



Which fit is the right one?

An explanation of the significance of ISO fits to standard shafts and holes

Correct torque application to the transducer is crucial for measuring torque. It is the only way to obtain precise and reliable measurement results. Torque is applied mainly via flanges using a friction joint, a method that has proven its worth a thousand times over with torque flanges, for example T12. Here a choice has to be made between ease of mounting through loose running fits or small unbalance through minimal clearance. In many cases, no flange is available at the customer side, but instead a shaft stub. In this case, choosing the right fit is extremely important. It is the only way to ensure correct torque introduction with dynamic processes, too.

Couplings

It is essential to eliminate parasitic loads on all transducers to ensure correct mounting of torque transducers [1]. HBM provides bellows couplings for torque transducers using shaft stubs (Fig. 1) and multiple-disk couplings for the torque flanges. The coupling supplier offers additional mounting accessories for these multiple-disk couplings, e.g. clamping hubs.



Fig. 1: HBM's T22 torque transducer and bellows couplings

The bellows couplings offered by HBM feature H7 tolerance holes. HBM recommends to implement a tolerance of j6 for the shaft diameter, to produce the preferred fit of H7/j6 [2].

[4] suggests additional securing against rotation for this configuration (Fig. 3). For this reason, the couplings come with additional clamping bolts. Irrespective of whether bellows couplings offered by HBM, centering seats of flanges or clamping hubs are used, the decisive factor is that: **Choosing the right fit is crucial to successful measurement.**

Choice of fits

DIN 7151 [3] or ISO 286 provide basic information for selecting the right fit. Figure 2 gives a first overview.

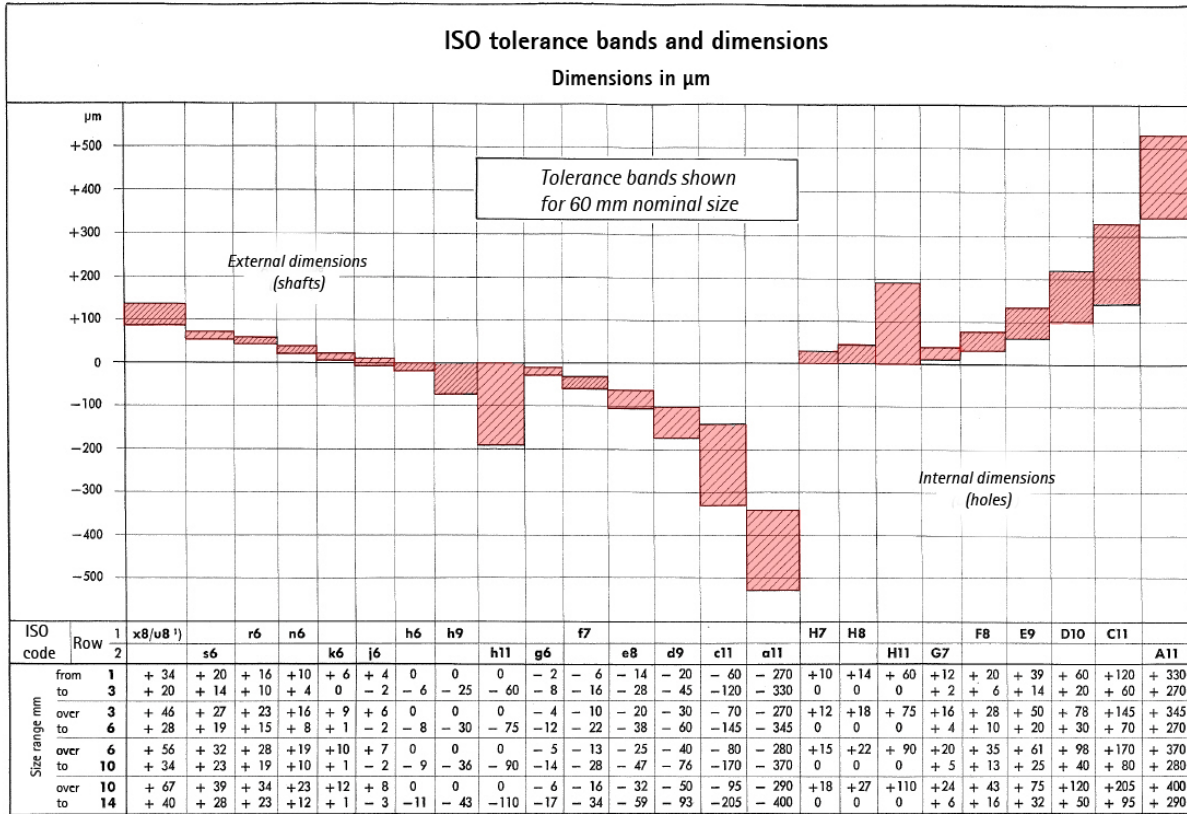


Fig. 2: ISO tolerance bands and dimensions

Choosing the right fit depends on the mounting and dismounting options at the user's site. In general, the user can choose freely to ensure correct torque application in all conditions of use. However, the user has sole responsibility for obtaining correct measurement results. Application examples and types of fits are specified in [4]. Fig. 3 shows an excerpt.

| Combination of | | Code, application examples, other notes |
|---|----------------|---|
| Standard hole | Standard shaft | |
| Interference and transition fits | | |
| H7/s6 H7/r6 | S7/h6 R7/h6 | Force fit/Press fit |
| H7/n6 | N7/h6 | Drive fit |
| H7/m6 | M7/h6 | Drive fit |
| H7/k6 | K7/h6 | Push fit |
| H7/j6 | J7/h6 | Easy push fit: Parts can be fitted by wood hammer or hand; for gears, belts, handwheels, bushes; requires additional securing against rotation. |
| Clearance fits | | |
| H7/h6 | H7/h6 | Slide fit |
| H7/g6 | G7/h6 | Close fit |
| H7/f7 | F7/h6 | Normal fit |
| H7/e8 | E8/h6 | Easy fit |
| H7/d9 | D9/h6 | Loose fit |
| H8/h9 | H8/h9 | Slide fit |
| H8/e8 | E9/h9 | Easy fit |

Fig. 3: Application examples for fits

Conclusions

There are various possibilities for connecting shafts with holes. Be it interference and transitions fits, clearance fits or clamping connections, feather keys, etc. The right manufacturing tolerance is crucial to the quality of measurement. HBM does not let its customers down and offers extensive support. Our tip: Do not refer to the data sheet only in the design, use the mounting instructions, too. Documentation for all torque products can be downloaded from HBM's web site at any time. In addition, technical articles about frequently asked questions are available on the Internet and are often very useful.

References:

- [1] Rainer Schicker, Georg Wegener: Measuring Torque Correctly, ISBN 3-00-008945-4
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- [2] HBM-Montageanleitung T20WN A0726_13.1_en/de/fr,
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[http://www.hbm.com/hbm_doc/navi/start-en_prod_torque_\(overview\).htm](http://www.hbm.com/hbm_doc/navi/start-en_prod_torque_(overview).htm), 2011
- [3] DIN 7157, Passungsauswahl, Toleranzfelder, Abmaße, Paßtoleranzen
German standards are exclusively sold by Beuth-Vertrieb GmbH, Berlin 30 and Köln
- [4] Böge, A.: Das Techniker-Handbuch, 2. Auflage, Friedrich Vieweg & Sohn GmbH, Braunschweig, 1969



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