

Nozzle designs - location of a support collar

WIKA data sheet IN 00.26

This technical information describes the influence of the flange nozzle on the construction details of the thermowell that has to be optimised after a wake frequency calculation to withstand the process loads.

In general, for standard thermowells the flange nozzle design has only little influence on the thermowell geometry. It just needs to be assured that the stem will fit into the flange nozzle and the flange face of the thermowell matches the flange face of the nozzle flange.

In case the thermowell didn't pass the wake frequency calculation and there is no possibility to optimise the thermowell by a reduced and reinforced stem, in many cases the support of the thermowell in the flange nozzle by one or two support collars is the first choice (for further detail information please see Technical information IN 00.15).

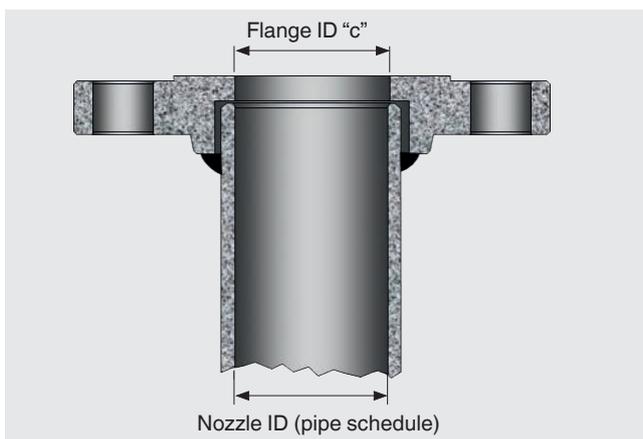
In this case, the flange nozzle has a high influence on the correct thermowell design - especially considering the following aspects:

- Nozzle flange design
- Excess penetration inside the nozzle pipe
- Weld seam between the nozzle and the piping wall

Nozzle flange design

Any flange design (e.g. welding neck flange, threaded flange, slip-on flange) can be used as a nozzle flange, as long as the inside diameter of the flange is equal to or bigger than the

used nozzle inner diameter. Problems can arise if the flange/pipe combination provides a small inside diameter, e.g. socket weld flanges:

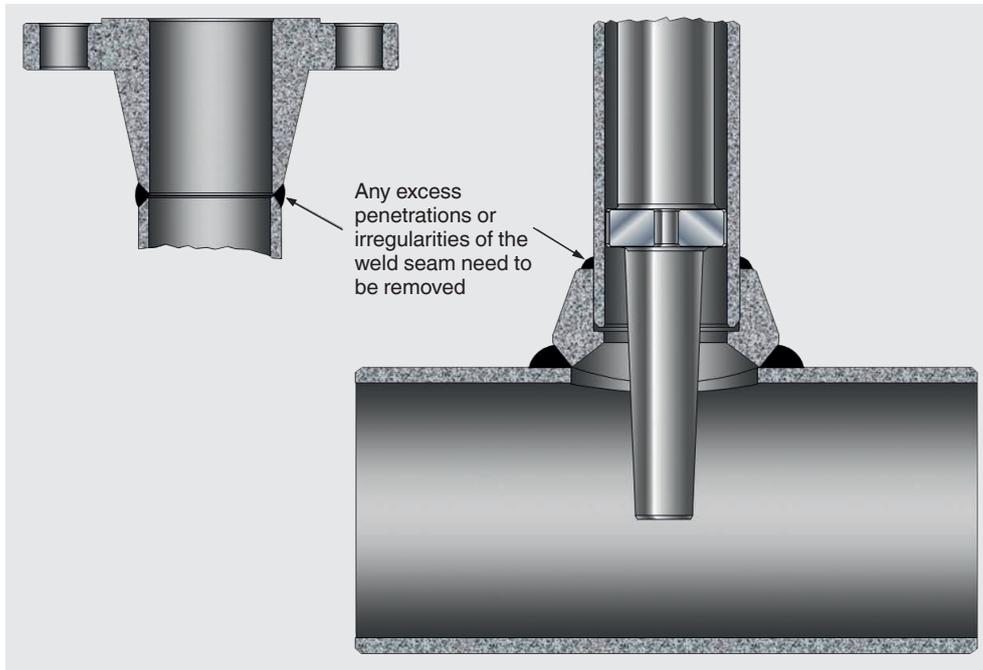


Possible combinations	Inside diameter c	Nozzle ID
DN 1" class 150 or 300	1.05" (26.7 mm)	Schedule 40, 80 or 160
DN 1.5" class 150 or 300	1.61" (40.9 mm)	Schedule 40, 80 or 160
DN 2" class 150 or 300	2.07" (52.6 mm)	Schedule 40, 80 or 160
Class 600 and higher	To be specified	Individual check required

Excess penetration inside the nozzle pipe

The welding connection between nozzle flange and stand-off pipe has to be done to avoid any kind of excess penetration. This would reduce the inner diameter of the nozzle pipe and prevent the correct installation of a support collar. If there is excessive excess penetration, this irregularity needs to be

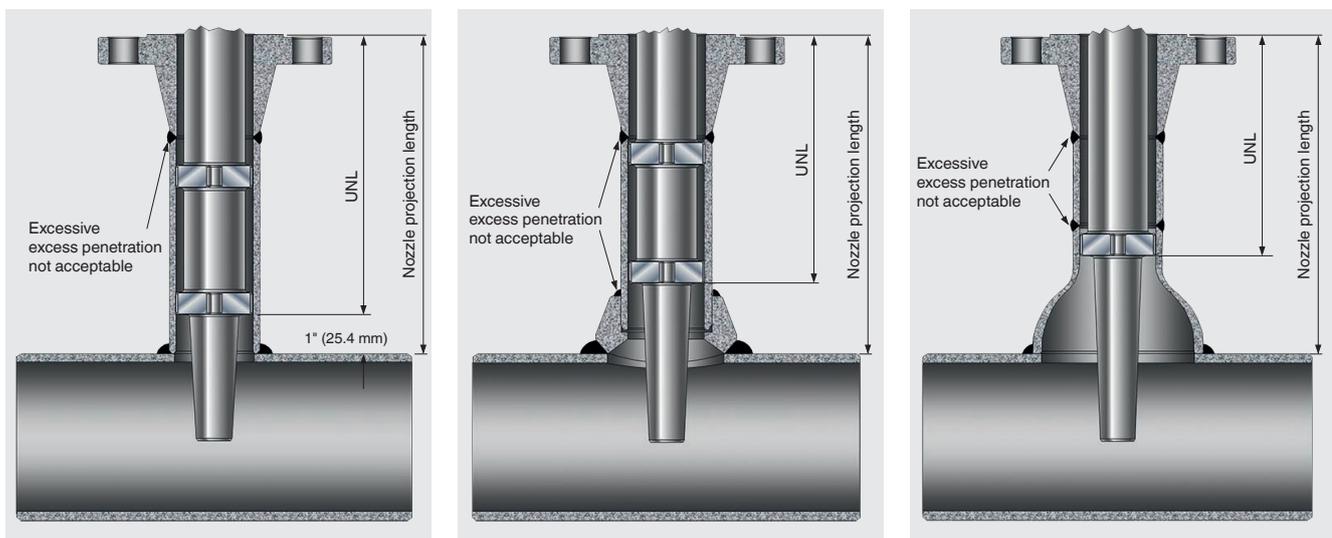
removed (e.g. by grinding) to allow the correct installation of the support collar. The same is needed for the weld seam between the pipe and the weld stub, if the support collar is located below this welding connection.



Weld seam between the nozzle and the piping wall

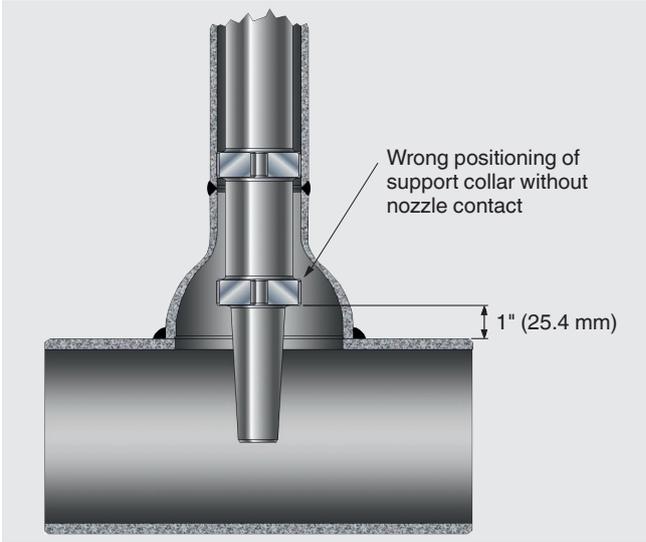
In the Technical information IN 00.15, the location for the first support collar is defined as:
Nozzle projection length - 1" (25.4 mm)

For standard nozzle designs this formula is correct, but different nozzle designs require different methods of calculation.



UNL = usable nozzle length; Details see on page 3

For instance, if the nozzle pipe is welded to the pipeline via a reducer, the “1-inch-rule” will not apply, because the support collar will be located in the large diameter without any contact to the nozzle pipe.

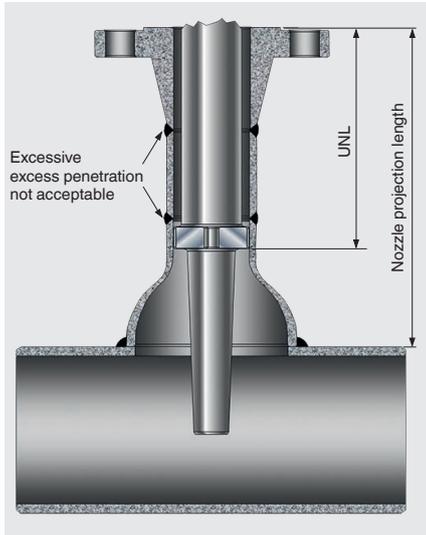
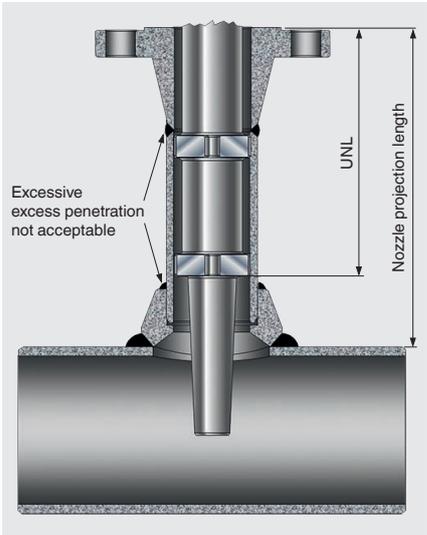
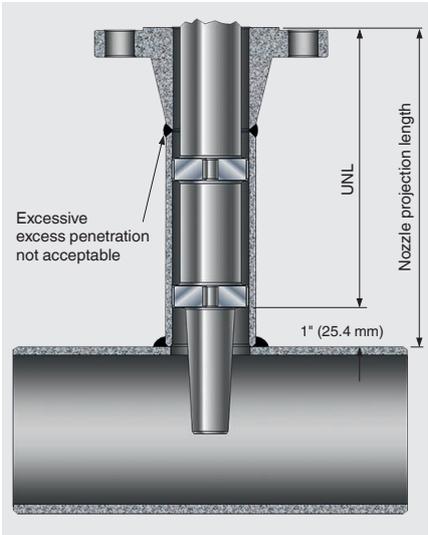


Calculation of the “usable nozzle length”

The wide variety of nozzle designs require that each installation has an individual calculation of the usable nozzle length. The general statement in the Technical information IN 00.15 “Nozzle projection length – 1” (25.4 mm)” needs to be verified for each nozzle design. As shown, the usable

nozzle length does not only depend on the fittings (e.g. flange, stand-off pipe, reducer, etc ...), but also on existing excessive welding irregularities, machining these welding defects is generally not done.

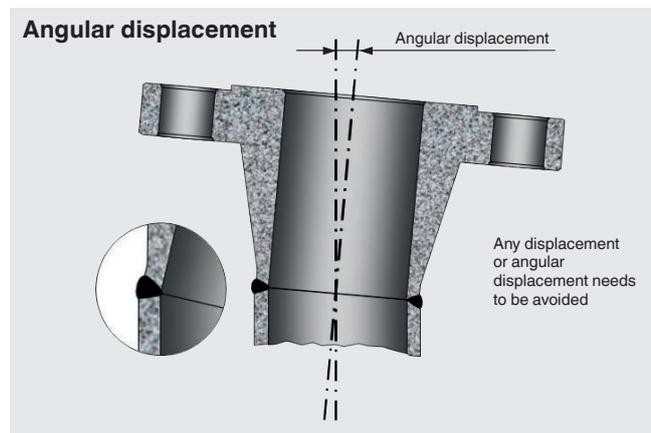
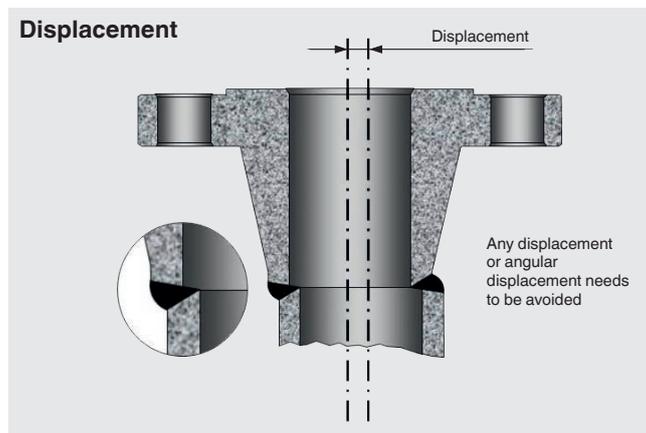
Examples of “usable nozzle lengths” (UNL)



Welding irregularities which make a proper “interference fit” installation impossible

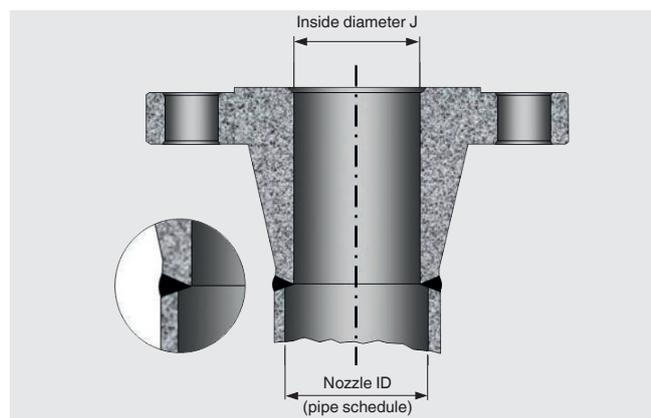
The ASME PTC 19.3 TW-2016 defines the term of rigid support as an “interference fit” between the support collar and the installed “nozzle pipe”.

Any kind of displacement or angular offset between the flange connection of the nozzle will not allow for a proper installation of the support collar inside the nozzle piping with an interference fit.



If welding irregularities exist, the oversized support collar will be over-machined for installation – an interference fit is now impossible and the engineered thermowell is unusable.

In case of increasing inner diameter (flange ID “J” < nozzle ID), too much material will be cleared away from the oversized support collar – an interference fit is now impossible and the calculated thermowell is unusable.



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