



11450 US Hwy 380 • Suite 130-#289 • Cross Roads, TX 76227 • 800-441-0111 • FAX: 704-635-7363

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## Definitions of different types of Steam Cleaners

There are 4 main types of steamers sold into our industry:

- A) **Dry Vapor Steam** also sometimes referred to as Saturated Steam
- B) **Wet Steam**
- C) **Combination** (Cold Water, Hot Water or Wet Steam)
- D) **Dry Steam Generator** (Mainly used for curing not cleaning)

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A) A **Dry Vapor Steam** cleaner or generator is designed to generate saturated and superheated steam between typically 60~145psi (307-363F). In this type of steamers, the steam pressure is generated by water being heated and becoming a gaseous state of water. Steam pressure and temperature are in direct correlation ([see temperature - pressure chart](#)). It has a boiler (not a coil) that consists of a water entry point and steam exit point, but otherwise is a confined pressurized vessel. Typically a pressure switch(es) or thermostat(s) control the heating source as a safety feature(s). Depending on the size and thermal efficiency of the boiler, the operating pressure could sustain or drop almost immediately after the start of use. True dry vapor steamers maintain moisture level of 3-5 % consistently once excess water is purged in the beginning of the operation\*\*. As saturated and superheated steam is a form of gas (air), its temperature and pressure decline exponentially once steam exits the (gun) nozzle point and is no longer pressurized ([example of Optima Steamer temperature chart](#)). If used for sanitizing or disinfecting purposes, it is important to remain a close distance from the gun nozzle, or contain the steam (e.g. steam tenting, winery barrel steaming).

This type of steamer can be broken down further:

- (i) no separate boiler and water reservoir tank: often marketed as "no-boiler" type steamer. These types of dry vapor steamers are common among less expensive and compact residential grade units in North America (110V). The boiler must be cooled before more water can be added directly to the boiler, which is inadequate for commercial usage.
  - (ii) automatic fill boiler: commercial and industrial dry vapor steamers have a separate water tank (or small reservoir if no on-board tank) and a boiler. A boiler feed pump replenishes water to boiler only when more water is needed in the boiler (activated by boiler water level sensors)
- \*\*Note:** While a dry vapor steamer boiler is designed to generate superheated and saturated steam, a feature common to this type of steamers is the moisture level control. By adding water to dry vapor steam, the output flow can be temporarily amplified providing relatively low pressure steam more cleaning power. When this feature is enabled, steam's temperature can go below the saturation level (212F), and steam becomes a mix of vapor (gaseous state) and diffused water particles (air molecules with tiny water particles floating in it).

B) A **Wet Steam** Cleaner is identical to a hot water pressure washer, except that the water flowing through the heat exchanger is superheated to typically 212-350 degrees F and limited to 100-464 psi max. These temperatures are above the atmospheric boiling point; however, no steam is generated in the product due to the elevated pressure generated by the water pump and discharge nozzle. Generally, these systems have an open gun system therefore the water is never heated in a closed vessel. The superheated water is always in liquid form (inside the coil and hose) due to the elevated pressure. However, upon exit of the discharge nozzle, as pressure is reduced, the superheated water immediately vaporizes/flashs to saturated (or wet) steam. The temperature of the saturated steam at the exit side of the discharge nozzle is given by the ASME Steam Tables; for example, it is 164 °C for a water pressure of 0,7

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MPa absolute. The higher the temperature the greater the expansion force as the water vaporizes/flashs to steam, the greater the cleaning power.

C) A **Combination** Cleaner (Cold Water, Hot Water or Wet Steam) is also identical to a hot water pressure washer defined in "B" above except, you can clean in three modes:

- 1) Cold Water: No heat is applied to the coil, thus functions as a typical cold-water pressure washer.
- 2) Hot Water: Heat is applied to the coil, which elevates the water temperature to less than 212 degrees F.
- 3) Steam Mode: Heat is applied to the coil, and water flow is reduced by adjusting the unloader valve to bypass more water, or by adding a separate bypass valve.

Typically, a combination machine can utilize a steam expansion nozzle, or a standard high-pressure spray nozzle.

D) A **Dry Steam Generator** is a heat generating unit usually used for a heating or curing process. Unit built much like a Wet Steam cleaning unit except the superheated water temperatures are higher. Also, there is a separator added to the output of the heating unit. The separator acts like a centrifuge to remove higher density or higher moisture content steam, leaving the lower density, lower moisture content steam or "dry steam". Usually used as a source of heat without adding a lot of moisture. Not typically used for cleaning processes.

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