

# OXFORD

CALIBRATION WEIGHTS

CLASS E1, E2, F1 and F2



## TECHNICAL INFORMATION

### EuroCal Calibration Services

- Balance service and calibration
- Weight calibration
- Pipette service and calibration

## **OXFORD WEIGHTS**

### **GENERAL SPECIFICATION**

Oxford weights are manufactured to OIML specifications, these details mainly refer to class E1, E2, F1 and F2.

The gram and kg E1, E2 and F1 weights are manufactured from stainless steel and have a polished finish. Fractional weights are stainless steel and below 10mg aluminium. Class F2 weights are stainless steel and have a fine papered finish.

The shape of the weights from 1g is cylindrical with knob and handle. Class F1 and F2 have an adjusting cavity closed by the screw knob. Class E1 and E2 weights have no adjusting cavity. The base of the weights is recessed. The 10kg and 20kg weights are also available with a recessed handle.

The class F1 and F2 weights bear numbers indicating the nominal value, but class E1 and E2 weights are unmarked. Fractional weights are polygonal and are turned up at the edge for easy handling with tweezers.

Weight sets are housed in wooden boxes (with the exception of the mg sets and F2 1mg-100g which are plastic) and are supplied with tweezers and or gloves for handling. Duplicated weights are marked with a dot and weight composition is according to OIML recommendations mainly 5-2-2-1 composition. The boxes have a label indicating the class of the weights and if certification is required a serial number.

Individual class E1, E2 and F1 weights from 1g upwards are supplied in either plastic or optional wooden boxes with glove and where certification is required, there is a serial number. Fractional weights are supplied in plastic boxes with tweezers. Class F2 weights from 1g to 5kg are supplied in plastic boxes. Individual 10kg and 20kg weights are in either wooden or plastic boxes with reinforced corners or edges.

## **OXFORD WEIGHTS**

### **WEIGHT CALIBRATION**

In our environmentally controlled metrology laboratory, according to strict quality procedures we calibrate OIML Class E2 weights and below under our UKAS Accreditation No. 0438. This certification will satisfy all quality assurance requirements. We also provide a calibration service to UKAS for OIML Class E1.

### **CALIBRATION INTERVAL**

Weights should be regularly checked and records kept. The frequency will depend on your quality system or the amount of use and environment they are used in. As a general rule if the weights are used several times a week, they should be checked every year. If they are used infrequently, usually every two years may be acceptable. If the weights are for a UKAS application the calibration interval is specified.

### **CARE OF WEIGHTS**

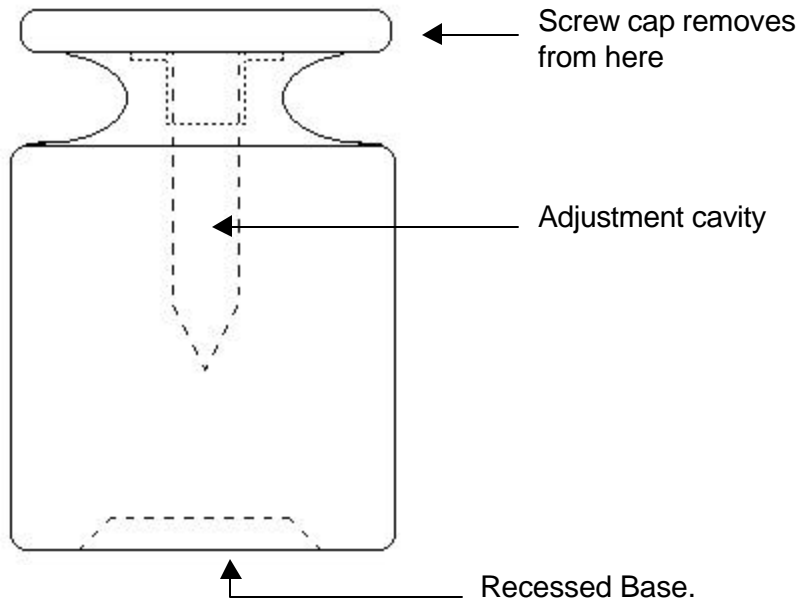
High precision weights should never be handled with bare hands. Always use suitable tipped tweezers, handling fork, chamois leather or smooth cotton gloves. Do not stand or slide them across a hard surface. Whenever possible stand them on acid free tissue paper.

When not in use weights should be kept in an enclosed container or box at normal working temperature.

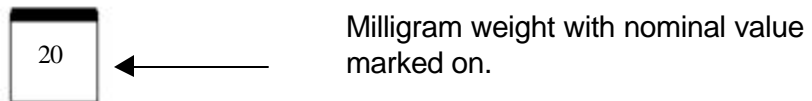
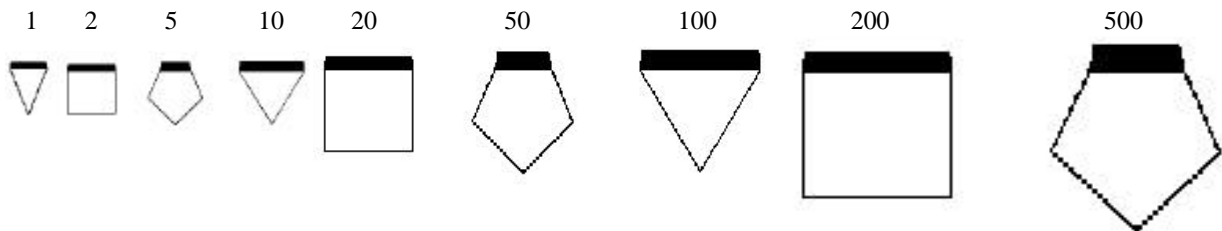
Weights should only be cleaned by dusting down with a hair brush. In the event of contamination, they should be cleaned with pure methanol and lightly polished with a chamois leather, but it is advisable that the calibration is rechecked afterwards.

### Oxford Weights

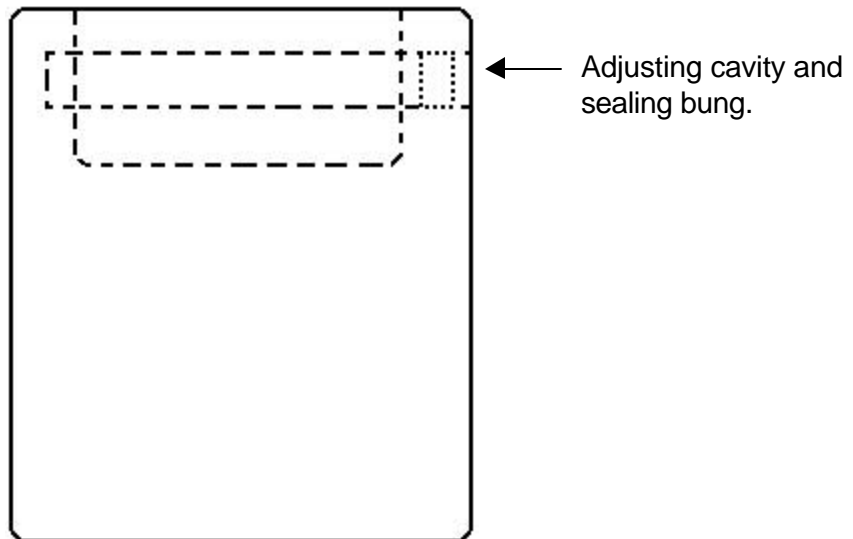
Class F1 shape showing adjusting cavity and screw cap.  
Class E2 are the same shape but without adjusting cavity or the screw cap.



### Milligram weights



Class F1  
10kg and 20kg  
weights with  
recessed handle.



# **OXFORD WEIGHTS**

## **WEIGHTS FOR BALANCE RE-CALIBRATION**

Re-calibration is the method of adjusting the span of the balance using an external mass which is placed on the balance pan and then activating the calibration mode. The balance then accepts the weight on the pan as the precise nominal value. It is important that the correct class of weight should be used, which would depend on the readability of the balance, otherwise unacceptable errors may be introduced. As a general guideline the following is recommended (except for balances which allow the measured value of the weight to be entered via the keyboard).

- E2 These are recommended for the re-calibration of micro, semi-micro and analytical balances where very high accuracy is required.
- F1 These are recommended for the re-calibration of analytical and precision, top loading balances which generally have a readability of 1mg to 0.1g. Also for balances with a readability of 0.1g which calibrate at below half capacity.
- F2 These are recommended for the re-calibration of balances with a readability of 0.1g if the calibration is at half capacity or above.

## **CERTIFICATION TEST**

When carrying out a full calibration we recommend the following class of weights be used, which is based as near as practical to the UKAS recommendation.

READABILITY OF:-	M1	F2	F1	E2
1g	<100kg	150kg	150kg	-
100mg	<10kg	35kg	<100kg	-
10mg	<1kg	3kg	<10kg	-
1mg	<100g	300g	<1kg	<10kg
0.1mg	<100mg	<5g	<100g	<5kg
0.01mg			<100mg	<1kg

**NOTE:** this is not a complete list.

## OXFORD WEIGHTS

### NATIONAL AND INTERNATIONAL DEFINITIONS

<b>ASTM</b>	‘American Society for Testing and Materials’.
<b>BIPM</b>	‘International Bureau of Weights and Measures’. This is in France and holds the Prototype International Kilogram.
<b>BSI</b>	‘British Standards Institute’. Many of its standards are recognised though out the EC and other parts of the world.
<b>CEN</b>	‘European Committee for Standardisation’. Also known as EN.
<b>CLAS</b>	‘Campden Laboratory Assessment Scheme’.
<b>GLP</b>	‘Good Laboratory Practice’. This is a compliance programme in accordance with the Department of Health based on the OECD recommendations.
<b>ISO</b>	‘International Organisation for Standardisation’.
<b>NACCB</b>	‘National Accreditation of Certification Bodies’.
<b>NIST</b>	‘National Institute of Standards Technology’. This is the USA and maintains the national standard of the United States, formerly ‘National Bureau of Standards’ (NBS).
<b>NPL</b>	‘National Physical Laboratory’. This is located in Teddington in the United Kingdom and is responsible for maintaining the standards of mass in the UK
<b>NWML</b>	‘National Weights and Measures Laboratory’ who control Local Trading Standards in the UK
<b>OIML</b>	‘Organisation Internationale de Metrologie Legale’ this is widely recognised throughout the world including the United States and EC countries.
<b>UKAS</b>	‘United Kingdom Accreditation Service’

All OIML mass standards originate from the International Prototype Kilogram maintained at the International Bureau of Weights and measures (BIPM) in Paris. The NPL has the custody of copy number 18 of the prototype, being of the same form and material, and this is returned to BIPM periodically for re-calibration.

## **MAXIMUM PERMISSIBLE ERRORS ON VERIFICATION**

The maximum permissible error on initial verification for each individual weight is given in the table below.

Nominal Values of Mass	Class E1 mg	Class E2 mg	Class F1 mg	Class F2 mg	Class M1 mg
50 kg	25	75	250	750	2500
20 kg	10	30	100	300	1000
10kg	5	15	50	150	500
5 kg	2.5	7.5	25	75	250
2kg	1.0	3.0	10	30	100
1 kg	0.50	1.5	5	15	50
500 g	0.25	0.75	2.5	7.5	25
200 g	0.10	0.30	1.0	3.0	10
100 g	0.05	0.15	0.5	1.5	5
50 g	0.030	0.10	0.30	1.0	3.0
20 g	0.025	0.080	0.25	0.8	2.5
10 g	0.020	0.060	0.20	0.6	2.0
5 g	0.015	0.050	0.15	0.5	1.5
2 g	0.012	0.040	0.12	0.4	1.2
1 g	0.010	0.030	0.10	0.3	1.0
500 mg	0.008	0.025	0.08	0.25	0.8
200 mg	0.006	0.020	0.06	0.20	0.6
100 mg	0.005	0.015	0.05	0.15	0.5
50 mg	0.004	0.012	0.04	0.12	0.4
20 mg	0.003	0.010	0.03	0.10	0.3
10 mg	0.002	0.008	0.025	0.08	0.25
5 mg	0.002	0.006	0.020	0.06	0.20
2 mg	0.002	0.006	0.020	0.06	0.20
1 mg	0.002	0.006	0.020	0.06	0.20

## OXFORD STAINLESS STEEL CALIBRATION WEIGHTS

CLASS kg WEIGHTS	F2 CAT No.	F1 CAT No.	E2 CAT No.	E1 CAT No.
20kg	7508-F2P	7508-F1P	7508-E2P	7508-E1P
10kg	7509-F2P	7509-F1P	7509-E2P	7509-E1P
5kg	7510-F2P	7510-F1P	7510-E2P	7510-E1P
2kg	7512-F2P	7512-F1P	7512-E2P	7512-E1P
1kg	7513-F2P	7513-F1P	7513-E2P	7513-E1P
CLASS g WEIGHTS	F2 CAT No.	F1 CAT No.	E2 CAT No.	E1 CAT No.
500g	7514-F2P	7514-F1P	7514-E2P	7514-E1P
200g	7516-F2P	7516-F1P	7516-E2P	7516-E1P
100g	7517-F2P	7517-F1P	7517-E2P	7517-E1P
50g	7518-F2P	7518-F1P	7518-E2P	7518-E1P
20g	7520-F2P	7520-F1P	7520-E2P	7520-E1P
10g	7521-F2P	7521-F1P	7521-E2P	7521-E1P
5g	7522-F2P	7522-F1P	7522-E2P	7522-E1P
2g	7524-F2P	7524-F1P	7524-E2P	7524-E1P
1g	7525-F2P	7525-F1P	7525-E2P	7525-E1P
CLASS mg WEIGHTS	F2 CAT No.	F1 CAT No.	E2 CAT No.	E1 CAT No.
500mg	7526-F2P	7526-F1P	7526-E2P	7526-E1P
200mg	7528-F2P	7528-F1P	7528-E2P	7528-E1P
100mg	7529-F2P	7529-F1P	7529-E2P	7529-E1P
50mg	7530-F2P	7530-F1P	7530-E2P	7530-E1P
20mg	7532-F2P	7532-F1P	7532-E2P	7532-E1P
10mg	7533-F2P	7533-F1P	7533-E2P	7533-E1P
5mg	7534-F2P	7534-F1P	7534-E2P	7534-E1P
2mg	7536-F2P	7536-F1P	7536-E2P	7536-E1P
1mg	7537-F2P	7537-F1P	7537-E2P	7537-E1P
CLASS WEIGHT SETS	F2 CAT No.	F1 CAT No.	E2 CAT No.	E1 CAT No.
1mg - 500mg	7440-F2P	7440-F1P	7440-E2P	7440-E1P
1mg - 100g	7428-F2P	7440-F1	7440-E2	7440-E1
1g - 1kg	7416-F2	7416-F1	7416-E2	7416-E1
1g - 2kg	7414-F2	7414-F1	7414-E2	7414-E1
1g - 5kg	7410-F2	7410-F1	7410-E2	7410-E1
1g - 10kg	7408-F2	7408-F1	7408-E2	7408-E1

N.B.

- 1) all individual weights are supplied in plastic cases with glove or tweezers. Weight sets with the exception of the fractional sets are in wooden boxes.
- 2) Fractional weight sets will fit into the larger weight set boxes when required.
- 3) Weights below 10mg are aluminium.