



# Definition of homogeneity tests

## 1 Required Methods

The testing relating to the PT Scheme is effectively divided into two distinct types: Homogeneity testing and Interlaboratory tests. This section describes the methods used for this particular Proficiency Testing program.

## 2 Determination of homogeneity

Before initiating the PT program it must be confirmed that the material is homogeneous (i.e. has minimum and constant variance with respect to the characteristic being measured). The process to be followed for the determination of material homogeneity shall include the following:

- Define material sampling plan (specimen extraction)
- Establish material characteristics (perform tests)
- Analyse test data to obtain a comparison of the variance and centring of each test characteristic with the values of the criteria and, therefore, determination of lot homogeneity.

### 2.1.1 Homogeneity Tests (Source France Standard NFX 06-21)

#### 2.1.1.1 Implementation of inspection process

- The characteristic to be inspected must be measurable on a continuous scale with a normal or an approximately normal distribution (unimodal, only slightly off-centre, with a Henry line with a fair goodness of fit).
- The supplier risk  $\alpha$  (*risk of rejecting a good quality lot*) is estimated at 5% and the customer risk  $\beta$  (*risk of acceptance of a poor quality lot*) is estimated at 10% (conventional values). Each of the foregoing risks is associated with a proportion of nonconforming items (p95 for  $\alpha$  and p10 for  $\beta$ ).
- Two limit values are defined (an upper limit TS and a lower limit Ti). The importance of exceeding these values is identical.
- In the case in hand, the sample size (n), the pair (p95, 5 %) and K are determined and p10 are deduced from the tables.

The acceptance condition is formulated as follows:

$$T_i - K \leq m \leq T_s - K$$

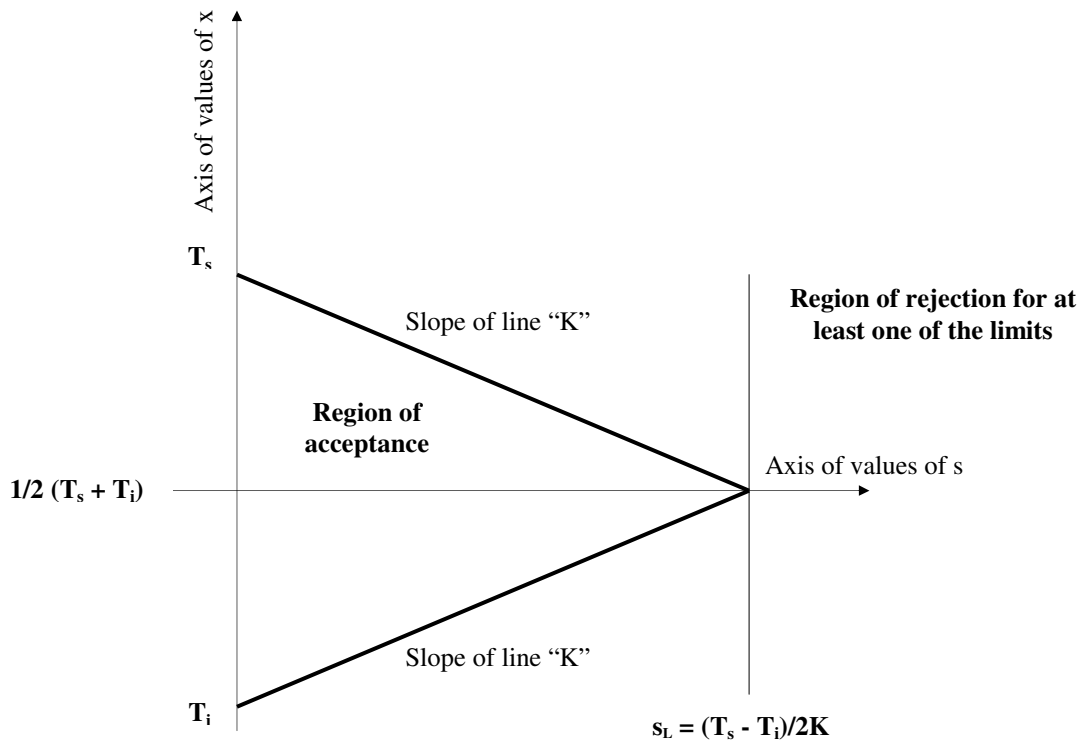
Where "m" is the mean of the sample items and "K" =  $u_{1-p} - u_{Pa}/\sqrt{n}$

$u_{1-p}$ : fractile degree 1-p

$u_{Pa}$ : fractile degree Pa

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Graphic Acceptance Method:



- The acceptance region is the region situated inside the triangle. If the standard deviation “s” estimated for the lot is higher than the limit standard deviation “ $s_L$ ”, the lot is rejected.
- Otherwise, we only need to position the point (s, m) where “m” is the mean and “s” the estimated standard deviation, in order to know whether the lot must be rejected or accepted.
- The limits “ $T_s$ ” and “ $T_i$ ”, relate to the maximum and minimum values of the analysed population respectively. The deviation is defined as the difference between these values ( $T_s - T_i$ ).

### 2.1.1.2 Sampling Plan

The reference material in panels of a size suitable to obtain the required number of test specimen blanks for the PTP Scheme. The specific number and positions of test specimen blanks to be taken for the homogeneity tests are defined within the relevant cutting drawing and will ensure adequate coverage of the material being sampled. The minimum number of homogeneity test specimens for each test type required by this scheme is Ten (10).



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#### 2.1.2 Test Performance

In order to reduce the number of variability factors, testing will be performed under the following conditions:

- The same laboratory
- One operator only
- One machine tool only
- One testing machine only
- Tests performed in sequence

#### 2.1.3 Acceptation – Validation of the homogeneity results

The homogeneity results are validated by the Sponsors. They use the results from the analyses described above as a base and may ask for complementary results and /or analyses, if they think this is necessary.