

# Condensate Neutralizer Kits

*The necessity to treat acidic condensation produced from today's high-efficiency fuel burning appliances*

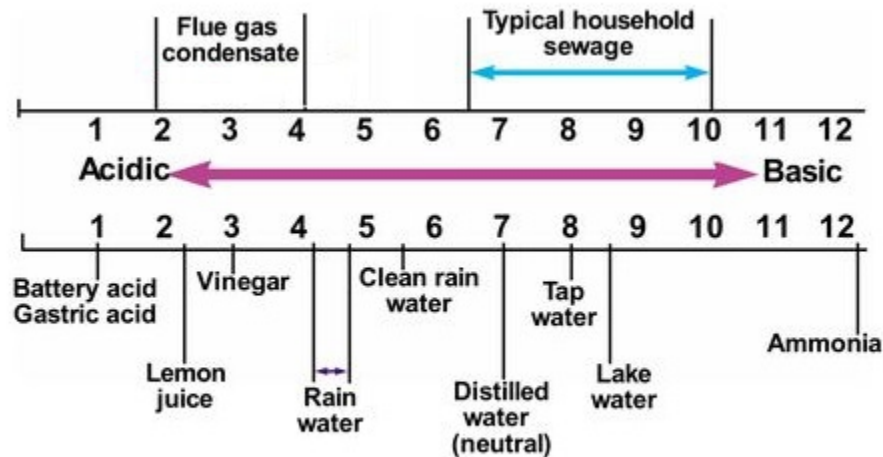


Today's typical heating and hot water equipment installs, from large commercial boilers and furnaces to single family tankless water heaters, are high-efficient condensing appliances. Most aging or failed appliances will also be replaced with mod-con (modulating condensing) technology. These furnaces and boilers attain high-efficiency by utilizing potential waste heat in flue gases. Condensing appliances extract additional heat from the waste gases which condenses water vapor produced during combustion to a liquid form, or condensate, thus recovering the latent heat.

The other by products of the combustion of natural and propane gases and the condensing process are concentrations of sulfuric, nitric, and hydrochloric acids. The condensate discharged from condensing appliances will have a pH level between 2 and 4. The level of the condensate will vary with the type of equipment, fuel, temperature and other factors. The acidic nature of the condensate is very corrosive to cast plumbing, waste systems and concrete floors. This damage begins at a pH of 4. Another potential problem is that condensing appliances are sealed combustion which requires no makeup or fresh air ventilation in the equipment room, and most of these appliances discharge into a trapped line where it pools in the same space. The lack of fresh air allows this evaporation of the condensate to carry these acids within, which over time corrodes the susceptible metals in the enclosed environments.

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In perspective, most conventional condensing appliances will produce one gallon of condensate for every 100,000 BTU at design maximum efficiency. A home containing a 100,000 BTU heating appliance operating 1,300 hours during the year will annually produce around 1,300 gallons of acidic condensate. In a good number of water treatment jurisdictions, you can multiply this by every house connected to the system. Some will argue that the condensate is no more hazardous than common household items such as lemon juice and vinegar, though they have a similar pH, they are not the same acid. You can be sure no one is consuming or cooking with this type of acid nor are they expelling thousands of gallons of vinegar or lemon juice down the drain.

It is now a common and good practice and in a growing number of jurisdictions mandated, to condition, or neutralize the acidic condensate prior to it being discharged into the environment or waste water systems. The National Standard Plumbing Code, The International Plumbing Code, along with other state codes “Prevent liquid waste containing acid from entering a building drainage system public or private sewer or treatment plant process”.

This conditioning or treating of condensate is typically accomplished by installing a condensate neutralizer into the appliances condensate drain line which allows the condensate to pass over aggregates, preferably calcium carbonate, that react with and thus raise the pH of the liquid to a more neutral level, prior to discharge into the drainage system. The reaction with the media results in carbon dioxide and certain salts. The carbon dioxide stays suspended in the water and passes with it out of the neutralizer. The salts generally settle inside the neutralizer. Over the life of the media, the salt build up and diminishing surface area will reduce the efficiency of the neutralizer. At the point the neutralizer is no longer effectively raising the pH, the neutralizer or the media will need to be replaced.

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When selecting a neutralizer, you want to look for a product that:

- Media contains at least 95% Calcium carbonate
- Media surface area isn't too great
- Sized for application
- Allows for media replacement
- Easily maintainable

Something to consider concerning the media of a neutralizer is the type and amount of space for water to flow between the media itself. The thought of more surface area the better is not necessarily the case. If the media has too much surface area or too small of a size, the salts produced from the reaction can clog the space between the media and the flow of the condensate, resulting in a sludge and drop in efficiency. Calcium carbonate can be found in several mediums in different percentages, most common is limestone or limestone products.

Manufactured limestone products typically have a lower calcium carbonate percentage and have fillers that allow it to stick or ball together and serve no useful purpose in neutralization and these fillers build up with the salts and can become ineffective prematurely. A high calcium carbonate percentage, natural, medium sized media is desirable.

Manufactures guidelines should be followed when sizing and maintaining the neutralizer. The neutralizer should be installed according to local and state codes and should be checked periodically according to manufactures directions to ensure it is performing to specifications. When the neutralizer is no longer effective, the neutralizer itself or the media needs to be replaced. Neutralizers that are designed to be easily removed and easily recharged encourage proper care and maintenance of the unit.

Neutralizers are too often the missing component in a mechanical system and according to International Plumbing code, are required to be installed on every condensing appliance. Damage like seen in the above picture is completely avoidable.

### **IPC 803.1 Neutralizing Device Required for Corrosive Waste.**

Corrosive liquids, spent acids or other harmful chemicals that destroy or injure a drain, sewer, soil or waste pipe, or create noxious or toxic fumes or interfere with sewage treatment processes shall not be discharged into the plumbing system without being thoroughly diluted, neutralized or treated by passing through an *approved* dilution or neutralizing device. Such devices shall be automatically provided with a sufficient supply of diluting water or neutralizing medium so as to make the contents noninjurious before discharge into the drainage system. The nature of the corrosive or harmful waste and the method of its treatment or dilution shall be *approved* prior to installation.

### **NATIONAL STANDARD PLUMBING CODE**

#### Chapter 6

#### "Liquid waste equipment"

6.1.1: Neutralizers shall be provided where required to prevent liquid waste containing ACID or ALKALINE waste or other harmful substances from entering a building drainage system public or private sewer or treatment plant or process.

6.1.6: a. Liquid waste treatment equipment shall be so installed that it is accessible for the removal of covers and the performance of necessary cleaning, servicing and maintenance.

6.6: a. Neutralizing or dilution tanks shall be provided where necessary to prevent ACIDIC or ALKALINE waste from entering the building drainage and sewer system.