# Thread: Threadability

### Fit of thread/Threadability

For the screw-in function of internal and external threads (e.g. screw with nut), the standards are generally based on the functional quality upon assembly with the corresponding tool.

With additional thicker layers/coatings and/or required light-running clearance in the thread (manual assembly) are additional measures and order requirements are necessary!

The basic parameters for threadability:

– **placement of tolerance**
= Distance of the upper dimension of the external thread to the lower limit deviation of the internal thread
➔ Picture B

– **tolerance interval**
("Tolerance quality")
= Distance of lower to upper limit deviation (interval size es–ei/EI–ES)

– **length of thread engagement:**
Minor form and position differences, which are visible dependent on the length as a kind of lead deviation, are unavoidable and manufacture-related in rational mass production.

For this reason, length of thread engagement of the external thread into the internal thread for normal screw fastenings (= screw-in group N) according to ISO 965/DIN 13-14, restricted due to pitch dependency.
➔ Table 3

For higher lengths of thread engagements (L) correspondingly large tolerance intervals are to be selected.

– **Surface discontinuities/damages to the thread**
During thread production, small laps and/or profile deviations may occur – in the later manufacturing process (quenching and tempering, transport, drum-coating) minor damage like dents, nicks and gouges are unavoidable and make the threadability with thread gauges and mating threads more difficult.

These manufacturing-related surface discontinuities/damages are permitted up to specific limits according to ISO 6157-1/-3 (DIN 267-19) for screws or according to ISO 6157-2 (DIN 267-20) for nuts.

Should especially smooth-running threads be necessary for specific operating situations, either greater tolerance qualities or supplementary "smoothing rolls" with thread protection are needed.

**Note:** The standardised permitted stress loads for screw fastenings are valid for the tolerances assigned in the respective product standards. Understandably, increases in the tolerance placements/intervals lead to a reduction in the stress capacity in the thread.

**Picture B: Placement of tolerance tolerance interval**

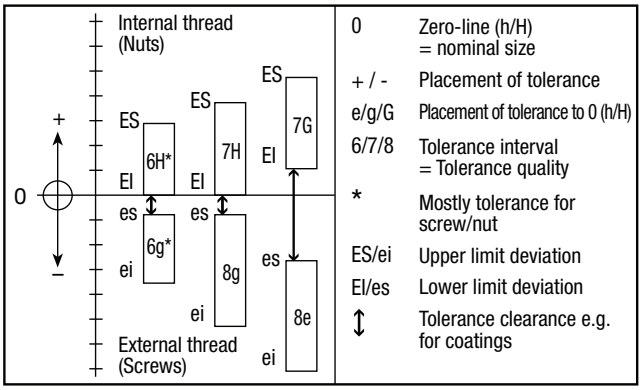


**Table 2: Recommended tolerance intervals for length of thread engagement N** (before applying a corrosion protection coating*)

| Tolerance class: | | medium | | coarse | |
|---|---|---|---|---|---|
| Thread | | Ext. thread. (screw) | Int. thread. (nut) | Ext. thread. (screw) | Int. thread (nut) |
| for surface condition | – without coating (plain)* – thin coatings** (electro plated) | 6g * | 6H * | 8g * | 7H * |
| | – with large clearance (plain) – thick coatings** (electro plated) | 6e | 6G | 8e | 7G |
| Article product class: | | A, B (m, mg) | | C (g) | |
| = e.g. | DIN | 931, 933 | 934 | 558, 601 | 555 |
| | ISO | 4014, 4017 | 4032 | 4018, 4016 | 4034 |

* general tolerance without/before application of coatings
** ➔ TI-173, Table 8/TI-174, Table 9

**Table 3: Length of thread engagement $N_{max.}$ for coarse and fine pitch thread**

| Thread | | M 5 | M 6 | M 8 | M 10 | M 12 | M 14 | M 18 | M 24 | M 30 | M 36 | M 42 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Ø d/D | | | | | | | M 16 | -M22 | M 27 | M 33 | M 39 | M 45 |
| Pitch | RG | 0.8 | 1 | 1.25 | 1.5 | 1.75 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 |
| P | FG | 0.5 | 0.75 | 1 | 1.25 | 1.5 | 1.5 | 2 | 2 | 2 | 3 | 3 |
| Length of thread | RG | 7.5 | 9 | 12 | 15 | 18 | 24 | 30 | 36 | 45 | 53 | 63 |
| engagement $N_{max.}$ | FG | 4.5 | 7.1 | 9 | 12 | 13 | 16 | 16 | 25 | 25 | 36 | 36 |