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## BUILDINGS BULLETIN 2015-011

### OTCR

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**Supersedes:** None

**Related Bulletin** 2012-002

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**Issuance Date:** May 19, 2015

**Purpose:** This document establishes acceptance criteria for site-specific approval of fuel gas compressors, duct burners and heat recovery steam generators used in cogeneration and Combined Heat and Power (“CHP”) projects.

**Related Code/Zoning Section(s):**

AC 28-103.9	BC 1704.19
AC 28-113.1	EC 500.5

**Subject(s):** Cogeneration; Fuel gas compressors, cogeneration; Duct burners, cogeneration; heat recovery steam generators, cogeneration; Combined Heat and Power; Fuel gas compressors, Combined Heat and Power; Duct burners, Combined Heat and Power; heat recovery steam generators, Combined Heat and Power

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**Background:** In accordance with section AC 28-113.1, certain materials identified in the Construction Codes or by the Commissioner must be tested in accordance with the relevant standard or standards by a Department-recognized testing agency. Additionally, in accordance with section AC 28-103.9, the Commissioner has the authority to require testing of materials in accordance with recognized test standards approved by the Commissioner. This bulletin provides the criteria for site-specific acceptance of fuel gas compressors, duct burners and heat recovery steam generators used in cogeneration and CHP projects.

**Description:** The cogeneration equipment addressed in this bulletin includes:

1. Fuel gas compressors used in conjunction with gas turbines which simultaneously generate electricity and useful heat.
2. Duct burners which increase the temperature of the turbine exhaust gases to increase the steam production in the heat recovery steam generator (HRSG).
3. Heat recovery steam generators, which utilize the waste heat in the exhaust to generate steam or hot water.

Note: Microturbines shall comply with 1 RCNY 50-01.

**Uses:** Cogeneration equipment is used to generate electricity, steam and/or hot water.

**Evaluation Scope:** NYC Construction Codes  
**Evaluation Criteria:** Pursuant to section AC 28-113, the Office of Technical Certification and Research (“OTCR”) establishes the following product evaluation criteria for fuel gas compressors, duct burners and heat recovery steam generators used in cogeneration and CHP projects.

The acceptance criteria established in this bulletin shall be considered a minimum standard for acceptance. Installations shall be evaluated by OTCR on a case-by-case basis.

## **I. Fuel Gas Compressor**

**A. UL 984<sup>1</sup>, Hermetic Refrigerant Motor Compressors** - The fuel gas compressor shall be tested at the installation site and evaluated in accordance with UL 984 with the following modifications:

**Section 1.1** Revise definition of section 1.1 and add the following: A fuel gas compressor is not a hermetic refrigerant motor compressor. However, the fuel gas compressor shall comply with UL 984 with the following modifications:

**Section 19** – Delete

**Section 20** – Delete

**Section 32** – Delete

**Section 41.12 thru 41.22** – Delete

**Section 41.4** – Add at the end the following: Does not apply for indoor application

**B. Safety trip tests** - The following are set points for safety trips which are defined by the manufacturer’s technical specifications for field testing of the fuel gas compressor:

1. Emergency Shutdown
2. Hi Suction Scrubber Pressure
3. High Fuel Gas Outlet Pressure
4. Lo Fuel Gas Outlet Pressure
5. Hi Compressor Suction Pressure
6. Lo Compressor Suction Pressure
7. Hi Compressor Vibration
8. Hi Compressor Motor Vibration
9. Hi Compressor Motor Winding Temp for Phase A
10. Hi Compressor Motor Winding Temp for Phase B
11. Hi Compressor Motor Winding Temp for Phase C
12. Hi Compressor Discharge Temp
13. Hi Lube Oil Temperature
14. Hi Lube Oil Pressure
15. Other Trips if Stipulated

**C. All major components on compressor skid shall be:**

1. Listed or manufactured to industry recognized standards
2. Rated for the pressure that is above the maximum working pressure
3. Suitable for natural gas applications
4. Suitable for Class I Division 2 environment as per section 500.5 of NYC Electrical

Code

5. Installation shall be rated for outdoor or indoor use, as applicable.

## **II. Duct Burner**

- A. UL 295<sup>2</sup>, Commercial-Industrial Gas Burners - The duct burner shall be tested at the installation site and evaluated in accordance with UL 295.
- B. Safety trip tests - The following are set points for safety trips for field testing of the assembled duct burner:
  1. Burner failed to light/loss of flame
  2. Main Gas Upstream SSO (Safety Shut Off) valve failed
  3. Main Gas Downstream SSO valve failed to open
  4. Main Gas Upstream SSO valve failed to close
  5. Main Gas Downstream SSO valve failed to close
  6. Pilot failed to light
  7. Pilot valve failed to open
  8. Pilot valve failed to close
  9. Gas Pressure Hi
  10. Gas Pressure Lo
  11. Instrument Air Pressure Low
  12. Combustion Air Pressure Low
  13. Combustion Air Flow Low
  14. Duct Temp Hi
  15. BCP Trip Duct Burner
  16. Emergency Stop
  17. Purge Failure
  18. Pilot Fault
  19. Critical Input Check Failure
  20. External Main Fuel Trip
  21. Combustion Equipment Trip
  22. Low Fuel Gas Pressure
  23. High Fuel Gas Pressure
  24. Combustion Turbine Trip
  25. Low Water Level in the steam drum
  26. Loss of Combustion Control system
  27. Purge Timer (Watchdog Timer) Elapsed
  28. Manual Trip
  29. Burner Management system Logic Failure
- C. All major components on the duct burner shall be:
  1. Listed or manufactured to industry recognized standards
  2. Rated for pressure that is above the maximum working pressure
  3. Suitable for natural gas application
  4. Equipped with gas vents where necessary

## **III. High Pressure Heat Recovery Steam Generator (HRSG)**

### **A. ASME Boiler & Pressure Vessel Code<sup>3</sup>**

The high pressure heat recovery steam generators shall be tested at the installation site and evaluated in accordance with section I (Rules for Construction of Power Boilers) of the ASME. Boiler & Pressure Vessel Code<sup>3</sup>. The pressure vessels shall be code stamped in accordance with Section VIII, (Rules of

Construction of Pressure Vessels) Division 1.

**B. Safety trip test**

The following are safety trip set point for field testing of Heat Recovery Steam Generator as applicable:

1. Drum Level Lo-Lo
2. Aux Drum Level Lo-Lo
3. Drum Level Hi-Hi
4. Feed Water Pressure Lo
5. Drum Pressure Hi-Hi
6. Drum Pressure Hi
7. HRSG Purge

Note: The following shall apply where a low pressure heat recovery steam generator is used.

1. Supplemental Firing - Low pressure heat recovery steam generator systems where supplemental firing is installed downstream of the prime mover shall be tested and evaluated in accordance with section IV (Rules for Construction of Heating Boilers) of the ASME Boiler & Pressure Vessel Code. The pressure vessels shall be code stamped in accordance with Section VIII, Division 1.
2. Low pressure systems - Heat recovery steam generators systems where there is no supplemental firing beyond the prime mover must meet the requirements of the NYC Mechanical Code.

All surface temperatures of devices shall be in acceptable ranges per OSHA requirements. The boiler shall have ASME Code Relief Valves. Drums shall be ASME Code Stamped.

**Conditions of Acceptance:** Fuel gas compressors, duct burners and heat recovery steam generators used with cogeneration and CHP projects shall be designed and installed in accordance with the NYC Construction Codes and other applicable provisions including but not limited to the following:

A. Design

1. Fuel gas compressor, duct burners and heat recovery steam generator shall be designed in accordance with all applicable ASME reference codes and standards, the Building Code, manufacturer's recommendations and the condition of the required component listings.

B. Installation Requirements

1. Installation requirements shall be in accordance with the manufacturer's instructions and recommendations, the applicable listing, and conditions of this bulletin.
2. A valve shall be provided on the inlet piping of the compressor that automatically shuts off fuel gas supply to the compressor when
  - An emergency shut down is activated
  - Electrical power failure in the cogeneration system occurs
  - Electrical power to the compressor is shut off
3. The heater if provided in the compressor enclosure shall be an explosion proof type.
4. Gas distribution piping operating at pressure levels above 10 psig shall be located

within spaces having a 3 hour fire rating for walls and partitions and a 2 hour fire rating for floors and ceiling.

5. All high pressure gas piping 15 psig or over shall run outside buildings or be protected in accordance with the requirements of the NYC Construction Code and the following:
  - A 3 hour fire rating.
  - A suitable fire protection system as approved by the commissioner.
  - A fuel gas detection alarm system.
  - Special Inspection of the piping system as set forth in section BC 1704.19.
  - Gas pipe shafts shall not be located in stairways, shall be sealed to prevent any gas leakage from the shaft, shall conform to high hazard requirements, and shall be vented to the outdoor.
  - Compressors and/or turbines using gas at 15 psig or over shall be located in rooms provided with explosion venting in accordance with NFPA 68-2002<sup>3</sup> and the compressor, turbine, meter and boiler rooms shall be provided with mechanical and natural ventilation in accordance with NYC Construction Code.
  - The gas meter room shall be gas tight, and shall be vented in accordance with Appendix E of NYC Fuel Gas Code. Electrical equipment in meter, compressor and turbine rooms shall conform to the Electrical Code of the City of New York for Class 1 Division 2 occupancies.
  - The approval of the fire commissioner shall be obtained for all such high pressure gas installations, operating at 15 psig or over.
6. All piping, compressors, cylinders and containers shall be electrically grounded.
7. All receivers shall be designed, constructed and tested in accordance with Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code.
8. No open flames or hot work shall be permitted within 10 feet of the compressor enclosure without specific approval from all agencies having jurisdiction. "No-smoking" signs shall be posted in the compressor enclosure and at the entrance to the enclosure.

C. Filing Requirement

The installation of fuel gas compressors, duct burners and heat recovery steam generators used in cogeneration and CHP systems shall require OTCR 2 filing and approval.

- Referenced Standards:**
1. UL 984 seventh edition dated, May 31, 1996, "*Hermetic Refrigerant Motor-Compressors.*"
  2. UL 295, revised December 7, 2007, "*Commercial-Industrial Gas Burners.*"
  3. ASME Boiler and Pressure Vessel Code-2004