

Information sheet 3

SPECIFICATIONS, pipettes, dispensers etc.

This information sheet describes which specifications can be selected when filling out Formular 11 (DANAK accredited calibration) or Formular 12 (standard calibration). Pipettes are usually specified based on how they perform in terms of accuracy (systematic error) and precision (random error in CV%) and often the pipette manufacturer has specified these as type test specifications (TT).

Definitions:

- Accuracy (A%, Systematic Error) – Difference between measured (mean) volume and set volume.
- Precision (CV%, Random Error) – Difference on the scattering between measured (mean) volume and set volume.
- Measured (mean) volume – Actual calibrated volume determined by weighing with distilled water.
- Set volume – Test volume set on the pipette
- Nominal volume – Maximum volume of the pipette ~ pipette volume capacity defined by the manufacture.

To choose the most suitable specifications, it is important to consider the following:

- High/strict criteria for specifications (low %) makes high demands for pipetting technique, procedure, equipment, and environment.
- Use of original tips as the pipette and tip, are perceived as one unit.

DS/EN ISO/IEC 8655 Maximum permissible errors (the most common used tolerance limits) and are recommended for Field Calibration

The maximum permissible errors for systematic- and random errors are defined in the ISO 8655 standard. Part 2 is applicable for pipettes. Part 5 is applicable for dispensers and bottle-top-dispensers. And part 3 is applicable for piston operate burettes. ISO 8655 maximum permissible errors specifications are applicable for all pipetting brands (manufactures). One should be aware of, that it is not recommended to use a pipette in the volume range <10% of max volume, according to ISO 8655 part 6.

Maximum permissible errors are indicated in a table in ISO 8655 (part 2, 3 and 5) and only indicated for nominal pipette size (max. volume). Values in % for accuracy and precision at e.g., 10% and 50% of max. volume must be calculated from the absolute value (in μl) indicated for the nominal volume.

For example, a nominal 1000 μl pipette must deviate by $\pm 8\mu\text{l}$ in the entire volume range of the pipette (systematic error).

Converted to percent it is $\pm 0,8\%$ at 1000 μl and $\pm 8\%$ at 100 μl .

ISO 8655 maximum permissible errors values are often the "widest" accepted tolerances and are used the most.

Type Test specifications (TT) – Not available at Field calibration

Type test specifications are defined by the individual pipette manufacturer and are specific to every pipette size and type. The manufacturer's own specifications are often stated only valid for P-mode and are obtained under strict standardized calibration conditions. If calibration according to the TT specifications is desired, pipettes must be send to Dandiag.

TT specifications are the most "narrow/strict" tolerance limits. Pipettes of older date might need replacement of spare parts in order to meet the TT specifications.

Please note that manufacturers reserve the right to change these specifications without notice. Dandiag disclaims responsibility for this.

TT x 1,5 – Available at Field calibration

Type Test specifications multiplied by 1,5 - often referred to as User Specifications – can be used for calibration of pipettes in use. Minimum criteria at Field calibration. The accepted tolerance limits are often between ISO 8655 max. permissible errors and TT specifications.

Customer defined specifications (own specifications)

Customer defined specifications are based on the data and needs from the pipette users. It is not recommended to define "stricter" acceptance criteria than the manufactures specifications. TT x 1,5 specifications can be used as a starting point when tolerance limits are to be defined for own specifications. It is recommended to consult with Dandiag, whether own specifications can be met, especially if Dandiag performs the calibration.

Customer defined specifications are available at Field calibration – but only by agreement with Dandiag.