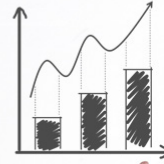


60 SECONDS WITH



Impeller
Clearance

VS.

Efficiency

BY: NICK WARNER &
The Summit Pump Team

Today we will discuss ANSI pumps with a focus on Summit's model 2196 product line.

Pump Impeller Clearance

When a pump leaves our OEM factory there are a minimum of five critical steps required (to be completed in the field) as part of [commissioning and starting up the pump](#). One of these five key steps is setting and or verifying the impeller clearance.

When asked what dimension to set the clearance many individuals will throw out a nominal number like 0.015” and sometimes that is right, but many times it is wrong. And so, it is important to realize that the clearances are different for each size, type and model of pump along with the essential factor of product temperature.

Below is a chart from the [2196 manual](#) as a reference:

Impeller Clearances					
Pumping Temperature	STO	MTO/LTO	XLO/XLO-17	2196LF and 2796	2196R*
-20 to 150° F (-29-66° C)	.005 (.13)	.008 (.20)	.015 (.38)	.015 (.38)	.060 (1.52)
Up to 175° F (80° C)	.005 (.13)	.008 (.20)	.015 (.38)	.015 (.38)	.060 (1.52)
Up to 200° F (93° C)	.005 (.13)	.008 (.20)	.015 (.38)	.015 (.38)	.060 (1.52)
Up to 225° F (107° C)	.006 (.16)	.009 (.23)	.016 (.40)	.016 (.40)	.060 (1.52)
Up to 250° F (121° C)	.007 (.18)	.010 (.26)	.017 (.43)	.017 (.43)	.060 (1.52)
Up to 275° F (135° C)	.008 (.21)	.011 (.28)	.018 (.46)	.018 (.46)	.060 (1.52)
Up to 300° F (149° C)	.009 (.23)	.012 (.30)	.019 (.48)	.019 (.48)	.060 (1.52)
Up to 350° F (177° C)	.011 (.28)	.014 (.36)	.021 (.53)	.021 (.53)	.060 (1.52)
Up to 400° F (204° C)	.013 (.33)	.016 (.41)	.023 (.58)	.023 (.58)	.060 (1.52)
Over 400° F (204° C)	.015 (.38)	.018 (.46)	.025 (.64)	.025 (.64)	.060 (1.52)

* Impeller clearance is set between back side of impeller and stuffing box cover (2196R only).

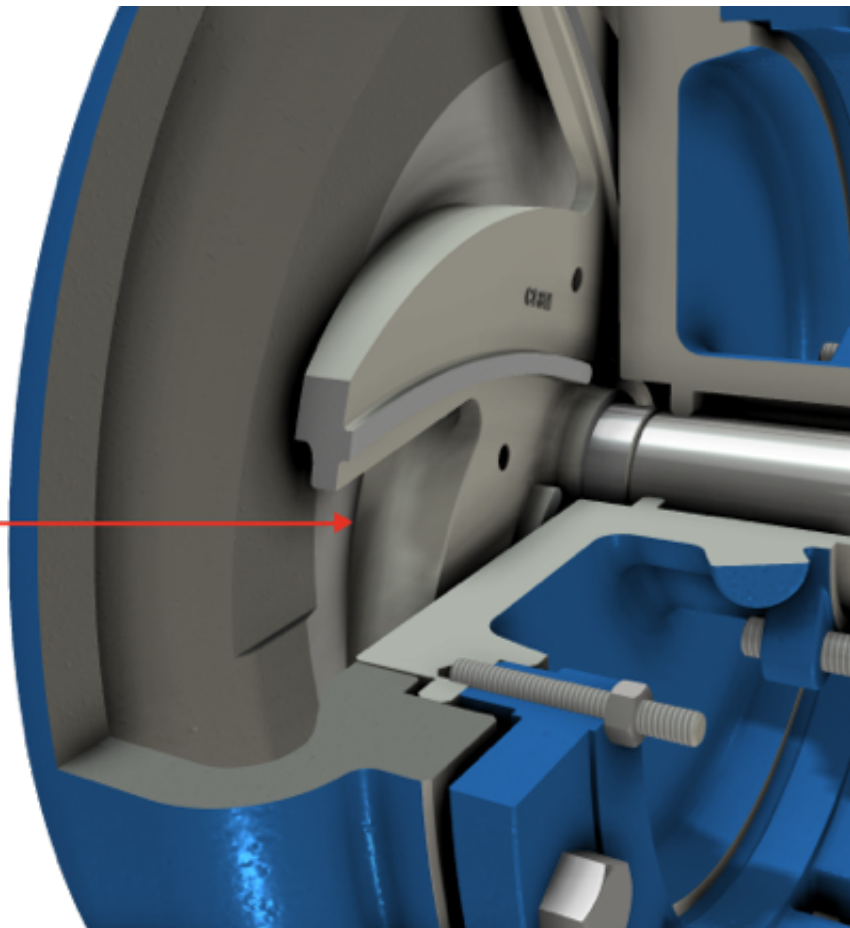
Pump Efficiency or... What happens if the clearances are opened up further then the factory recommendations?

In general: Once impeller clearances reach 0.005"- 0.010" in excess of the factory design clearances the efficiency loss will be approximately one to one. That is, there is a one percent efficiency loss for each additional 0.001" of clearance.

Once you exceed 0.010" beyond the factory advised clearances the rate changes and it then becomes a two to one loss. That is, there is an additional two percent loss for each additional 0.001" of clearance.

Efficiency continues to decrease dramatically as clearances increase. Once clearances exceed 0.015" to 0.020" over the initial clearance, the rate of efficiency decrease can become exponential, first as a square function and then by the cube and so on. Somewhere in excess of 0.030" to 0.040" the pump loses most of its ability to pump effectively.

IMPELLER
CLEARANCE



What should I do?

Even if you set the clearances correctly at startup... over time, wear on both the casing and impeller will inevitably take place and so the pump will experience a loss of efficiency and performance. At which point, you'll need to readjust the impeller clearance to compensate for the wear. As a general "*thumb rule*" once the clearance is doubled from the original settings, the pump clearances need to be reestablished to the original dimensions. Please talk with your RSM for more information on this topic.

Why should I maintain proper pump clearances?

Setting proper impeller clearances on pump installations is a critical and crucial step.

AS CLEARANCE INCREASES ...



INCREASES

Power Consumption (For Same Hydraulic Point)
Recirculation... Cavitation Damage
Vibration and Noise
NPSHR... Cavitation / Seal and Bearing Life Issues
Total Cost of Ownership (TCO)



DECREASES

Efficiency
Head and Flow
Bearing Life
Mechanical Seal Life
Mean Time Between Failure (MTBF)


& The Summit Pump Team



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