supply boiler, automatic water heater coil or tank shall be used for building heating, except that water to be used for auxiliary space heating may be by-passed from any such boiler or heater, provided there is no actual withdrawal or possible leakage of water from the unit, and that all surfaces and connections in contact with the water are of copper or other approved corrosion resistant material.

M-1015.1.10 Existing Tanks. A tank currently in use shall not be painted, lined or repaired on the inside with any material or in any manner that will affect either the color or taste of the water supply after the tank is put into service. Any material intended for use as a lining or protective coating for the interior of tanks shall be submitted for approval.

M-1015.1.11 Tank Maintenance and Repair. The water supply connections to and from the tank shall be disconnected or plugged while the tank is being cleaned, painted, lined or repaired, to prevent any foreign fluid or substance from entering the distribution piping. Adequate measures shall be taken for the protection of workmen in the tank.

M-1015.1.12 Welding Repair. Any repair by welding on a tank shall be done by a welder qualified and licensed by the Department and the work shall be done under the supervision of a D.C. Boiler Inspector or an insurance company.

M-1015.1.13 Modification or Additions. When any changes or additions are made to an existing hot water supply system or when a storage tank is replaced or moved, compliance with this title shall be required; provided, that when there is no available opening in the top of an automatic storage water heater having a nominal water containing capacity of one-hundred twenty (120) gallons or less, the valve shall be installed in the outlet header from the heater with only one fitting between the relief valve and the tank.

M-1015.2 Hydro-pneumatic Tanks

M-1015.2.1 Construction. Each hydro-pneumatic tank shall be constructed for a minimum working pressure of one-hundred fifty (150) pounds per square inch.

M-1015.2.2 Label. Each hydro-pneumatic tank shall be stamped with the following information.

The ASME symbol to indicate that it is constructed in accordance with the Unfired Pressure Vessel Code of the American Society of Mechanical Engineers;

1. The name of the manufacturer;
2. The maximum allowable working pressure;
3. The year built; and
4. The identifying number of the National Board of Boiler and Pressure

Vessel Inspector.

M-1015.2.3 Permit Applications. Applications for permits shall be accompanied by the Manufacturers Data Report which shall be signed by an Inspector licensed to inspect boilers and pressure vessels by the National Board.

M-1015.2.4 Gage-Glass. Each hydro-pneumatic tank shall be provided with a gage-glass to show the level of the water in the upper section of the tank and a pressure gage. It shall also be provided with an eleven inch (11") manhole opening which shall be kept clear of all walls, pipes, or other obstructions.

M-1015.2.5 Safety Valves. Each hydro-pneumatic shall be equipped with a lever lifting safety valve bearing the ASME symbol suitable for use with air, installed in a vertical position on the top of the tank and set to relieve at or below the maximum allowable working pressure of the tank. The valve shall be sealed to prevent tampering and there shall be no shut-off valve between the tank and the relief valve.

M-1015.2.6 Pressure Gage. Each tank shall be provided with a pressure gage not less than four inches (4”) in diameter connected directly to the tank by means of non-ferrous pipe. A cock with a tee handle shall be placed in the pipe near the gage. The gage shall be graduated to not less than one and one-half (1.5) times the maximum allowable working pressure of the tank.

M-1015.2.7 Valve By-Pass. Each hydro-pneumatic tank shall be piped to include a full-size valved by-pass so that city water can be used in the building when the tank is not in service.

M-1015.2.8 Vacuum Relieving Device. Each hydro-pneumatic tank shall be provided with a vacuum relieving device located on the top of the tank and a horizontal swing check valve in the water supply line from the pump to the tank, and in the District water supply by-pass line to the tank. A valved sludge drain pipe shall be installed at the bottom of the tank and shall discharge through an open connection into the drainage system of the building.

M-1015.3 Relief Valves, Gages, and Safety Controls

M-1015.3.1 General. Each hot water storage tank and automatic water heater shall be equipped with safety controls, which shall prevent the temperature of the water in the tank from exceeding two-hundred degrees Fahrenheit (200 deg F.) and the pressure from exceeding the maximum allowable working pressure for which the tank is built. Each such unit shall be equipped with the following.

1. A pressure relief valve and a separate temperature relief valve of the spillage type;

2. A combined temperature-pressure relief valve of the spillage type; or

3. In the case of automatic water heaters manufactured as a unit, a thermostat and pressure relief valve.

M-1015.3.2 Pressure Relief Valve. Each pressure relief valve shall be of the lever lifting, spring-loaded type without disk on the pressure side of the valve. The valves shall be set to relieve at a pressure at or below the maximum allowable working pressure of the tank and shall be so arranged that they cannot be reset to relieve at a higher pressure than stamped thereon.

M-1015.3.3 Relief Valve Capacity. The valve or valves shall have sufficient capacity to prevent the pressure in the tank from rising more than ten percent (10%) above the maximum allowable working pressure. The rate capacity of the valve, or valves shall be equal to the maximum gross output of the heating unit installed. The gross output shall be determined from the data supplied on the manufacturer's name plate, catalog data, or from the fuel input.

M-1015.3.4 Label. Pressure relief valves shall bear the ASME symbol to indicate that they comply with the requirements of the ASME Low Pressure Heating Boiler Code in regard to construction, testing, and rating, and shall be plainly and permanently marked by the manufacturer in a way that the marking will be readable when the valve is installed and will not be obliterated in service. Pressure relief valves used on non-ASME approved, gas-fired equipment shall bear the symbol to indicate listing under the requirements of an approved testing agency, and shall bear the ASME symbol for equipment using other fuels. The marking on pressure relief valves shall include the following information:

1. The manufacturer's name;

2. The type and catalog number;

3. The pressure at which it is set to blow; and

4. The capacity in pounds of steam or BTU per hour as certified by the National Board of Boiler and Pressure Vessel Inspectors.

M-1015.3.5 Valve Size. No pressure relief valve shall be less than three-quarter inch (3/4") standard pipe size.

M-1015.3.6 Installation. Each pressure relief valve shall be installed in a vertical position directly on the top of the tank, or if there is no opening available, to a fitting in the hot water service line within two inches (2") from the tank. Each pressure relief valve shall have a full size discharge pipe of non-ferrous metal, with an unthreaded open end, run to an approved plumbing fixture or if none is available to within six inches (6") of the floor. When the discharge pipe is over one inch (1") in diameter it shall be supported and braced to prevent any strain being placed on the valve.

M-1015.3.7 Multiple Valve Use. If more than one valve is used, they may be connected to a manifold whose inlet pipe area shall be equal to the area of the inlet openings of all the valves. There shall be no restriction in size on either the inlet or discharge side of the valve or valves, and there shall be no shut-off valve or check valve between the relief valve and the tank.

M-1015.3.8 Temperature Relief Valve. Each temperature relief valve shall bear a label indicating approval and listing by ASME, and shall be submitted for approval to the Department.

M-1015.3.8.1 Valve Type and Design. Each temperature relief valve shall be of the automatic self-closing type with a test lever and shall be designed to open at two-hundred degrees Fahrenheit (200 degrees F.) or lower and be of sufficient capacity to limit the temperature to not over two-hundred degrees Fahrenheit (200 degrees F.). The valve shall be non-adjustable and shall not be less than three-quarter inch (3/4") standard pipe size.
M-1015.3.8.2. Label. Each temperature relief valve shall bear a plate permanently attached, giving the following information.

1. The name of the manufacturer;

2. The model or type number of the valve;

3. The temperature at which the valve will deliver its rated capacity; and

4. The rated capacity in BTU.

M-1015.3.8.3 Installation. Each temperature relief valve shall be installed in a vertical position on the top of the tank. Valves shall be screwed directly into the tank without intervening fittings unless the dip tube extension type is used, in which case the tube shall project into the tank. If a fitting is used, it shall be of non-ferrous material. Each valve shall have a full size discharge pipe with an unthreaded open end, run to within six inches (6") of the floor or to a suitable fixture. There shall be no restrictions in size on either the inlet or discharge side of the valve, and there shall be no shut-off or check valve between the relief valve and the tank.

M-1015.3.9 Combined Temperature and Pressure Valve. When a combination temperature-pressure relief valve is used, it shall conform with and be installed similarly to the requirements for pressure relief valves and for temperature relief valves. It shall bear both the ASME symbol and required stamping in addition to the symbol of the AGA for the temperature relief element.

M-1015.3.10 Aquastat. Each aquastat used on an automatic gas water heater unless provided as part of a complete AGA approved unit, shall be listed by AGA and shall operate to shut off the gas supply to limit the temperature of the heated water to not over

two-hundred ten degrees Fahrenheit (210 deg F.).

M-1015.3.11 Hot Water Heating Systems. Hot water supply boilers, tankless heaters, electric heaters, immersion heating coils in boilers and any other type of heater shall be protected against excessive pressure, as provided herein.

M-1015.3.11.1 Pressure Gage. Each hot water supply boiler and hot water storage tank shall be provided with a pressure gage connected directly to the boiler or tank by means of non-ferrous pipe. A cock with a tee handle shall be placed in the pipe near the gage. The gage shall have a dial not less than four inches (4") in diameter and be so located that it can be easily read from the floor. It shall be graduated to not less than one and one-half (1.5) times the maximum allowable working pressure of the boiler or tank. Gages shall not be required for range boilers and domestic type water heaters.

M-1015.3.11.2 Thermometer. Each hot water supply boiler, hot water storage tank, tankless heater, immersion type heater or any other type of heater shall be provided with a thermometer reading up to three-hundred degrees Fahrenheit (300 degrees F.), of a size and so located that it can be easily read from the floor. It shall be located in a well so that it will indicate the temperature of the water at or near the outlet and shall be accurate within two percent (2%). Thermometers shall not be required for range boilers or domestic type water heaters.

M-1015.3.11.3 Water Mixing Valve. When hot water is used by the general public or by persons not in control of the heating equipment, an approved water mixing valve shall be installed to limit the temperature of the water at the fixture to not over one-hundred forty degrees Fahrenheit (140 degrees F.). A thermometer shall be installed on the discharge side of the mixing valve and be of a size and so located as to be easily read.

TABLE M-1015
MAXIMUM PERMISSIBLE FLOW FOR UNVENTED COMMERCIAL AND INDUSTRIAL WATER HEATERS
(see M-1015.1.8)

Net Cubical Contents of Room or Space (in cubic feet)	PERMISSIBLE MAXIMUM GAS FLOW IN CUBIC FEET PER HOUR	
	COLUMN NO. 1 (a)	COLUMN NO. 2 (b)
1000 to 1500	2	3
1500 to 2000	3	4
2000 to 2500	4	5
2500 to 3000	5	6
3000 to 3500	6	7
3500 to 4000	7	8
Over 4000	8	8

Note a. Column No.1 applies to appliances when located in areas, which do not

have openings to other areas.

Note b. Column No. 2 applies to appliances when located in areas, which have permanent openings of at least 15 sq. ft. leading to another area of equal or greater cubical content.

SECTION M-1016E WELDING ON BOILERS AND UNFIRED PRESSURE VESSELS

M-1016.1 General Rules for Welding. The construction, installation, repair or alteration of a boiler or unfired pressure vessel by welding shall be made in accordance with Section IX, Part QW, "Welding" in the ASME Code governing the particular kind of vessel or work to be done.

M-1016.1.1 Welding Procedure. A contractor desiring to make repairs shall have a written welding procedure specification that shall be prepared and qualified in accordance with the Welding Qualification of Section IX, Article II, "Welding Procedure Qualifications" in the ASME Code, or the contractor may use the standard D.C. welding procedure specification. This procedure shall then be used for qualifying each welders and shall be strictly adhered to in making repairs under this chapter. A welder shall be limited to the type of steel and thickness of plate for which he or she was qualified.

M-1016.1.2 Qualification Test. Each welder shall pass satisfactory qualification tests as required by Section IX, Article III, "Welding Performance Qualifications" in the ASME Code, NBIC and the D.C. Welding Standard. The qualification test for individual welders shall be made in accordance with the ASME Code. The test shall be made in the presence of the boiler inspector or an assistant boiler inspector who shall stamp the specimens with a D.C. identifying number. A welder may be accepted without further examination provided that he submits a satisfactory welding procedure and operator qualification test, made in accordance with the ASME Code and these regulations, for approval prior to any welding. The qualification test does qualify a welder to do welding on pressure piping.

M-1016.1.3 Test Specimens. After the specimens have been prepared as required by Section IX, Part QW, paragraph QW-310, "Qualification Test Coupons" in the ASME Code, they shall be tested by the D.C. Boiler Inspector, or they may be submitted to the National Institute of Standards and Technology (NIST) for test. The test shall be made in accordance with the guided-bend jig test as described Section IX, Part QW, paragraph QW-160, "Guided-Bend Tests" in the ASME Code. A report shall be made on a form similar to data recording forms in Section IX, Appendix-B, "Non-mandatory Welding and Brazing Forms" in the ASME Code. If the report indicates that the welder has passed the test, a card authorizing him or her to do welding on boilers or unfired pressure vessels in the District of Columbia for a period of two (2) years from the date of the test, shall be issued.

M-1016.1.4 Fees. The fee for witnessing the welding and making the tests shall be sixty-five dollars ($65.00). The fee for the NIST test is additional. All fees are payable in advance.

M-1016.2 Qualification Retest. A welder who fails to meet the requirements for one or more of

the test specimens may be retested under the following conditions.

1. When an immediate retest is made, the welder shall make two test welds of each type for each position on which he has failed, all of which shall pass the test examination; or

2. If, in the judgment of the inspector, the welder requires further training or practice, a complete retest of the welder shall be made after he has completed his additional training or practice.

M-1016.3 Inspector's Authority. Notwithstanding the issuance of a qualification card, the inspector may request a new test under the following circumstances.

1. When a welder has not welded under the procedure specification for a period of three (3) months or more;

2. When there is a specific reason to question his ability to make welds that meet the specification; and

3. At the expiration of his two (2) year qualification period.

M-1016.3.1 Welding Defects. If any question should arise as to the quality of a weld, the inspector may call for test specimens to be trepanned from the welds. Preparation of the specimens and examination shall be done by the NIST and the contractor shall stand all expense incidental to this testing.

M-1016.3.2 Welding Inspection. No welding on any boiler or unfired pressure vessel shall be done before an inspection has been made by the boiler Inspector, an assistant boiler Inspector, or an insurance company Inspector, and the method of welding sanctioned by that Inspector. If, in the opinion of the Inspector, a hydrostatic test is necessary, that test shall be applied after the repairs have been completed.

M-1016.4 Repairs of Boilers or Unfired Pressure Vessels. Before repairs are started, it shall be the duty of the Inspector to satisfy himself or herself, by examination of the written welding procedure and records of qualification tests, that procedures and welders have been properly tested and qualified. Welding repairs or alterations on boilers or unfired pressure vessels and connections by unqualified contractors or welding operators will not be accepted for either new or existing installations.

M-1016.4.1 Inspector's Report. A report shall be made of every welded repair by the Inspector who authorized and witnessed the repair.

M-1016.5 Rules for Welding on Boilers and Unfired Pressure Vessels

M-1016.5.1 Welding Rule. The construction, installation, repair or alteration of a boiler or unfired pressure vessel by welding shall be made in accordance with the section of the ASME Code governing the particular kind of vessel or work to be done or by the specific requirements in this section for welded repairs.

M-1016.5.2 Qualified Welding Procedure. A contractor desiring to make repairs shall

have a written welding procedure specification that shall be prepared and qualified in accordance with the Welding Qualification in Section IX of the ASME code, or the contractor may use the standard D.C. welding procedure specification. This procedure shall then be used for qualifying each welders and shall be strictly adhered to in making repairs under this chapter. A welder shall be limited to the type of steel and thickness of plate for which he or she was qualified.

M-1016.5.3 Welder Qualifications. Each welder shall pass satisfactory qualification tests as required by the ASME Code.

M-1016.5.4 Qualification Standard. The qualification test for individual welders shall be made in accordance with the ASME Code. The test shall be made in the presence of the boiler inspector or an assistant boiler inspector who shall stamp the specimens with a D.C. identifying number. A welder may be accepted without further examination provided that he submits a satisfactory welding procedure and operator qualification test, made in accordance with the ASME Code and these regulations for approval prior to any welding.

M-1016.5.5 Specimen Test. After the specimens have been prepared as required by the ASME Code, they shall be tested by the D.C. Boiler Inspector or they may be submitted to the NIST for test. The test shall be made in accordance with the guided-bend jig test as described in the ASME Code. A report shall be made on a form similar to the data recording forms in Section IX, Appendix-B in the ASME Code.

M-1016.5.6 Welding Fees. The fee for witnessing the welding and making the tests shall be one-hundred dollars ($100.00). The fee for the NIST test is additional. All fees are payable in advance.

M-1016.5.7 Authorization Card. If the report indicates that the welder has passed the test, a card authorizing him or her to do welding on boilers or unfired pressure vessels in the District of Columbia for a period of two (2) years from the date of the test, shall be issued.

M-1016.5.8 Welder Qualification Limit. The qualification test does not qualify a welder to do welding on pressure piping.

M-1016.5.9 Welder Re-Test. A welder who fails to meet the requirements for one or more of the test specimens may be retested under the following conditions.

1. When an immediate retest is made, the welder shall make two test welds of each type for each position on which he has failed, all of which shall pass the test examination; or

2. If, in the judgment of the inspector, the welder requires further training or practice, a complete retest of the welder shall be made after he has completed this additional training or practice.

M-1016.5.10 Welder Re-Test Performance. Notwithstanding the issuance of a qualification card, the inspector may request a new test under the following circumstances.

1. When a welder has not welded under the procedure specification for a period of three (3) months or more;
2. When there is a specific reason to question his ability to make welds that meet the specification; and

3. At the expiration of the two (2) year qualification period.

M-1016.5.11 Trepanned Specimen. If any question should arise as to the quality of a weld, the inspector may call for test specimens to be trepanned from the welds. Preparation of the specimens and examination shall be done by the NIST and the contractor shall stand all expense incidental to this testing.

M-1016.5.12 Inspection Requirements. No welding on any boiler or unfired pressure vessel shall be done before an inspection has been made by the boiler inspector, an assistant boiler inspector, or an insurance company inspector, and the method of welding sanctioned by that inspector. If, in the opinion of the inspector, a hydrostatic test is necessary, that test shall be applied after the repairs have been completed.

M-1016.5.13 Inspector Examination. Before repairs are started, it shall be the duty of the inspector to satisfy himself or herself, by examination of the written welding procedures and records of qualification tests, that procedures and welders have been properly tested and qualified.

M-1016.5.14 Weld Rejection. Welding repairs or alterations on boilers or unfired pressure vessels and connections by unqualified contractors or welding operators will not be accepted for either new or existing installations.

M-1016.5.15 Inspector's Report. A report shall be made on every welded repair by the inspector who authorized and witnessed the repair.

M-1016.6 Method of Conducting Tests

M-1016.6.1 Welder Qualification Tests. The qualification tests described shall be specially devised tests to determine a welder's ability to produce sound wells. In order to determine the welder's ability to make groove wells in various positions in plate, the following three positions for tests are required.

1. Test Position I – Plates placed in a vertical position with the welding groove in a horizontal plane. This test shall qualify the welder to make flat and horizontal welds.

2. Test Position II – Plates placed in a vertical position with the axis of the weld vertical. The test shall qualify the welder to make flat and vertical welds.

3. Test Position III – Plates placed in a horizontal position with the weld metal deposited form the underside of the plate. This test shall qualify the welder to make flat welds in the overhead position.

M-1016.6.2 Weld Plate Specifications. The base material of the plates to be welded shall be of flange or firebox steel quality three-eights inch (3/8") thick and having a tensile strength of not less than fifty-five thousand (55,000) pounds per square inch. The plates shall be five inches (5") long by six inches (6") wide, and shall be prepared for a single "V" groove butt joint.

M-1016.6.3 Preparing Test Specimens. The method of preparing test specimens shall be as follows:

1. When the welding has been completed, specimens shall be removed as directed by machine or flame cutting. They shall be approximately one and one-half inches (1.5") wide.

2. The weld reinforcement shall be removed by machine or grinding, flush with the surface or the base metal.

3. The corners of the edges of all test specimens shall be rounded to a radius of not more than one-fifteenth inch (1/15").

In addition to (1), (2) and (3) above, the test specimens shall be prepared as specified in Section IX, paragraph QW-462, "Test Specimens" in the ASME Code.

M-1016.6.4 Specimen Testing Methods. The method of testing specimens shall be as follows:

Specimens shall be bent in a bending jig called the "guided bend test", until the curvature of the specimen is such that a one-thirty-second inch (1/32") wire cannot be passed between the curve portion of the plunger and the specimen. Face bend specimens shall be placed with the face of the weld toward the gap in the jig; root bend specimens shall be placed with the root of the weld toward the gap.

After removal from the jig, the convex surface of the specimens shall be examined for the appearance of cracks or other open defects. Any specimen in which a crack or other open defect is present after the bending exceeding one-eight inch (1/8") measured in any direction, shall be cause for failure to pass the test.

M-1016.7 Repairs by Welding

M-1016.7.1 Repairs Limited to Steels. The repairs that may be made under these rules are limited to steels having known weldable quality and are further limited to carbon steels having a carbon content of not more than thirty-five hundredths percent (0.35%) and low alloy steels having a carbon content of not more than twenty-five hundredths (0.25%) percent. A welder shall not make repairs in a plate thickness in excess of that

permitted under the qualification tests in the ASME Code, or on a material, or in a thickness of plate that is not permitted within the welder's qualification tests.

M-1016.7.2 Groove Welding. Groove welds shall completely penetrate the material being welded. If possible, welding shall be applied from both sides of the plate, or a backing strip or ring may be used to insure complete penetration. Welds shall have a convex surface on both sides if applied on both sides of the plates being joined; or on one side if welding is applied from one side only. No valleys or undercutting at edges or welded joints shall be permitted. The reinforcement may be chipped, ground or machined off flush with the base metal, if so desired, after the welding has been completed.

M-1016.7.3 Defective Weld Repair. In making a repair to a weld that has failed in service, the defective weld material shall be removed by chipping or grinding until sound metal is reached on all sides. The resulting groove shall be filled as required by the applicable welding procedure.

M-1016.7.4 Carbon Steel Stress-Relieving. In the repair of carbon or low alloy steels, when required by these rules and when considered necessary by the authorized inspector, thermal stress-relieving shall be applied to the completed work. The heat may be applied by any means that will raise the temperature of the material gradually and uniformly to approximate twelve-hundred degrees Fahrenheit (1200 deg. F.). In the absence of more accurate means of determining temperature, a dull "red glow" in daylight will suffice. This temperature shall be maintained for a period of one hour per inch of thickness of material.

> **M-1016.7.4.1 Circumferential Joints.** For circumferential joints, the area heated shall comprise a band extending completely around the cylinder and having a width on each side of the center line of the weld not less than three times the greatest width of the finished weld.
>
> **M-1016.7.4.2 Nozzles.** For nozzles, the heated area shall comprise a circumferential band extending around the entire vessel, including the nozzle of welded attachment, and shall extend at least six times the plate thickness beyond the welding which connects the nozzle or other attachment to the vessel.

M-1016.7.5 Stress-Relieve Cooldown Procedure. Upon completion of the stress-relieving operation, the plate shall be allowed to cool at a rate not greater than five-hundred degrees Fahrenheit (500 deg. F.) per hour divided by the maximum thickness of the welded part in inches, but in no case more than five-hundred degrees Fahrenheit (500 deg. F.) is reached, after which normal cooling by exposure in a still atmosphere may be permitted.

M-1016.7.6 Thermal Stress-Relief Alternatives. It should be noted that under certain conditions, thermal stress relieving as outlined above may be inadvisable. In such cases

any other method of stress-relieving acceptable to the authorized inspector may be used. Under certain conditions preheating may be necessary.

M-1016.8 Welded Repairs on Boilers and Unfired Pressure Vessels

M-1016.8.1 Crack Repair in Stayed Areas. Cracks in stayed areas may be repaired by welding, provided that no multiple or star cracks radiating from rivet or stay bolt holes shall be welded.

M-1016.8.2 Crack Repair in Unstayed Shells. Cracks in unstayed shells, drums or headers of boilers or pressure vessels may be repaired by welding, provided that the cracks do not extend between rivet holes in a longitude seam or parallel to a longitudinal riveted seam within eight inches (8”), measured from the nearest caulking edge. The total length of any one such crack shall not exceed eight inches (8”). A crack of greater length may be welded provided the complete repair is radiographed and stress-relieved. Any crack that may be welded shall be properly prepared to permit fusion through the entire plate.

M-1016.8.3 Crack Repair in Unstayed Furnaces. Cracks of any length in unstayed furnaces may be welded, provided that the welds are thermally stress relieved. Welds shall be applied from both sides of the plate wherever possible. Welds applied from one side only may be used if expressly permitted by the inspector. Repair of cracks at the knuckle or turn of flange of furnace openings shall be prohibited except upon special approval by the Inspector.

M-1016.8.4 Corrosion Repair in Stayed Furnaces. Corroded areas in stayed furnaces may be built up by welding, provided that the remaining plate has an average thickness of not less that fifty percent (50%) of the original thickness, and further provided that the areas so affected are not sufficiently extensive to impair the safety of the object. In those cased the stays and stay bolts shall come completely through the reinforcing metal and the original ends of the stay bolts shall be plainly visible to the Inspector.

M-1016.8.5 Corrosion Repair Around Manholes. Corroded areas around manholes or handhole openings, in either stayed or unstayed plates, may be built up by welding, provided that the average loss of thickness does not exceed fifty percent (50%) of the original plate thickness and the area to be repaired does not extend more than three inches (3”) from the edge of the hole.

M-1016.8.6 Corrosion Repair in Unstayed Shells. Corroded areas in unstayed shells, drums or of the object has not been impaired.

M-1016.8.7 Repairing Connector Areas. Edges of butt straps, of plate laps and nozzles, or of connections, attached by riveting may be restored to their original thickness by welding. No seal welding shall be used except upon special approval of the Inspector, and in no case where cracks are present in riveted areas.

M-1016.8.8 Welding Tube Ends. The ends of tubes in fire-tube and water-tube boilers may be welded, provided that they have not been reduced more than ten percent (10%) percent in thickness and comply with the requirements of paragraphs PWT-11 and PFT-12 in Section I, Parts PWT and PFT in the ASME Power Boiler Code.

M-1016.8.9 Re-ending Tubes, Pipes. Re-ending of piecing tubes or pipes in either fire-tube or water-tube boilers shall be permitted, provided that the thickness of the tube or pipe has not been reduced by more than ten percent (10%) from the thickness required by the ASME Code for the pressure approved. In all cases they shall comply with the requirements in Section I, Part PWT, paragraph PWT-10, "Tube Wall Thickness" in the ASME Power Boiler Code.

M-1016.8.10 Patch Material. The material used for patches shall be of the same general quality and have at least the minimum physical properties of the plate to be patched. The thickness of any patch shall be at least equal to, but not more than one-third inch (1/3") greater than the plate being patched.

M-1016.8.11 Patches Permitted. Flush or butt-welded patches or new sections may be applied to stayed plates without limitation of size or plate thickness. Lapped or fillet-welded patches may be applied to stayed plates, provided that they are not exposed to radiant heat. Lapped and fillet-welded patches may be applied on the pressure side of the sheet in unstayed areas, provided that the maximum diameter of the opening so repaired does not exceed sixteen (16) times the thickness of the plate, but in no case larger than eight inches (8") in diameter.

M-1016.8.12 Patches Not Permitted. No flush or butt-welded patches in unstayed shells, drums or headers shall be permitted.

M-1016.8.13 Threaded to Weld-in Stays. Threaded stays may be replaced by welded-in stays, provided that in the judgment of the Inspector, the plate adjacent to the stay bolt has not been materially weakened by deterioration or wastage. All requirements of the applicable sections of the ASME Code governing welded-in stays, including Section I, Part PW, paragraph PW-19, "Welded-in Stays" shall be complied with.

SECTION M-1017E EXISTING INSTALLATIONS. POWER BOILERS

M-1017.1 Maximum Allowable Working Pressure. The maximum allowable working pressure on the shell or drum of a power boiler shall be determined by the strength of the weakest section of the structure, computed from the following information.

1. The thickness of the plate;

2. The tensile strength of the plate;

3. The efficiency of the longitudinal joint, or tube ligaments (whichever is least);

4. The inside diameter of the course; and

5. The factor of safety allowed by this chapter.

M-1017.1.1 Computation. The maximum allowable working pressure computation shall be as follows:

$\frac{TS \times t \times E}{R \times FS}$	=	Maximum allowable working pressure in pounds per square inch

TS	=	ultimate tensile strength of shell plates, pound per square inch
t	=	minimum thickness of shell plate in weakest course in inches
E	=	efficiency of longitudinal joint. (See Section VIII, Division 1, Part UW, paragraph UW-12 in ASME Code)
R	=	inside radius of the weakest course of the shell or drum in inches.
FS	=	factor of safety allowed by these rules.

M-1017.2 Factors of Safety. The factor of safety for boilers of nonstandard construction, the longitudinal joints of which are of butt and double strap construction, shall be not less than the following:

1. Four and one-half (4.5) for boilers not over 20 years old;

2. Five (5) for boilers over 20, but not more than 25 years old;

3. Five and one-half (5.5) for boilers over 25, but not more than 30 years old;

At the beginning of each five (5) year period thereafter, the factor of safety shall be increased by not less than five-tenths (0.5).

M-1017.2.1 Maximum Allowable Working Pressure Limit. In no case shall the maximum allowable working pressure on old boilers be increased unless they are being operated at a lesser pressure than would be allowable for new boilers, in which case the changed pressure shall not exceed that allowable for new boilers of the same construction.

M-1017.2.2 Conditional Factor of Safety Limits. The factor of safety for all standard boilers, the longitudinal joints of which are of butt and double strap construction shall be five (5) for boilers not more than twenty-five (25) years old, and at the beginning of each five (5) year period thereafter, the factor of safety shall be increased by not less than five-tenths (0.5), provided that after a thorough internal and external inspection and a hydrostatic pressure test to one and one-half times the pressure allowed during which no distress or leakage develops, the pressure allowed may be continued at a factor of safety of five (5).

M-1017.2.3 Lowest Factor of Safety. The lowest factor of safety for boilers of the

water-tube type of nonstandard construction, the longitudinal joints of which are of lap riveted construction shall be not less than the following:

1. Five (5) for boilers not over 20 years old.

2. Five and one-half (5.5) for boilers over 20, but not over 25 years old.

3. Six (6) for boilers over 25, but not over 30 years old.

4. At the beginning of each five (5) year period thereafter, the factor of safety for boilers of the water-tube type of nonstandard construction, the longitudinal joints of which are of lap riveted construction, shall be increased by not less than five-tenths (0.5).

M-1017.2.3.1 Lowest Factor of Safety. The lowest factor of safety for all fire tube, flue and cylinder boilers of nonstandard construction, the shells of which are exposed to the products of combustion and which have continuous longitudinal joints of lap-riveted construction exceeding twelve feet (12ft) in length, shall be not less than the following:

1. Six (6) for boilers not over 10 years old.

2. Six and one-half (6.5) for boilers over 10, but not over 15 years old.

3. Seven (7) for boilers over 15, but not over 20 years old.

4. At the beginning of each five (5) year period thereafter, the factor of safety for boilers as specified in 1, 2 and 3 above, shall be increased by not less than five-tenths (0.5). This type of boiler when removed from an existing setting shall not be reinstalled for a pressure in excess of fifteen (15) pounds.

M-1017.3 Cast-Iron Headers and Mud Drum. The maximum allowable working pressure on water-tube boilers, the tubes of which are secured to cast-iron or malleable-iron headers, or which have cast-iron mud drums, shall not exceed one-hundred sixty (160) pounds per square inch.

M-1017.4 Tensile Strength. When the tensile strength of steel or wrought iron shell plates is not known, it shall be taken as fifty-five thousand (55,000) pounds per square inch for steel and forty-five thousand (45,000) pounds per square inch for wrought iron.

M-1017.5 Crushing Strength of Mild Steel. The resistance to crushing of mild steel shall be taken at ninety-five thousand (95,000) pounds per square inch of cross-sectional area.

M-1017.6 Rivets. In computing the ultimate strength of rivets in shear the cross-sectional area of the rivet shank shall be used for the values in pounds per square inch based upon the requirements in Section I of the ASME Code.

M-1017.6.1 Size of Rivets. When the diameter of the rivet holes in the longitudinal joints on a boiler is not known, the diameter and cross-sectional area of rivets, after driving, may be selected from Table M-1017 or ascertained by cutting out one rivet in the body of the joint.

M-1017.7 Inspection of Inaccessible Parts. The heads of water tube boiler mud drums or headers which are not accessible for inspection shall have the brick work removed after the boiler has been in service for ten (10) years and at not less than every five (5) years period thereafter. All seams and parts of fire-tube boilers that are not accessible for inspection shall be exposed whenever, in the discretion of the inspector, the general condition of the boiler appears to be such that further examination is desirable.

M-1017.8 Safety Valves. Each boiler shall be equipped with one or more safety valves of the spring-pop type with a lifting device, placed as close to the boiler as possible. No valve of any description shall be placed between the safety valve and the boiler nor on the escape pipe between the safety valve and the atmosphere. When an elbow is placed on a safety valve escape pipe, it shall be located close to the safety valve outlet or the escape pipe shall be securely anchored and supported. When an escape pipe is used, it shall be full sized and fitted with an open drain to prevent water lodging in the upper part of the safety valve or escape pipe. Safety valves having either the seat or disk of cast iron shall not be used. Dead weight and lever weight safety valves shall be prohibited.

M-1017.8.1 Safety Valves Capacity. The safety-valve capacity of each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than six percent (6%) above the maximum allowable working pressure, or more than six percent (6%) percent above the highest pressure to which any valve is set.

M-1017.8.2 Safety Valves Setting. One or more safety valves on every boiler shall be set at or below the maximum allowable working pressure. The remaining valves may be set within a range of three percent (3%) above the maximum allowable working pressure, but the range of setting of all the safety valves on a boiler shall not exceed ten percent (10%) of the highest pressures to which any valve is set.

M-1017.9 Parts and Equipment for existing installations – Power Boilers.

M-1017.9.1 Fire-Actuated Fusible Plugs. Fire-actuated fusible plugs when used shall conform to the rules and regulations of the ASME Code for new construction.

M-1017.9.2 Water Glass. Each steam boiler shall have at least one water glass, the lowest visible part of which shall be as called for under the ASME Code for new construction.

M-1017.9.3 Gage Cock. Each boiler shall have three or more gage cocks located within

the range of the visible length of the water glass when the maximum allowable working pressure exceeds fifteen (15) pounds per square inch except when such boiler has two water glasses with independent connections to the boiler, located on the same horizontal line and not less than two feet (2') apart.

M-1017.9.4 Outlet Connections. No outlet connections except for damper regulator, feed water regulator, low water fuel cut-out, drains or steam gage shall be placed on the pipes connecting a water column to a boiler. Each water column shall have a valved drain run to within six inches (6") of the floor.

M-1017.9.5 Steam Gage. Each steam boiler shall have a steam gage connected to the steam space or to the steam connection to the water column. The steam gage shall be connected to a siphon or equivalent device of sufficient capacity to keep the gage tube filled with water and so arranged that the gage cannot be shut off from the boiler except by a cock placed near the gage and provided with a "T" or level handle arranged to be parallel to the pipe in which it is located when the cock is open.

M-1017.9.6 Low-Water Cut-Off. Each steam boiler when mechanically fired shall be equipped with a low-water cut-off so located as to automatically cut off the fuel supply when the water level falls to a point not lower than the top of the bottom nut of the water glass. Each cut-off shall have a drain run to within six inches (6") of the floor. When two or more mechanically fired boilers are connected to the same system, each boiler shall have independent low-water cut-offs, controls, and gages.

M-1017.9.7 Stop Valve. Each steam outlet from a high-pressure boiler (except safety-valve connections) shall be fitted with a stop valve located as close as practicable to the boiler.

M-1017.9.8 Blow Drains. When a stop valve is so located that water can accumulate, free blow drains shall be provided, the discharge of which shall be visible to the operator while manipulating the valve.

M-1017.10 Blow-Off Connection. Each boiler shall have a full-size blow-off fitted with a valve or cock in direct connection with the lowest water space practicable. When cocks are used they shall be of the gland or guard type and suitable for the pressure allowed. Globe valves are not permitted.

M-1017.10.1 Maximum Pressure. When the maximum allowable working pressure exceeds one-hundred (100) pounds per square inch, the blow-off shall be extra heavy from boiler to valve or valves, and shall run full size without reducers or bushings. Blow-off piping shall be of black wrought iron or black steel (not galvanized) and shall be extra heavy pipe.

M-1017.10.2 Fittings. All fittings, between the boiler and valve shall be steel or extra heavy fittings of bronze, brass, or malleable iron. In case of renewal of pipe or fittings in the blow-off lines, as specified in this paragraph, they shall be installed in accordance with the ASME Code for new installations.

M-1017.10.3 Blow-off Pipe. When the maximum allowable working pressure exceeds one-hundred (100) pounds per square inch, each bottom blow-off pipe shall be fitted with two valves or a valve and cock such valves and cocks to be of the extra heavy type. A bottom blow-off pipe when exposed to direct furnace heat shall be protected by fire-brick or other heat-resisting material, so arranged that the pipe may be inspected. An opening in the boiler setting for a blow-off pipe shall be arranged to provide for free expansion and contraction.

M-1017.11 Feed-Water Connections. The feed pipe of a steam boiler shall be provided with a check valve near the boiler and a valve or cock between the check valve and the boiler, and when two or more boilers are fed from a common source, there shall also be a globe valve on the branch to each boiler between the check valve and the source of supply. When a globe valve is used on a feed pipe, the inlet shall be under the disk from the valve. In all cases where the safety valve is set above twenty-five (25) pounds, there shall be an additional means of feeding water against the maximum approved pressure.

M-1017.12 Test Pressure. When a hydrostatic test is applied, test pressure shall be not more than one and one-half times the maximum allowable working pressure. During a hydrostatic test of a boiler, suitable provisions shall be made so that it will not be necessary to screw down the compression screw upon the spring of the safety valve.

M-1017.13 Repair and Replacements. Where repairs or replacements are made or fittings or appliances renewed or attached to a boiler, they must comply with the ASME Code for new installations.

M-1017.14 Conditions not Covered by These Rules. If any condition not definitely covered by this chapter, the ASME Code for new installations shall apply.

TABLE M-1017
SIZES OF RIVETS BASED ON PLATE THICKNESS
(see M-1017.6.1)

	Inch	Inch	Inch	Inch	Inch	Inch
Thickness of plate	1/4	9/32	5/16	11/32	3/8	13/32
Diameter of rivet after driving	11/15	11/16	3/4	3/4	13/16	13/16
Thickness of plate	7/16	15/32	2	9/16	5/8	-
Diameter of rivet after driving	15/16	15/16	15/16	11/16	11/16	-

SECTION M-1018E EXISTING INSTALLATIONS - HEATING BOILERS

M-1018.1 Maximum Allowable Working Pressure. Maximum allowable working pressure of heating boilers shall be as follows.

1. Riveted Heating Boilers. The maximum allowable working pressures on the shell or drum of riveted heating boiler shall be determined in accordance with Section M-1017.0, except that in no case shall the maximum allowable working pressure of a steam-heating boiler exceed fifteen (15) pounds per square inch.

2. Cast Iron Heating Boilers. The maximum allowable working pressure of a boiler composed principally of cast iron shall not exceed fifteen pounds (15 psi) unless such boiler complies with all other requirements of the rules and regulations for power boilers. The maximum allowable working pressure of a boiler having cast-iron shell or heads and steel or wrought-iron tubes shall not exceed fifteen (15 psi).

   M-1018.1.1 Low Pressure Boiler. A radiator in which steam pressure is generated at a pressure of fifteen (15 psi) or less shall be considered a low pressure boiler.

   M-1018.1.2 Manufacturers Specification and Identification. The maximum allowable working pressure shall in no case exceed the pressure indicated by the manufacturer's identification stenciled or cast upon the boiler or upon a plate secured to it. In the absence of a manufacturer's identification stencil or plate the maximum allowable working pressure shall not exceed that guaranteed in the manufacturer's specification or catalogs.

   M-1018.1.3 Safe Operating Pressure. If in the judgment of an inspector, a steam-heating boiler is not safe for operation at the pressure previously approved, the pressure shall be reduced to the safe amount or proper repair shall be made or the boiler retired from service.

M-1018.2 Safety Valves. Each steam-heating boiler shall be provided with one or more safety valves with a total area of not less than one square inch (1 sq. in.) for each five square feet (5 sq. ft) of grate area or equivalent, if grates are not used. The steam-relieving capacity of the safety

valve or valves on any boiler shall be sufficient to prevent the boiler pressure from rising more than five (5 psi) above the maximum allowable working pressure of the boiler.

M-1018.2.1 Capacity. If there is any doubt as to the capacity of the safety valve, an accumulation test shall be run. No safety valve shall be smaller than three-quarter inch (3/4") in diameter or larger than four and one-half inches (4.5") in diameter.

M-1018.2.2 Stop Valve. No stop valve of any description shall be located between a boiler and its safety valve, nor in the safety valve discharge pipe.

M-1018.3 Parts and Equipment. Each steam boiler shall be equipped with the following parts and equipment in accordance with each specified conditions.

M-1018.3.1 Steam Gage Pressure. Each steam boiler shall have a steam pressure gage connected to the steam space of the boiler itself or on steam pipe near the boiler. The graduations of the steam gage shall not be less than fifteen (15 psi) nor more than thirty (30 psi).

M-1018.3.2 Water Gage Glass. Each boiler shall have at least one water gage glass with the lowest visible part above the heating surfaces in the primary combustion chamber. When, in the judgment of an Inspector, the heating surfaces above the low-water line may be injured by contact with gases of high temperature, the water gages shall be raised until the lowest visible part of the glass gage is above the testing surface.

M-1018.3.3 Gage Cocks. Each steam boiler shall have two or more gage cocks located within the visible length of the water gage glass except when such boiler is provided with two water gage glasses.

M-1018.3.4 Steam Stop Valve. If a boiler may be closed off from the heating system by closing a steam stop valve, there shall be a check valve in the condensate return line between the boiler and the system. If any part of a heating system may be closed off from the remainder of the system by closing a steam stop valve, there shall be a check valve in the condensate return pipe from that part of the system.

M-1018.3.5 Feed-Water Connections. Feed-water connections shall be independent of any water gage connections and it is recommended that the connections be made to the condensate return pipe of reservoir of the condensate return pump. There shall be a check valve in the feed-water line close to the boiler.

M-1018.3.6 Low-Water Cut-Off Mechanical Fired Boilers. Each mechanically fired boiler shall be equipped with a low-water cut-off so located as to automatically cut off the fuel supply in case the water level falls to a point not lower than the tip of the bottom nut of the water glass. Each cut-off shall have a drain run to within six inches (6") of the floor. When two or more mechanically fired boilers are connected to the same system, each boiler shall have independent low-water cut-offs, controls, and gages.

M-1018.3.7 Low-Water Cut-Off Electrically Operated Boilers. If a low-water fuel cut-out device is electrically operated, it shall be so connected that it will assume the "cut-out" position when the electric current is off.

M-1018.3.8 Condensate Return Pump. Each condensate return pump shall be provided with an automatic water level control set to maintain the water level within the limits of two gage cocks.

M-1018.4 Repairs or Replacements. When repairs or replacement of parts or piping are made or fittings or appliances renewed or attached to a boiler, the rules applying to new installations shall be followed as nearly as practicable.

M-1018.4.1 Safety Valve. When a safety valve is replaced the requirements of Section M-1014.0 and Section M-1015.0 shall be complied with, no valve being less than three-quarter inch (3/4") in diameter or larger than four and one-half inches (4.5") in diameter.

SECTION M-1019E EXISTING INSTALLATIONS - MINIATURE BOILERS

M-1019.1 Maximum Allowable Working Pressure. The maximum allowable working pressure on the shell of a boiler or drum shall be determined by the formula.

$\frac{TS \times t \times E}{R \times FS}$	=	Maximum allowable working pressure in pounds per square inch

Where:

TS	=	ultimate tensile strength of shell plates, pound per square inch
t	=	minimum thickness of shell plate in weakest course in inches
E	=	efficiency of longitudinal joint. (See Section VIII, Division 1, Part UW, paragraph UW-12 in ASME Code)
E	=	efficiency for tube ligaments between openings as calculated in Section I, Part PG, paragraphs PG-52 and PG-53 in the ASME Code.
R	=	inside radius of the weakest course of the shell or drum in inches.
FS	=	factor of safety allowed by these rules.

N.B. To be used as given for longitudinal joints, riveted construction, or if for fusion welded joints, E shall be taken as specified in Section VIII, Division 1, Part UW, paragraph UW-12, “Joint Efficiencies” in the ASME Code. In any case where there are both riveted joints and tube ligaments to consider, the weaker of these shall be used for E.

M-1019.2 Parts and Equipment. Each miniature boiler shall be equipped with the following parts and equipment in accordance with each specified conditions.

M-1019.2.1 Feed Pump. Each miniature boiler operating at a pressure in excess of twenty-five (25) pounds per square inch shall be provided with at least one feed pump or other approved feeding device except where the steam generator is operated with no

extraction of steam (closed system). In the latter case, in lieu of a feeding device, a suitable connection or opening, not less than one-half inch (½") pipe size, shall be provided to fill the generator when cold.

M-1019.2.2 Feed Water and Blow-Off Connections. Each miniature boiler shall be fitted with feed water and blow-off connections which shall not be less than one-half inch (½") iron pipe size unless operated on a closed system. The feed pipe shall be provided with a check valve and stop valve. The blow-off shall be fitted with a valve or cock in direct connection with the lowest water space practicable. When the boiler is under pressure, feed water shall not be introduced through the openings or connections used for the column, the water gage glass or gage cocks. All valves, pipe fittings, and appliances shall be at least one-hundred twenty-five (125 psi) standard pressure.

M-1019.2.3 Water Gage Glass and Gage Cocks. Each miniature boiler shall be equipped with a water gage glass and one or more gage cocks. The lowest permissible water level shall be at a point one-third of the height of the shell except where the boiler is equipped with internal furnace, when it shall be not less than one-third of the length of the tube above the top of the furnace. In the case of small generating units operated on the closed system, where there is insufficient space for the usual water gage, water-level indicators of the glass bull's eye type may be used.

M-1019.2.4 Steam Gage. Each miniature boiler shall be equipped with a steam gage having its dial graduated to not less than one and one-half times the maximum allowable working pressure. The gage shall he connected to the steam space or to the steam connection to the water column by a brass or bronze composition siphon tube or equivalent device that will keep the gage tube filled with water.

M-1019.2.5 Safety Valve. Each boiler shall be equipped with a sealed, spring loaded "pop" safety valve not less than one-half inch (½") diameter connected directly to the boiler. To insure the safety valve being free each valve shall have a substantially lifting device by which the valve disk may be lifted from its seat when there is at least seventy-five percent (75%) of full working pressure in the boiler. All safety valves shall be mounted with their spindles vertical and freely accessible.

1. Safety Valve Identification. The safety valve shall be plainly marked by the manufacturer with the following information.
   (a) Manufacturer name or identifying trademark;
   (b) The nominal diameter;
   (c) The steam pressure at which it is set to blow; and
   (d) The capacity in pounds and ASME Standard.

2. Minimum Relieving Capacity. The minimum relieving capacity for the safety valve shall be determined on the basis of three (3) pounds of steam per hour per square foot of heating surface and shall be sufficient to discharge all the steam that can be generated by the boiler without allowing the pressures to rise more

than six percent (6%) above the maximum allowable working pressure.

M-1019.2.6 Standard Stop Valve. Each steam line from a boiler shall be provided with a one-hundred twenty-five (125 psi) standard stop valve located as close to the boiler shell or drum as is practicable.

M-1019.2.7 Blow-Off Connections. Each boiler shall be provided with a blow-off connection which shall not be reduced in size and shall be led to a safe point of discharge. Whenever, in the judgment of the boiler inspector, such a place cannot be provided, a blow-down tank shall be provided on all such tanks. The blow-off shall be fitted with a valve or cock in direct connection with the lowest water space practicable.

M-1019.2.8 Automatic Low-Water Fuel Cut-Off. Each boiler mechanically fired other than by gas shall be provided with an automatic low-water fuel cut-off so located as to automatically cut off the fuel supply in case the water level falls to a point not lower than the bottom of the water glass.

M-1019.2.9 Exception. Where boilers are gas-fired, the burners used shall conform to the requirements of the American Gas Association. The burner shall in those cases be equipped with a fuel-regulating governor which shall be automatic and regulated by the steam pressure. The governor shall be so constructed that in the event of its failure, there can be no possibility of steam from, the boiler entering the gas chamber or supply pipe. A manual stop cock or throttle valve shall in all cases be located in the inlet pipe ahead of the fuel-regulating governor. Each gas-fired boiler shall be equipped with a four inch (4") vent or flue extended to an approved location outside of the building or connected to a chimney, all to be in accordance with the *Building Code*. Where the horizontal run is more than ten feet (10'), the vent shall be increased to six inches (6").

M-1019.2.10 Replacement. All boiler replacements shall conform to the rules and regulations governing new installations.

M-1019.2.11 Retubed Boilers. Each retubed boiler must be inspected and passed by the boiler inspector before the boiler is again put in service. The annual inspection fee will be charged for this inspection.

M-1019.2.12 Used Boilers. Each used boiler brought into the District of Columbia shall be inspected by the boiler inspector before being installed.

M-1019.2.13 Installation Permit. Moving a boiler and reinstating it in the same or another building shall require an installation permit.

SECTION M-1020E EXISTING INSTALLATIONS - UNFIRED PRESSURE VESSELS

M-1020.1 Maximum Allowable Internal Working Pressures. For internal pressure, the maximum allowable working pressure for the shell of a pressure vessel shall be determined by the strength of the weakest course computed for the thickness of the plate, the tensile strength of

the plate, the efficiency of the longitudinal joint, the inside diameter of the course (see R below) and the factor of safety allowed by the rules.

$\frac{TS \times t \times E}{R \times FS}$	=	Maximum allowable working pressure in pounds per square inch

Where:

TS	=	ultimate tensile strength of shell plates, pound per square inch		
t	=	minimum thickness of shell plate in weakest course in inches		
E	=	efficiency of longitudinal joint depending upon construction. Use values as follows:		
		For riveted joints	=	calculated riveted efficiency.
		For fusion welded joint	=	Single "V" weld, fifty (50) percent.
				Double "V" weld, seventy (70) percent.
				Forge weld, eighty (80) percent.
				Brazed, eighty (80) percent.
				Brazed copper, ninety (90) percent.
E	=	efficiency for tube ligaments between openings as calculated in Section I, Part PG, paragraphs PG-52 and PG-53 in the ASME Code.		
R	=	Inside radius of the weakest course of the shell, inches, provided the thickness of the shell does not exceed ten (10) percent of the radius. If the thickness is over ten (10) percent of radius, the outer radius shall be used.		
FS	=	factor of safety allowed by these rules.		

M-1020.2 Maximum Allowable External Working Pressure. The maximum allowable working pressure for cylindrical vessels subjected to external or collapsing pressure shall be determined by methods in Section 1, Part PG, paragraph PG-28 in the ASME Code, except that the factor of safety used to calculate the working pressure shall be in accordance with the requirements of Section 1020.3.

M-1020.3 Existing Pressure Vessels. The maximum permissible working pressure on pressure vessels of other than lap-seam construction shall have a factor of safety of not less than four and one-half (4.5).

M-1020.3.1 Exception. The maximum permissible working pressure on pressure vessels (PVs) with longitudinal lap joints shall be calculated in accordance with the age of the vessel and the following factors of safety.

1. Not less than four (4) for PVs up to and including ten (10) years of age.

2. Not less than four and one-half (4.5) for PVs from ten (10) years of age to twenty (20) years of age.

3. Not less than five (5) for PVs from twenty (20) years of age to twenty-five (25) years of age.

4. Not less than five and one-half (5.5) for PVs from twenty-five (25) years of age to thirty (30) years of age.

M-1020.4 Maximum Allowable Working Pressure Limit. In no case shall the maximum allowable working pressure be increased unless such vessels are being operated at a lesser pressure than would be allowable for new vessels, in which case the changed pressure shall not exceed that allowable for new vessels of the same construction.

M-1020.4.1 Stress Limits. In checking the conformity of existing vessels with the limiting stresses for use in the design of pressure vessels, it is necessary to take account of the effect of static head that may be produced in any part in order that such stress limits be not exceeded.

M-1020.4.2 Age Limit. The age limit of a pressure vessel having a longitudinal lap joint and carrying over fifty (50) pounds pressure per square inch, shall be thirty (30) years.

M-1020.5 Inspection of Inaccessible Parts. Where, in the opinion of the inspector, as the result of the conditions disclosed at the regulator inspection, it is deemed advisable to remove interior or exterior lining, covering or brick work to expose certain parts of the vessel not visible at time of regular inspection, the inspector shall require the removal of such material to permit proper inspection and drilling of same to ascertain thickness if necessary.

M-1020.6 Lap-Seam Cracks. The shell or drum of a pressure vessel in which a lap seam crack is discovered along a longitudinal riveted joint, either butt or lap construction, shall be immediately discontinued from use. If the vessel is not more than fifteen (15) years of age, a complete new course of the original thickness may be installed at the discretion of the inspector (and after approval by the boiler inspector). Patching shall be prohibited. (By "lap-seam crack" is meant the typical crack frequently found in lap seams, extending parallel to the longitudinal joints and located either between or adjacent to rivet holes).

M-1020.7 Tensile Strength. When the tensile strength of steel shell plates is not known, it shall be taken as fifty-five thousand (55,000) pounds per square inch for temperatures not exceeding seven-hundred degrees Fahrenheit (700 degrees F.).

M-1020.8 Crushing Strength of Mild Steel. The resistance to crushing of mild steel shall be taken at ninety-five thousand (95,000) pounds per square inch of cross-sectional area.

M-1020.9 Rivets. In computing the ultimate strength of rivets in shear the following values of the cross-sectional area of the rivet shank shall be used.

POUNDS PER SQUARE INCH

Steel rivets in single shear	44,000
Steel rivets in double shear	88,000

M-1020.9.1 Cross-Sectional Area. The cross-sectional area used in the computations shall be that of the rivet shank after driving.

M-1020.9.2 Diameter. When the diameter of the rivet holes in the longitudinal joints of a pressure vessel is not known, the diameter and cross-sectional area of rivet after driving, may be ascertained from Table M-1017.0 or by cutting out one rivet in the body of the joint.

M-1020.10 Safety Appliances. Each unfired pressure vessel shall be protected by such safety and relief valves and indicating and controlling devices as will insure its safe operation. These valves and devices shall be so constructed, located, and installed such that they cannot readily be rendered inoperative. The relieving capacity of safety valves shall be such as to prevent a rise of pressure in the vessel of more than ten percent (10%) percent above the maximum allowable working pressure, taking into account the effect of a static head. Safety valve discharges shall be carried to a safe place.

CHAPTER 11E REFRIGERATION

SECTION M-1101E GENERAL

Add new Sections M-1101.4.1 through M-1101.4.3 to the Mechanical Code to read as follows:

M-1101.4.1 Condenser Cooling Water. Water used for condenser cooling purposes without recirculation shall at all times be regulated by automatic controls designed to produce a minimum water temperature rise of 15 degrees Fahrenheit (8.3 degrees Celsius), and to stop the flow of water when cooling is not required.

M-1101.4.2 Refrigeration Systems. No permit shall be issued for the installation of a refrigeration system requiring water from the public water mains, quantity of which exceeds 15 gallons per minute, until an application signed by the owner or owners of the premises where the system is to be installed has been filed with and approved by the Water and Sewer Authority.

M-1101.4.3 Water for Refrigeration. Water supplied from the public water mains shall not be used for refrigeration purposes to the extent that the use might be detrimental to the proper service of consumers in the distribution area, as determined by the director of the Water and Sewer Authority.

SECTION M-1105E MACHINERY ROOM, GENERAL REQUIREMENTS

Add new Section M-1105.7.1 to the Mechanical Code to read as follows:

M-1105.7.1 Discharge Pipe Sizing. Discharge piping shall be in accordance with ASHRAE 15.

CHAPTER 15E REFERENCED STANDARDS

Add the following Referenced Standards to the Mechanical Code:

ANSI

American National Standards Institute
25 West 43rd Street
Fourth Floor
New York, NY 10036

Standard Reference number	Title	Referenced in code section number
721.13		

ASHRAE

American Society of Heating, Refrigerating
And Air-Conditioning Engineers, Inc.
1791 Tullie Circle, NE
Atlanta, GA 30329-2305

Standard Reference number	Title	Referenced in code section number
15-2004		

ASME

American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

Standard Reference number	Title	Referenced in code section number
ASME 98 I through XI		

NBIC

National Board Inspection Code
National Board of Boiler and Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, OH 43229

Standard Reference number	Title	Referenced in code section number

NFPA

National Fire Protection Association
Batterymarch Park
Quincy, MA 02269

Standard Reference number	Title	Referenced in code section number
NFPA 45-2004	Fire Protection for Laboratories using Chemicals	

UL

Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096

Standard Reference number	Title	Referenced in code section number
835		