Cal-Paks™

Troemner UltraClass, ANSI/ASTM E617 Class 1 and OIML R 111 Class E2 and F1

General Information

Troemner Cal-Paks™ contain (3) high quality, precision weights which can be used with all balance manufacturers' makes and models. The weights supplied are the balance manufacturers' recommended calibration weight, 10% of the calibration weight, and the minimum weight as determined by the balance's readability and expected standard deviation under normal conditions as recommended by USP 41 (United States Pharmacopeia).

Troemner Cal-Pak™ components and carrying case are linked through the use of a unique serial number. You can trace your individual weights to the appropriate NVLAP+ Accredited Certificate and master carrying case. The precision weights in your Cal-Pak™ are traceable to internationally recognized standards through an exacting series of precision measurements that provide an accurate value for each weight with low uncertainty. Troemner's NVLAP+ Accredited Certificate provides evidence that the process for the measurement traceability chain meets the stringent requirements of ISO/IEC 17025 and has been approved by NVLAP+.

Calibration Consistency - Troemner addresses every variable of our measurement process to ensure consistency of calibration results for your processes, products and services.

Alloy 8 Advantage - Troemner Alloy 8 Stainless Steel is the finest grade of stainless steel available. Alloy 8 possesses closely controlled density (8.03 g/cm^3), extremely low magnetic properties, good stability, and resistance to corrosion. Alloy 8 is available exclusively through Troemner.

Lowest Uncertainties - Troemner is committed to achieving the highest measurement capabilities and offering the lowest measurement uncertainties possible. The true test of how well we perform a calibration is in the reported uncertainty, which provides you a higher level of confidence.

Electronic Certificates

Your Cal-Pak™ includes a USB Flash Drive that contains your electronic NVLAP+ Accredited Certificate. The USB Flash Drive provides you with a paperless system for your certificates to be easily accessed and maintained over time. Return your flash drive each time you have your Cal-Pak™ recalibrated and we will add the new NVLAP+ Accredited Certificate to the flash drive. This green system provides you with a history of your weights all in one convenient place with no paper to keep on file. All the information is maintained on the Flash Drive so you can print the NVLAP+ Accredited Certificate when necessary.

Suggested Applications

Cal-Paks™ are used for routine maintenance of your balance. Troemner provides you with (3) weights that will allow you to cover the entire usable range of your balance. The maximum weight is used to calibrate the balance externally, the mid weight is 10% of the calibration weight to test the sensitivity of the balance, and the minimum weight is the lowest possible weight that can be weighed on your balance. The minimum weight was selected based on USP 41 test for minimum weight and the expected standard deviation of your balance at the minimum weight. The three weights will test the accuracy and linearity of your balance throughout its entire range.

Tolerance Classes

Refer to Troemner's Tolerance Chart on pages 19-21 for specific information on the tolerance of each weight in a given class. Troemner's Tolerance Chart is also available on www.troemner.com for additional reference.

+ NVLAP Laboratory Code 105013-0

Construction and General Shape

Troemner Cal-Paks™ are available in either Analytical Precision Weight or OIML Precision Weight styles. Each style differs in construction and shape as described below.

Milligram Weights - Both Analytical Precision Weights and OIML Precision Weights 500 mg and below are made of stainless steel or aluminum and are one-piece construction with one side turned up to make them easier to handle with forceps. Analytical Precision milligram weights are rectangular and all classes are marked with their nominal value. Each OIML Precision milligram weight's nominal value is determined by the shape of the weight according to the table below.

ANSI/ASTM E617 Milligram Weights

OIML R 111 Milligram Weights

Shape	Denomination
Pentagon	500 mg, 50 mg, 5 mg
Square	200 mg, 20 mg, 2 mg
Triangle	100 mg, 10 mg, 1 mg

Gram Weights - Analytical Precision Weights and OIML Precision Weights 1 g and larger consist of a body with a lifting knob. The lifting knob is specifically designed for use with forceps or some other lifting device. Weight bottoms are slightly recessed to expose the smallest possible area to wear. Each weight (except OIML R111 Class E2) is marked with its nominal value.

OIML R 111 class E2 weights 1 g and larger are of one-piece construction using Troemner Alloy 8 Stainless Steel which has a consistent density. One-piece construction indicates that the weight is manufactured from a single uniform piece of stainless steel or aluminum, the weight has no method of adjustment other than removing material by polishing.

All other weights 1 g and larger are produced from two pieces of material. The body of the weight is one piece and the knob is the second piece. The knob has a thread that screws into the body and is tightened. There is a cavity below the knob thread in the body which contains adjusting material, typically the same material from which the weight is made.

ANSI/ASTM E617 Gram Weight

OIML R 111 Gram Weight

Material Specifications

The table below describes the material used in the construction of Troemner ANSI/ASTM E617 and OIML R 111 Precision Weights.

Troemner UltraClass

Weight Range	Base Material	Density
1 g and larger	Troemner Alloy 8	8.03 g/cm³ at 20° C
5 mg — 500 mg	316 Stainless Steel	7.95 g/cm³ at 20° C
1 mg — 3 mg	3003-H14 Aluminum	2.7 g/cm³ at 20° C

Weights 1 g and larger are two-piece weights.
Milligram weights are one-piece weights.

ANSI/ASTM E617 Class 1

Weight Range	Base Material	Density
1 g and larger	316 Stainless Steel	7.95 g/cm³ at 20° C
5 mg — 500 mg	316 Stainless Steel	7.95 g/cm³ at 20° C
1 mg — 3 mg	3003-H14 Aluminum	2.7 g/cm³ at 20° C

Weights 1 g and larger are two-piece weights.
Milligram weights are one-piece weights.

OIML R 111 Class E2 and F1

Weight Range	Base Material	Density
Class E2 One-Piece Weights 1 g and larger	Troemner Alloy 8	8.0 g/cm3 at 20° C
Class F1 Two-Piece Weights 1 g and larger	316 Stainless Steel	7.95 g/cm3 at 20° C
Sheet Metal Weights 10 mg — 500 mg	316 Stainless Steel	7.95 g/cm3 at 20° C
Sheet Metal Weights 1 mg — 5 mg	3003-H14 Aluminum	2.7 g/cm3 at 20° C

Milligram weights are one-piece weights.

Surface Finish

All surfaces are to be finished to a perfect mirror like finish and conform to specifications in ANSI/ASTM E617 or OIML R 111. Surface finish specifications are available on www.troemner.com for additional reference.

Cal-Paks™

Troemner UltraClass and ANSI/ASTM E617 Class 1

Large Cal-Paks™

Troemner Cal-Paks™ where the largest weight is above 200 g are supplied in a rugged polypropylene case with each individual weight in its own high quality polycarbonate case (5 kg weights are set inside a foam insert within the master case). Accessories for proper care and handling of weights are also included.

Class 1 with NVLAP+ Accredited Certificate

Weight Set	5 kg	2 kg	1 kg	500 g	200 g	100 g	50 g	20 g	10 g	5 g	2 g	1 g	500 mg	200 mg	100 mg	50 mg	50 mg
5 kg — 20 g	1			1				1									
5 kg — 20 g*	1			1				1									
5 kg — 20 g	1				1			1									
5 kg — 20 g*	1				1			1									
5 kg — 2 g	1			1							1						
5 kg — 2 g*	1			1							1						
5 kg — 2 g	1				1						1						
5 kg — 2 g*	1				1						1						
2 kg — 20 g		1			1			1									
2 kg — 2 g		1			1						1						
1 kg — 20 g			1			1		1									
1 kg — 2 g			1			1					1						
500 g — 2 g				1			1				1						
500 g — 200 mg				1			1							1			

*5 kg is a grip handle weight

+ NVLAP Laboratory Code 105013-0

Small Cal-Paks™

Troemner Cal-Paks™ where the largest weight is 200 g and below are supplied in an attractive, durable, high quality, **patented** polycarbonate case with each individual weight in its own polycarbonate case. Accessories for proper care and handling of weights are also included.

Class 1 with NVLAP+ Accredited Certificate

Weight Set	200 g	100 g	50 g	20 g	10 g	5 g	2 g	1 g	500 mg	200 mg	100 mg	50 mg	20 mg	10 mg	5 mg	2 mg	1 mg
200 g — 2 g	1			1			1										
200 g — 200 mg	1			1						1							
100 g — 2 g		1			1		1										
100 g — 200 mg		1			1					1							
100 g — 20 mg		1			1								1				
50 g — 2 g			1			1	1										
50 g — 200 mg			1			1				1							
20 g — 200 mg				1			1			1							
20 g — 20 mg				1			1						1				

UltraClass with NVLAP+ Accredited Certificate

Weight Set	200 g	100 g	50 g	20 g	10 g	5 g	2 g	1 g	500 mg	200 mg	100 mg	50 mg	20 mg	10 mg	5 mg	2 mg	1 mg
5 g — 1 mg						1			1								1
2 g — 1mg							1			1							1

+ NVLAP Laboratory Code 105013-0

Cal-Paks™

OIML R 111 Class E2 and F1

Large Cal-Paks™

Troemner Cal-Paks™ where the largest weight is above 200 g are supplied in a rugged polypropylene case with each individual weight in its own high quality polycarbonate case (5 kg weights are set inside a foam insert within the master case). Accessories for proper care and handling of weights are also included.

Class F1 with NVLAP+ Accredited Certificate

Weight Set	5 kg	2 kg	1 kg	500 g	200 g	100 g	50 g	20 g	10 g	5 g	2 g	1 g	500 mg	200 mg	100 mg	50 mg	50 mg
5 kg — 20 g	1			1				1									
5 kg — 20 g	1				1			1									
5 kg — 2 g	1			1							1						
5 kg — 2 g	1				1						1						
2 kg — 20 g		1			1			1									
2 kg — 2 g		1			1						1						
1 kg — 20 g			1			1		1									
1 kg — 2 g			1			1					1						
500 g — 2 g				1			1				1						
500 g — 200 mg				1			1							1			
500 g — 20 mg				1			1										1

+ NVLAP Laboratory Code 105013-0

Small Cal-Paks™

Troemner Cal-Paks™ where the largest weight is 200 g and below are supplied in an attractive, durable, high quality, **patented** polycarbonate case with each individual weight in its own polycarbonate case. Accessories for proper care and handling of weights are also included.

Class F1 with NVLAP+ Accredited Certificate

Weight Set	200 g	100 g	50 g	20 g	10 g	5 g	2 g	1 g	500 mg	200 mg	100 mg	50 mg	20 mg	10 mg	5 mg	2 mg	1 mg
200 g — 2 g	1			1			1										
200 g — 200 mg	1			1						1							
100 g — 2 g		1			1		1										
100 g — 200 mg		1			1					1							
100 g — 20 mg		1			1								1				
50 g — 2 g			1			1	1										
50 g — 200 mg			1			1				1							
5 g — 1 mg						1			1								1
2 g — 1 mg							1			1							1

Class E2 with NVLAP+ Accredited Certificate

Weight Set	200 g	100 g	50 g	20 g	10 g	5 g	2 g	1 g	500 mg	200 mg	100 mg	50 mg	20 mg	10 mg	5 mg	2 mg	1 mg
5 g — 1 mg						1			1								1
2 g — 1 mg							1			1							1

+ NVLAP Laboratory Code 105013-0

Cal-Paks
Weight Sets

Weight	Class	Certificate Type	Part Number
2 g-1 mg	0	NVLAP Accredited Certificate	11967-14
5 g-1 mg	0	NVLAP Accredited Certificate	11967-17
50 g-200 mg	1	NVLAP Accredited Certificate	11967-07
50 g-2 g	1	NVLAP Accredited Certificate	11967-05
100 g-20 mg	1	NVLAP Accredited Certificate	11967-11
100 g-200 mg	1	NVLAP Accredited Certificate	11967-01
100 g-2 g	1	NVLAP Accredited Certificate	11967-02
200 g-200 mg	1	NVLAP Accredited Certificate	11967-06
200 g-2 g	1	NVLAP Accredited Certificate	11967-09
500 g-20 mg	1	NVLAP Accredited Certificate	11967-18
500 g-200 mg	1	NVLAP Accredited Certificate	11967-15
500 g-2 g	1	NVLAP Accredited Certificate	11967-10
1 kg-2 g	1	NVLAP Accredited Certificate	11967-12
1 kg-30 g	1	NVLAP Accredited Certificate	11967-03
2 kg-2 g	1	NVLAP Accredited Certificate	11967-08
2 kg-20 g	1	NVLAP Accredited Certificate	11967-04
5 kg Grip Handle-2 g	1	NVLAP Accredited Certificate	11967-36
5 kg-2 g	1	NVLAP Accredited Certificate	11967-16
5 kg Grip Handle-20 g	1	NVLAP Accredited Certificate	11967-37
5 kg-20 g	1	NVLAP Accredited Certificate	11967-13
5 kg Grip Handle-2 g	1	NVLAP Accredited Certificate	11967-39
5 kg-2 g	1	NVLAP Accredited Certificate	11967-38
5 kg Grip Handle-20 g	1	NVLAP Accredited Certificate	11967-41
5 kg-20 g	1	NVLAP Accredited Certificate	11967-40
20 g-20 mg	1	NVLAP Accredited Certificate	11967-34
20 g-200 mg	1	NVLAP Accredited Certificate	11967-35
2 g-1 mg	E2	NVLAP Accredited Certificate	11967-32
50 g-200 mg	F1	NVLAP Accredited Certificate	11967-25
50 g-2 g	F1	NVLAP Accredited Certificate	11967-23
100 g-20 mg	F1	NVLAP Accredited Certificate	11967-29
100 g-200 mg	F1	NVLAP Accredited Certificate	11967-19
100 g-2 g	F1	NVLAP Accredited Certificate	11967-20
200 g-200 mg	F1	NVLAP Accredited Certificate	11967-24
200 g-2 g	F1	NVLAP Accredited Certificate	11967-27
500 g-200 mg	F1	NVLAP Accredited Certificate	11967-33
500 g-2 g	F1	NVLAP Accredited Certificate	11967-28
1 kg-2 g	F1	NVLAP Accredited Certificate	11967-30
1 kg-20 g	F1	NVLAP Accredited Certificate	11967-21
2 kg-2 g	F1	NVLAP Accredited Certificate	11967-26
2 kg-20 g	F1	NVLAP Accredited Certificate	11967-22
5 kg-20 g	F1	NVLAP Accredited Certificate	11967-31