
AMERICAN NATIONAL STANDARD

**DETERMINING CONDENSATE LOADS
TO SIZE STEAM TRAPS**

Fluid Controls Institute, Inc.

Sponsor:



Fluid Controls Institute, Inc.
1300 Sumner Ave
Cleveland, Ohio 44115-2851

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Suggestions for improvement of this standard will be welcome. They should be sent to the Fluid Controls Institute, Inc.

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Foreword (This foreword is included for information only and is not part of FCI 13-1-2016, *Determining Condensate Loads to Size Steam Traps.*)

This voluntary standard has been developed by the Steam Trap Section of the Fluid Controls Institute, Inc. It is intended to assist users in estimating condensate loads using generally accepted formulas. The result is then used to size a steam trap with sufficient safety factor to cover the flow throughout the range without being grossly oversized.

FCI recognizes the need to periodically review and update this standard. Suggestions for improvement should be forwarded to the Fluid Controls Institute, Inc., 1300 Sumner Avenue, Cleveland, Ohio 44115-2851. All constructive suggestions for expansion and revision of this standard are welcome.

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AMERICAN NATIONAL STANDARD

Determining Condensate Loads to Size Steam Traps

1. PURPOSE

The purpose of this standard is to help estimate condensate loads using generally accepted formulas. The result is then used to size a steam trap with sufficient safety factor to discharge the necessary flow throughout the positive pressure differential range without being grossly oversized. A properly-sized steam trap can help provide reliable and efficient function.

2. SCOPE

Many steam trap manufacturers design and test steam trap flow capacities to stringent standards. Steam trap hot condensate flow capacities can be measured in accordance with ANSI/ASME PTC 39 or ISO 7842 standards. Steam trap manufacturers should publish capacity tables or graphs according to the aforementioned standards in order for users to select the correct steam trap to discharge the condensate load required by their application.

Calculation of the condensate load requirement that the steam trap needs to discharge is just as important as having an accurate flow capability. Under-sizing of the steam trap due to poor load information can lead to poor process performance or dangerous water hammer. Over-sizing the steam trap also serves little purpose, and in the case of certain types of traps, may cause steam leakage under low flow conditions. Steam traps are often considerably over-sized, which may result in removal of condensate; however, it may also shorten steam trap life in addition to possible unnecessary steam loss as referenced above.

If the equipment manufacturer lists the heat output of the steam equipment that needs to be drained, the estimated condensate rate can be easily calculated. Generally, equipment manufacturers provide the BTU/hr output. In that case, divide the BTU/hr output by the operating steam pressure latent heat (Table 1) to estimate the condensate generation rate from that equipment. (For more exact calculation, the steam quality / wetness has to be considered to adjust for actual lowered latent heat available at the process).

Example: 2,500,000 BTU/hr @ 30 psig steam

$$\frac{2,500,000 \text{ BTU/hr}}{929 \text{ BTU/lb of 30 psig steam}} = 2,691 \text{ lb/hr condensate flow}$$

When selecting the trap type, size, and required discharge capacity, consideration still has to be given to whether the steam pressure is steady state or modulating. The calculation shown in the example above is maximum condensate load at full pressure.

When the heat output rates from the equipment are unknown, estimated calculations for heat load using other sources of data can be utilized.