Appendix B: Furnace Certification Standard and Models Affected

The furnaces manufactured by Carrier Corporation with the PLCHX's were designed, tested, constructed and 3rd party certified to the ANSI Z 21.47/CSA 2.3 design standard for gas-fired central furnaces that was current at the time. The standard requires the secondary heat exchanger surfaces in contact with flue gas to be corrosion resistant to flue gas condensate.

Product data

The following brands and models were manufactured with Carrier Corporation's patented polypropylene laminated condensing heat exchanger:

Carrier models: 58SX*, 58SXA, 58SXC, 58DX*, 58DXA, 58DXC, 58MSA, 58MCA, 58MXA, 58MCB, 58MXB, 58UVB, 58SXB*, 58VUA, 58VCA, 58MVP, 58MVB, 58MTA, 58MTB, and 58MVC

Bryant/Payne/Day & Night models: 398AAW*, 398AAZ, 398AAV, 399AAW*, 399AAZ, 399AAV, 345MAV, 340MAV, 350MAV, 340AAV, 350AAV, 351DAS, 355BAV, 398BAW*, 398BAZ, 320AAZ, 321AAZ, 355MAV, 355AAV, 352MAV, 352AAV, 490AAV, PG9MAA, and PG9MAB and 355CAV.

*The asterisk next to a model number indicates that for those models, only those with serial numbers with the last two digits of 89 or higher were manufactured using PPL CHXs.

The furnace was certified to the ANSI Z 21.47/CSA 2.3 design standard for gas-fired central furnaces that was current at the time. The standard requires the secondary heat exchanger surfaces in contact with flue gas to be corrosion resistant to flue gas condensate, and to incorporate a flame rollout safety switch. The Technical Safety BC investigations found that the furnaces examined did not resist corrosion and failed as a result. Corrosion restricted flue gas flow which can cause a flame rollout, indicative of conditions that produce elevated CO levels. Investigations also found that flame rollout safety device did not turn the furnace off in three cases and the flame was producing elevated levels of CO. Examples of clauses in the standard ANSI Z 21.47/CSA 2.3 -2006 relevant to issues noted above are provided in the excerpts below:

Materials

1.3.3
Materials intended to be in contact with fuel gases shall be resistant to the action of liquefied petroleum gases.

1.3.4
Any flue gas passageway which is directly exposed to return air on the negative pressure side of an air-circulating blower shall be constructed of a corrosion-resistant material or have a corrosion-resistant finish to resist corrosion by condensate. Steels with coatings, suitable to the conditions to which exposed, and cast iron are considered corrosion resistant.

1.3.6
Heat exchanger surfaces in contact with flue gas which have a normal operating steady state temperature not more than 150°F (65.6°C) shall be corrosion resistant to flue gas condensate. (See 2.15, Corrosion Resistance.)

> **2.15** Corrosion Resistance
> The furnace and venting systems provided or specified shall exhibit acceptable resistance to corrosion when tested and evaluated according to procedures included in Exhibit G (Corrosion Resistance Criteria and Test Method).
> G.4 Corrosion Evaluation Criteria
> G.4.2, No evidence of leakage of flue gas or condensate shall be observed where condensate normally occurs in Category II and IV appliances. (This includes joints, gaskets, pipes, and condensing heat exchangers.)

1.3.7
When sheet metal is used in the construction of heating surfaces, the thickness shall be such as to provide strength, rigidity, durability, resistance to corrosion and other physical properties equivalent to 0.0304 in (0.772 mm) minimum thick AISI C1010 hot-rolled sheet steel. For minimum thickness of certain other materials, see Table I, Minimum Thickness of and Maximum Allowable Rise Above Room Temperature for Ferrous Metals.