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## WORTH KNOWING WHEN THREAD PLUG AND RING GAUGES ARE USED FOR THREAD INSPECTION

When a thread plug or ring gauge is used for thread inspection a portion of the pitch diameter tolerance is often "stolen" from the full pitch diameter tolerance. Thread inspection, where both the manufacturer and the customer use plug and ring gauges can sometimes result in rejection by the customer, even although the thread is within the tolerances – especially when the thread on the component is near the top or bottom of the tolerance.

Tolerances on the pitch diameter for a standard **M36x4 (6H/6g)** nut and bolt and correct **thread plug gauge** and **thread ring gauge** is :

Nut	D <sub>2</sub> max / min for a nut	Smallest correct tolerance for a thread plug gauge	Largest correct tolerance for a thread plug gauge
	33,702 / 33,402 ( <b>0,300</b> )	33,694 / 33,425 ( <b>0,269</b> )	33,716 / 33,397 ( <b>0,319</b> )

Bolt	d <sub>2</sub> max / min for a bolt	Smallest correct tolerance for a thread ring gauge	Largest correct tolerance for a thread ring gauge
	33,342 / 33,118 ( <b>0,224</b> )	33,319 / 33,126 ( <b>0,193</b> )	33,356 / 33,095 ( <b>0,261</b> )

**Nominal pitch diameter for M36x4 is 33,402**  
**The nut shall be between 33,402 and 33,702**  
**The bolt shall be between 33,342 and 33,118**

*Note that the allowance between the nut and the bolt shall be at least **0,060***

The "perfect" nut should have a pitch diameter of  $33,702 + 33,402 : 2 = \mathbf{33,552}$

The "perfect" bolt should have a pitch diameter of  $33,342 + 33,118 : 2 = \mathbf{33,230}$

This means that the "slack" between the nut and the bolt of a "perfect" thread is  $33,552 - 33,230 = \mathbf{0,322}$

*If a tolerance (fit) other than 6H/6g then this must be specified.*

When the pitch diameter on a thread is measured, the use of a "GO" thread plug or ring gauge will usually be enough to determine if the thread profile and pitch are correct.

When the pitch diameter value is known, and measured as within tolerance, before using the gauge, then the wear on the plug or ring gauge will be kept to a minimum – thus prolonging calibration intervals.

N.B. As a thread plug gauge is used to inspect a nut (over nominal pitch diameter D<sub>2</sub>), and a thread ring gauge is used to inspect a bolt (below nominal pitch diameter d<sub>2</sub>) a thread plug gauge will never be able to be screwed into a thread ring gauge.

**Page 2 - 2 shows the schematic relationship between a component and thread plug and ring gauges**

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STANDARD M36 (6H/6g) NUT & BOLT		Pitch diameter tolerances on a component (nut/bolt) and thread gauges (thread plug gauge and thread ring gauge)
<p>M36 – 6H NUT D<sub>2</sub> TOLERANCE 0,300</p>	(MAX) 33,702	<p>33,716 max – new thread plug gauge (NO-GO) 33,702 min – new thread plug gauge (NO-GO) 33,694 min –used thread plug gauge (NO-GO)</p>
	(NOMINAL) 33,402	<p>33,425 max – new thread plug gauge (GO) 33,411 min – new thread plug gauge (GO) <b>NOMINAL PITCH DIAMETER D<sub>2</sub> / d<sub>2</sub></b> 33,397 min – used thread plug gauge (GO) 33,356 max – used thread ring gauge (GO)</p>
<p>Allowance from max. bolt pitch diameter is 0,060</p>	33,342	<p>33,342 max – new thread ring gauge (GO) 33,319 min – new thread ring gauge (GO)</p>
	(MIN) 33,118	<p>33,126 max – used thread ring gauge (NO-GO) 33,118 max – new thread ring gauge (NO-GO) 33,095 min – new (NO-GO)</p>

*Manufacturing tolerances as well as wear allowances on thread plug and ring gauges can result in rejection from the customer to the supplier if both only use gauges. This is especially relevant when the thread is at the top or bottom of the tolerance.*