Form ThorSor. 1013

Test Report of the Test Unit..... to specify the name .....

who is a person carrying out the test on the prototype of the vehicle scale

Trademark/Identity Mark.....

Model ..... **Capacity Range** ..... **Detailed Value**

Table 1 Result of Visual Inspection

(1) Certificate of Components of Prototype of Vehicle Scale

No.	Components	Certificate	
		Holding	Not Hold
1	Weighing Indicator	Registration No.	
2	Weighing Platform	Holding a certificate in the form of.....	
3	Load Cell	Certification No..... ☐ Pass ☐ Not Pass (please specify)	
4	External Weigh Indicating Device (Remote Display)	Registration No.	
5	Weighing Program (in the case of using a computer)	Registration No.	

Result of Inspection of Document ☐ **Pass** ☐ **Not Pass**

Criteria for Consideration : All particulars shall be passed.

Remark : It is required that a competent official must first consider the certificate of a load cell.

(2) Characteristics of Prototype of Vehicle Scale

No.	Characteristics of Prototype of Vehicle Scale as Inspected	Result of Inspection (to mark ✓ or ✘ in the case of inaccuracy, please explain details)		
		Accuracy	Inaccuracy	Details (please specify)
1	It is required to be produced permanently and not be simply used as a tool of fraud. All weighing instruments shall be made from good materials. It is required to be designed and made in a manner that when the weighing instruments are used as usual, they can always operate accurately. The components of the weighing instruments can operate continuously without defect, bend or deformation, which affects the accuracy of the weighing instruments. In the case of adjusting the weighing instruments, the adjusted instruments are required to maintain the condition of accuracy appropriately. (1) It is required to prevent the use of a tare device. (2) The adjustment of a load value to become zero shall be made when an indicating device is in equilibrium. (3) It is required to prevent unauthorized alterations of value setting and calibration.			
2	The following details shall be indicated on the instrument. Such details shall be legible, clear and indelible. (1) a name or a trademark, (2) the model which is specified the form of an instrument, (3) an accuracy class, (4) a verified principal scale mark (e), (5) the principal scale mark of a weighing instrument (d), (6) the maximum capacity range, (7) the minimum capacity range.			
3	There shall be a device for indicating a quantity value as weighed in an appropriate manner. And the number of devices shall be sufficient for using.			
4	In providing an indication of value whether to combine numbers with alphabets or other symbols or not, it is required not to cause confusion in reading			

No.	Characteristics of Prototype of Vehicle Scale as Inspected	Result of Inspection (to mark ✓ or ✘ in the case of inaccuracy, please explain details)		
		Accuracy	Inaccuracy	Details (please specify)
	the value. If there are many places of an indicating device, every place shall indicate the same value. If there is a printing device, a print value shall be the same as the value as indicated.			
5	The inscriptions of all of the controllers for operation, an indicating device and other equipment, including a switch of a weighing instrument shall be legible, clear and indelible.			
6	There is a space for a tamper-evident seal so as to prevent unauthorized alterations after verification has already been provided. The weighing instrument shall be modified or repaired after the seal is destroyed.			
7	An indicating device shall indicate the name or symbol of a unit of weighing.			
8	The principal scale marks shall indicate a value of 1×10^k or 2×10^k or 5×10^k whereby k is a positive integer, a negative integer, or zero.			
9	In indicating a value in a digital form, it is required to indicate at least one number at the rightmost position whereby there shall be a decimal point (.) or a comma (,) separated between an integer and the number after the decimal point. And in indicating this value, it is required to indicate the number on the left of the decimal point at least one position and the number on the right of the decimal point in every position. As for the indication of a zero value, the number zero may be possibly indicated one position on the far right without a point. In the case where a weighing instrument is able to change a principal scale mark automatically, the point shall be in the same position.			
10	An indicating device shall indicate a value exceeding the maximum capacity range but not exceeding 9 times of a verified principal scale mark.			

No.	Characteristics of Prototype of Vehicle Scale as Inspected	Result of Inspection (to mark ✓ or ✘ in the case of inaccuracy, please explain details)		
		Accuracy	Inaccuracy	Details (please specify)
11	A printing device shall print a value accurately and clearly. The height of alphabets and numbers shall not be less than 2 millimetres. The printing device shall print the value only when an indicating device is in equilibrium. The equilibrium shall be considered from the indicating device that shall indicate the stable value or indicate 2 adjacent weight values alternately for a period of more than 5 seconds.			
12	A recording device shall record a value when an indicating device is in equilibrium.			
13	In the case where there is external disturbance, an electronic weighing instrument shall be able to operate properly or indicate that there is an error resulting from such disturbance.			
14	In the case where abnormality occurs that affects the correctness of a weighing instrument, the weighing instrument shall stop operating automatically. Or alternatively, the weighing instrument shall indicate such abnormality to a user, and the indication shall be given until the abnormality disappears.			
15	In the case of activating a weighing instrument, an indicating device shall indicate all various symbols which can be indicated.			
16	If a weighing instrument has a computer system or a peripheral via equipment connecting to an external signal (a port), the computer system or the peripheral shall not adversely affect the result of weighing and data about weighing. And the computer system or the peripheral shall not be able to send orders or data to the weighing instrument, which causes the weighing instrument to indicate, print, calculate or record the value of the result of weighing differently from the time when there is no such equipment connected to the instrument. And it is required to seal the aforementioned port.			

No.	Characteristics of Prototype of Vehicle Scale as Inspected	Result of Inspection (to mark ✓ or ✘ in the case of inaccuracy, please explain details)		
		Accuracy	Inaccuracy	Details (please specify)
17	It is required to prevent the disturbance of electromagnetic and radio - frequency waves from affecting the precision of a weighing instrument, an indicating device, a recording device and a printing device.			
18	A signal cable from an internal circuit board of a weighing indicator to equipment connecting to an external cable (a port) shall not be connected with any other signal cables or equipment.			
19	In each set of signal cables from an internal circuit board of a weighing indicator to equipment connecting to an external signal (a port) for the purpose of connecting the signal cable indicating the result of weighing to a computer system and an external load indicating device (a remote display), it is required that there shall be two cables, i.e. (1) the signal cable indicating the result of weighing to the computer system and the indicating device that is connected outside only and (2) the signal cable for grounding.			
20	In connecting a signal cable of a weighing instrument, a wireless signal system is prohibited.			
21	As for the computer system with software that is used to indicate the result of weighing, it is required to provide an indication of the result of weighing that comes from a weighing indicator, to provide the date, time and place of weighing. Such indication is required to be the real-time indication at the time of weighing in the present only. And the indication shall not be able to alter the result of weighing as well as the date, time and place of weighing as indicated.			
22	In the case of printing the result of weighing, a weighing report shall be printed out of software that is used in indicating the result of weighing only.			

No.	Characteristics of Prototype of Vehicle Scale as Inspected	Result of Inspection (to mark ✓ or ✘ in the case of inaccuracy, please explain details)		
		Accuracy	Inaccuracy	Details (please specify)
	And the weighing report shall indicate the following details: (1) a total of weights (a weight of a truck combined with a weight of goods), (2) a weight of a truck, (3) a weight of goods, (4) a weight minus impurities, moisture, etc. (if any), (5) a goods type (if any), (6) a place of weighing while weighing, (7) the signatures of operators (a purchaser and a seller (if any)), (8) the date and time to be indicated at present (hour : minute : second).			
23	A weighing instrument and a weighing report shall indicate a value of the metric system that uses the kilogram as a basic unit only.			
24	A weighing indicator shall indicate the following details: (1) an accuracy class, (2) the number of maximum verified scale marks (n_{ind}), (3) an excitation voltage sent to a load cell (U_{exc}), (4) the minimum voltage received from a load cell (U_{min}), (5) the minimum voltage received from a load cell per a verified principal scale mark (Δu_{min}), (6) the minimum/maximum resistance value of a load cell (R_{Lmin} / R_{Lmax}), (7) the scope of operating temperature (T_{min} / T_{max}), (8) the number of signal cables, (9) the maximum ratio of length to a cross-sectional area. $(L/A)_{max}$			
25	It is required a load cell to indicate the following details: (1) an accuracy class,			

No.	Characteristics of Prototype of Vehicle Scale as Inspected	Result of Inspection (to mark ✓ or ✘ in the case of inaccuracy, please explain details)		
		Accuracy	Inaccuracy	Details (please specify)
	(2) the maximum capacity range of a load cell (E_{max}), (3) the minimum original weight value of a load cell (E_{min}), (4) the output signal value of a load cell *(C),* (5) the number of the maximum verified scale marks of a load cell *(n_{LC})*, (6) the minimum principal scale mark of a load cell (v_{min}), (7) Ratio E_{max} / v_{min} (Y) (8) Ratio E_{max} / (2 x *DR*) (Z) (9) the resistance of a load cell *(R_{LC})*, (10) the scope of operating temperature. (T_{min} / T_{max})			
26	The non - automatic weighing instrument with a weighing platform fixed at a place having a capacity range of 10 metric tons upwards (the vehicle scale) shall indicate the following details: (1) an accuracy class, (2) the maximum capacity range of a weighing instrument (Max), (3) the verified principal scale mark of a weighing instrument (*e)*, (4) the number of load cells (*N)*, (5) the ratio of a tare (*R)*, (6) the original constant load on a load platform (DL), (7) the range of setting a zero value (IZSR), (8) a correction to a variable load (NUD), (9) a tare value (T^+), (10) the scope of operating temperature (T_{min} / T_{max}), (11) the length of a signal cable (*L),*			

No.	Characteristics of Prototype of Vehicle Scale as Inspected	Result of Inspection (to mark ✓ or ✘ in the case of inaccuracy, please explain details)		
		Accuracy	Inaccuracy	Details (please specify)
	(12) the cross-sectional area of a signal cable (*A*).			

Result of Inspection ☐ **Pass** ☐ **Not Pass**

Criteria for Consideration : All particulars shall be correct.

Table 2 Result of Inspection of Structural Plan of Load Platform

No	Particulars of Load Platform as Inspected	Result of Inspection		
		Complete	Incomplete	Remark
1	The plans of a weighing platform consist of a floor plan of the weighing platform, a floor beam plan of the weighing platform, a foundation plan and a ground beam plan, including an approach slab or ramp plan that is transition from the ground to the weighing platform.			
2	As for an enlarged picture of important parts together with details, there are at least the enlarged picture of important parts together with the details of a floor, a beam, foundations and an approach slab.			
3	As for specifications, it is required to provide the details of the quality and type of materials, a load supporting capacity (in the case of pile foundations), as well as procedures and methods for construction, including the objective of drawing up construction plans.			
4	As for calculation sheets, it is required to specify all of the requirements for designing starting from a designing method, material qualifications including a bearing capacity of foundation soil, and to indicate a calculation method under general engineering fundamentals.			
5	A person who is responsible for design work and calculation is required to sign and write his/her name in a cursive manner and a registration number of his /her license on all pages of an area plan, plans, specifications and calculation sheets.			

6	A design certificate is issued by a person who designs and calculate a building and holds a professional engineering license, together with a copy or a photograph of the aforementioned valid professional license.			

Result of Inspection ☐ **Pass** ☐ **Not Pass**

Criteria for Consideration : All particulars shall be complete.

Table 3 Result of Inspection of Technical Detail of Load Cell

No	Technical Particulars of Load Cell	Reference Document		Remark
		Having	Not Have	
1	an accuracy class			
2	the maximum capacity range of a load cell			
3	the minimum original load value of a load cell			
4	the output signal value of a load cell			
5	the number of the maximum verified scale marks of a load cell			
6	the minimum principal scale mark of a load cell			
7	Ratio E_{max} / v_{min}			
8	Ratio E_{max} / (2 x DR)			
9	the resistance of a load cell			
10	the scope of operating temperature			

Result of Inspection ☐ **Pass** ☐ **Not Pass**

Criteria for Consideration : All particulars shall be given reference documents.

Table 4 Result of Inspection of Consistency of Weighing Instrument, Weighing Indicator and Load Cell

(1) the accuracy classes of a load cell (LC), a weighing indicator (IND) and a weighing instrument (WI)

LC	&	IND	Equal or Better	WI	Pass	Not Pass
	&		Equal or Better			

(2) the scope of operating temperature of a weighing instrument (WI) in comparison to the scope of operating temperature of a load cell (LC) and a weighing indicator (IND)

	LC		IND		WI	Pass	Not Pass
T_{min}		&		≤			
T_{max}		&		≥			

(3) the number of maximum verified scale marks of a weighing indicator (n_{ind}) and the number of scale marks of a weighing instrument (n)

n_{ind}	≥	n = Max / e	Pass	Not Pass
	≥			

(4) the maximum capacity range of a load cell (E_{max}) and the maximum capacity range of a weighing instrument (Max) whereby Q = (Max + DL +IZSR + NUD +T^+) / Max

Q x Max x R / N	≤	E_{max}	Pass	Not Pass
	≤			

(5) the number of maximum verified scale marks of a load cell (n_{LC}) and the number of maximum verified scale marks of a weighing instrument (n)

n_{LC}	≥	n = Max / e	Pass	Not Pass
	≥			

(6) the original constant load on a weighing platform (DL) and the minimum original weight value of a load cell (E_{min})

DL x R / N	≥	E_{min}	Pass	Not Pass
	≥			

(7) the verified scale mark of a weighing instrument (e) and the minimum principal scale mark of a load cell (v_{min})

e x R / $\sqrt{N}$	≥	v_{min} = E_{max} / Y	Pass	Not Pass
	≥			

(8) the minimum voltage of a weighing instrument (U) and the minimum voltage of (U_{min})

U = C x U_{exc} x R x DL / (E_{max} x N)	≥	U_{min}	Pass	Not Pass
	≥			

(9) the minimum voltage per the verified principal scale mark of a weighing instrument (Δu) and the minimum voltage per the verified principal scale mark (Δu_{min})

Δu = C x U_{exc} x R x e / (E_{max} x N)	≥	Δu_{min}	Pass	Not Pass
	≥			

(10) the resistance value of a load cell (R_{LC}) and the scope of the minimum/maximum resistance value of a load cell (R_{Lmin} / R_{Lmax})

R_{Lmin}	≤	R_{LC} / N	≤	R_{Lmax}	Pass	Not Pass
	≤		≤			

(11) the maximum ratio of length to a cross-sectional area of a weighing indicator (L/A)$_{max}$ and the maximum ratio of length to a cross-sectional area of a weighing instrument (L/A)

(L/A)	≤	(L/A)$_{max}$	Pass	Not Pass
	≤			

Result of Inspection ☐ **Pass** ☐ **Not Pass**

Criteria for Consideration: All conditions shall be met.

Table 5 Result of Inspection of Documents Concerning Weighing Program (a peripheral computer in particular)

Documents concerning a weighing program shall be inspected as follows:

(1) a device for connecting data from a weighing indicator,

(2) a device for indicating a value,

(3) a device for storing data in a memory unit or database,

(4) a device for printing a weighing report,

(5) a device for sending data on the result of weighing to the outside (if any),

(6) a device for registration and identification.

No.	Particulars for Inspection of Document	Name of Attached Document	Explanation/Notice	Pass
1	There are explanatory documents detailing all functions and instructions including parameters, switches and keys.			
2	There are explanatory documents detailing algorithms of all functions and instructions in connection with weighing, calculation and other functions.			
3	There are explanatory documents detailing menus about the use of a weighing program and various warning messages.			
4	There are explanatory documents on an overview of the structure of all equipment in a weighing system and the indication of devices connecting to a weighing program.			
5	There are explanatory documents detailing at least the following safety systems: - a system for the protection of altering the data on the result of weighing, - a system for setting an account level and the right of use, - a system of identification.			

6	There are explanatory documents relating to a user manual.			

Result of Inspection of Document ☐ **Pass** ☐ **Not Pass**

Criteria for Consideration: All devices shall be passed.

Table 6 Result of Test on Immunity to Conducted Radio - Frequency Fields

Verification scale interval, e: _____ Rate of sweep: _____

Load: _____ (Min) Material of load: _____

Cable/Interface	Frequency range (MHz)	Result		
		Indication (I)	Significant fault (>e) Or detection and reaction	
			No	Yes (remarks)
	Without disturbance			
	Without disturbance			
	Without disturbance			
	Without disturbance			
	Without disturbance			
	Without disturbance			

Result of Test ❑ **Pass** ❑ **Not Pass**

Test equipment: IEC 61000 - 4 - 6 [16]

Test set-up: IEC 61000 - 4 - 6 [16]

Test Procedure: IEC 61000 - 4 - 6 [16]

Test severity: Frequency range: 0.15 - 80 MHz

RF amplitude (50 ohms): 10 V (emf)

Modulation: 80 % AM, 1 kHz, sine wave

Table 7 Result of Test on Correctness of Weighing Program (a peripheral computer in particular)

No.	Checklist of Testing	Pass	Not Pass (please specify)	
1	When there is a weight signal, an indicating device shall indicate a weight value in the same as a weighing indicator, and it shall provide a real-time indication of the weight value all the time.			
2	When there is no weight signal, an indicating device shall not indicate as a number, and it shall warn a user that there is such malfunction.			
3	When a weight does not still, a device for storing data in a memory unit or database shall not record, and a device for printing a weighing report shall not be able to print the result of weighing.			
4	When a weight exceeds the maximum capacity range, an indicating device shall not indicate as a number, and it shall warn or notify a user of a weight exceeding the maximum capacity range of a weighing instrument.			
5	When a weight stills, (1) a device for storing data in a memory unit or database shall record a weight value accurately, (2) a device for printing a weighing report shall print a weight value accurately.			
6	When a weight is negative, an indicating device shall be able to indicate a negative weight value.			

Test Result ☐ **Pass** ☐ **Not Pass**

Criteria for Consideration: The weighing program shall have an accurate operating manner in compliance with the law governing weights and measures.

Table 8 Result of Test on Printing Result of Weighing

No.	Checklist of Testing	Pass	Not Pass	Please Specify
1	In printing the result of weighing, a weighing report shall be printed out of software that is used in indicating the result of weighing only. And the weighing report shall indicate the following details: (1) a total of weights (a weight of a truck combined with a weight of goods), (2) a weight of a truck, (3) a weight of goods, (4) a weight minus impurities, moisture, etc. (if any), (5) a goods type of (if any), (6) a place of weighing while weighing, (7) the signatures of users (a purchaser and a seller (if any)), (8) the date and time to be indicated at present (hour: minute: second).			
2	A weighing report is required to be printed a value accurately and clearly. The height of alphabets and numbers shall not be less than 2 millimetres.			
3	A weighing report shall indicate a value of the metric system that uses the kilogram as a basic unit only.			
4	A weighing report shall indicate a code for tracing back to the result of weighing and registration (a peripheral computer in particular).			

Test Result ☐ **Pass** ☐ **Not Pass**

Criteria for Consideration: All particulars shall be passed.

Doing a calculation to find out about the maximum permissible error of the prototype of the non- automatic weighing instrument in the type of non - self – indication by substituting the value of “e” into the specified equations as follows:	
Maximum Permissible Error for Verification	**Mass Used for Testing (m) Which is Indicated in the Unit of Verified Scale Marks (e)**
0.5 x e = ...	Consideration pursuant to Accuracy Class from ..... to .....
1.0 x e = ...	Consideration pursuant to Accuracy Class greater than ..... to .....
1.5 x e = ...	Consideration pursuant to Accuracy Class greater than ..... to .....

Maximum Permissible Error	**Mass Used for Testing (m) Which is Indicated in the Unit of Verified Scale Marks (e)**			
	Class 1	**Class 2**	**Class 3**	**Class 4**
0.5 e	0 to 50,000 (0 ≤ m ≤ 50,000)	from 0 to 5,000 (0 ≤ m ≤ 5,000)	from 0 to 500 (0 ≤ m ≤ 500)	from 0 to 50 (0 ≤ m ≤ 50)
1.0 e	greater than 50,000 to 200,000 (50,000 < m ≤ 200,000)	greater than 5,000 to 20,000 (5,000 < m ≤ 20,000)	greater than 500 to 2,000 (500 < m ≤ 2,000)	greater than 50 to 200 (50 < m ≤ 200)
1.5 e	greater than 200,000 (200,000 < m)	greater than 20,000 to 100,000 (20,000 < m ≤ 100,000)	greater than 2,000 to 10,000 (2,000 < m ≤ 10,000)	greater than 200 to 1,000 (200 < m ≤ 1,000)

Table 9 Result of Weighing Performance Test

Place a Load (L) (kg)	**Weighing Indicator (a screen that indicates a value) (I) (kg)** ↓	↑	**(ΔL) (kg)** ↓	↑	**Error (E) (kg)** ↓	↑	**Error as Corrected (E_c)** ↓	↑	**MPE (kg)**
* 0 or near zero					*				
Min									
1/3 Max									
1/2 Max									
2/3 Max									

Test Result ❑ Pass ❑ Not Pass

Criteria for Consideration: $|E_c| \leq |MPE|$

L (Load) means a weight rate that is used for testing.

I (Indication) means a weight that is indicated.

ΔL (Additional load to next changeover point) means a weight rate that is increased or decreased.

E (Error) = I + ½ e - ΔL – L

E_c (Corrected Error) = E – E_0

E_0 means an error at a position of a zero weight or a weight value near zero.*

MPE means the maximum permissible error.

Remark : In the case where a weight rate used for testing is calculated as a decimal number, it shall be rounded to an integer.

Table 10 Result of Discrimination Test

Load as Tested (L)	Weight Indicator (a screen that indicates a result) (I_1)	Lift a Load (ΔL)	Increase a Load 1/10 d	Increase = 1.4 d Weight Indicator (I_2)	$I_2 - I_1$

Test Result ❑ Pass ❑ Not Pass

Criteria for Consideration: $I_2 - I_1 \geq d$

L (Load) means a weight rate that is used for testing not less than 20 e.

ΔL (Additional load to next changeover point) means a weight rate that is increased or decreased (1/10d time).

I_1 (Indication$_1$) means a weight that is indicated. (a tested load combined with an additional weight rate 1d)

I_2 (Indication$_2$) means a weight that is indicated.

d means a scale mark of an instrument.

Table 11 Result of Repeatability Test

Load as Tested (L) (kg)	No.	Weighing Indicator (a screen that indicates a value) (I) (kg)	(ΔL) (kg)	(P) (kg)
	1			
	2			
	3			
			$P_{max} - P_{min}$	
			MPE	

Test Result ❑ Pass ❑ Not Pass

Criteria for Consideration: $P_{max} - P_{min} \leq |MPE|$

L (Load) means a weight rate that is used for testing not less than 1/2 Max.

I (Indication) means a weight that is indicated.

ΔL (Additional load to next changeover point) means a weight rate that is increased or decreased (1/10d per time).

P (a load value that is indicated by a weighing instrument before rounding up) = I + ½d - ΔL

MPE means the maximum permissible error.

Table 12 Result of Eccentricity Test

1	2	3

Load as Tested (L) (kg)	**Position**	**Weighing Indicator (a screen that indicates a value) (I) (kg)**	**(ΔL) (kg)**	**(E) (kg)**
			E_{max} - E_{min}	
			MPE	

Test Result ❑ Pass ❑ Not Pass

Criteria for Consideration: |E| ≤ |MPE| and $E_{max} - E_{min} \leq$ |MPE|

L (Load) means a weight rate that is used for testing not less than 1/3 Max.

I (Indication) means a weight that is indicated.

ΔL (Additional load to next changeover point) means a weight rate that is increased or decreased (1/10d per time).

E (Error) = I + ½ e - ΔL – L

MPE means the maximum permissible error.

Table 13 Summary of Inspection/Test Result

No.	Checklist of Inspection/Testing	Test Result		Remark
		Pass	Not Pass	
1	Visual Inspection			
2	Inspection of Structural Plan of Weighing Platform			
3	Inspection of Technical Detail of Load Cell			
4	Inspection of Consistency of Weighing Instrument, Weighing Indicator and Load Cell			
5	Inspection of Documents Concerning Weighing Program (a peripheral computer in particular)			
6	Test on Immunity to Conducted Radio - Frequency Fields			
7	Test on Correctness of Weighting Program (a peripheral computer in particular)			
8	Test on Printing Result of Weighing			
9	Weighing Performance Test			
10	Discrimination Test			
11	Repeatability Test			
12	Eccentricity Test			

I hereby certify that the aforementioned test/inspection results are correct and true in all respects.

(Signed).....Tester/Inspector

(.....)

Position .....

Date ..... Month ..... B.E. .....

(Signed).....Authorized person to bind a juristic person

(a juristic person's seal to be stamped (if any)) (.....)

Position.....

Date ..... Month ..... B.E.....