5. CALIBRATION PROCEDURE

NOTE: In this section the word "test" is used to denote each aspect of the calibration. "Tests", "tested" and "testing" should be read accordingly.

If on initial testing it is found that adjustment is necessary, then wherever possible two sets of readings shall be taken. The first set of readings with the instrument in the "As Found" condition, i.e. no adjustments or repairs are to be carried out with the exception of any normal preparation for weighing. Any abnormal circumstance found prior to testing (e.g. machine is out of level) will be noted on the calibration certificate.

If there is no maintenance agreement in force, or if the customer does not want any maintenance or adjustment carried out, then only “As Found” results will be recorded.

The second set of readings - "Definitive" - will be carried out following any routine maintenance, adjustment or repair which may have influenced the “As Found” results. (Such maintenance, adjustment or repair is outside the scope of this Code of Practice and will usually be covered by a maintenance agreement or repair contract.)

Instruments which are in need of repair and not initially capable of being tested will only be tested following repairs. The results will be recorded as “Definitive” and comment shall be made on the calibration certificate. Newly installed instruments shall be tested after installation and adjustment is completed and the results recorded as “Definitive”.

A list of the recommended tolerances based on the requirements of OIML Recommendation R76: 2006 (E) is given in Annex B2. Customers may specify their own tolerances if they wish to do so. Instruments used for legally controlled purposes are required to be within the tolerances permitted under the appropriate legislation.

The results of the “Definitive” tests should be within the tolerances for the class of instrument being tested as specified in Annex B or as specified by the customer. When the results are outside the specified tolerances, these must be noted on the Calibration Certificate and brought to the attention of the customer.

When the instrument is used for legally controlled purposes and the Definitive test shows results, which are outside the legally permitted tolerances, this shall be indicated on the Calibration Certificate and shall be brought to the attention of the customer.

5.1 TESTS

There are a number of tests that can be carried out to determine the performance levels of weighing, instruments. They are listed below. Some of these are suitable for all instruments, some are only appropriate to certain instruments under certain circumstances. The table below defines those tests that are essential for all instruments and those that may be appropriate depending upon the use and construction of the instrument. (In the table the term “Initial Calibration” refers to the first calibration after installation and set-up of a new instrument and after a major repair or service likely to affect the weighing performance. “Routine Calibration” refers to instruments which are already in-service and have not undergone a major repair.)

TEST	Initial Calibration	Routine Calibration
Repeatability	Mandatory	Mandatory
Eccentric Loading	Mandatory	Mandatory
Linearity / Hysteresis	Mandatory	Mandatory
Weighing with Tare	Recommended	Optional
Sensitivity	Recommended	Optional

5.2 REPEATABILITY

5.2.1

The test load(s) must be the same for each test but need not be made up of test weights. See Annex B2 for requirements regarding tolerances.

The load should be placed onto the load receptor in a consistent way and the displayed readings noted. The displayed readings should also be noted when the load is removed.

5.2.2

The Repeatability test shall be carried out at a load value of 50% or greater of the maximum capacity or as close thereto as is practicable. A minimum of three loadings is required.

5. 3 ECCENTRIC LOADING

5.3.1 - Instruments with 'flat' load receptors for weighing stationary loads.

The load receptor is notionally segmented and a load chosen in accordance with the table below is applied centrally to each segment. The displayed readings should be noted. The errors should not be greater than those given in Annex B2 or as specified by the customer for the load in question.

No. of Points of Support (n)	**Test Load**	**No. of Segments**
1-4	Max/3	4
5	Max/4	5 } load placed
6	Max/5	6 } over each
7	Max/6	7 } point of
8	Max/7	8 } support
More than 8	Max/n-1	n }

5.3.2 Instruments for weighing rolling loads.

For machines which weigh rolling loads (e.g. weighbridges) the eccentric loading test may be carried out as described in 5.3.1 above or by placing the load at the beginning, middle and end of the load receptor in the normal driving direction. The positions will then be repeated in the reverse direction.

5.3.3 Instruments with other load receptors.

Eccentric loading tests should be carried out where it is practical to do so and when it can be said to duplicate a situation that may occur in normal use.

Test loads chosen in line with 5.3.1 above should be used and placed in or on the load receptor as is appropriate and safe to do.

5. 4 LINEARITY/HYSTERESIS

5.4.1

The linearity and hysteresis test is performed using a minimum of 5 points within the weighing range of the instrument. (Multi-interval instruments will require more than 5 loading points; the number will depend upon the configuration of the instrument.) One point should be at or near zero and one at or near the maximum (working) capacity. Intermediate points should be chosen such that tests are carried out at, or just below, the break points at which the tolerances change.

5.4.1.1

A test at two points to be carried out on a category B weighing instrument used for the determination of mass in the practice of medicine for weighing patients for the purposes of monitoring, diagnosis and medical treatment

The recommendation is that the calibration is carried out over the normal working range plus 5% - 10% (e.g. a 1500 kg capacity instrument, used only for weighings up to 1000 kg may be calibrated up to 1050 kg - working range of 1000 kg +5%).

Multiple range instruments should be tested over each weighing range as if each was a separate instrument.

5.4.2 Linearity
Apply each load in sequence by adding sufficient weights (or substitute materials, see Section 6) to the previous load. The displayed reading at each loading point should be noted.

5.4.3 Hysteresis
Hysteresis testing is essential where the instrument is used for "weighing out" (e.g. discharging by weight); in which case loads are removed in the reverse sequence to the order in which they were applied and the displayed reading at each point shall be recorded. For other applications, observations of the indications shall be made as the instrument is unloaded and any indications outside the specified tolerances shall be noted on the calibration certificate and be brought to the attention of the customer.

5. 5 WEIGHING WITH TARE (MECHANICAL INSTRUMENTS ONLY)
This test is conducted in the same way as Linearity/Hysteresis test (5.4) but with a tare value set into the instrument. One weighing with tare test is sufficient for both Initial and Routine Calibration.

A tare value should be chosen which reflects the normal use of the instrument.

5.6 SENSITIVITY (mechanical weighing machines with analogue indication)
This test requires the addition of a small weight, usually equal to the tolerance allowed being added to the load receptor. When the weight is added there should be a discernible movement of the indicating element (pointer). The test may also be carried out by removing a small weight from the load receptor. The test should be carried out at full load/maximum weighing capacity.

5.7 RE-VERIFICATION
Whenever any weighing instrument used for a legally controlled purpose is subject to adjustment, alteration, addition, repair or replacement that **could** affect its accuracy or function, it is likely that the instrument will need to be re-verified. Further guidance on this can be found in Annex D.

It should be noted that that the adjustment, alteration, addition, repair or replacement does not need to have affected the accuracy, the important element is whether it **could** have affected the accuracy.

If, in the judgement of the UKWF Member Organisation, the instrument needs to be re-verified; this should be carried out immediately after the instrument has been repaired.

If the re-verification is not carried out immediately following the repair, the member organisation shall have regard to the following;

- Provide written notification to the person responsible for the instrument of the need for the instrument to be re-verified. This notification should outline the fact that its continued use for commercial transactions may be illegal until this has been completed.

- The following phrase is suggested as sufficient to clearly outline to the user of the instrument their obligations with regard to re-verification:

  Dear Customer
  We are required to advise that today [Date] the repair to your weighing instrument is complete. Due to the nature of the repair, the calibration of the weighbridge could have been affected and it is therefore a legal requirement that your installation is re-verified for a regulated use.. Should you wish to obtain further advice on this matter, please contact us on the number below, or contact your local Trading Standards Department on .....

  This is suggested wording and other phrases may be suitable.

- If the instrument has a capacity equal to or greater than 5,000kg the re-verification should be carried out within a period not exceeding 28 days from the date of the completion of the work. It is highly recommended that the user of the instrument is advised to contact the local Trading Standards Department to advise them of the intended course of action.

- If the instrument has a capacity equal to or greater than 5,000kg the UKWF Member Organisation shall subsequent to the verification, notify the local Trading Standards Department in writing as soon as is practicable that the verification has taken place.