

# Guide for the calibration/testing of tension/compression testing machines

## Foreword

In accordance with the decision of the DKD Technical Committee "Material Testing Machines" of 14-06-2007, the following bindingly valid specifications have been agreed for calibration laboratories accredited at DKD as well as for the members of the VMPA Working Group "Testing Machines and Test Equipment". These specifications shall ensure a uniform procedure during the calibration/testing of material testing machines.

In the following, some important or unclear points of the standard are dealt with.

## 1. Specifications regarding DIN EN ISO 7500-1:2004-11

### 1.1. Relative resolution of the force indicator (cf. DIN EN ISO 7500-1:2004-11 subsection 6.3)

For automatic switching of the measurement range it is to be observed that the relative resolution  $a$  must not only be taken into account for *each calibration point*, but also for the smallest calibration point to be permitted as well as for all range switchings. In the test/calibration certificate, the maximum value of the relative resolution which has occurred in the approved calibration range must be stated.

### 1.2. Machines with separated test rooms (cf. DIN EN ISO 7500-1:2004-11 subsection 6.4.1)

If the calibration is performed - in accordance with the standard - in only one direction of force although both directions of force are approved, a corresponding note *must* be included in the test/calibration certificate.

### 1.3. Effect of different piston positions (cf. DIN EN ISO 7500-1:2004-11 subsection 6.4.7)

If - deviating from the standard - it has not been possible to test the effect of different piston positions, a corresponding note must be included in the test/calibration certificate.

### 1.4. Reversibility error (cf. DIN EN ISO 7500-1:2004-11 subsection 6.4.8 and DIN EN ISO 7500-1 Bbl.1:1999-11 subsection 2.2.1)

Generally, the reversibility error must (as far as possible) be determined during the calibration in accordance with the procedure described in the standard in the lowest and highest force range. This also applies to machines which are to be classified only for increasing forces.

The measurement of the reversibility error furnishes important practically oriented results regarding the condition of the testing machine. A classification of the testing machine without reversibility error is, however, possible if a corresponding note is contained in the test/calibration certificate.

The mean value  $\bar{F}$  is calculated from all three increasing measurement series.

### **1.5. Classification of the testing machine** (cf. DIN EN ISO 7500-1:2004-11 section 7)

Deviating from the standard, the force indicating ranges can be classified from at least 20% of the highest value to the highest value *achieved* if the nominal force itself cannot be reached for technical reasons. A note in the test/calibration certificate is then required. A 100 kN tension testing machine can, for example, be classified from 20 kN to 95 kN if only 95 kN can be reached for technical reasons. It is, however, necessary that at least a maximum value exceeding 80% of the nominal force is reached.

### **1.6. Measurement uncertainty** (cf. DIN EN ISO 7500-1:2004-11 Annex D)

The measurement uncertainty must be stated in the test/calibration certificate.

### **1.7. Adjustments of force measuring devices** (cf. DIN EN ISO 7500-1 Bbl.1:1999-11 subsection 2.2.2)

The adjustment of the force measuring device used during the calibration should be protected by the person performing the calibration, e.g. by sealing or documentation in the test/calibration certificate.

### **1.8. Bending effect** (cf. DIN EN ISO 7500-1 Bbl.1:1999-11 subsection 2.1.4)

In the case of compression testing machines for solid concrete with  $F_N \geq 2$  MN, the bending effect must, for reasons of safety, be determined in any case.

## **2. Specifications to DIN 51302-2:2000-12**

### **2.1. Strain cylinder test** (cf. DIN 51302-2:2000-12 section 5)

The strain cylinder test (balancing/blocking of the compression plate) must be carried out for machines manufactured after December 2000.

## **3. Specifications to DIN EN ISO 9513:2003-05**

### **3.1. Calibration range** (cf. DIN EN ISO 9513:2003-05 subsection 5.4)

Reference is made to the specification in the standard stating that the calibration range in accordance with

$$5 \leq \frac{E_{\max}}{E_{\min}} \leq 10$$

with  $E_{\max}$  as upper limit of measurement range must be complied with. This means that, for example, a calibration from 1% to 100% in one range is not possible. Here, a division into several ranges is required.