PERFORMANCE EVALUATION CRITERIA

Confirmatory:

In confirmatory analysis, the compounds are separated by chromatographic techniques (GC, HPLC, UPLC, LC...); afterwards they are detected by MS, FLD, DAD, etc...

The Assigned Value x_{pt}:

The Assigned Value x_{pt}, is the value attributed to a particular property of proficiency test items (definition from ISO13528:2016).
In the routine, the results from chromatographic techniques are considered a reference; they are used with legal purpose (as regulatory requirement).
Because of above described, the Assigned Value x_{pt} derives just from participants' quantitative results obtained with confirmatory analysis.
The procedure for determining the Assigned Value x_{pt} is described below.
After excluding results that are identified as invalid the data population was checked for normality and for the presence of outliers by applying appropriate statistics and visual presentations. For both spiked and incurred test materials, x_{pt} represents the value of concentration obtained from Algorithm A (ISO 13528:2015) or from the median.
The chosen value is reported in the Final Report.
Sometimes very low concentrations are quantified. When it occurs, the concentration value is assigned only if proper statistics are applicable.
The value is not assigned when $p < 8$, where "p" is the number of data after invalid results rejection. In case of $8 \leq p < 15$ the uncertainty attributable to Assigned Value is not negligible.

z-score and σ_{pt} (standard deviation for proficiency assessment):

For quantitative data, the participant's result is converted into a z-score according to the equation:

$$\text{z-score} = (x_i - x_{pt}) / \sigma_{pt}$$

where:
x_i is the analyte concentration value reported by the laboratory;
x_{pt} is the assigned value (obtained with confirmatory methods);
σ_{pt} is the standard deviation for proficiency assessment calculated from $b * x_{pt}$.

b = %RSD / 100, (RSD = Relative Standard Deviation) the %RSD value comes from the Horwitz equation (Horwitz, W., 1988, Pure Appl. Chem. 60, 855-864)
$(1\text{-}0.5 \log X_{pt})$ %RSD = 2

where x_{pt} is expressed as a dimensionless concentration.

σ_{pt} is related to the concentration of the analyte: it comes from Horwitz equation (unless otherwise specified); in case of contamination less than 10 ppb the Thompson equation modified Horwitz equation (Thompson, M., 2000, Analyst 125, 385-386).
In particular circumstance σ_{pt} is chosen from Proficiency Test provider's (PTp) experience, derived from previous rounds. The adopted criteria is reported in the Final report.
The laboratory performance evaluation is established taking into account the following criteria for z-score:
when $|z| \leq 2$ acceptable (satisfactory)
when $2 < |z| \leq 3$ warning signal (questionable)
when $|z| > 3$ action signal (unsatisfactory)