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The Swedish Board for Accreditation and Conformity Assessment's regulations on automatic weighing instruments

Adopted on xx xx 20xx

By virtue of Section 4 of the Ordinance (1993:1066) concerning units of measurement, measurements and measuring instruments, the Swedish Board for Accreditation and Conformity Assessment (Swedac) lays down[1] the following:

Scope

Section 1 These regulations contain provisions on the automatic weighing instruments defined below, intended to determine the mass of a body by using the action of gravity on that body which:

1. bear the CE marking and the supplementary metrology marking;
2. are placed on the market or made available on the market to be put into use for certain, specifically indicated purposes; or
3. are shown at fairs and exhibitions, at demonstrations and similar events.

The regulations also contain requirements for the putting into use of such automatic weighing instruments for certain specifically indicated purposes.

Definitions

Section 2 For the purposes of these regulations, words and terms are used within the meaning of Chapter 1, Section 5, of STAFS 2016:1[2] on measuring instruments. In addition, for the purposes of these regulations:

1. *automatic catchweigher*: an automatic weighing instrument that determines the mass of pre-assembled discrete loads (for example prepackages) or single loads of loose material;
2. *automatic gravimetric filling instrument*: an automatic weighing instrument that fills containers with a predetermined and virtually constant mass of a product from bulk;

[1] Cf. Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (recast), as amended by Commission Directive (EU) 2015/13. See also Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services.

[2] Swedish Board for Accreditation and Conformity Assessment regulations (STAFS 2016:1) on measuring instruments.

3. *automatic checkweigher*: an automatic catchweigher that subdivides articles of different mass into two or more subgroups according to the value of the difference of their mass and a nominal set-point;

4. *automatic weighing instrument*: an instrument that determines the mass of a product without the intervention of an operator and follows a predetermined programme of automatic processes characteristic of the instrument;

5. *determination of verified gross mass*: determination of the verified gross mass (VGM) in accordance with method 1 in Annex 1 to the Swedish Transport Agency's regulations and general advice (TSFS 2010:174) on the carrying of cargo on vessels, and on terminals visited by vessels loading or unloading solid bulk cargo; and

6. *production of prepackages (pre-established quantities)*: measuring or checking the actual quantity of goods during the production of pre-packaged goods in accordance with the requirements of STAFS 2017:1[1] on pre-packaged goods,

7. *production of prepackages (quantities not pre-established)*: determination of the actual quantity of goods during the production of prepackages intended for sale in nominal quantities and expressed in weight or units of volume and containing not less than 5 g or 5 ml and not more than 10 kg or 10 l;

8. *discontinuous totaliser (totalising hopper weigher)*: an automatic weighing instrument that determines the mass of a bulk product by dividing it into discrete loads. The mass of each discrete load is determined in sequence and summed. Each discrete load is then delivered to bulk.

9. *rail weighbridge*: an automatic weighing instrument having a load receptor inclusive of rails for conveying railway vehicles;

10. *continuous totaliser*: an automatic weighing instrument that continuously determines the mass of a bulk product on a conveyor belt, without systematic subdivision of the product and without interrupting the movement of the conveyor belt;

11. *weight labeller*: an automatic catchweigher that labels individual articles with the weight value;

12. *weight/price labeller*: an automatic catchweigher that labels individual articles with the weight value and price information; and

13. *weighing of fishery products*: weighing of fishery products pursuant to Articles 60 and 61 of Council Regulation (EC) No 1224/2009 of 20 November 2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations (EC) No 847/96, (EC) No 2371/2002, (EC) No 811/2004, (EC) No 768/2005, (EC) No 2115/2005, (EC) No 2166/2005; (EC) No 388/2006, (EC) No 509/2007, (EC) No 676/2007, (EC) No 1098/2007, (EC) No 1300/2008, (EC) No 1342/2008 and repealing Regulations (EEC) No 2847/93, (EC) No 1627/94 and (EC) No 1966/2006, as amended by Regulation (EU) 2015/812 of the European Parliament and of the Council and Chapter II of Title IV of Commission Implementing Regulation (EU) No 404/2011 of 8 April 2011 laying down detailed rules for the implementation of Council Regulation (EC) No 1224/2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, as amended by Commission Implementing Regulation (EU) 2015/1962.

[1] Swedish Board for Accreditation and Technical Control (Swedac) regulations (STAFS 2017:1) on pre-packaged goods.

Requirements for automatic weighing instruments

Section 3 To be affixed with the CE marking and supplementary metrology marking
pursuant to Chapter 4, Sections 14–25 of STAFS 2016:1 on measuring instruments, an automatic weighing instrument must meet the requirements of:

1. Annex 1 to STAFS 2016:1 on measuring instruments; and
2. the Annex to these regulations.

Section 4 An automatic weighing instrument shall bear the CE marking and the supplementary metrological marking if it is placed on the market or made available on the market for the purpose of being put into use for:

1. determination of fees, based on mass, for the collection of waste from private households;
2. determination of verified gross mass;
3. weighing of fishery products;
4. determination of price based on mass in direct sales to the public;
5. production of prepackages (pre-established quantities); or
6. production of prepackages (not pre-established quantities).

In addition, it shall be:

1. designed for the temperature and humidity conditions in which it is intended to be used; and
2. suitable in terms of accuracy class, verification scale intervals, gravity and tilt.

Section 5 The automatic instrument shall have undergone one of the following conformity assessment procedures, as described in Annexes B, D, D1, E, F, F1, G and H1 to STAFS 2016:1 on measuring instruments.

Mechanical systems:

1. B + D.
2. B + E.
3. B + F.
4. D1:
5. F1:
6. G.
7. H1:

Electromechanical weighing instruments:

1. B + D.
2. B + E.
3. B + F.
4. G.
5. H1:

Electronic weighing instruments or weighing instruments incorporating software:

1. B + D.
2. B + F.
3. G.
4. H1.

Section 6 An automatic weighing instrument, which does not meet the requirements of these regulations, may be shown at fairs and exhibitions, at demonstrations and similar events. In such cases, it shall be clearly indicated that the automatic weighing instrument does not meet the requirements and that it may not be made available on the market or put into use for the purposes set out in Section 4 until it meets the requirements.

Putting an automatic weighing instrument into use

Section 7 Anyone putting an automatic weighing instrument into use for the purposes set out in Section 4, first paragraph, shall use an automatic weighing instrument that meets the requirements of Section 4.

Other

Section 8 Swedac may, in individual cases and if there are specific reasons for doing so, grant exemptions from the application of these regulations.

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1. This statute comes into force on xx.
2. The statute repeals the Board's regulations (STAFS 2006:7) on automatic weighing instruments.
3. Certificates issued in accordance with STAFS 2006:10 on automatic weighing instruments or STAFS 2006:7 on automatic weighing instruments shall be valid under the new statute.

On behalf of SWEDAC

ULF HAMMARSTRÖM

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Specific requirements for automatic weighing instruments

Chapter I – Requirements common to all types of automatic weighing instrument

1. ***Rated operating conditions***

The manufacturer shall indicate the rated operating conditions for the instrument as follows:

1.1 For the measurand:

The measuring range in terms of its maximum and minimum capacity.

1.2 For the electrical supply influence quantities:

In case of DC voltage supply: the nominal DC voltage supply or the DC voltage limits.

In the case of AC voltage supply: the nominal and minimum AC voltage supply or the AC voltage limits.

1.3 For the mechanical and climatic influence quantities:

The minimum temperature range is 30 °C unless specified otherwise in the following chapters of this Annex.

The mechanical environmental classes according to point 1.3.2 of Annex I to STAFS 2016:1 on measuring instruments are not applicable. For instruments which are used under special mechanical strain, e.g. instruments incorporated into vehicles, the manufacturer shall define the mechanical conditions of use.

1.4 For other influence quantities (if applicable):

The rate(s) of operation.

The characteristics of the product(s) to be weighed.

2. ***Permissible effect of disturbances – Electromagnetic environment***

The required performance and critical change value are given in the relevant chapter of this Annex for each type of instrument.

3. ***Suitability***

3.1 Means shall be provided to limit the effects of tilt, loading and rate of operation such that maximum permissible errors (MPEs) are not exceeded in normal operation.

3.2 Adequate material handling facilities shall be provided to enable the instrument to respect the MPEs during normal operation.

3.3 Any operator control interface shall be clear and effective.

3.4 The integrity of the display (where present) shall be verifiable by the operator.

3.5 Adequate zero setting capability shall be provided to enable the instrument to respect the MPEs during normal operation.

3.6 Any result outside the measurement range shall be identified as such, where a printout is possible.

Chapter II – Automatic catchweighers

1. ***Accuracy classes***

1.1 Instruments are divided into primary categories designated by

X and Y

as specified by the manufacturer.

1.2 These primary categories are further divided into the four accuracy classes:

XI, XII, XIII and XIIII

and

Y(I), Y(II), Y(a) and Y(b)

which shall be specified by the manufacturer.

2. ***Category X instruments***

2.1 Category X applies to instruments defined in Section 2 points 6 and 7.

2.2 The accuracy classes are supplemented by a factor (x) that quantifies the maximum permissible standard deviation as specified in point 4.2.

The manufacturer shall specify the factor (x), where (x) shall be ≤ 2 and in the form 1×10^k, 2×10^k or 5×10^k,where k is a negative whole number or zero.

3. ***Category Y instruments***

Category Y applies to all automatic catchweighers.

4. ***Maximum permissible error***

4.1 Mean error Category X/MPE Category Y instruments

Table 1

Net load (m) in verification scale intervals (e)								Maximum permissible error	Maximum permissible error
XI	Y(I)	XII	Y(II)	XIII	Y(a)	XIIII	Y(b)	X	Y
0 < m ≤ 50 000		0 < m ≤ 5,000		0 < m ≤ 500		0 < m ≤ 50		± 0.5 e	± 1 e
50,000 < m ≤ 200,000		5,000 < m ≤ 20,000		500 < m ≤ 2,000		50 < m ≤ 200		± 1.0 e	± 1.5 e
200,000 < m		20,000 < m ≤ 100 000		2,000 < m ≤ 10 000		200 < m ≤ 1,000		± 1.5 e	± 2 e

4.2 Standard deviation

Maximum permissible value for the standard deviation of a class X (x) instrument is the result of the multiplication of the factor (x) by the value in *Table 2* below.

Table 2

Net load (m)	Maximum permissible standard deviation for class X(1)
m ≤ 50 g	0.48 %
50 g < m ≤ 100 g	0,24 g
100 g < m ≤ 200 g	0.24 %
200 g < m ≤ 300 g	0.48 g
300 g < m ≤ 500 g	0.16 %
500 g < m ≤ 1 000 g	0.8 g
1 000 g < m ≤ 10 000 g	0.08 %
10 000 g < m ≤ 15 000 g	8 g
15 000 g < m	0.053 %

For class XI and XII, (x) shall be less than 1.
For class XIII, (x) shall be not greater than 1.
For class XIIII, (x) shall be greater than 1.

4.3 Verification scale interval – single interval instruments

Table 3

Accuracy classes		Verification scale interval	Number of verification scale intervals n = max/e	
			Minimum	Maximum
XI	Y(I)	0.001 g ≤ e	50,000	-
XII	Y(II)	0.001 g ≤ e ≤ 0.05 g	100	100,000
		0.1 g ≤ e	5,000	100,000
XIII	Y(a)	0.1 g ≤ e ≤ 2 g	100	10,000
		5 g ≤ e	500	10,000
XIIII	Y(b)	5 g ≤ e	100	1,000

Table 4

Accuracy classes		Verification scale interval	Number of verification scale intervals n = max/e	
			Minimum value[1] $n = max_i/e_{(i+1)}$	Maximum value $n = max_i/e_i$
XI	Y(I)	0.001 g ≤ e_i	50,000	-
XII	Y(II)	0.001 g ≤ e_i ≤ 0.05 g	5,000	100,000
		0.1 g ≤ e_i	5,000	100,000
XIII	Y(a)	0.1 g ≤ e_i	500	10,000
XIIII	Y(b)	5 g ≤ e_i	50	1,000

Where:

i = 1, 2, ... r

i = partial weighing range

r = total number of partial ranges

[1] For i = r, the corresponding columns of *Table 3* apply with e replaced by e_r.

5. ***Measurement range***

In specifying the measurement range for class Y instruments, the manufacturer shall take account that the minimum capacity shall not be less than:

class Y(I):	100 e
class Y(II):class Y(II):	20 e for 0.001 g ≤ e ≤ 0.05 g, and 50 e for 0.1 g ≤ e
class Y(a):	20 e
class Y(b):	10 e
Scales used for grading, e.g. postal scales and garbage weighers:	5 e

6. ***Dynamic setting***

6.1 The dynamic setting facility shall operate within a load range specified by the manufacturer.

6.2 When fitted, a dynamic setting facility that compensates for the dynamic effects of the load in motion shall be inhibited from operating outside the load range, and shall be capable of being secured.

7. ***Performance under influence factors and electromagnetic disturbances***

7.1 The MPEs due to influence factors are:

7.1.1 For category X instruments:

1. For automatic operation; as specified in *Tables 1* and *2*.
2. For static weighing in non-automatic operation; as specified in *Table 1*.

7.1.2 For category Y instruments:

1. For each load in automatic operation; as specified in *Table 1*.
2. For static weighing in non-automatic operation; as specified for category X in *Table 1*.

7.2 The critical change value due to a disturbance in one verification scale interval.

7.3 Temperature range:

1. For class XI and Y(I), the minimum range is 5 ˚C.
2. For class XII and Y(II), the minimum range is 15 ˚C.

Chapter III – Automatic gravimetric filling instruments

1. ***Accuracy classes***

1.1 The manufacturer shall specify both the reference accuracy class Ref(x) and the operational accuracy class(es) X(x).

1.2 An instrument type is designated a reference accuracy class, Ref(x), corresponding to the best possible accuracy for instruments of the type. After installation, individual instruments are designated for one or more operational accuracy classes, X(x), having taken account of the specific products to be weighed. The class designation factor (x) shall be ≤ 2 and in the form 1×10^k, 2×10^k or 5×10^k, where k is a negative whole number or zero.

1.3 The reference accuracy class, Ref(x), is applicable for static loads.

1.4 For the operational accuracy class X(x), X is a regime relating accuracy to load weight and (x) is a multiplier for the limits of error specified for class X(1) in point 2.2.

2. ***Maximum permissible error***

2.1 Static weighing error

2.1.1 For static loads under rated operating conditions, the MPE for the reference accuracy class, Ref(*x*), shall be 0.312 of the maximum permissible deviation of each fill from the average, as specified in *Table 5*, multiplied by the class designation factor (*x*).

2.1.2 For instruments where the fill may be made up from more than one load (e.g. cumulative or selective combination weighers), the MPE for static loads shall be the accuracy required for the fill as specified in point 2.2 (i.e. not the sum of the maximum permissible deviation for the individual loads).

2.2 Deviation from average fill

Table 5

Value of the mass, m (g), of the fills	Maximum permissible deviation of each fill from the average for class X(1)
m ≤ 50	7.2 %
50 < m ≤ 100	3.6 g
100 < m ≤ 200	3.6 %
200 < m ≤ 300	7.2 g
300 < m ≤ 500	2.4 %
500 < m ≤ 1 000	12 g
1 000 < m ≤ 10 000	1.2 %
10 000 < m ≤ 15 000	120 g
15 000 < m	0.8 %

Note: The calculated deviation of each fill from the average may be adjusted to take account for the effect of material particle size.

2.3 Error relative to preset value (setting error)

For instruments where it is possible to preset a fill weight, the maximum difference between the preset value and the average mass of the fills shall not exceed 0.312 of the maximum permissible deviation of each fill from the average, as specified in *Table 5*.

3. ***Performance under influence factors and electromagnetic disturbances***

3.1 The MPEs due to influence factors shall be as specified in point 2.1.

3.2 The critical change value due to a disturbance is a change of the static weight indication equal to the MPE as specified in point 2.1 calculated for the rated minimum fill, or a change that would give equivalent effect on the fill in the case of instruments where the fill consists of multiple loads. The calculated critical change value shall be rounded to the next higher scale interval (d).

3.3 The manufacturer shall specify the value of the rated minimum fill.

Chapter IV – Discontinuous totalisers

1. ***Accuracy classes***

The instruments are divided into four accuracy classes as follows: 0.2, 0.5, 1 and 2.

2. ***Maximum permissible error***

Table 6

Accuracy class	MPE of totalised load
0.2	± 0.10 %
0.5	± 0.25 %
1	± 0.50 %
2	± 1.00 %

3. ***Totalisation scale interval***

The totalisation scale interval (d_t) shall be in the range:

0.01 % max ≤ d_t ≤ 0.2 % max.

4. ***Minimum totalised load (Σ_{min})***

The minimum totalised load (Σ_{min}) shall be not less than the load at which the MPE is equal to the totalisation scale interval $(d)_t$), and not less than the minimum load as specified by the manufacturer.

5. ***Zero setting***

Instruments that do not tare weigh after each discharge shall have a zero setting device. Automatic operation shall be inhibited if zero indication varies by:

1. 1 d_t on instruments with automatic zero setting device, and
2. 0.5 d_t on instruments with a semi-automatic or non-automatic zero setting device.

6. ***Operator interface***

Operator adjustments and reset function shall be inhibited during automatic operation.

7. ***Printout***

On instruments equipped with a printing device, the reset of the total shall be inhibited until the total is printed. The printout of the total shall occur if automatic operation is interrupted.

8. ***Performance under influence factors and electromagnetic disturbances***

8.1 The MPEs due to influence factors shall be as specified in *Table 7*.

Table 7

Load (m) in totalisation scale intervals (dt)	Maximum permissible error
0 < m ≤ 500	± 0.5 d_t
500 < m ≤ 2 000	± 1.0 d_t
2 000 < m ≤ 10 000	± 1.5 d_t

8.2 The critical change value due to a disturbance is one totalisation scale interval for any weight indication and any stored total.

Chapter V – Continuous totalisers

1. ***Accuracy classes***

Instruments are divided into three accuracy classes as follows: 0.5, 1 and 2.

2. ***Measurement range***

2.1 The manufacturer shall specify the measurement range, the ratio between the minimum net load on the weighing unit and the maximum capacity, and the minimum totalised load.

2.2 The minimum totalised load Σ_{min} shall not be less than

800 d for class 0.5,

400 d for class 1,

200 d for class 2,

where d is the totalisation scale interval of the general totalisation device.

3. ***Maximum permissible error***

Table 8

Accuracy class	Maximum permissible error for totalised load
0.5	± 0.25 %
1	± 0.5 %
2	± 1.0 %

4. ***Speed of the belt***

The speed of the belt shall be specified by the manufacturer. For single-speed beltweighers, and variable-speed beltweighers having a manual speed setting control, the speed shall not vary by more than 5 % of the nominal value. The product shall not have a different speed than the speed of the belt.

5. ***General totalisation device***

It shall not be possible to reset the general totalisation device to zero.

6. ***Performance under influence factors and electromagnetic disturbances***

6.1 The MPE due to influence factors, for a load not less than Σ_{min} shall be 0.7 times the appropriate value specified in *Table 8*, rounded up to the next higher totalisation scale interval (d).

6.2 The critical change value due to a disturbance shall be 0.7 times the appropriate value specified in *Table 8*, for a load equal to Σ_{min}, for the designated class of the beltweigher, rounded up to the next higher totalisation scale interval (d)

Chapter VI – Automatic rail weighbridges

1. ***Accuracy classes***

The instruments are divided into four accuracy classes as follows: 0.2, 0.5, 1 and 2.

2. ***Maximum permissible error***

2.1 The maximum permissible errors for weighing-in-motion of a single wagon or a total train are shown in *Table 9*.

Table 9

Accuracy class	Maximum permissible errors
0.2	± 0.1 %
0.5	± 0.25 %
1	± 0.5 %
2	± 1.0 %

2.2 The MPEs for the weight of coupled or uncoupled wagons weighing-in-motion shall be one of the following values, whichever is the greatest:

1. the value calculated according to *Table 9*, rounded to the nearest scale interval;
2. the value calculated according to *Table 9*, rounded to the nearest scale interval for a weight equal to 35 % of the maximum wagon weight (as inscribed on the descriptive markings);
3. one scale interval (d).

2.3 The MPEs for the weight of train weighing-in-motion shall be one of the following values, whichever is the greatest:

1. the value calculated according to *Table 9*, rounded to the nearest scale interval;

2. the value calculated according to *Table 9* for the weight of a single wagon equal to 35 % of the maximum wagon weight (as inscribed on the descriptive markings) multiplied by the number of reference wagons (not exceeding 10) in the train, and rounded to the nearest scale interval;

3. one scale interval (d) for each wagon in the train, but not exceeding 10 d.

2.4 When weighing coupled wagons, the errors of not more than 10 % of the weighing results taken from one or more passes of the train may exceed the appropriate MPE given in point 2.2, but shall not exceed twice the MPE.

3. ***Scale interval (d)***

The relationship between the accuracy class and the scale interval shall be as specified in *Table 10*.

Table 10

Accuracy class	Scale interval (d)
0.2	d ≤ 50 kg
0.5	d ≤ 100 kg
1	d ≤ 200 kg
2	d ≤ 500 kg

4. ***Measurement range***

4.1 The minimum capacity shall not be less than 1 t, and not greater than the value of the result of the minimum wagon weight divided by the number of partial weighings.

4.2 The minimum wagon weight shall not be less than 50 d.

5. ***Performance under influence factors and electromagnetic disturbances***

5.1 The MPEs due to influence factors shall be as specified in *Table 11*.

Table 11

Load (m) in verification scale intervals (d)	Maximum permissible error
0 < m ≤ 500	± 0.5 d
500 < m ≤ 2 000	± 1.0 d
2 000 < m ≤ 10 000	± 1.5 d

5.2 The critical change value due to a disturbance is one scale interval.