



Thank you again for sparing your time for the newsletter of Goa Instruments ! I hope these newsletters are useful.

In this edition we are providing a brief on the standard for Thermowell Performance Test Codes. The standard mentioned below is ASME PTC 19.3 TW-2010, where ASME is the registered trademark of The American Society of Mechanical Engineers. Please also be informed that, ASME does not “approve”, “rate”, or “endorse” any item, construction, proprietary device, or activity.

WAKE FREQUENCY CALCULATIONS - ASME PTC 19.3TW-2010

A thermowell is commonly designed as a piece of drilled out metal that protects the temperature sensor within, from high pressure, temperatures and the harsh environments commonly contained in a pipeline. Wake frequency calculations are performed to ensure the design of the thermowell is suitable for the environment of the pipeline into which it will be introduced.

Wake frequency calculations are completed to ensure the harmonic frequency of the materials passing through a pipeline & of thermowell materials are not similar during the transmission of materials in the pipeline, as a similar frequency can result in damage to the thermowell and the pipeline.

The governing standard for design of these thermowells for the past 30+ years has been the [ASME PTC 19.3-1974](#) standard. While this standard was straightforward to understand and apply to thermowell designs, it had limitations. The biggest issue with the 1974 standard was that it only considered the transverse resonance and completely ignored the possibility of thermowell mechanical failure from in-line resonance.

An example of a high profile catastrophic thermowell fatigue failure came when the Monju (Japan) Fast Breeder reactor was shutdown due to a leak in a liquid sodium coolant system in 1995. The investigation revealed that the thermowell was designed in accordance to ASME PTC 19.3-1974 but the failure mode was due to the in-line resonance, which is not accounted for in the standard.



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The committee determined that due to the significance of the changes, a new standard was required instead of an update to the existing standard. The new standard, [ASME PTC 19.3TW-2010](#) was approved in February of 2010 and fully released in July 2010.

The mandatory information required for the completion of wake frequency calculations as per [ASME PTC 19.3TW-2010](#) include:

- All Dimensions & type of thermowell.
- Nozzle height (For Flanged type TW)
- Fluid velocity.
- Fluid Density
- Operating temperature
- Operating pressure
- Dynamic viscosity.

The major difference in finding the solution, for the failed WFC is the use of velocity (or high frequency) collars. The new standard states that collars are not recommended as a rigid support for the purposes of shortening the unsupported length. This can only be achieved through the use of an interference fit. The collar must be an interference fit to be effective and since one cannot ensure the final fit, it recommends using geometry or installations changes to meet the process conditions rather than the use of collars. These include :- increasing the TW OD, tip thickness, reducing the "U" length or changing the TW materials. For critical parameters, the thermowell construction type could also be altered.

GOA INSTRUMENTS INDUSTRIES performs the Wake frequency calculations as per the new standard, [ASME PTC 19.3TW-2010](#).



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