NEW JERSEY
SPECIFICATIONS AND TOLERANCES FOR PHARMACY SCALES, WEIGHTS AND MEASURES

As Established and Promulgated

by the

STATE DEPARTMENT OF WEIGHTS AND MEASURES

July 1st, 1940.

DEPARTMENT OF LAW AND PUBLIC SAFETY

Division of Weights and Measures

Trenton, New Jersey.

Specifications and Tolerances for Prescription Scales and Balances

Adopted by

THE NEW JERSEY STATE DEPARTMENT OF WEIGHTS AND MEASURES

July 1, 1940

F-1. APPLICATION.—Class A prescription scales and balances may be used for all determinations of the character specified in the definition following. In the case of a drug store doing prescription work, which is provided with a class A prescription scale or balance, then and in that case only a class B prescription scale or balance may be approved for use, but only for the weighing of loads of 10 grains or more. The specifications and tolerances for class A prescription scales and balances shall also apply to scales used in the purchase and sale of gold, insofar as they are applicable.

F-2. DEFINITION.—Prescription scales and balances are scales and balances designed for or adapted to weighing the ingredients of medicinal and other formulas prescribed by physicians and others and entering into the ordinary trade of pharmacists and chemists, and which are used or intended to be used for such purpose. These scales or balances shall be of two classes, class A and class B. A class A scale or balance is one which meets sensibility reciprocal and tolerance requirements given hereinafter for class A prescription scales and balances. A class B scale or balance is one which is somewhat less sensitive and accurate than a class A scale or balance, but which complies with the sensibility reciprocal and tolerance requirements given hereinafter for class B prescription scales and balances.

F-3. SPECIFICATIONS.

F-3a. Indicating Means.

F-3a (1). To be Provided.—A prescription scale or balance shall be equipped with means which will accurately indicate its condition of balance.

F-3a (2). Types.—The indicating means may consist of one indicating edge, line, or point, and a graduated scale or arc; or of two indicating edges, lines, or points. The design shall be such that when the beam vibrates one or both of the elements will oscillate with reference to the other.

F-3a (3). Design.—If the indicating means consists of a single indicating edge, line, or point and a graduated scale or arc, then the graduated scale or arc shall be divided into equal spaces with at least 0.04 inch clear

interval between the graduations, and the edge, line, or point shall reach to the graduated scale; or if the construction is such that the indicator and graduated scale are in the same plane, then there shall not be a separation of the ends of the graduations and the end of the indicator of more than 0.04 inch, this distance to be measured along the line of the graduations. The indicator shall be so designed and constructed as to enable the readings to be made with precision. If the indicating means consists of two indicating edges, lines, or points, these shall be sharply defined, *and shall in no case be more than 0.04 inch from each other when the scale is in balance, this space to be measured horizontally.*

F-3a (4). Clearance.—*The distance between the graduated scale and the indicator shall in no case exceed 0.04 inch:* Provided, however, That this shall not be construed to prohibit the employment of an additional indicator at a greater distance from the graduated scale, designed and constructed so as to facilitate the correct positioning of the eye of the observer properly to read the indications of the scale and reduce parallax, when such additional indicator is clearly differentiated from the regular indicator so that it will not be mistaken therefor.

F-3b. Pivots and Bearings.—Pivots and bearings of prescription scales and balances shall be made of hardened steel or of agate.

F-3c. Arresting Means.—A prescription scale or balance shall be provided with a device for arresting the vibration of the mechanism.

F-3d. Marking of Class B. Scales.—A class B prescription scale or balance shall be conspicuously and clearly marked with the words "Class B. Not to be used in weighing loads of less than 10 grains", or with a similar and suitable wording conveying the same information. (In the case of class B prescription scales and balances, which are hereafter manufactured in the State or brought into the State, this requirement shall be fulfilled by the manufacturer. In all other cases the inscription shall be placed upon such scales and balances by the weights and measures official.)

F-3e. Assumed Capacity.—For the purpose of applying the SR requirements and tolerances hereinafter given, the capacity of all prescription scales and balances which are in the State, either in use or in the stock of manufacturers of or dealers in such apparatus, and which shall not have the nominal or rated capacity marked upon them, shall be taken to be 1 apothecaries' ounce (or 30 grams).

NOTE: Specifications printed in Roman type are retroactive and apply to all apparatus.

Specifications printed in *italics* are non-retroactive and apply only to apparatus manufactured in or brought into the State after the date of promulgation of the specifications.

Maximum Allowable Sensibility Reciprocal (SR) on Prescription Scales and Balances

Adopted by

THE NEW JERSEY STATE DEPARTMENT OF WEIGHTS AND MEASURES

July 1, 1940

I-5a. Class A Scales and Balances.—The maximum SR allowable on a class A prescription scale or balance of a capacity of ½ ounce (or 15 grams) or more, at the capacity of the scale or balance or at any lesser load, shall be 0.2 grain (or 13 mg), or the value of two of the minimum weighbeam graduations, whichever is less: Provided, however, That the manufacturers' maximum allowable SR, or the maximum SR allowable on a new prescription scale or balance, shall be one-half of the value given, or one of the minimum beam graduations, whichever is less. (If any prescription scale or balance has a smaller capacity than ½ ounce—or 15 grams—the maximum SR allowable at the capacity or at any lesser load shall be the same proportionate part of the applicable value specified above that this capacity is of ½ ounce—or 15 grams—or the value of two or of one of the minimum weighbeam graduations, whichever is less.)

I-5b. Class B Scales and Balances.—The maximum SR allowable on a class B prescription scale or balance, at the capacity or at any lesser load, shall be 0.5 grain: Provided, however, That the manufacturers' maximum allowable SR, or the maximum SR allowable on a new class B prescription scale or balance, shall be one-half the value given.

Specifications and Tolerances for Weights

Adopted by

THE NEW JERSEY STATE DEPARTMENT OF WEIGHTS AND MEASURES

July 1, 1940

SPECIFICATIONS.

1. Weights shall be made of steel, iron, brass, or any other metal or alloy of metals not softer than brass: Provided, however, That weights below ¼ ounce shall not be made of iron or steel, but may be made of aluminum.

2. Weights shall have smooth surfaces, and no weight of more than 1 gram, 1 pennyweight, or 1 scruple shall have sharp points or corners.

3. Weights shall not be covered with a soft or thick coat of paint or varnish.

4. All holes in which foreign material is to be placed for adjusting purposes shall be of such form that the material will be permanently and securely held in place. In no case shall this adjusting material project beyond the surface of the weight.

5. Rings on weights shall not be split or removable.

6. All weights shall be clearly marked with their nominal value, *and in addition weights intended for use on multiplying-lever scales shall be clearly marked with the value they represent when used upon the scale for which they are intended.* Provided, however, That the values of weights of less than 1 gram, 1 pennyweight, or 1 scruple may be designated by dots, lines, figures, distinctive shape, or other appropriate means.

TOLERANCES.

The tolerances to be allowed in excess or deficiency on commercial avoirdupois weights shall be the values shown in the following table: Provided, however, That the manufacturers' tolerances or the tolerances to be allowed on new commercial avoirdupois weights shall be one-half of the values given.

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TOLERANCES FOR COMMERCIAL AVOIRDUPOIS WEIGHTS

Weight	Tolerance, weights for equal-arm scales	Tolerance counterpoise weights for multiplying-lever scales
Pounds	*Grains*	*Grains*
50	100.0	
25	70.0	
20	60.0	
15	40.0	
10	40.0	20.0
8	30.0	18.0
5	25.0	13.0
4	25.0	12.0
3	20.0	10.0
2	15.0	8.0
1	10.0	5.0
Ounces		
10	8.0	4.0
8	7.0	3.0
5	5.0	2.0
4	4.0	2.0
2	3.0	1.0
1	2.0	1.0
½	2.0	1.0
¼	1.0	
⅛	0.5	
1/16	.5	
1/32	.5	
1/64	.2	

The tolerances to be allowed in excess or deficiency on apothecaries' prescription weights shall be the values shown in the two following tables. Provided, however, That the manufacturers' tolerances or the tolerances to be allowed on new apothecaries' prescription weights shall be one-half of the values given.

TOLERANCES FOR PRESCRIPTION WEIGHTS IN APOTHECARIES' SYSTEM

Weight *Ounces ap*	*Tolerance* *Grains*
12	4.0
10	4.0
8	3.0
5	3.0
4	2.0
3	2.0
2	2.0
1	1.0
Drams ap	
8	1.0
6	1.0
4	0.7
3	.6
2	.5
1	.3
0.5	.2

Weight *Scruples*	*Tolerance* *Grains*
3	0.3
2	.25
1	.15
Grains	
20	.15
10	.12
5	.08
2	.04
1	.03
0.5	.02
.2	.015
.1	.01

TOLERANCES FOR PRESCRIPTION WEIGHTS IN METRIC SYSTEM

Weight *Grams*	*Tolerance* *Milligrams*
500	350
200	200
100	150
50	100
20	50
10	40
5	25
2	15
1	10

Weight *Milligrams*	*Tolerance* *Milligrams*
500	7
200	4
100	3
50	2
20	1
10	1

The tolerances to be allowed in excess or deficiency on commercial troy weights shall be the values shown in the following table: Provided, however, That the manufactures' tolerances or the tolerances to be allowed on new commercial troy weights shall be one-half of the values given.

TOLERANCES FOR COMMERCIAL TROY WEIGHTS

Weight *Ounces troy*	*Tolerance* *Grains*
12	4.0
10	4.0
8	3.0
5	3.0
4	2.0
3	2.0
2	2.0
1	1.0

Weight *Pennyweights*	*Tolerance* *Grain*
10	0.7
5	.5
4	.4
3	.3
2	.25
1	.15

Specifications and Tolerances for Glass Graduates

Adopted by

THE NEW JERSEY STATE DEPARTMENT OF WEIGHTS AND MEASURES

July 1, 1940

1. *Graduates shall be made to contain or to deliver the indicated volume at 20° C (68° F). They shall be legibly, conspicuously, and permanently marked to indicate whether they are graduated to contain or to deliver.*

2. *Graduates shall be either cylindrical or conical in shape. In the case of all cylindrical graduates the ratio of length of the graduated scale to the internal diameter shall not be less than five to one. In the case of conical graduates the ratio of length of the graduated scale to the internal diameter at the highest graduation shall be not less than two to one, and at one-fourth of the total capacity this ratio shall be not less than one to one.*

3. Graduates shall be made of good quality glass, thoroughly annealed, clear, transparent, of uniform but not excessive thickness, and free from bubbles and streaks.

4. Graduates shall be provided with a base at right angles to the axis *and of such a diameter that the graduate will stand when placed on a surface making an angle of 25 percent, or approximately 15°, with the horizontal.*

5. All graduates shall be provided with pouring lips.

6. The graduation marks shall be perpendicular to the axis and parallel to the base and to each other.

7. Main graduation marks are those indicating the principal subdivisions into which a graduate is divided, the value of which should readily be ascertainable in order to facilitate the reading of the graduate at any point on its scale. *All main graduation marks shall extend around the same proportional part of the circumference of the graduate. All graduation marks of this character shall be construed to be main graduation marks. These graduations shall extend at least one-half of the distance around the graduate: Provided, however, That on duplex, or double-scale, graduates a clear space shall be left between the ends of the main graduation marks on the two scales, and this space, measured parallel to the graduation marks, shall conform to the following values:*

Circumference of graduate at the graduation marks	Distance between ends of graduation marks Inch
Up to 5 inches	1/8 to 1/4
From 5 inches to 10 inches, inclusive	1/4 to 1/2
More than 10 inches	3/8 to 5/8

Intermediate graduation marks are those which extend around a smaller proportional part of the circumference of the graduate than do the main graduation marks, and when these are employed the graduations shall be varied in length in such a manner that the scale may be conveniently read, *but in no case shall any graduation mark extend less than one-fourth of the distance around the graduate.*

8. Graduation marks shall be clear and distinct and uniform in character. They shall be etched or engraved, *and shall not exceed 0.015 inch (0.38 mm) in width.* Blown or pressed graduation marks shall not be allowed.

9. *The clear interval between the graduation marks shall not be less than 0.04 inch (1 mm).*

10. The value of the main graduation marks shall be plainly designated, *each number being placed either directly upon or immediately above the graduation mark to which it refers,* but the position of the numbers shall be consistent throughout the graduated scale. *If placed upon the graduation marks, the numbers shall be placed from the ends a sufficient distance to allow the ends to be used in making a setting. Intermediate graduation marks shall not be numbered.*

11. *On all single-scale graduates, where the main graduation marks do not completely encircle the graduate, the middle points of the main graduation marks shall be directly opposite the lip. On duplex, or double-scale, graduates the center of the clear spaces between the ends of the main graduation marks, provided for in specification 7, shall be approximately 90° from the lip.*

TOLERANCES

The tolerances to be allowed in excess or deficiency on class graduates marked "to contain" shall be the values shown in the following tables; the tolerances to be allowed on graduates marked "to deliver" shall be 25 percent greater than the values given.

Note:—The tolerance to be used at any point on any graduate shall be determined by measuring the inside diameter of the graduate at the point under test and taking from the table the tolerance value corresponding to this diameter.

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Tolerance for Graduates of Various Diameters (Values Expressed in U. S. Customary Units)

Diameter			Tolerance
Inches	Sixteenths	Liquid drams	Minims
..	6	..	0.6
..	7	..	.8
..	8	..	1.0
..	9	..	1.3
..	10	..	1.6
..	11	..	2.0
..	12	..	2.5
..	13	..	3.0
..	14	..	3.5
..	15	..	4.0
1	0	..	5
1	1	..	6
1	2	..	6
1	3	..	7
1	4	..	8
1	5	..	9
1	6	..	10
1	7	..	11
1	8	..	12
1	9	..	14
1	10	..	15
1	11	..	16
1	12	..	17
1	13	..	19
1	14	..	21
1	15	..	22
2	0	..	24
2	1	..	26
2	2	..	28
2	3	..	30
2	4	..	32
2	5	..	34
2	6	..	36
2	7	..	39
2	8	..	41
2	9	..	44
2	10	..	47
2	11	..	49
2	12	..	52
2	13	..	55
2	14	..	58
2	15	1	2

Tolerance for Graduates of Various Diameters—*Cont.* (Values Expressed in U. S. Customary Units)

Diameter			Tolerance
Inches	Sixteenths	Liquid drams	Minims
3	0	1	5
3	1	1	8
3	2	1	12
3	3	1	15
3	4	1	18
3	5	1	21
3	6	1	24
3	7	1	27
3	8	1	31
3	9	1	34
3	10	1	38
3	11	1	41
3	12	1	44
3	13	1	47
3	14	1	51
3	15	1	55
4	0	2	0

Tolerance for Graduates of Various Diameters (Values Expressed in Metric Units)

Diameter	*Tolerance*	*Diameter*	*Tolerance*
Millimeters	Milliliters(a)	Millimeters	Milliliters(a)
10	0.04	56	1.9
11	.05	57	2.0
12	.06	58	2.0
13	.07	59	2.1
14	.08	60	2.2
15	.09	61	2.3
16	.10	62	2.4
17	.12	63	2.5
18	.14	64	2.6
19	.16	65	2.7
20	.18	66	2.8
21	.20	67	2.9
22	.22	68	3.0
23	.24	69	3.1
24	.26	70	3.2
25	.28	71	3.4
26	.30	72	3.5
27	.35	73	3.6
28	.35	74	3.7
29	.40	75	3.9
30	.45	76	4.0
31	.45	77	4.1
32	.50	78	4.2
33	.55	79	4.4
34	.60	80	4.5
35	.60	81	4.6
36	.65	82	4.8
37	.70	83	4.9
38	.75	84	5.0
39	.80	85	5.1
40	.85	86	5.2
41	.90	87	5.4
42	.95	88	5.5
43	1.00	89	5.6
44	1.05	90	5.7
45	1.10	91	5.9
46	1.15	92	6.0
47	1.25	93	6.1
48	1.30	94	6.2
49	1.35	95	6.4
50	1.4	96	6.5
51	1.5	97	6.6
52	1.6	98	6.8
53	1.6	99	6.9
54	1.7	100	7.1
55	1.8		

(a) The term milliliter, or "ml", is used herein to designate the one-thousandth part of the liter. This unit is also commonly known as the cubic centimeter, or the "cc." The latter is not an accurate usage, as the units are not exactly equal, but the difference between them is of no consequence for the purposes of this table, and therefore they may be used interchangeably.