DOCUMENT

Model-18205

Isotech

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The Best Comparison Calibration Equipment

Isotech have a range of professionally engineered comparison calibration equipment covering the temperature range -200°C to 1300°C. Isotech have equipment to match the requirements of National Metrology Institutes, Accredited Calibration Laboratories and in house calibration labs.

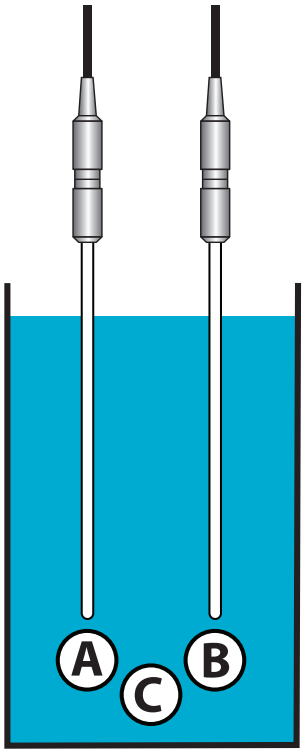
Comparison Calibration

With comparison calibration a thermometer with known characteristics is compared to the thermometer we want to calibrate. Relying on the "Zeroth Law of Thermodynamics".

There are four "Laws of Thermodynamics", the Zeroth Law was only formulated in 1931 by Fowler - it is more fundamental than the other three existing laws so it became known not as the fourth law, but the "Zeroth" law.

It states, "If two systems are in thermal equilibrium, each having the same temperature as a third system, the two systems have the same temperature as each other".

This can be rephrased to explain comparison calibration "if a calibrated thermometer is at the same temperature as a calibration bath, and a thermometer under test is at the same temperature as that calibration bath, then the calibrated thermometer and the thermometer under test are at the same temperature."



Isotech Comparison Equipment

Isotech products are designed to be deep enough, to be stable enough and to have sufficient uniformity to enable calibration to the smallest of uncertainties. The comparison calibration schedule below is from Isotech's UKAS accredited calibration laboratory. The performances are achieved using Isotech Baths and Reference Thermometers.

Evaluation reports describing the performance of Isotech equipment are freely available.

Isotech UKAS Calibration Uncertainties (k=2)

Platinum Resistance Thermometers

Calibration by comparisons	-80 °C to -40 °C	7.0 mK
	-40 °C to +50 °C	4.0 mK
	50 °C to 156 °C	5.0 mK
	156 °C to 300 °C	6.5 mK
	300 °C to 420 °C	20 mK
	420 °C to 660 °C	35 mK

The latest schedule can be found on the Isotech website or at www.ukas.org.

UKAS CALIBRATION
0175

Evaluation reports describing the performance of Isotech equipment are freely available.

Types of Equipment

Cryogenic

A Liquid Nitrogen Comparator provides a convenient calibration point at a nominal -196°C. The Model 459 Cryostat employs Liquid Nitrogen to operate over the range -180C to -80C

Low Temperature Range -80°C to 250°C

Over this range Isotech Stirred Liquid Baths of parallel tube design provide outstanding temperature uniformity with low filling costs.

Medium Temperature Range 50°C to 700°C

The Isotech Fluidized Furnace Model 875 is a concentric tube design that uses safe inert alumina oxide powder in place of oil or dangerous salt mixes and operates up to 700°C without hazard. The sealed design ensures no powder loss into the laboratory.

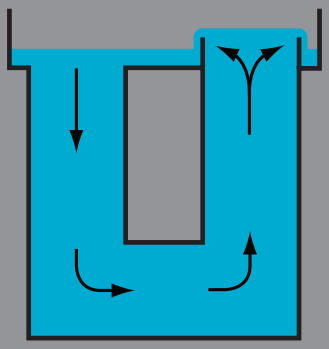
High Temperature Range 150°C to 1300°C

The concentric design of the Isotech 877 Thermocouple Calibration Furnace avoids the large temperature gradients present in simple tube furnaces.

■ The following pages describe the Isotech range of comparison equipment.

Isotech baths employ sophisticated designs to ensure calibration to the smallest of uncertainties

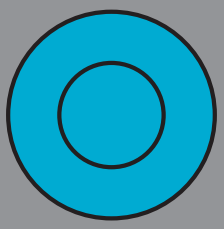
Parallel Tube Design

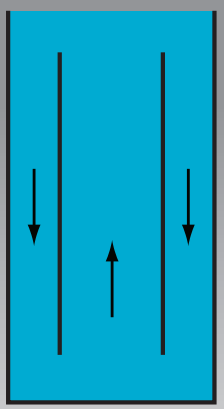


Here the heating, cooling and mixing take place in one of two parallel tubes. The second tube is the calibration volume and again the excellent temperature uniformity gives small calibration uncertainties.

An added benefit of these tube design of bath over large square tank designs is that to fill the bath much less liquid is required. For high temperature work it is usual to use Silicone Oils which have both a high cost and finite life.

Concentric Tube Baths





In this design liquid is forced down an outer tube and flows up an inner concentric tube. The heating and cooling takes place in the outer tube leaving the inner tube as the calibration volume into which the thermometers are immersed. This design gives very small vertical and axial temperature gradients

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