

WEIGHTRON BILANCIAI / WESTCO BILANCIAI

SELF VERIFICATION (SV)

WORK INSTRUCTION

1. **General**

The Company carries out type conformity verification of specified equipment in compliance with the relevant national and European legislation and standards. This process is called Self Verification. In performing Self Verifications, the Company is acting as the representative of the manufacturer of the type approved equipment (i.e. the weighing instrument) and on behalf of the Notified Body for Declaration of Type Conformity (e.g. BSI), NAWI Regulations, NAWI Guidance Notes.

Only fully trained and named members of staff (Nominated verifiers) may perform verifications. This work instruction describes how verifications should be performed. The information given is derived from Business System Manual associated Procedures and SV Work Instructions.

Further information and support for Nominated Verifiers is available in the relevant Directives, Standards and Regulations, as well as from the Service Director and Self verification Technical Representative.

All references are to the NAWI Standard, unless otherwise specified.

2. **Preparation & Visual Inspection**

- 2.1 Ensure the project sheet or job report sheet has been properly completed. Check that the load cell certificates are with the project sheet or job report sheet. Check the machine has been built in accordance with the type approval. Ensure that inscriptions and labels have been correctly applied as described in the type approval (see 7.1.1).
- 2.2 Set the weighing machine to operate in its intended manner. You may protect the load receptor with an appropriate cover if necessary.
- 2.3 Check the Test Weight Certification Chart to ensure that the test weights are within their designated calibration frequency. If test weights belonging to another organisation are to be used, obtain and check the calibration certificate for the weights to ensure they are within their calibration frequency and are traceable to national or international standards. Check the weight tolerances to ensure they are appropriate for the machine under test (refer to the UKWF Code of Practice for the Calibration of NAWI's Annex A [OIML R111 – 1:2004]).
- 2.4 Visually inspect the test weights for signs of damage. Do not use the weights if significant degradation is apparent. If necessary allow time for temperature normalisation before commencing the test. Examine the weights after the test. If they show signs of degradation, bring this to the attention of the Service Director or Self Verification Technical representative who will take appropriate action.

3. **Testing**

- 3.1 Use the table in Appendix 1 of this Work Instruction to work out the various test points, tolerance changeover points and maximum permissible errors you will be using during the testing. These depend on the Accuracy Class of the machine and the range details of a Multi-Interval Machine. Note that the Minimum Capacity for Class III machines is reduced to 5e when the scale is to be used to calculate a transport tariff (charges for transportation of goods such as those made by the Post Office and other carriers).

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- 3.1.1 **Accuracy Classes** run from Class I (very high resolution) to Class III (coarse). Most machines will be Class III, but you may self verify some Class III machines. Table 3 in the NAWI standard defines the classes.
- 3.2 Record the details of the machine, the test weights, the Type Approval (including any revision number) and the results of the visual inspection and tests on the test certificate.
- 3.3 Switch the instrument on and ensure it displays gross zero. You may use any zero setting devices if necessary.
- 3.4 If the instrument has a device for displaying a scale division of $1/5e$ or less (e.g. a x 10 mode) you may use it instead of incremental weights to determine errors. If you do, make a note of the fact on the test certificate.
- 3.5 The tests may be performed in the order described below, but the best or most efficient order will depend on the machine being tested. Plan the most efficient order before starting the testing. Preload Test – Before each weighing test the instrument shall be preloaded once to Max or to Lim if this is defined. Overload Test – Whilst at Max capacity carry out limits of indication test. There shall be no indication above Max +9e.
- 3.6 **Zero Setting Accuracy Test:** With the scale at gross zero, apply enough weight to bring the scale out of its zero tracking range (e.g. $10e$). Establish and record the error. The MPE for this test is $0.25e$.
- 3.6.1 To establish error using a display resolution of $1/5e$ or better, record the weight displayed by the increased resolution indicator. Subtract the load on the scale. The result is the actual error. It is then assumed that this value is the same as the error at zero.
- 3.6.2 To establish error using weights, apply weights of $1/10e$ until the value of e increases unambiguously by 1
- 3.7 **Linearity/Hysteresis Test (Weighing Test):** Progressively load to maximum capacity and then unload the scale stopping at each test point (see Appendix 1) to establish and record the displayed reading and error. See A.4.2.3 and A.4.4.3:-
- 3.7.1 To establish error using a display resolution of $1/5e$ or better, note the weight displayed by the increased resolution indicator. Subtract this reading from the value of the load on the scale to give the displayed error. Subtract the error at zero from the displayed error to give the corrected error. (Remember that subtracting a negative number gives the same result as adding a positive number, e.g. $1 - (-1) = 2$ and $-1 - (-1) = 0$, etc).
- 3.7.2 To establish error using weights, apply weights of $1/10e$ until the value of e increases unambiguously by 1:-
- a) Add the weight value displayed before the $1/10e$ weights were added to the value of $1/2e$

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- b) Subtract the value of the small weights added.
- c) Subtract the error found as a result of the zero error test.
- d) Subtract the actual reading from the reading originally displayed.
- e) The result is the actual error.

3.8 **Discrimination Test:** Select three of your test points during the linearity test (e.g. Min, 1/2Max and Max) to also perform a discrimination test. Once you have established the linearity error. Tick or cross the Discrimination test box to indicate pass or fail and put * next to reading of the relevant test point on SV Test certificate to identify when discrimination test is carried out. See A.4.8:-

3.8.1 Find the changeover point and apply additional weights up to 1.4e to the scale. To pass this test the display must increment by at least 1.1e.

3.8.2 To establish error using weights, apply 10 weights of 1/10e and then remove them progressively until the value of e decreases unambiguously by 1. Re-apply one 1/10e weight and then apply weights of up to 1.4e. To pass this test the display must increment by 1e.

3.9 **Repeatability Test: This test is performed at around 50% and 100% of maximum capacity.** Test weights are not necessary. If zero tracking is available it should be switched on during the test. Unload the scale and ensure the display is at zero (use any zero setting device if necessary). Apply the test load and unload the scale three times, recording the loaded and unloaded readings. Ensure the display returns zero between each application (use any zero setting device if necessary). The actual readings are found using the procedures described in 3.7.1 and 3.7.2 above. Calculated and record the error by subtracting the lowest loaded reading from the highest. The error should be absolute value of the Maximum Permissible Error as per BS EN45501.

Refer to BS EN45501 [3.5.1]

Table 1	For loads m expressed in verification scale interval e			
Max Perm error on initial verification	Class I	Class II	Class III	Class IIII
$\pm 0.5e$	$0 \leq m \leq 50\ 000$	$0 \leq m \leq 5000$	$0 \leq m \leq 500$	$0 \leq m \leq 50$
$\pm 1e$	$50\ 000 < m \leq 200\ 000$	$5000 < m \leq 20\ 000$	$500 < m \leq 2000$	$50 < m \leq 200$
$\pm 1.5e$	$200\ 000 < m$	$20\ 000 < m \leq 100\ 000$	$2000 < m \leq 10\ 000$	$200 < m \leq 1000$

NB. For Class II machines the load should be applied six times for each test. See A.4.10.

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- 3.10 **Tare Setting Accuracy Test:** Two distinct tare loads are used in testing, rather than the single test at, or close to zero for determining. For each of two tare loads, there will be an associated tare-setting error. The two tare-setting errors should be recorded and used in the subsequent tare weighing (linearity and hysteresis) test. The value of the tare-setting error should not exceed 0.25e.
- 3.10.1 To establish error using a display resolution of 1/5e or better, record the weight displayed by the increased resolution indicator. Subtract this value from the value of the load on the scale. The result is the actual error. It is then assumed that this value is the same as the error at zero.
- 3.10.2 To establish error using weights, apply weights of 1/10e until the value of e increases unambiguously by 1.
- 3.11 **Tare Weighing Test:** After performing each tare setting accuracy test, at least 5 load steps shall be selected. The steps shall include values close to Min, the values at which MPE changed and the value close to the maximum possible net load. Find the displayed error as per 3.7.1 - 3.7.2 of the work instruction and apply the tare setting accuracy error in the same way as the zero setting accuracy error is applied in the linearity/hysteresis test. Record the displayed reading and error.
- 3.12 **Eccentric Loading Test:** This test may not be performed during the Linearity/Hysteresis Test. Load the platform as described below and record the reading. The actual readings are found using the procedures described in 3.7.1 and 3.7.2 above. Calculate and record the error for each reading as per 3.7.1 and 3.7.2. The error for each reading must not exceed the applicable Maximum Permissible Error. Record the positions of the weights on the test certificate. See A.4.8.
- 3.12.1 **For machines weighing stationary loads with a flat load plate,** divide the plate into segments and apply the test load in the middle of each sector. Remove the load from the plate for between each application, where practical*. The table below details the number of sectors and test load used for varying numbers of plate support points:-

No. of Support Points	Test Load	No. of Segments
1 – 4	Max/3	4
5	Max/4	5
6	Max/5	6
7	Max/6	7
8	Max/7	8
More than 8	Max/n – 1	N

- 3.12.2 *Please ensure that the instrument never returns to zero by always leaving one weight in place on the weighing instrument.
- 3.12.3 **Machines for weighing rolling loads** can be tested with a load placed at the start, middle and end of the load receptor in the driving direction and then in the reverse direction. A rolling test load corresponding to the usual rolling load, the heaviest and most concentrating one which may be weighed, but not exceeding 0,8 times the sum of the Max capacity as per BS EN45501 3.6.2.4.

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3.12.4 **Machines with other load receptors** only need be tested under eccentric loading where it is practical to do so and where it is possible to simulate eccentric loading that may occur in normal use.

3.13 **If you do not have enough test weights to reach Maximum Capacity**, you may use substitute materials ('make-up weights') provided the maximum capacity of the scale is greater than 1 tonne and either of the following conditions apply :-

3.13.1 The maximum capacity of the scale is greater than 1 tonne and the test weights used amount to either 1 tonne or 50% of max (whichever is the greater).

3.13.2 The maximum capacity of the scale is greater than 1 tonne and the test weights used amount to 20% of max, provided the repeatability test performed at 50% max produces an error that meets the MPE's shown in the table below. See 3.7.3 and A.4.4.5. If you have less than 50% test weights, do this test first.

% Standard Weights Used	Maximum Permissible Error
20% to 34%	0.2e
35% to 50%	0.3e

3.13.3 Record the use of substitution material on the test certificate.

3.14 **If the results of any test fall outside the applicable tolerance**, record the results and the reason for failure. Complete the form to show that the machine did not pass the test. If adjustments or repairs are made you will need to start a new test.

4. Application of Verification Marks

4.1 If the machine has passed all examinations and tests and the documentation is in order, the qualification mark and any seals should be applied in the appropriate position as described in the Type Approval Test Certificate.

5. Issue of Declaration of Type Conformity

5.1 If the machine has passed all examinations and tests and the documentation is in order issue a Declaration of Type Conformity. Pass Declaration of Type Conformity and the test certificate to the Nominated Verifier who will check the documentation and, if all is in order, log the verification.

6. First and Second Stage Verification

6.1 If the verification is being performed at a site other than the site at which the machine is to be used, it may need to be verified in two stages. Consider these questions:-

- a) Will the shipping and installation of the machine involve operations that are likely to affect its performance?

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- b) Is the machine to be installed at a location where the effect of gravity variation will be greater than the absolute value of the MPE for any load applied (see NAWI Guidance Notes Annex 2)? In this case two options may be considered.
 - i) Adjust the machine to allow for the gravity effect at the location it is to be used before starting the testing. Allow for the correction error in the gravity sensitive tests as per NAWI Guidance Notes General Verification Matters(a) Gravity and Annex 2 refers.
 - ii) Perform a first stage verification as below.

6.2 In the event of a two stage verification being chosen, those tests which are likely to be affected by the shipping and/or installation of the machine should be left out. All other examinations and tests may be performed and recorded on the test certificate along with a note specifying which tests remain to be performed.

6.3 Apply the verification mark as per section 4 above.

6.4 Issue a qualified Declaration of Type Conformity to be passed to the Nominated verifier and take a second copy to accompany the machine to its final destination.

6.5 If you are required to perform the second stage verification of a machine at the site where it is to be used, use the qualified Declaration of Type Conformity to ascertain which tests need to be done. Perform the outstanding tests and record the results as per section 3 above. Make a reference on the test certificate to the qualified Declaration of Type Conformity. Issue a full Declaration of Type Conformity. Clip the Declarations of Type Conformity and verification certificate together and pass them to the Nominated verifier to log and process as per 5.1 above.

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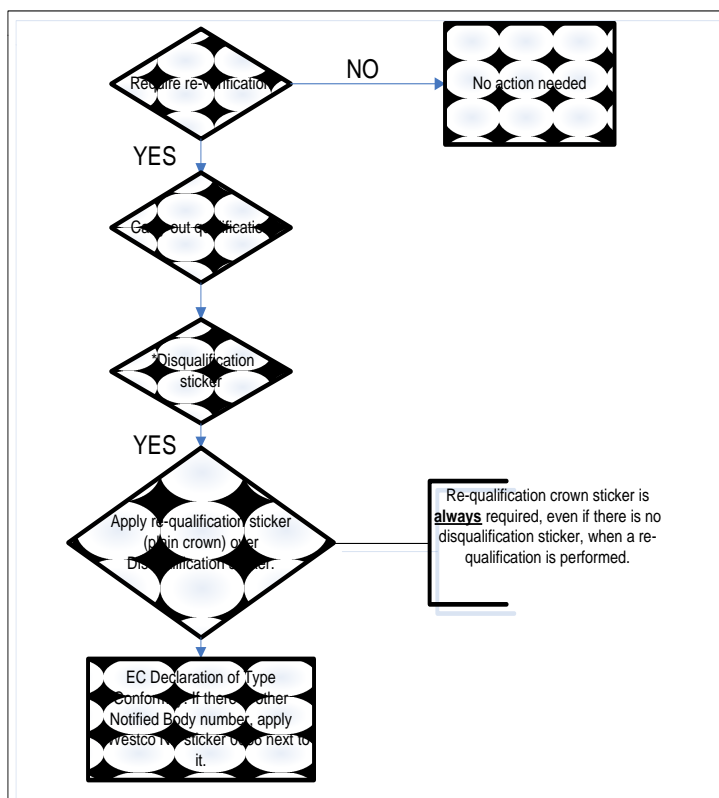
APPENDIX 1: TEST POINT, TOLERANCE CHANGEOVER POINT & MAXIMUM PERMISSIBLE ERROR CALCULATION.

From BS EN 45501:1994 AC:1994 Section 3.2, Table 3 & Table 6	Class II non vehicle tariff e=0.001g to 0.05g	Class II non vehicle tariff e=0.1g or more	Class II vehicle tariff e=0.001g to 0.05g	Class II vehicle tariff e=0.1g or more	Class III non vehicle tariff e=0.1g to 2g	Class III vehicle tariff e=0.1g to 2g	Class III non vehicle tariff e=5g or more	Class III vehicle tariff e=5g or more	Class III
Min	20e	50e	5e	5e	20e	5e	20e	5e	10e
Zero MPE	0.25e	0.25e	0.25e	0.25e	0.25e	0.25e	0.25e	0.25e	0.25e
1st MPE Range	0-5000e (±0.5e)	0-5000e (±0.5e)	0-5000e (±0.5e)	0-5000e (±0.5e)	0-500e (±0.5e)	0-500e (±0.5e)	0-500e (±0.5e)	0-500e (±0.5e)	0-50e (±0.5e)
2nd MPE Range	5000-20,000e (±1e)	5000-20,000e (±1e)	5000-20,000e (±1e)	5000-20,000e (±1e)	500-2000e (±1e)	500-2000e (±1e)	500-2000e (±1e)	500-2000e (±1e)	50-200e (±1e)
3rd MPE Range	20,000-100,000e (±1.5e)	20,000-100,000e (±1.5e)	20,000-100,000e (±1.5e)	20,000-100,000e (±1.5e)	2000-10,000e (±1.5e)	2000-10,000e (±1.5e)	2000-10,000e (±1.5e)	2000-10,000e (±1.5e)	200-1000e (±1.5e)
1st Test Point	20e (Min)	50e (Min)	20e (Min)	50e (Min)	20e (Min)	5e (Min)	20e (Min)	5e (Min)	10e (Min)
2nd Test Point*	5000e	5000e	5000e	5000e	500e	500e	500e	500e	50e
3rd Test Point*	1/3 or 1/2 Max	1/3 or 1/2 Max	1/3 or 1/2 Max	1/3 or 1/2 Max	1/3 or 1/2 Max	1/3 or 1/2 Max	1/3 or 1/2 Max	1/3 or 1/2 Max	1/3 or 1/2 Max
4th Test Point*	20,000e	20,000e	20,000e	20,000e	2000e	2000e	2000e	2000e	200e
5th Test Point	Max	Max	Max	Max	Max	Max	Max	Max	Max
Max	100-100,000e	5000-100,000e	100-100,000e	5000-100,000e	1000-10,000e	1000-10,000e	500-10,000e	500-10,000e	100-1000e
*These test points are suggested options and may not be available for all scales. If the values of Min., Max. & the Tolerance Changeover Points have all been used, additional points may be selected to adequately cover the range of the scale.									

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APPENDIX 2

If self verification of repaired equipment is required amend the self verification procedure according to the verification history of the equipment according to the flowchart below :-



* Disqualification sticker - crown with a six pointed star printed over it – see page 64 of the NAVI guidance notes.
** NB sticker – Notified Body (Westco Bilancial Ltd) sticker number is 0086

Self verification of repaired equipment

- Self verification of weighing equipment is performed in accordance with BS/EN 45501:1994 Section 8.2 and may be performed only by trained, nominated verifiers.
- A Visual Inspection is made in accordance with BS/EN 45501:1994 Section 8.2.1 and recorded on the Test certificate.
- Performance Tests are made in accordance with BS/EN 45501:1994 Section 8.2.2 as described in SV Work Instruction. The results of the tests are recorded on the Test certificate.
- Verification Marks will be applied in accordance with BS/EN 45501:1994 Section 7.2. and a Declaration of Type Conformity issued.
- The EC Declaration of Type Conformity and test certificate will be passed to the Nominated Verifier (Barrie Hurford) who will check the certificate. Nominated Verifier (Barrie Hurford) certificate/s will be checked by Service Director/Manager (Dave Clark). If all is in order, Office Administrator (Julie-Ann Pollard) will record the details of the qualification in the Verification Log. If the machine failed the verification it will still be entered in the Verification Log and NCR issued.

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