

**GOOD PRACTICE GUIDE**

# **CLEANING, HANDLING AND STORAGE OF WEIGHTS**



# CLEANING, HANDLING AND STORAGE

## CLEANING WEIGHTS

If well handled, under ideal conditions, mass standards and other precision weights should not become contaminated and would never need cleaning. In practice, however, weights are sometimes submitted for calibration in a dirty condition and must be cleaned before calibration. If cleaning is necessary it is good practice for the weights to be calibrated both before and after cleaning if the weight is in a suitable condition and the customer is agreeable to this. This gives the user some knowledge of the value of the weights at the time they were submitted for calibration.

When not in use weights should be stored under cover to keep them as free from contamination as possible.

## OIML Class E1 to Class F2 weights

Before weights are used, brush the weights with a clean soft brush to remove dust particles or blow particles off with a small bulb-type puffer blower. Be sure to check the bottom of each weight to remove any dust or fibres from the lining material of the box. If you use a brush, do not touch the bristles with bare hands. When brushes are laid down, place them so that the bristles do not touch anything. Store brushes in clean containers between use. Clean brushes regularly in soapy water and then rinse several times in freshly made ultra pure water.

## OIML M Class weights

OIML M Class weights should be cleaned with a stiff brush to remove any loose material. Contaminants on the surface of the weights, e.g. rust, can be removed with a wire brush. Sand-blasting the weights will remove all surface coatings after which the weights should be coated with a suitable paint.

## HANDLING WEIGHTS

Proper handling of weights is important to the conservation of that weight as a measurement standard. Appropriate handling methods must be used to ensure that the weight is not damaged in use and is not contaminated by handling.

When handling weights wear special gloves to prevent contamination of the weight surface from skin acids, and to reduce the effects of heat from the operator's hand. For high class weights soft chamois leather gloves may be used, providing that they have been washed several times before use and then regularly afterwards. Washing removes dirt, oils and also chemicals which may have been used in the manufacture of the gloves. For lower class weights clean cotton gloves can be used.

Gloves should ideally be used to handle M Class weights, but cast-iron weights may also be handled with clean dry hands.

A wide range of handling devices, special pronged lifters and tweezers are now available commercially. Any lifting device should be covered with a suitable material, such as clean chamois leather, so that metal surfaces do not come into contact with the

weight. Larger tweezers help to distance the weight and the balance or mass comparator from the heat of the operator's hand.

Care is required in the use of plastic tipped tweezers. The plastic easily wears and may allow contact with the metal of the tweezers tips. Additionally, some



plastic tipped tweezers can become contaminated with dirt, which is then transferred on to weights which are being handled.

When using weights, it is essential to prevent damage to the surface of weights through metal-to-metal contact, either with other weights or with the load receptor of balances or mass comparators. Acid-free tissue paper may be used to stand weights on when in use. Weights should not be



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stacked on top of each other (special stacking weights are manufactured which, although they do not eliminate the problem of contact, greatly reduce the effects - they should always

be brushed with a clean brush to prevent dirt particles from causing damage when the weights are stacked together).

## STORAGE OF WEIGHTS

Precision mass standards are normally maintained in storage cupboards, where they can be protected from dust and atmospheric pollution by glass covers.

However, when transported for calibration or used outside the laboratory, weights should be contained in specially-built boxes. Wood, such as mahogany, is the traditional material for the manufacture of such boxes: acidic woods, such as oak, and the use of animal or vegetable glue should not be permitted. Some modern plastic materials are also used for weight boxes.

Boxes should have individual compartments for each weight, with the holes for larger cylindrical weights being lined with a material which has been washed and is chemically inert and which does not shed fibres whilst in use. Each weight should fit in its respective hole, neither too tightly or too loosely (tight fitting weights

can have their surface damaged through repeated insertion into the hole).

When not being transported between sites, it is recommended that the weights are removed from their transit boxes. Larger standard weights can be placed under a simple bell jar, with a granite or non-magnetic stainless steel base. The weights should not rest directly on the granite or stainless steel base plate, but should be placed on to sheets of clean acid-free tissue paper (other papers, including filter paper are not suitable, as chemicals may have been used in their manufacture). Smaller weights can often be stored in the balance case, sat on acid-free tissue paper, covered with a simple glass cover. It is often safer and more convenient to leave fractional weights in their storage box.

Cast iron weights should ideally also be stored on weights retaining trays with detachable covers. The trays can even be made to allow the set of weights to be moved by a fork-lift truck or crane. Where weights are

routinely used outside for the calibration of weighing machines, special precautions need to be taken to avoid corrosion of the surface of the weight (this can lead to a change in mass of several times the calibration uncertainty). If the weights become damp they should be wiped with a dry clean cloth prior to storage in a well ventilated area. If possible the weights retaining tray should be perforated to allow ventilation to all sides including the base of the weights. Weights used for the testing of weighbridges and other heavy weighing machines, and which are routinely transported and stored on special testing vehicles, should likewise be wiped to dry them off if they are used in a damp atmosphere. The special testing vehicle should be provided with a roof or canopy which keeps the weights covered during transit, but allows good ventilation over the surface of the weights to maintain a stable atmosphere where surface corrosion can be minimized.



## CLEANING OF WEIGHTS

The following cleaning methods are easy to use and can be repeatedly undertaken without producing significant mass changes after the initial removal of dirt (before cleaning, remember to calibrate the weights to get a value which can be compared with the previous mass value):

**For weights of OIML Class E1 and E2**, and for solid weights of other classes (except lacquered brass weights, cast iron weights and weights of less than 10 mg) two methods of cleaning give good results: ultrasonic cleaning using acetone or boiling in pure water. Weights may also be cleaned by gently wiping in one direction with a pure suitable alcohol.

**Weights of Classes F1 to M1** (except lacquered brass weights, cast iron weights and weights of less than 10 mg) may be cleaned by partial immersion and stroking in acetone, followed by a similar process using freshly made ultra pure water. Lacquered brass weights can be cleaned by using this method but only with ultra pure water.

**Weights of less than 10 mg** nominal mass should not be cleaned if at all possible.

**Cast iron weights**, if in good condition, may be cleaned by brushing with a stiff brush. Surface contamination, such as rust, may be removed with a wire brush. Sand-blasting will remove all surface contaminants after which the weights should be sprayed using a zinc phosphate modified alkyd resin fleet primer. The weights should ideally be handled using washable cotton gloves. The weights should not be slid across the load receptor, should be wiped clean of any accumulated moisture during use, and stored in a well ventilated covered weight store.

**After cleaning** all weights should be allowed to stabilize. Stabilization times will vary from a few hours after the removal of small amounts of contamination from large Class F or Class M weights to at least fourteen days for weights of Class E1 which have been thoroughly cleaned.

*This project has been conducted for the National Measurement System Policy Unit by the National Physical Laboratory, the National Weights and Measures Laboratory and the South Yorkshire Trading Standards Unit in respect of Mass Metrology: Project 1.2.5 DTI/ITT Ref No: MPU 8/60.1. The project team records their thanks to the National Measurement System Policy Unit of the Department of Trade and Industry for funding this work.*

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