

# Troemner Alloy 8 Stainless Steel Precision Weights



*Precision & Balance Matched Only By Nature.*

## OIML R 111 Classes E1, E2, F1 and F2



**General Information** – Troemner OIML Precision Weights conform to the standards of the Organisation Internationale de Metrologie Legale International Recommendation (OIML R 111). They are manufactured from the finest stainless steels available including Troemner Alloy 8 Stainless Steel that has low magnetic permeability, uniform consistency and high resistance to corrosion. Troemner OIML Precision Weights are available in Classes E1, E2, F1 and F2, where Class E1 has the smallest tolerances and Class F2 has the largest tolerances. The letter “E” for Classes E1 and E2 refers to “extra fine” where the letter “F” for Classes F1 and F2 refers to “fine.” OIML R 111 weight specifications are designed

so the specifications on surface finish, markings, construction, material density and magnetic properties get more restrictive as the weight tolerances get smaller in order to enable the weight to maintain its tolerance over time. The tolerances for the various classes are established in a manner that enables weights of higher classes to calibrate weights of the next lowest class. For example, Class E2 weights can be used to calibrate Class F1 weights. Troemner OIML Precision Weights and Weight Sets are supplied with Troemner’s Statement of Accuracy, which details the date of calibration and accuracy class of each weight. If your laboratory requires more stringent documentation, please review the Weight Calibration Certificate Options section of this desk reference.

**\*\*Caution\*\*** Class E1 weights have extremely small tolerances and are intended to be used as primary reference standards with direct traceability to national reference standards. They should be used in extremely stable environments and handled with the highest level of care. Otherwise, Class E1 weights



## OIML R 111 Classes E1, E2, F1 and F2

will not maintain their measured value within the tolerance class. One may be tempted to purchase the weights with the tightest tolerances in order to reduce measurement uncertainty. However, frequency of use, care, handling, and environmental conditions all play a major role in long term stability of weights and these factors should be considered before purchasing Class E1 weights.

### **OIML R 111 Class Tolerances –**

Please see the Tolerance Chart within the Mass Standards Handbook in the back of this desk reference for specific information on the tolerances of each weight of a given OIML Class.

### **Construction and General Shape –**

As specified in OIML R 111, Troemner's OIML Precision Weights are available in one or two-piece construction.

- Troemner OIML Precision Weights 500 mg and below are made of sheet metal and are one-piece construction with one side turned up to make them easy to handle with forceps. Corners and edges are smooth. There are no markings permitted on any sheet metal weight 500 mg and below. The nominal value of weights 500 mg and below are determined by the shape of the weight according to the following table.

SHAPE	DENOMINATION
Pentagon	500 mg, 50 mg, 5 mg
Square	200 mg, 20 mg, 2 mg
Triangle	100 mg, 10 mg, 1 mg

- Weights 500 mg and below are also available in wire construction as opposed to sheet metal with the same shape configuration as listed in the above table. Troemner's OIML wire weights have one end turned up as well to allow for easy handling with forceps. Contact a Troemner sales representative for more information on wire milligram weights. To order wire milligram weights, specify the Troemner part number in the table at the end of this section followed by "-WIRE."
- Weights 1 g and above can be either one or two-piece construction. Troemner OIML Precision Weights 1 g and larger are cylindrical in shape with a tapered neck for easy gripping. They are perfectly flat on top to stack easily on center. Weight bottoms are slightly recessed to expose the smallest possible area to wear.



- One-piece construction indicates the weight is manufactured from a single uniform piece of raw material, the weight has no other material added to it, and it has no method of adjustment other than removing material by grinding or polishing. One-piece weights are difficult to manufacture as the only method of final adjustment is removing material by fine grinding, polishing or electro-polishing. Class E1 and E2 weights 1 g and larger are cylindrical in shape and are of one-piece construction.



Sizeable flat top surface that allows for stacking

Tapered neck allows for easy handling by hand or lifter

Highly polished mirror like finish allows scratches and foreign matter on the weight to be seen easily

Bottom of weights are recessed which reduces wear



## OIML R 111 Classes E1, E2, F1 and F2



- Two-piece construction indicates that the weight is constructed of multiple pieces of raw material. In the case of Troemner OIML Precision Weights, this means that the weight body is constructed from one piece of material and the lifting knob or head is constructed from a different piece of raw material. Although the head and body may come from different bars of raw material, they are the same grade and type of raw material with the same densities. The knob or head typically screws into the body and one can barely tell the weight is not constructed of one piece of material. There is a cavity below the knob thread in the body, which contains adjusting material that is typically the same material from which the weight is made. Class F1 and F2 weights 1 g and larger are cylindrical in shape and are of two-piece construction.

- The table below describes the material used in the construction of all of Troemner's OIML Precision Weights.

**Surface Finish** – All surfaces are polished to a perfect, mirror like finish and meet or exceed OIML R 111 specifications. For OIML R 111 surface finish specifications see the Mass Standards Handbook in the back of this desk reference.

### Suggested Applications –

- Class E1 weights are intended for use in metrology laboratories as primary reference standards where the stability of the environment and careful handling are assured. Although very stable, one-piece construction Class E1 weights have no method of adjustment and are not suitable for general laboratory use.
- Class E2 weights can be also be used as reference standards as well as calibrating Class I balances as specified in OIML R 76. Class E2 weights can also be used to calibrate Class F1 weights.
- Class F1 weights can be used to calibrate certain Class I balances and scales as specified in OIML R 76. Class F1 weights can also be used to calibrate Class F2 weights.
- Class F2 weights can be used to calibrate weighing instruments for important commercial transactions like gold and precious stones. They can also be used to calibrate Class M2 weights.

DESCRIPTION	BASE MATERIAL	DENSITY
Sheet Metal Weights 500 mg—10 mg	316 Stainless Steel	7.95 g/cm <sup>3</sup> at 20° C
Sheet Metal Weights 5 mg—1 mg	Aluminum	2.7 g/cm <sup>3</sup> at 20° C
Class E1 & E2 One Piece Weights 1 g and larger	Troemner Alloy 8	8.0 g/cm <sup>3</sup> at 20° C
Class F1 & F2 Two Piece Weights 1 g—1 kg	Troemner Alloy 8	8.0 g/cm <sup>3</sup> at 20° C
Class F1 & F2 Two Piece Weights above 1 kg	316 Stainless Steel	7.95 g/cm <sup>3</sup> at 20° C

# OIML R 111 Classes E1, E2, F1 and F2

**Presentation** – All Troemner OIML Precision Weight Sets are supplied in protective cases.

- Weight sets where the largest weight in the set is 200 g and lower are supplied in attractive, durable polypropylene cases with a compartment for each weight within the case. There is also a compartment for forceps. The cases are designed so that each weight will stay in its compartment. A wood case may be substituted for the polypropylene case for an extra charge.



- Troemner weight sets 500 g and larger are supplied in wood cases. Within the interior of the wood case is contained a polypropylene case to hold weights 200 g and below with compartments for each weight. For weights larger than 200 g, a velvet lined compartment for each weight exists within the wood case. There are also compartments for lifters and forceps supplied with each weight set.
- Troemner supplies appropriate lifting devices such as forceps, gloves and other lifting forks sufficient to handle every weight in the set.

- Individual weights are supplied in polypropylene cases. For weights larger than 5 kg, weight cases have reinforced corners.
  - Wood cases for individual weights are available for an extra charge. The wood cases feature a fine wood exterior with an interior compartment that is either fully lined with padded velvet or velour for the weight or the case has a foam interior.
- \*\*Caution\*\*** Weight cases are not intended to be used as shipping containers. When you ship your weights to be calibrated, the weights and weight sets must be overpacked in larger containers and/or cartons to protect your weight cases.

**Weight Set Configuration Information** – Troemner OIML Weight Sets are supplied in a 5-2-2-1 series. 5-2-2-1 series means that weights beginning with a “2” are doubled in each decade and weights beginning with a “5” and “1” are single in each decade. For example, for a set with 5-2-2-1 series from 50 g to 1 g, there is one 50 g, two 20 g, one 10 g, one 5 g, two 2 g, and one 1 g. The OIML Weight Sets Configuration Table that follows shows the contents of each set.



## *Hummingbird Help*

Do you need a Density Determination Calibration or Magnetic Susceptibility Determination Calibration for your primary standards? Ask a Troemner sales representative for more information about these certificate options.



# OIML R 111 Classes E1, E2, F1 and F2

## OIML WEIGHT SETS CONFIGURATION TABLE


		1 mg	2 mg	5 mg	10 mg	20 mg	50 mg	100 mg	200 mg	500 mg	1 g	2 g	5 g	10 g	20 g	50 g	100 g	200 g	500 g	1 kg	2 kg	5 kg	10 kg	20 kg	
Weight Set	Part #																								
500 mg—1 mg	7440	1	2	1	1	2	1	1	2	1															
5 g—1 mg	7441	1	2	1	1	2	1	1	2	1	1	2	1												
50 g—1 mg	7433	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1									
50 g—1 g	7429										1	2	1	1	2	1									
100 g—1 mg	7428	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1								
100 g—1 g	7424										1	2	1	1	2	1	1								
200 g—1 mg**	7423	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2							
200 g—1 g**	7422										1	2	1	1	2	1	1	2							
200 g—1 mg	7421	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	1							
200 g—1 g	7420										1	2	1	1	2	1	1	1							
500 g—1 mg	7419	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1						
500 g—1 g	7418										1	2	1	1	2	1	1	2	1						
1 kg—1 mg	7417	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1					
1 kg—1 g	7416										1	2	1	1	2	1	1	2	1	1					
2 kg—1 mg*	7415	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2				
2 kg—1 g*	7414										1	2	1	1	2	1	1	2	1	1	2				
2 kg—1 mg	7413	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	1				
2 kg—1 g	7412										1	2	1	1	2	1	1	2	1	1	1				
5 kg—1 mg	7411	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1			
5 kg—1 g	7410										1	2	1	1	2	1	1	2	1	1	2	1			
5 kg—1 kg	7442																			1	2	1			
10 kg—1 mg	7409	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1		
10 kg—1 g	7408										1	2	1	1	2	1	1	2	1	1	2	1	1		
20 kg—1 mg	7407	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	1	1
20 kg—1 g	7406										1	2	1	1	2	1	1	2	1	1	2	1	1	1	1

\*Weight Set contains two 2 kg weights  
 \*\*Weight Set contains two 200 g weights



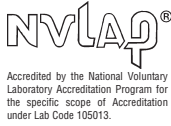
## OIML R 111 Classes E1, E2, F1 and F2

**Ordering a Certificate with your Weight or Weight Set** – There is a choice of certificates available for your Troemner OIML Precision Weights or Weight Sets to meet your traceability and compliance needs. Complete information on our calibration certificates is located in the Weight Calibration Certificate Options section of this desk reference. Sample certificates are available for viewing on our website at [www.troemner.com](http://www.troemner.com).

- Weights and Weight Sets supplied without weight certificates come with **Troemner's Statement of Accuracy**.
- To order **Troemner's NVLAP Weight Calibration Certificate**, specify the Troemner part number using the table at the end of this section followed by "W."
- To order **Troemner's UKAS Certificate of Calibration**, specify the Troemner part number followed by "NA."  No. 0516
- To order **Troemner's Traceable Certificate**, specify the Troemner part number followed by "T."
- To order **Troemner's Mass Code Report of Mass Values**, specify the Troemner part number followed by "M."



- To order **Troemner's NVLAP Density Determination Calibration Certificate** for one-piece construction Weights and Mass Standards, specify the Troemner part number of the weight or weight set and also include part number WDC-1111. Visit our website at [www.troemner.com](http://www.troemner.com) to view our NVLAP Density Determination Calibration Certificate.



- To order **Troemner's NVLAP Magnetic Susceptibility Determination Calibration Certificate** for one-piece construction Weights and Mass Standards, specify the Troemner part number of the weight or weight set and also include part number MAGCAL-1111. Visit our website at [www.troemner.com](http://www.troemner.com) to view our NVLAP Magnetic Susceptibility Determination Calibration Certificate.



## OIML R 111 Classes E1, E2, F1 and F2

OIML INDIVIDUAL WEIGHTS				
Weight	Class E1* Part #	Class E2* Part #	Class F1 Part #	Class F2 Part #
1 mg	7537-E1P	7537-E2P	7537-F1P	7537-F2P
2 mg	7536-E1P	7536-E2P	7536-F1P	7536-F2P
5 mg	7534-E1P	7534-E2P	7534-F1P	7534-F2P
10 mg	7533-E1P	7533-E2P	7533-F1P	7533-F2P
20 mg	7532-E1P	7532-E2P	7532-F1P	7532-F2P
50 mg	7530-E1P	7530-E2P	7530-F1P	7530-F2P
100 mg	7529-E1P	7529-E2P	7529-F1P	7529-F2P
200 mg	7528-E1P	7528-E2P	7528-F1P	7528-F2P
500 mg	7526-E1P	7526-E2P	7526-F1P	7526-F2P
1 g	7525-E1P	7525-E2P	7525-F1P	7525-F2P
2 g	7524-E1P	7524-E2P	7524-F1P	7524-F2P
5 g	7522-E1P	7522-E2P	7522-F1P	7522-F2P
10 g	7521-E1P	7521-E2P	7521-F1P	7521-F2P
20 g	7520-E1P	7520-E2P	7520-F1P	7520-F2P
50 g	7518-E1P	7518-E2P	7518-F1P	7518-F2P
100 g	7517-E1P	7517-E2P	7517-F1P	7517-F2P
200 g	7516-E1P	7516-E2P	7516-F1P	7516-F2P
500 g	7514-E1P	7514-E2P	7514-F1P	7514-F2P
1 kg	7513-E1P	7513-E2P	7513-F1P	7513-F2P
2 kg	7512-E1P	7512-E2P	7512-F1P	7512-F2P
5 kg	7510-E1P	7510-E2P	7510-F1P	7510-F2P
10 kg	7509-E1P	7509-E2P	7509-F1P	7509-F2P
20 kg	7508-E1P	7508-E2P	7508-F1P	7508-F2P
50 kg	7505-E1	7505-E2	7505-F1	7505-F2

OIML WEIGHT SETS				
Weight Set	Class E1* Part #	Class E2* Part #	Class F1 Part #	Class F2 Part #
500 mg—1 mg	7440-E1P	7440-E2P	7440-F1P	7440-F2P
5 g—1 mg	7441-E1P	7441-E2P	7441-F1P	7441-F2P
50 g—1 mg	7433-E1P	7433-E2P	7433-F1P	7433-F2P
50 g—1 g	7429-E1P	7429-E2P	7429-F1P	7429-F2P
100 g—1 mg	7428-E1P	7428-E2P	7428-F1P	7428-F2P
100 g—1 g	7424-E1P	7424-E2P	7424-F1P	7424-F2P
200 g—1 mg**	7423-E1P	7423-E2P	7423-F1P	7423-F2P
200 g—1 g**	7422-E1P	7422-E2P	7422-F1P	7422-F2P
200 g—1 mg	7421-E1P	7421-E2P	7421-F1P	7421-F2P
200 g—1 g	7420-E1P	7420-E2P	7420-F1P	7420-F2P
500 g—1 mg	7419-E1	7419-E2	7419-F1	7419-F2
500 g—1 g	7418-E1	7418-E2	7418-F1	7418-F2
1 kg—1 mg	7417-E1	7417-E2	7417-F1	7417-F2
1 kg—1 g	7416-E1	7416-E2	7416-F1	7416-F2
2 kg—1 mg*	7415-E1	7415-E2	7415-F1	7415-F2
2 kg—1 g*	7414-E1	7414-E2	7414-F1	7414-F2
2 kg—1 mg	7413-E1	7413-E2	7413-F1	7413-F2
2 kg—1 g	7412-E1	7412-E2	7412-F1	7412-F2
5 kg—1 mg	7411-E1	7411-E2	7411-F1	7411-F2
5 kg—1 g	7410-E1	7410-E2	7410-F1	7410-F2
5 kg—1 kg	7442-E1	7442-E2	7442-F1	7442-F2
10 kg—1 mg	7409-E1	7409-E2	7409-F1	7409-F2
10 kg—1 g	7408-E1	7408-E2	7408-F1	7408-F2
20 kg—1 mg	7407-E1	7407-E2	7407-F1	7407-F2
20 kg—1g	7406-E1	7406-E2	7406-F1	7406-F2

\*Weight Set contains two 2 kg weights

\*\*Weight Set contains two 200 g weights

\* Density certification is highly recommended for one-piece weights (Class E1 and E2) used as reference standards. To order Troemner's NVLAP Density Determination Calibration Certificate include part number WDC-1111.



### Weight Selector

TROEMNER

Troemner's online Weight Selector takes the guess work out of choosing the correct weight for your application. Visit us at [www.troemner.com](http://www.troemner.com) and let us help you find exactly what you need.

## OIML R 111 Classes E1, E2, F1 and F2

**Accessories** – Troemner can provide you with all the accessories you need to properly handle and protect your OIML Precision Weights and Weight Sets. Please

contact us for specific information on new cases, replacement cases, or special cases you need to store and protect your OIML Precision Weights and Weight Sets.



OIML WEIGHT ACCESSORIES	
Description	Part #
<b>Forceps</b>	
240 mm Stainless Steel Forceps with silicone tips for lifting 1 g-1 kg weights	WA439
165 mm Stainless Steel Forceps with silicone tips for lifting 1 g-200 g weights	WA438
100 mm Stainless Steel Forceps with silicone tips for lifting 1 mg-100 g weights	WA437
Plastic Forceps for 1 mg to 100 g Precision Weights	WA056
<b>Weight Lifters &amp; Forks</b>	
Weight Fork to lift 500 g or 1 kg OIML Precision Weights	WA449
Weight Fork to lift 2 kg OIML Precision Weights	WA450
Weight Fork to lift 5 kg OIML Precision Weights	WA451
Weight Fork to lift 10 kg OIML Precision Weights	WA452
T-Handle Lifter to lift 500 g or 1 kg OIML Precision Weights	WA444
T-Handle Lifter to lift 2 kg OIML Precision Weight	WA445
T-Handle Lifter to lift 5 kg OIML Precision Weight	WA446
Weight Lifter to lift 10 kg OIML Precision Weight	WA447
Weight Lifter to lift 20 kg OIML Precision Weight	WA448
<b>Brushes</b>	
Extra large 250 mm Brush - 25 mm diameter brush head	WA443
Large 150 mm Brush - 20 mm diameter brush head	WA442
Medium 115 mm Brush - 10 mm diameter brush head	WA441
Small 100 mm Brush - 5 mm diameter brush head	WA440
<b>Gloves</b>	
Leather Glove (Specify left or right)	WA436
Cotton Glove (Single glove, fits either hand)	WA061
<b>Weight Dolly</b>	
Weight Dolly - 400 kg capacity	WA015