

## ADVISORY COMMITTEE COMMENT FORM FOR PROPOSED CODE CHANGES

(This form must be submitted electronically)

**1346 IMC #3d**

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### **Proposed Code Change - Language**

Please provide your proposed code change in strikeout/underline format. Provide the *specific* language you would like to see changed, with new words underlined and words to be deleted should be ~~stricken~~. Also, state whether the language contained in your proposal is from a code book or from an amendment currently found in Minnesota Rule. (You may provide the language (electronically) on a separate, attached sheet).

Add new Section 313 to 2012 IMC (revising proposed Chapter 16):

### **SECTION 313** **FUEL-FIRED APPLIANCE PERFORMANCE TEST**

**313.1 Performance Test.** Fuel-fired appliances shall be installed and tested according to Section 313 and the manufacturer's installation instructions, and the installation shall be verified with a performance test. The performance test shall include a combustion analysis test according to Section 313.5 in addition to any start-up procedure required by the manufacturer. A report of the test, including necessary start-up forms provided by the manufacturer, shall be submitted to the building official for review. The building official shall be permitted to accept the *Fuel-Fired Equipment Performance Safety Check Form* in Appendix C or start-up forms provided by the manufacturer. Supervised start-up, in the presence of the building official, shall be required for unlisted appliances, direct-fired appliances, and listed appliances with a fuel input of 1,000,000 Btu/hr or greater.

**Exception:** The performance test specified in this section does not apply to the following listed appliances:

1. Water heaters with an input less than 1,000,000 Btu/hr that heat potable water.
2. Room heaters, unit heaters and similar appliances installed in dwelling units.
3. Decorative appliances and fireplaces.
4. Portable heating appliances.
5. Cooking appliances.
6. Clothes dryers.

Revise proposed Chapter 16 as follows and add to section 313:

## **CHAPTER 16**

### **INSTALLATION AND TESTING OF OIL OR LIQUID FUEL-FIRED EQUIPMENT**

#### **~~1346.1601 SECTION 1601 GENERAL.~~**

The IMC is amended by adding a section to read as follows:

#### **SECTION 1601 GENERAL**

**1601.1 General.** Chapter 16 governs the installation, testing, or repair of: oil or liquid fuel burners, oil or liquid fuel burning systems, oil or liquid fuel burning equipment, and the oil or liquid fuel piping systems installed within, or in conjunction with, buildings or structures. The requirements of this chapter shall apply to the following equipment:

1. ~~Equipment utilized to provide control of environmental conditions.~~

**Exception:** ~~Equipment and appliances listed and labeled to an appropriate standard by a nationally recognized testing laboratory, which is qualified to evaluate the equipment or appliance, when installed and tested according to the manufacturer's installation instructions.~~

2. ~~Equipment with a fuel input of 1,000,000 Btu/hr or greater.~~
3. ~~Unlisted equipment.~~
4. ~~Miscellaneous equipment when required by the building official.~~

#### **~~1346.1602 SECTION 1602 EQUIPMENT PLACEMENT.~~**

The IMC is amended by adding a section to read as follows:

#### **SECTION 1602 EQUIPMENT PLACEMENT**

**313.21602.1 Placing appliances in operation.** After completion of all installations, the installer shall test all safety and operating controls and venting before placing the burner in service. The correct input of liquid fuel shall be determined and the fuel-to-air ratio set. Each oil or liquid fuel burner shall be adjusted to its proper input according to the manufacturer's instructions. Overrating the burners or the appliance is prohibited. The input range shall be appropriate to the appliance.

1. For conversion burners installed in hot water (liquid) boilers or warm air furnaces, the rate of flow of the oil or liquid fuel in Btu/h shall be adjusted to within plus or minus five percent of the design load, and not to exceed the design rate of the appliance.

2. For conversion burners installed in steam boilers, the oil or liquid fuel hourly input demand shall be adjusted to meet the steam load requirements. The oil or liquid fuel input demand necessitated by an oversized boiler shall be established and added to the input demand for load requirements to arrive at a total input demand.

#### **~~1346.1603 SECTION 1603 PILOT OPERATION.~~**

The IMC is amended by adding a section to read as follows:

#### **SECTION 1603 PILOT OPERATION**

**~~313.31603.1~~ Pilot operation.** Igniter or pilot flames shall be effective to ignite the oil or liquid fuel at the main burner or burners and shall be adequately protected from drafts. Pilot flames shall not become extinguished during the pilot cycle when the main burner or burners are turned on or off in a normal manner either manually or by automatic controls.

**~~1346.1604~~ SECTION 1604 BURNER OPERATION.**

The IMC is amended by adding a section to read as follows:

SECTION 1604  
BURNER OPERATION

**~~313.41604.1~~ Burner operation.** When testing ~~In making tests~~ to determine compliance with the requirements of this section, care shall be exercised to prevent the accumulation of unburned liquid fuel in the appliance that might result in an explosion or fire.

1. Burner ~~The flames from the burner~~ shall freely ignite the liquid fuel when operating at the lowest firing position.
2. Burner flames shall not flash back when the liquid fuel is turned on or off by an automatic control mechanism.
3. Main burner flames shall ignite freely from the pilot when the pilot flame is reduced to a minimum point that will actuate the pilot safety device.
4. When ignition is made in a normal manner, the flame shall not flash outside the appliance.
5. Burners shall not expel liquid fuel through air openings when operating at prevailing pressure.
6. Burners shall have a proper liquid fuel air mixture to insure smooth ignition of the main burner.

**~~1346.1605~~ SECTION 1605 TEST METHODS.**

The IMC is amended by adding a section to read as follows:

SECTION 1605  
TEST METHODS

**~~313.51605.1~~ Combustion analysis Method of test.**

1. **~~Operational checking.~~** The flue gas, venting, safety, and operating controls of the appliance shall be checked to ensure proper and safe operation.
2. **~~Method of test - atmospheric type/induced draft type/fan assisted types.~~** The appliance shall be allowed to operate until the stack temperature becomes stabilized after which a sample of the undiluted flue products shall be taken from the appliance flue outlet. The sample taken shall be analyzed for carbon monoxide, carbon dioxide, and oxygen. Stack temperature shall be noted.

**~~Note:~~** Appliance designs incorporating induced draft assemblies may require a flue gas sample to be taken after the draft regulator or induced draft fan.

3. **Combustion analysis requirements Performance standards for all appliances atmospheric type.**
  - a. Minimum of 75 percent efficiency as determined by flue gas analysis method at appliance flue outlet.
  - b. Carbon monoxide concentration in flue gas not greater than 0.04 percent 400 parts per million (ppm), on an air-free basis.

- c. Stack temperature not greater than 700°F (371°C), plus ambient.
- d. Carbon dioxide concentration between 8 and 13 percent, inclusive.
- e. Oxygen concentration between 4 and 10 percent, inclusive.
- f. Smoke test no higher than #2 for light oils, or #4 for oils heavier than #4.
- g. Draft shall be in accordance with burner manufacturer's specifications.

~~3a. **Performance standards for induced draft type/fan assisted types.**~~

- ~~a. Minimum of 75 percent efficiency as determined by flue gas analysis method at appliance flue outlet.~~
- ~~b. Carbon monoxide concentration in flue gas not greater than 0.04 percent.~~
- ~~c. Stack temperature not greater than 700°F (371°C), plus ambient.~~
- ~~d. Carbon dioxide concentration between 8 and 13 percent, inclusive.~~
- ~~e. Oxygen concentration between 4 and 10 percent, inclusive.~~
- ~~f. Smoke test no higher than #2 for light oils, or #4 for oils heavier than #4.~~
- ~~g. Draft shall be in accordance with burner manufacturer's specifications.~~

**Note:** Induced draft and fan-assisted types of appliances may require a sample to be taken after the induced draft fan, which may cause oxygen figures in excess of the limits stated. In such cases, safe liquid fuel combustion ratios shall be maintained and be consistent with the terms of the appliance listing.

~~4. **Method of test - power type.** The appliance shall be allowed to operate until the stack temperature becomes stabilized after which a sample of the undiluted flue products shall be taken from the appliance flue outlet. The sample shall be analyzed for carbon monoxide, carbon dioxide, and oxygen. Stack temperature shall be recorded.~~

~~5. **Performance standards for power type.**~~

- ~~a. Minimum of 80 percent efficiency as determined by flue gas analysis method at appliance flue outlet.~~
- ~~b. Carbon monoxide concentration in the flue gas not greater than 0.04 percent.~~
- ~~c. Stack temperature not greater than 700°F (371°C), plus ambient.~~
- ~~d. Carbon dioxide concentration between 8 and 13 percent, inclusive.~~
- ~~e. Oxygen concentration between 4 and 10 percent, inclusive.~~
- ~~f. Smoke test no higher than #2 for light oils, or #4 for oils heavier than #4.~~
- ~~g. Draft shall be in accordance with burner manufacturer's specifications.~~

~~46. **Test report records filing; tag.** After completion of the test of newly installed oil or liquid fuel burner equipment as provided in this section, complete test records shall be filed with the building official on an approved form. The A tag stating the date of the combustion analysis test and the name of the installer shall be affixed attached to the equipmentappliance at the main valve.~~

~~7. **Oxygen concentration.**~~

- ~~a. The concentration of oxygen in the undiluted flue products of oil or liquid fuel burners shall in no case be less than 3 percent nor more than 10 percent, shall be in~~

~~conformance with applicable performance standards and shall be consistent with the appliance listing.~~

~~b. The allowable limit of carbon monoxide shall not exceed 0.04 percent.~~

~~c. The flue gas temperature of an oil appliance, as taken on the appliance side of the draft regulator, shall not exceed applicable performance standards and shall be consistent with the appliance listing.~~

~~58.—~~ **Approved oxygen trim system.** The oxygen figures may not apply when there is an approved oxygen trim system on the burner that is designed for that use, including a low oxygen interlock when approved by the building official.

~~9.—~~ **Supervised start-up.**

~~a. Supervised start-up may be required to verify safe operation of oil or liquid fuel burner and to provide documentation that operation is consistent with this code, listing and approval. Supervised start-up is required for all liquid fuel burners listed in b, c, and d. Supervised start-up requires that the liquid fuel burner shall be tested in the presence of the building official in an approved manner. Testing shall include safety and operating controls, input, flue gas analysis, and venting. Flue gas shall be tested at high, medium, and low fires. Provisions shall be made in the system to allow firing test in warm weather. After completion of the test of newly installed oil or liquid fuel burner equipment as provided in this section, complete test records shall be filed with the building official on an approved form. The tag stating the date of the test and the name of the installer shall be attached to the appliance at the main valve.~~

~~b. Oil and liquid fuel burners of 1,000,000 Btu/hr input or more require a supervised start-up as in a.~~

~~c. Installation of oxygen trim systems, modulating dampers, or other draft control or combustion devices require a supervised start-up as in a.~~

~~d. All direct fired heaters require a supervised start-up as in a.~~

~~10.—~~ **Control diagram.** A complete control diagram of the installation and suitable operating instructions shall be supplied to the building official.

~~1346.1606~~ **SECTION 1606 EQUIPMENT.**

The IMC is amended by adding a section to read as follows:

SECTION 1606  
EQUIPMENT

~~313.61606.1~~ **Appliance information.** ~~A.~~ All installations of gas or fuel burners fuel-fired appliances with input above ~~1,000,000~~400,000 Btu/hr, all non-listed appliances and all combinations of gas/liquid/solid appliances ~~gas or fuel burners must~~ shall be reviewed for code compliance by the building official ~~approved~~ before installation. The following information shall ~~must~~ be provided ~~as required by the building official.~~

1. Name, model, and serial number of the equipment ~~burner~~.

2. Input rating and type of fuel.

3. Name of the nationally recognized testing laboratory that tested and listed the unit, if applicable.

4. Name, model, and serial number of the appliance ~~furnace or boiler~~ that the burner will be installed in if not part of a complete package.

5. A complete wiring diagram showing the factory and field fuel wiring installed or to be installed including all controls, ~~identified by the brand name and model number.~~

6. A diagram print of the ~~gas or~~ fuel train from the manual shutoff to the appliance showing all controls that will be installed, ~~their names, model numbers, and approvals.~~

~~B. All installations of gas or fuel burners with input above 400,000 Btu/hr and all combination gas and oil or other combination fuel burners that are installed in new or renovated boiler or equipment rooms, or are installed in a package with the boiler or furnace, shall include the following information in addition to that required in item A, sub items 1 to 6.~~

~~1. A complete piping diagram from the supply source showing all components and materials identified by brand name and model number with relevant approvals.~~

~~2. Detailed provisions for combustion air, venting, and stacks.~~

~~3. A floor plan drawn to scale showing all relevant equipment. Plans and specifications shall be approved before proceeding with an installation.~~

**APPENDIX C**

**FUEL-FIRED EQUIPMENT PERFORMANCE SAFETY CHECK FORM**

(as required by Section 313 of the Minnesota Mechanical Code and Section 311 of the Minnesota Fuel Gas Code)

**PROPERTY ADDRESS:** \_\_\_\_\_ **Date of Inspection:** \_\_\_\_\_  
 \*\*\*\*Contractor must have the proper Mechanical or Gas License in order to perform the Performance Safety Check\*\*\*\*

**Equipment Description (use a separate form for each unit):**

Type \_\_\_\_\_ Location \_\_\_\_\_ Serial # \_\_\_\_\_

Make \_\_\_\_\_ Model \_\_\_\_\_ Type of Fuel \_\_\_\_\_

Equipment Venting Type: Atmospheric \_\_\_\_\_ Induced Fan \_\_\_\_\_ Other \_\_\_\_\_

**Total Btu/hr input of all vented gas appliances per chimney:** \_\_\_\_\_

Type of Chimney: Masonry \_\_\_\_\_ Class B \_\_\_\_\_ Other \_\_\_\_\_

Type of Liner: None \_\_\_\_\_ Metal \_\_\_\_\_ Flex-liner \_\_\_\_\_ B-vent \_\_\_\_\_

Combustion Air Supply, with air trap: Yes \_\_\_\_\_ Properly sized \_\_\_\_\_

**Safety & Operating Control Tests:**

**Pass**

**Flue Gas Analysis:**

**Initial**

**Final**

Pilot/Flame Safeguard Operating Properly \_\_\_\_\_ Stack Temperature \_\_\_\_\_ °F/Net \_\_\_\_\_ °F/Net

Limit(s) Operating Properly \_\_\_\_\_ Oxygen \_\_\_\_\_%

Operator(s) Operating Properly \_\_\_\_\_ Carbon Monoxide \_\_\_\_\_ppm \_\_\_\_\_ppm

Low Water Cut-Off Operating Properly \_\_\_\_\_ Carbon Dioxide \_\_\_\_\_%

All Controls Operating Properly \_\_\_\_\_ Steady State efficiency \_\_\_\_\_%

Fuel Piping System-Okay \_\_\_\_\_

Burner Lights Smoothly \_\_\_\_\_

**Visual Inspection (plenums, supplies, returns, etc):**

Connector, Vent, Chimney-Okay \_\_\_\_\_ Pass \_\_\_\_\_

Heating Unit-Okay \_\_\_\_\_

**Does the heating system operate safely and properly?**

Combustion Chamber/Smoke Bomb Test \_\_\_\_\_ Yes \_\_\_\_\_ No \_\_\_\_\_

Vents Properly Without Spillage \_\_\_\_\_

Flame Stays Inside/Doesn't Roll Out \_\_\_\_\_

If the heating system does not operate safely and properly, the system needs to be repaired or replaced with the proper permits.

**Comments (List of all repairs made to the system. All necessary permits need to be obtained):**

**Name of Licensed Contractor:** \_\_\_\_\_ **Phone:** \_\_\_\_\_  
**Address:** \_\_\_\_\_  
**Name of Master (if applicable):** \_\_\_\_\_ **Master License #:** \_\_\_\_\_  
**Person Performing Test:** \_\_\_\_\_ **Signature** \_\_\_\_\_  
*A licensed journeyman/master heating installer employed by this firm has inspected the heating system(s) of the address listed above. The inspection revealed that the entire heating system(s) is consistent with the Minnesota Mechanical Code and Minnesota Fuel Gas Code for adequate heat supply, chimney vent liner, manual gas shut-off, draft hood, venting, cleaning and servicing. As a representative of the firm, I am authorized to sign this certification on behalf of the Master Heating Installer.*

## **Proposed Code Change – Need and Reason**

Please provide a thorough explanation of the need for this change and why this proposed code change is a reasonable change. During the rulemaking process, the Agency must defend the need and reasonableness of all its proposed changes. The Agency must submit evidence that it has considered all aspects of the proposal. (You may provide the need and reason (electronically) on a separate attached sheet).

**This proposed amendment contains the essential requirements for “Installation and Testing of Oil or Liquid Fuel-Fired Equipment” from the current mechanical code, however it is reduced to a shorter, easier to understand format that results in the same outcome. It is necessary because the current language is not consistently enforced due to poorly worded sections and confusing requirements. The provisions of this section are reasonable since they have been in effect in Minnesota under previous mechanical codes and have been in use by the affected industry.**

## **Proposed Code Change – Cost/Benefit Analysis**

Please consider whether this proposed code change will increase/decrease costs or indicate that it will not have any cost implications and explain how it will not. If there is an increased cost, will this cost be offset somehow by a life safety or other benefit? If so, please explain. Are there any cost increases/decreases to enforce or comply with this proposed code change? If so, please explain. (You may provide the cost/benefit analysis (electronically) on a separate, attached sheet).

**Since it has the same result as language in the current mechanical code, there are no cost implications.**

## **Other Factors to Consider Related to Proposed Code Change**

1. Is this proposed code change meant to:

change language contained in a published code book? If so, list section(s).

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

**MR 1346.1601**

delete language contained in a published code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

neither; this language will be new language, not found in the code book or in Minnesota Rule.

2. Is this proposed code change required by a Minnesota Statute or new legislation? If so, please provide the citation to the Statute or legislation.

**No.**

3. Will this proposed code change impact other sections of a published code book or of an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

**MR 1346.1601 and MR 1346.5901.**

4. Will this proposed code change impact other parts of the Minnesota State Building Code? If so, please list the affected parts of the Minnesota State Building Code.

**No.**

5. Who are the parties affected or segments of industry affected by this proposed code change?

**None.**

6. Can you think of other means or methods to achieve the purpose of the proposed code change? If so, please explain what they are and why your proposed change is the preferred method or means to achieve the desired result.

**No.**

7. Are you aware of any federal requirement or regulation related to this proposed code change? If so, please list the regulation or requirement.

**No.**