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CERTIFICATE OF APPROVAL No 6/9C/50

VARIATION No 1

This is to certify that the following modifications of the patterns of the

Toledo Weighing Instrument Model 2154-LCE

approved in Certificate No 6/9C/50 dated 10 March 1976

submitted by Toledo-Berkel Pty Ltd, 525 Graham Street, Port Melbourne, Victoria, 3207,

have been approved under the Weights and Measures (Patterns of Instruments) Regulations as being suitable for use for trade.

Date of Approval: 11 August 1977

The approved modifications, described in Technical Schedule No 6/9C/50 - Variation No 1 and in drawings and specifications lodged with the Commission, provide for:

- 1. the basework to be replaced by other Commission-approved baseworks;
- 2. the 8130 weight indicator displaying up to 3000 increments;
- 3. a Toledo 8134 weight indicator.

le approval is subject to review on or after 1 December 1977.

All instruments conforming to this approval shall be marked with the approval number "NSC No 6/9C/50".

Signed

Executive Officer

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NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 6/9C/50

Pattern: Toledo 2154-LCE Weighing Instrument

Submittor: Toledo-Berkel Pty Ltd, 525 Graham Street, Port Melbourne, Victoria, 3207.

Date of Approval: 1 December 1975

Condition of Approval:

All instruments conforming to this approval shall be marked "NSC No 6/9C/50".

Description:

The pattern is a self-indicating platform weighing instrument (see Figure 1) with two resistant mechanisms. It comprises a mechanical basework, headwork levers with a pendulum-resistant mechanism and an analogue weight indicator displaying up to 1200 graduations, and a load cell resistant mechanism with an electronic weight indicator displaying up to 2500 increments (see Figure 2).

The basework (see Figures 3 and 4) consists of two main levers coupled at their nose-ends with an extension of one lever connected to the headwork pullrod. The main lever knife-edges are mounted between two side plates, the platform is supported on parallel-link suspension units (see Figure 5) and four fulcrum stands are attached to the frame. The maximum capacity of the basework is 3 tonnes.

The headwork (see Figures 6 and 7) comprises:

- 1. Headwork cabinet -- the basework pullrod is coupled through up to three intermediate levers to the main headwork lever. A lead stamping plug is provided on the headwork cabinet.
- 2. Headwork-locking mechanism -- selects either the mechanical or electronic weighing systems. Unlocking the main headwork lever, thus allowing the mechanical weighing system to operate, blanks out the electronic weight indicator.

- 3. Main headwork lever -- fitted with a zero adjustment for the mechanical weighing system and an oil-filled dashpot.
- 4. Tare bars -- one or two tare bars may be fitted to the main headwork lever by extension pieces which pass through the cabinet.
- 5. Pendulum-resistant mechanism -- two steel ribbons attached to a yoke connected to the main headwork lever transfer the load to the load-bearing sectors of a double-pendulum resistant mechanism. The pendulums are supported by steel ribbons attached to fulcrum sectors. The vertical movement of the pendulum rotates the pointer through a rack and pinion. The resistant mechanism is suitable for weight indicators with up to 3,5 graduations per degree (1200 graduations).
- 6. Intermediate lever and load cell resistant mechanism -a stirrup connects the fulcrum knife-edge of the final intermediate lever to the load cell bearing of a Toledo 90-kg cantilever type load cell resistant mechanism so that the load cell becomes the fulcrum stand (see Figure 6). The lever ratios of the basework and the intermediate levers are selected so that at maximum capacity the force applied to the load cell is between 360 N and 880 N (37 to 90 kgf).
- 6. The weight indicator type 8130 (see Figure 2) converts the output from the load cell into a digital weight indication of up to 2500 increments. A motion detector prevents the weight indicator from displaying until the signal sampled in successive counting periods is the same; that is, when the instrument is in equilibrium. Zero is set by a screwdriver adjustment. A zero-check push-button displays zero in 1/5-graduation increments. Lights indicate when the weight displayed is below zero or the load is above capacity; the indicator is blank when the load is above capacity.

An output socket provides digital information to peripheral equipment. The output is inhibited by the motion detector until the instrument is in equilibrium or when the zero-check push-button is operated. The use of peripheral equipment will not affect the operation of the instrument.

The 8130 weight indicator is retained in its cabinet by a lead-and-wire seal as it is too fragile for a stamping-plug seal. The serial number of the load cell and the cable from the load cell are sealed to the weight indicator (see Figure 8).

The instrument is marked on the analogue weight-reading face, for example:

(III)

| Max | = | 2400 kg |
|-----|---|---------|
| Min | = | 100 kg |
| d | = | 2 kg |

and adjacent to the digital weight-reading face, for example:

| | (II) | Ð |
|-----|------|---------|
| Max | | 1200 kg |
| Min | = | 25 kg |
| dd | | 0,5 kg |

As the electronic and mechanical weight-indicating systems are substantially separate systems, other than for a common basework, provision has been made to verify each system separately.

The approval includes:

- 1. The resistant mechanism being a Toledo 45-kg cantilever load cell or a Toledo 22-kg cantilever load cell. The lever ratios are selected so that at maximum capacity the force applied to the load cells is:
 - (a) 45-kg load cell -- between 175 N and 440 N (18 to 45 kgf);
 - (b) 22-kg load cell -- between 90 N and 220 N (9 to 22 kgf).
- 2. A Toledo 132 basework-selector unit allowing the output from the load cell resistant mechanisms of up to six Toledo 2154-LCE weighing instruments, as described in the patterns, to be displayed on the one 8130 weight indicator (see Figure 9). Each load receptor has the same maximum capacity. The calibration circuits of the 8130 weight indicator are placed in the 132 basework selector, together with a calibration circuit for each additional basework. The 132 basework selector is retained in its cabinet by a lead-and-wire

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seal as it is too fragile for a stamping-plug seal. The serial number of each load cell and the cable from each load cell are sealed to the basework selector (see Figure 10). The 132 basework selector is located adjacent to the weight indicator.

3. A Toledo 133 basework-selector unit allowing the output from the load cell resistant mechanisms of up to four Toledo 2154-LCE weighing instruments, as described in the pattern, to be displayed individually or in combination on the one 8130 weight indicator (see Figure 11). * Each load receptor may have a different maximum capacity. The calibration circuits of the 8130 weight indicator are placed in the 133 basework selector, together with a calibration circuit for each additional basework. Over-capacity monitor circuits fade out the weight indication if the weight on any one of the load receptors is more than the weight equivalent of five graduations above the instrument's maximum capacity with that load receptor selected. The 133 basework-selector unit is retained in its cabinet by a lead-and-wire seal as it is too fragile for a stamping-plug seal. The serial number of each load cell and the cable from each load cell are sealed to the basework selector. The cables to the weight indicator are sealed to the weight indicator and to the basework selector. The 133 basework selector is located adjacent to the weight indicator.

The 133 basework selector is marked, for example, as illustrated in Figure 11.

Special Tests:

- 1. <u>Zero-balance 8130 Weight Indicator</u> -- When the indicator is adjusted to zero with the zero-check push-button depressed, it should indicate zero when the zero-check push-button is released.
- 2. Load-cell Creep -- Leaving a maximum-capacity load on the load receptor for a period of 30 minutes should not cause the weight indicated to be incorrect, and on removal of the load the weight indicated should be zero $\pm 0,25 \, d_d$.
- 3. Motion-detector Sensitivity -- Removal from the load
- * Weights and Measures inspectors should note that the limiting factors on the use are that no load receptor should have a maximum capacity above 3000 kg and that, singly or in combination, the maximum number of graduations is 2500.

receptor at any load of a load equal to 1,5 increments should cause the weight indicator to go blank for a perceptible period before indicating the new load.

- 4. <u>Over-capacity Load</u> -- When any load receptor is loaded with its maximum-capacity load, placing an additional load equal to five graduations on the load receptor should cause the weight indicator to go blank irrespective of which load receptor or combination of load receptors is selected. This test should be repeated with each load receptor loaded to maximum capacity plus five graduations.
- 5. <u>Test Loads</u> -- The application of the test loads specified in Table 1 and the display of these loads on the 8130 weight indicator within the applicable tolerance is one method of checking that the electronic weight-indicating system operates in accordance with the approved design.

| Technical | Schedule | No | 6/90/50 |
|-----------|----------|----|---------|
|-----------|----------|----|---------|

| TABLE 1 | | | | | | | |
|---------|---------|---------|-------|-----|-----|-----------------|--|
| Test | Load in | Graduat | ions* | | | | |
| 0 | 10 | 25 | 60 | 120 | 250 | 698,5 | |
| 1 | 12 | 30 | 70 | 140 | 300 | 798,5 | |
| 2 | 14 | 35 | 80 | 160 | 350 | 898,5 | |
| 3 | 16 | 40 | 90 | 180 | 400 | 998,5 | |
| 4 | 18 | 45 | 100 | 200 | 450 | 1198,5 | |
| 5 | 20 | 50 | | | 500 | 1398 , 5 | |
| 6 | | | | | | 1598,5 | |
| 7 | | | | | | 1798,5 | |
| 8 | | | | | | 1998,5 | |
| 9 | | | | | | 2498 | |

| ¥ | $^{\mathrm{T}}$ est | Load | = | Number | of | graduations | Х | graduation | value |
|---|---------------------|------|---|--------|----|-------------|---|------------|-------|
|---|---------------------|------|---|--------|----|-------------|---|------------|-------|

Note: The test load should include a test at capacity, less the tolerance and less 0,5 graduation



NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 6/9C/50

VARIATION No 1

Pattern: Toledo Weigning Instrument Model 2154-LCE

Submittor: Toledo-Berkel Pty Ltd, 525 Granam Street, Port Melbourne, Victoria, 3207.

Date of Approval of Variation: 11 August 1977

The modifications described in this Schedule apply to the patterns described in Technical Schedule No 6/9C/50 dated 10 March 1976.

All instruments conforming to this approval shall be marked "NSC No 6/9C/50".

Description:

The approved modifications provide for:

- 1. Otner Commission-approved baseworks to replace the basework described in the pattern, provided that -
 - (a) the basework is of an instrument conventionally known as a platform weigning machine, weighbridge or nopper scale, etc., where the headwork and basework are separate assemblies connected by a mechanical linkage;
 - (b) the force applied to the load cells is:

| (i) | 22 - kg | load | cell | between | 90 and 2 | 15 N | ١; | |
|-------|----------------|------|------|-------------|----------|------|----|-----|
| (ii) | 45 - kg | load | cell | between | 180 and | 440 | N; | and |
| (iii) | 90-kg | load | cel1 | between | 360 and | 880 | N; | |

- (c) the capacity of the instrument is not more than the capacity approved for the basework;
- (d) a levelling device and an indicator are fitted, except for instruments installed in a fixed position, or instruments which satisfy the following accuracy

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requirements and indication limits when tilted to a slope of 1 in 20:

Accuracy Requirements

- (i) \pm 0,5e for loads between zero and 500e inclusive;
- (ii) ± le for loads between 500e exclusive and 2000e inclusive;
- (iii) \pm 1,5e for loads greater than 2000e;

Indication Limits

- (i) <u>Tilting at no-load</u> the zero indication does not vary more than 2e when tilted to a slope of 1 in 20, the zero being first adjusted in the reference (level) position; and
- (ii) <u>Tilting when loaded</u> the indication does not vary more than e when tilted to a slope of l in 20, the indication at zero being adjusted in the reference position before tilting and in the tilted position before reloading;
- (e) an instrument with one load receptor is marked:

"Approval Numbers

Headwork NSC No 6/9C/50 Basework NSC No"; and

(f) an instrument with several load receptors is marked, for example:

"Approval Numbers

Headwork NSC No 6/9C/50 Basework No 1 NSC No Basework No 2 NSC No Basework No 3 NSC No', etc.

- 2. The 8130 weight indicator displaying up to 3000 increments.
- 3. An 8134 weight indicator (see Figure 12) converting the output from the load cell into a digital weight indication of up to 3005 increments. The weight indication will be blank above capacity.

The instrument will automatically rezero within 0,25e

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whenever it comes to rest within 0,45e of zero; this is indicated by the word "zero" being illuminated. A pusnbutton marked "Z" is provided for rezeroing the instrument when the zero is outside the automatic zero range.

A pusn-button marked "T" allows automatic taring of a container on the load receptor to within 0,25e. On removal of the container the value of the tare to the nearest whole graduation is indicated on the weight indicator prefixed by a minus (-) sign. The tare is subtractive and of maximum effect equal to the capacity of the instrument. When a tare is selected the word "tare" will illuminate and when the filled container is weighed the word "net" will also illuminate. The tare is cancelled automatically when the load is reduced to less than 10e. The word "gross" will then be illuminated and the instrument will "gross" weigh until a tare is selected.

Successive operations of the "verify" button marked "V" can be used to blank out the indicator or display "all-8", minus (-) sign, tare, gross, net and kg while the button is depressed. This checks that all displays are working properly.

The 8134 weight indicator is retained in its cabinet by a lead-and-wire seal as it is too fragile for a stamping-plug seal. The serial number of the load cells, and the cable from the load cell, are sealed to the weight indicator (see Figure 13).

An alternative nousing for the 8134 weight indicator is illustrated in Figure 14. With this nousing the load cell cable is permanently connected and the load cell serial number is attached to the weight-indicator seal.

The instrument is marked adjacent to the analogue weight reading face, for example:

Max = 2400 kg
Min = 100 kg
d = e = 2 kg
T =
$$+$$
 300 kg (if tare bars fitted)

The instrument is marked adjacent to the digital weight reading

face, for example:

(111)

| Max | = | 1005 kg |
|-----------|---|------------------|
| Min | = | 50 kg |
| $d_d = e$ | = | l kg |
| Т | = | - 1005 kg |

A button marked "P" and keyboard with ten pusn-buttons numbered from 0 to 9 may be used by the operator to provide a transfer-data instruction and numerical data to the output socket; no data is provided to the weigning instrument.

An output socket wnich has provision for sealing may be used to provide information to peripheral devices which are not a part of the measuring instrument.* These devices, which may only be provided with the authorisation of the Weights and Measures Authority of the State, may, for example, print receipts or store and process the data, etc. This output information is inhibited until the signal sampled in successive counting periods is the same, that is, the instrument is in equilibrium.

The use of such peripheral equipment will not affect the operation of the weigning instrument.

Special Tests - 8134 Weight Indicator**

<u>Zero range</u> — the maximum range of the push-button zero device should not exceed 4% of the capacity of the instrument (\pm 2% approximately). Satisfactory setting may be checked by the following method:

- 1. with zero balance indicated, apply a load of, say, 2,4% of the instrument capacity, and press the "zero" button; the instrument should not rezero; and
- reduce the load to, say, 1,6% of the instrument capacity and again press the "zero" button; the instrument should indicate zero balance.

* The measuring instrument examined and approved by the Commission is limited to the devices which determine the value of a physical quantity, control the measurement, and indicate the result of the measurement on a visual display, for example, a seven-segment indicator.

** Tne special tests applicable to tne 8130 weignt indicator are detailed in Tecnnical Scnedule No 6/9C/50.

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<u>Zero balance</u> — place a small weight equal to, say, 10 graduations $(10 d_d)$ on the load receptor before checking "zero". Two readings are taken at each applied load with the instrument equilibrium being disturbed before each reading.

With an additional load of 0,25 d_d , that is, 10,25 d_d , on the load receptor, readings of 11 d_d and 11 d_d indicate that the alignment of the instrument is not correct, readings of 10 d_d and 11 d_d or 10 d_d and 10 d_d are acceptable.

With an additional load of 0,75 d_d , that is, 10,75 d_d , on the load receptor, readings of 10 d_d and 10 d_d indicate that the alignment of the instrument is not correct, readings of 10 d_d and 11 d_d or 11 d_d and 11 d_d are acceptable.

<u>Level sensitivity</u> — when the instrument is tilted so that the bubble in the level indicator moves 2 mm, zero should not change and, when tested in the tilted position, the instrument should satisfy the weigning-accuracy specifications, that is, $\pm \frac{1}{2}$ graduation for the first 500 graduations and ± 1 graduation over 500 and up to 2000 graduations, and $\pm 1,5$ graduations over 2000 graduations.

<u>Load-cell creep</u> — leaving a maximum-capacity load on the load receptor for a period of 30 minutes should not cause the weight indicator to be incorrect, and on removal of the load the weight indicated should be zero \pm 0,25e.

<u>Motion-detector sensitivity</u> — removal from the load receptor at any load of a load equal to 1.5 graduations should cause the weight indicator to go blank for a perceptible period before indicating the new load.

<u>Over-capacity indication</u> — when maximum capacity is indicated, placing an additional load equal to one graduation on the load receptor should cause the weight indicator to go blank irrespective of which load receptor or combination of load receptors is selected.

<u>Test loads</u> — the application of the test loads specified in Table 1 and the display of these loads within the applicable tolerance is one method of checking that the instrument operates in accordance with the approved design.



NATIONAL STANDARDS COMMISSION

NOTIFICATION OF CHANGE

CERTIFICATE OF APPROVAL No 6/9C/50

CHANGE No 1

The approval of the

Toledo Weigning Instrument Model 2154 LCE

given in Certificate No 6/9C/50 dated 10 March 1976

and described in Technical Schedule No 6/9C/50 dated 10 March 1976

is changed by:

- 1. adding to the Description:
 - (a) of the neadwork cabinet:

"The instrument is provided with a level indicator and adjustable feet. Adjacent to the level indicator is a notice advising that the instrument must be level when in use."

(b) of the tare bars:

"The tare bars have a maximum of 300 graduations and are on the same side of the neadwork as the analogue weight reading face*."

2. adding to the Special Tests:

"Level Sensitivity — when the instrument is tilted so that the bubble in the level indicator moves 2 mm, the zero should not change by more than 2 graduations, and when zero

[&]quot;* The rules in relation to reading distance of Document 103
 (Design Manual No 1) -- the Commission's Model Inspection
 Rules, should be applied if the tare and weight reading faces
 of the instrument face the load receptor."

is reset in the tilted position the instrument should satisfy the weighing-accuracy specifications, that is, \pm 0,5 graduation for the first 500 graduations, \pm 1 graduation for graduations over 500 and up to 2000, and \pm 1,5 graduations over 2000 graduations."



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Toledo B130 Weight Indicator

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FIGURE 6/90/50 - 2



FIGURE 6/90/50 - 3



2-lever Basework -- Schematic Dingram



Platform Suspension and Fulcrum Support

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FIGURE 6/90/50 - 6



Losá Cell Resistant Nechanism

10/3/76



Double-pendulum Resistant Mechanism

10/3/76



Toledo 8130 - Load Cell Sorial Number and Sealing of Load Cell Cable

FIGURE 6/90/30 - 9

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Toledo 132 Bauework Selector



Toledo 132 -- Load Call Serial Numbers and Sealing of Load Call Cables

. FIGURE 6/9C/50 - 10

Toledo 133 - Basework-selector Unit



FIGURE 6/90/50 - 11

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FIGURE 6/9C/50 - 12

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Toledo 3134 Weight Indicator



FIGURE 5/9C/50 - 13

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Toledo 8134 Weight Indicator - Alternative Housing 24/9/77