Summary test procedures used to test a weighbridge using substitution

Test Name	Summary of Test Procedure
TEST SETUP	Check the certificate of approval Check the data plate is properly inscribed
	Determine: • maximum capacity • verification scale interval "e" • number of supports points (load cells) • quantity of working standards available (use min 20% of max) • quantity and type of substitution material available. • optimum and practical position of loads (substitution and standard masses) on the platform
	Determine loads required for weighing performance with a minimum of 5 up and 3 down. Include min, max and MPE change points and substitution points. Work out where the loads will be positioned during testing
	Determine the load for eccentricity test. 1/(n-1). e.g. 40 t WB with 6 load cells = 8 t of load, close to the value of a fork lift. Divide the platform into equal sections based on the number of load cells. Fork lift is suitable for eccentricity as the load must fit between boundaries for each section.
	Determine the load for repeatability (2/3 max or 0.8 max) If a truck is used for substitution this can be used for repeatability load.
DETERMINING THE VALUE OF THE SUBSTITUTION LOAD	**Method A – value within 1 tonne or 10%** (a) Calculate the error in the weighbridge (E) for the load applied using: $E = I + 0.5e - \Delta L - L$ (a) Remove the standard weights and ΔL. For electronic instruments make sure that a suitable load (e.g. $10e$) is left on the load receptor to avoid zero-tracking. (b) Add substitution material until the indication (I_{sub}) is within −10% or − 1 t, whichever is smaller, of the standard weights applied previously. The substitution material should be placed as close as possible to the same position on the load receptor. (c) Record the indication for the substitution load (I_{sub}). (d) Add additional standard weights of $0.1e$ until the indication changes up and stabilises. Leave these additional standard weights (ΔL) with the substitution load. (e) Calculate the actual mass of the substitution load (L_{sub}) using the formula: $$L_{sub} = I_{sub} + 0.5e - E$$ Note: The error may be positive or negative. (f) Use L_{sub} plus standard weights to make the next load required for this

	test.
	Method B – exact value
	(a) Remove the standard weights. For electronic instruments make sure that a suitable load (e.g. $10e$) is left on the load receptor to avoid zero-tracking.
	(b) Leave ΔL on the load receptor.
	(c) Replace the standard weights with substitution material. The substitution material should be placed as close as possible to the same position on the load receptor. Continue to add substitution material to the substitution load in sufficiently small increments ($\le 0.1e$) until the indication changes up and stabilises at the same indicated value determined previously.
	(d) Remove ΔL. The substitution material (L_{sub}) will then be equal to the standard weights (L) it is replacing, i.e. $L_{sub} = L$.
	(e) Use $Lsub$ plus standard weights to make the next load required for this test.
VISUAL INSPECTION	Carry out a visual inspection
ZERO	1. Activate the zero-setting device.
	(a) Load the instrument using a standard weight that is within the zero-setting range (this range varies between 0 to 4% of Max, in most cases this is ±2% around zero).
	(b) Add additional standard weights to take the total load just **below** the next changeover point.
	2. Re-set the indication to zero using the zero-setting device.
	3. Apply a suitable load (e.g. $10e$) to the load receptor to avoid zero-tracking.
	4. Apply an additional $0.25e$. If the indication:
	• remains unchanged, go to step 5;
	• **changes and stabilises** at $+1e$ from the original indication: FAIL
	5. If the indication remains unchanged in step 4, apply an additional $0.5e$. If the indication:
	• **changes and stabilises** at $+1e$ from the original indication: PASS
	• remains unchanged: FAIL
ZERO TARE	1. Activate the zero-setting device.
	(a) Load the instrument a weight that is within the tare setting range.
	(b) Add additional standard weights to take the total load just **below** the next changeover point.
	2. Re-set the indication to zero using the tare-setting device.
	3. Apply a suitable load (e.g. $10e$) to the load receptor to avoid zero-tracking.
	4. Apply an additional $0.25e$. If the indication:

	• remains unchanged, go to step 5; • **changes and stabilises** at +1e from the original indication: FAIL 5. If the indication remains unchanged in step 4, apply an additional 0.5e. If the indication: • **changes and stabilises** at +1e from the original indication: PASS • remains unchanged: FAIL
DISCRIMINATION	1. Zero the instrument. 2. Apply a load to the load receptor. 3. Apply additional standards weights of 0.1e until the indication changes up and stabilises. 4. Record this indication. 5. Gently apply a load of 1.4e. The indication should increase by 1e to the next scale interval. 6. Determine whether the instrument has passed or failed
REPEATIBILITY	1. Drive the substitution load on to the weighbridge and record the indication. 2. Determine the position (P) by adding small weights (delta loads) P = I + 0.5e $- \Delta L$ 3. Repeat step 2 twice more 4. Check if the difference between any two readings is within the absolute value of the MPE.
ECCENTRICITY	**Using Forklift as the load** 1. Placing standards weights equal to or greater than the weight of the forklift, provided it is within 0.3 t. 2. Use method A above to determine the value of forklift. 3. Drive forklift over each section recoding the indication. 4. Determine if each section is within MPE
ACCURACY	1. Apply either standard weights or substitution materials at each load point determined earlier. 2. Determine the error at each load. 3. Determine if each indication is within MPE For a 60 t weighbridge with 20 t of standard weights and e value of 20 kg **Example of suitable test points** Min = 400 kg standard weights 10 t -= standard weights 20 t = standard weights 20 t substitution 1 (truck) 40 t = substitution 1 + 20 t standard weights 40 t substitution 2 (2 trucks) 60 t = substitution 2 + 20 t standard weights