Conception of a new device for storage and transfer of mass artefacts under vacuum or in inert gases compatible with existing apparatus

Pauline Barat (BIPM), Mark Kliebenschaedel (Mettler-Toledo AG),
Javier Levitt (Mettler-Toledo AG)

Abstract

The following pages describe the contribution from the BIPM and METTLER TOLEDO to the SIB-05 NewKILO project, consisting of METTLER TOLEDO conceiving a new device and a new vessel to meet most of the requirements for storage, transport, and transfer of mass artefacts under vacuum or in inert gases compatible with existing apparatus, and the BIPM successfully completing some tests for its own purposes.

The details hereby provided complement the information already cited in the Appendixes A and B of the NPL Report ENG 43 - EMRP SIB-05 Work Package 4 Deliverable 4.1.1 - distributed in January 2013.

TRANSFER APPARATUS INFORMATION

BUREAU INTERNATIONAL DES POIDS ET MESURES

Table 1 : BIPM transfer apparatus

Type (Inert gas storage to vacuum or vacuum storage to vacuum)	The transfer apparatus allows transferring: - Inert gas storage to vacuum - Vacuum storage to vacuum
Dimensions (W x D x H)	730 x 975 x 905 mm (M_one Vacuum Enclosure) 1240 x 370 x 650 mm (Artefact Transfer Device)
Type of Vacuum Comparator	METTLER TOLEDO M_one
Date in Operation	METTLER TOLEDO M_one Mass Comparator and Artefact Transfer Device are operational
Description	The transfer apparatus consists of an Artefact Transfer Device (ATD) with its related Artefact Storage & Transport Vessel (ASTV) to facilitate the transfer of artefacts under vacuum or in inert gas atmospheres from/to the M_one Mass Comparator 
Maximum Size of Storage Vessel that can be accommodated	According to METTLER TOLEDO's Artefact Storage & Transport Vessel specifications

STORAGE VESSEL INFORMATION

BUREAU INTERNATIONAL DES POIDS ET MESURES

Table 2 : Type III BIPM Storage Vessels

Number of Storage Vessels	1
Type (Inert gas storage / vacuum storage)	METTLER TOLEDO's Artefact Storage & Transport Vessel
Dimensions	Diameter: 142 mm, Height: 237mm
Date in Operation	Operational
Material use to support mass artefacts	PEEK
Type of mass artefacts that can be accommodated	• 1kg platinum-iridium cylinders • 1kg silicon sphere • 1kg stainless steel OIML shape • 1kg stainless steel cylindrical shape
Description	The Artefact Storage & Transport Vessel (ASTV) is made of high-grade stainless steel and equipped with the following: - An observation window allowing visual inspection into the ASTV - A right-angle valve which allows the connection of a vacuum pumping system - Exchangeable inserts which can hold the various mass artefacts shapes mentioned above - A secure mechanism to hold the artefacts in place - Removable grip to easily lift and place the ASTV - A lifting device helps to securely close and open the ASTV.