BROCHURE

Low-Temperature-Furnace

Isotech

Distributed by AKRIBIS

Metrology Furnaces

Designed by Metrologists
for Metrologists...

Furnace Selection Guide

Isotech offers the widest range of metrology furnaces for the realisation of ITS-90 Fixed Points. All models can give very long plateau, in excess of ten hours as suggested in CCT/2000-13, “Optimal Realization of the Defining Points of the ITS-90…”

Dual Furnaces - the no compromise choice

These furnaces use heatpipes to provide an essentially gradient free environment to melt and freeze the ITS-90 fixed points. These furnaces meet all the requirements of CCT/2000-13 and allow a uniformity of <10mK over the entire length of the fixed point sample.

The second independent furnace is used to pre warm and anneal the thermometers being calibrated. This concept of heatpipe and second furnace for pre and post conditioning the thermometers in a single apparatus was developed from a concept of Dr. Marcarino of IMGC, Italy.

Heatpipe Furnaces

For those laboratories who already have furnaces for pre and post conditioning SPRTs we offer the range of furnaces in heatpipe only version.

Three Zone Furnaces

All heatpipes have a limited operating range, determined by fluid that flows inside the pipe. Furnaces without heatpipes can work over wider temperature ranges. Isotech offer two models of Three Zone Furnaces, one from 50°C to 700°C and one from 200°C to 1200°C. These furnaces use top and bottom guard heaters to minimise temperature gradients and also meet the requirement of “Optimal Realizations”.

Single Zone Furnace

Finally the range includes an economical single zone furnace for Indium, Tin and Zinc Cells and an Annealing Furnace for pre and post conditioning thermometers.

Plateau Lengths

CCT/2000-13 states that a plateau length of 10 or more hours is suitable for optimal realizations.

NIST in the US like to work with long plateaus whereas according to our UKAS procedure we should calibrate an SPRT 2 or 3 times using a new plateau each time.

The length of the cell plateau is dictated mainly by how close the set point of the apparatus is to the fixed point being realized.

The controller resolution of our furnaces allow plateau lengths at the silver point of over 70 hours. From a practical point we operate with plateaus that last an entire day, remelting the cell overnight ready for a new freeze the next day.

Isotech ITS-90 Fixed Point System have been in use around the world since 1990.

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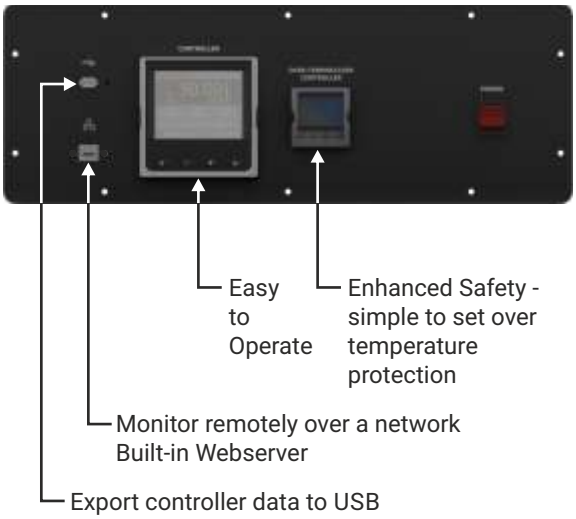
2020 Updates

From our own ongoing experience and customer feedback, 2020 sees an update to the Isotech Furnace Range to deliver the same proven performance and advanced features but with a number of convenience upgrades to make your life easier.

1 Repositioned Controllers

With the most featured and up to date controllers we have repositioned them to make them easier to view.



2 Thermometer Stand Included

Metrologists realise how important it is to safely support SPRTs, especially so at high temperatures. Our 2020 update includes a fully adjustable support to hold your SPRTs.

3 Adjustable Accessories

Our furnaces now feature and include “Accessory Pods” and “Cable Tidies”

Avoid the clutter on top of furnaces and tidy SPRT cables to reduce the risk of a cable getting pulled or caught. Each furnace includes two Accessory Pods and two Cable Tidies (they can be positioned anywhere the user sees fit by way of multi point mountings on either side of the furnace).

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Why Isotech Furnaces?

- Isothermal Environments for Long Plateaus
- Safe Convenient Operation
- Four Decades of Proven Operation

Heatpipe Furnaces

Isotech Metrology Furnaces have been in use in world leading National Measurement Institutes, (NMI) since the late 1980's with the widest range of heat pipes covering Indium freeze point (156.5985°C) to Copper freeze point (1084.62°C). Many nations rely on Isotech technology to provide their national standards for temperature.

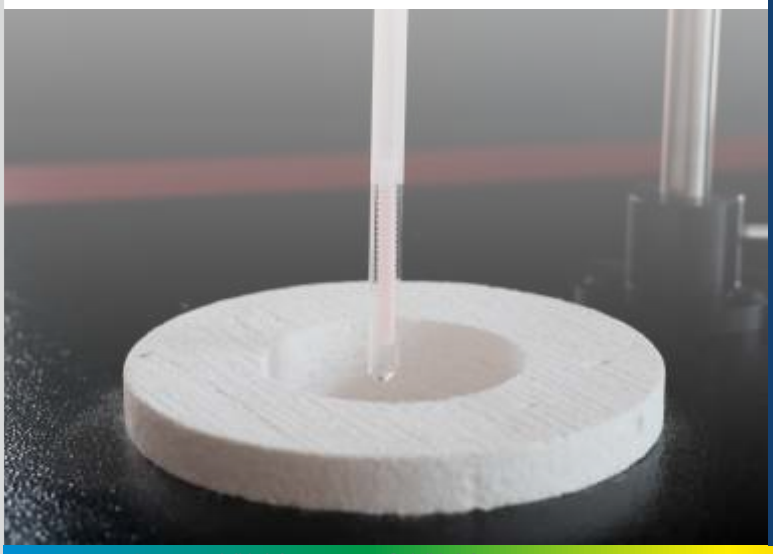
Dual Furnaces

The no compromise approach, Realise Fixed Points and Maintain Thermometers

Two furnaces in one, as well as the heatpipe to realise the fixed points there is a separate furnace for annealing SPRTs. A further innovation from Isotech.

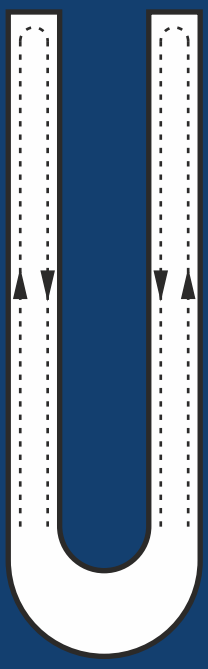
Three Zone Furnaces

Heatpipes provide best performance and operation but have limited temperature ranges, our Three Zone Furnaces have wider temperature ranges and are more cost effective. We use guard heaters at the top and bottom to minimise gradients. Our control systems offer enhanced performance and flexibility.



Why Heatpipes?

"A heatpipe is a self-contained structure which achieves very high thermal conductance by means of two-phase fluid flow with capillary circulation"



- Lower portion of the heatpipe is heated
- Liquid turns to a vapour and travels up the heatpipe
- Vapour condenses and travels down the heatpipe
- Latent heat created a volume of very uniform temperature, radially and axially
- Ideal conditions to realise ITS-90 Fixed Points

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Temperature Control Systems

Isotech furnaces have the most sophisticated Temperature Control Systems

In 2016 we updated the control systems to the latest technology with crystal clear colour displays. Advanced gain scheduling that automatically optimizes the stability at each fixed point temperature. Save time with the included programmer – set the furnace to melt or freeze the cells at specific times. An eight point correction curve ensures high accuracy across the fixed point temperatures. Connect via ethernet to allow multiple furnaces to be monitored – export heat up and cool down times to a USB Drive.

- Crystal clear, easy to read Display

- Optimise stability and accuracy at each fixed point

- Automatic temperature stepping

- Export to USB

- Remote control and monitoring over a network

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Isotech Furnaces for Optimal Plateaus

Why it matters...

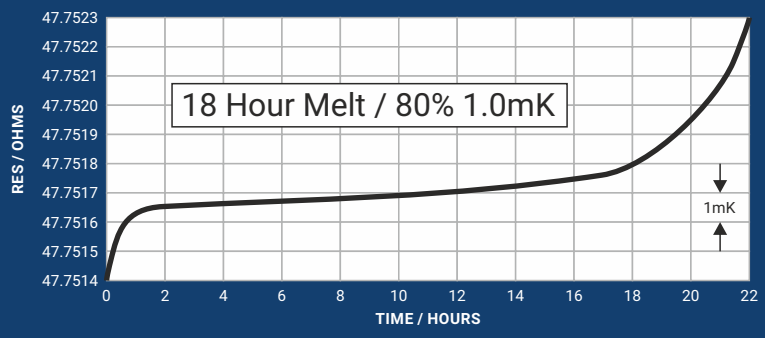
CCT/2000-13 says that a plateau length of 10 or more hours is suitable for optimal realizations.

NIST in the US like to work with long plateaus whereas according to our UKAS procedure we should calibrate a SPRT 2 or 3 times using a new plateau each time. Our apparatus has sufficient performance that the length of the plateau is dictated mainly by how close the set point of the apparatus is to the fixed point being realized.

Choose Isotech for...

- Heatpipes operating from 150°C to 1100°C to suit Indium to Copper Cells
- 'Dual' combined Annealing and Fixed Point Furnaces
- Ethernet Built in Temperature Programmer

Long Plateau - Plateau lengths at the silver point of over 70 hours have been achieved using our furnaces



Plateau lengths at the silver point of over 70 hours (3 days) have been achieved using our furnaces. From a practical point we normally work with one working day long plateaus, re-melting the cell overnight ready for a new freeze the next day.

The world's leading National Metrology Institutes choose Isotech...

Shouldn't you?

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Further Equipment for the Primary Laboratory

Annealing Furnace

Isotech-Jarrett Water Triple Point Cells

ITS-90 Fixed Point Cells

ITS-90 Isothermal Towers and Slim Cells

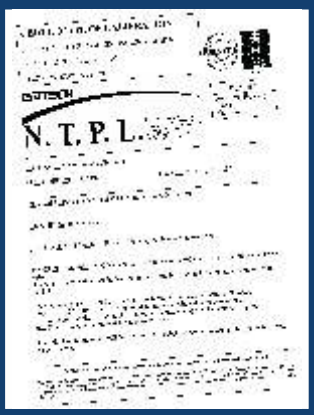
Standard Thermometers

Thermometry Bridges and Precision Thermometers

Resistance Bridge RBC and Standard Resistors

Gallium Apparatus

Calibration Services



more at www.isotech.co.uk/primary

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125 to 1100°C

Furnaces
Heatpipe

- Essentially Gradient Free
- Heatpipe Operation from Indium to Copper
- Simple Use - no zone offsets to adjust

Isotech metrology furnaces have more than 35 years of proven use and are widely used by the worlds' leading NMIs. For the optimal use of fixed point cells the temperature uniformity should be less than 10mK over the length of the fixed point sample CCT/2000-13, "Optimal Realization of the Defining Points of the ITS-90…"

Isotech heatpipe furnaces offer essentially gradient free operation; heatpipes provide the ideal conditions for the creation and maintenance of ITS-90 fixed point cells. Unlike some other companies Isotech can provide heat pipe furnaces to suit Indium, Tin, Zinc, Aluminum, Silver and Copper fixed points.

Plateau length is determined by the difference in temperature between the heatpipe and cell - this can be adjusted to give a plateau of any length of up to tens of hours. Our controllers offer extra resolution and allow adjustment to 0.1°C right up to 1090°C. The Potassium and Sodium models have a cooling coil in the lid with connections to circulate tap water to keep the furnace lid cool protecting the SPRT and reducing heat load into the lab.

A pre warming tube with a temperature approximately equal to that of the heat pipe made of a unique and gas-tight material, is provided to heat the SPRT prior to it being placed in a cell.

The furnaces feature an adjustable independent and adjustable over temperature device to protect expensive cells and SPRTs as well as a second internal over temperature safety device.

Isotech Heatpipe Furnaces

Model	Temperature Range	Heat Pipe Type	Cells
17702W	125 to 250°C	Water	Indium Tin
17702P	400 to 1000°C	Potassium	Zinc Aluminium Silver
17702S	500 to 1100°C	Sodium	Aluminium Silver Copper

Accessories

Accessories include equalizing blocks, a fan assembly to keep thermometer handles cool and a thermometer holder. With an equalizing block it is possible to use the furnace for comparison calibration.

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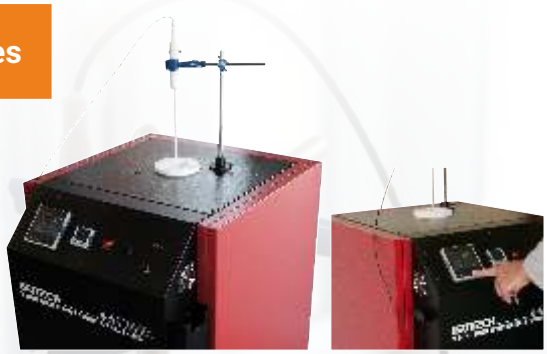
New Features



From our own ongoing experience and customer feedback we have updated the Isotech Furnace Range to deliver the same proven performance and advanced features but with a number of convenience upgrades to make your life easier.

The controllers have now been relocated to the top for easier operation, we now include an SPRT Stand and Cable Tidies to keep your standards safe and Accessory Pods to keep the furnace tops free from clutter. Our furnaces are programmable to automatically melt and freeze cells and feature both USB and Ethernet interfaces with bright crystal clear displays.

Specification

Uncertainty	<1mk (with cells)
Uniformity	<10mK over length of fixed point sample
Control	0.1°C Resolution: Gain Scheduling Action and Power Feedback
Interface	Ethernet and USB Host
Core Size	52 x 432mm
Dimensions	Height 960mm Width 600mm Depth 690mm
Weight	115kg
How to Order	Please specify model and Voltage required

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125 to 1100°C

Furnaces
Dual

- Essentially Gradient Free
- Heatpipe Operation from Indium to Copper
- Simple Use - no zone offsets to adjust

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Plateau length is determined by the difference in temperature between the heatpipe and cell - this can be adjusted to give a plateau of any length of up to tens of hours. Our controllers offer extra resolution and allow adjustment to 0.1°C right up to 1090°C. The Potassium and Sodium models have a cooling coil in the lid with connections to circulate tap water to keep the furnace lid cool protecting the SPRT and reducing heat load into the lab.

A pre warming tube with a temperature approximately equal to that of the heat pipe made of a unique and gas-tight material, is provided to heat the SPRT prior to it being placed in a cell.

The furnaces feature an adjustable independent and adjustable over temperature device to protect expensive cells and SPRTs as well as a second internal over temperature safety device.

Isotech Dual Furnaces

Model	Temperature Range	Heatpipe Type	Cells
17707	125 to 250°C	Water	Indium Tin
17706	400 to 1000°C	Potassium	Zinc Aluminium Silver
17705	500 to 1100°C	Sodium	Aluminium Silver Copper

In addition to the heatpipe furnaces described the Dual Furnaces incorporate a second furnace which, because of its unique design, will safely (and without contamination) pre and post-condition the thermometers.

There is also a separate storage enclosure for up to four thermometers with adequate support for the thermometer head.

With the Dual Furnace the thermometers are removed from their storage enclosure and placed in the preconditioning furnace. The furnace is slowly heated to the Cell temperature. The thermometers are protected from contamination by a slow air flux around them. One by one the thermometers are transferred into the cell for 20 to 30 minutes for calibration and thence back to the conditioning furnace. When all the thermometers have been calibrated, the conditioning furnace is slowly cooled back to 400°C whence the thermometers can safely be removed into room temperature.

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Accessories

Accessories include equalizing blocks, a fan assembly to keep thermometer handles cool and a thermometer holder. With an equalizing block it is possible to use the furnace for comparison calibration.

Specification	
Uncertainty	<1mk (with cells)
Uniformity	<10mK over length of fixed point sample
Control	0.1°C Resolution: Gain Scheduling Action and Power Feedback
Interface	Ethernet and USB Host
Core Size	52 x 432mm
Dimensions	Height 960mm Width 600mm Depth 690mm
Weight	119kg
How to Order	Please specify model and Voltage required

New Features

From our own ongoing experience and customer feedback we have updated the Isotech Furnace Range to deliver the same proven performance and advanced features but with a number of convenience upgrades to make your life easier.

The controllers have now been relocated to the top for easier operation, we now include an SPRT Stand and Cable Tidies to keep your standards safe and Accessory Pods to keep the furnace tops free from clutter. Our furnaces are programmable to automatically melt and freeze cells and feature both USB and Ethernet interfaces with bright crystal clear displays.

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50 to 500°C

Furnaces
Low Temperature

- Affordable Single Zone Furnace
- Simple Operation
- For Indium, Tin and Zinc Cells

The Isotech Low Temperature Fixed Point Furnace is designed specifically to realize and maintain the freeze plateaux of Isotech Indium, Tin and Zinc Fixed Point Cells, for calibration of thermometers on the International Temperature Scale of 1990.

The Low Temperature Furnace is a single zone furnace. The recommended procedure for establishing a freeze plateau requires operator attention until the plateau is realized. Following that, the Model 17701 Furnace will maintain the plateau, essentially automatically, for a period of 10 to 12 hours.

The furnace core, into which the freeze-point cell is inserted, is of aluminium alloy, which provides a very low thermal gradient along the core length. The main furnace heater is of the parallel-tube design as used at NIST. A pre-warming tube is provided.

Two entirely independent over-temperature safety devices are included. A dedicated (on-off) over temperature control circuit provides active safety. A fusible link in the main power circuit provides passive safety.

The Low Temperature Furnace is completely self-contained, castor mounted and requires no external supplies (except power).

Fixed Points of:
Indium 156.5985°C
Tin 231.928°C
Zinc 419.527°C
6 to 12 Hours Plateau
Annealing Adaptor
Active and Passive Safety Circuits

Model	ITL-M-17701
Temperature Range	50 to 500°C
Uncertainty	<1mK (with cells)
Control	0.1°C Resolution, Gain Scheduling Action and Power Feedback
Interface	Ethernet and USB Host
Core Size	54.7mm x 420mm
Dimensions	Height 960mm Width 600mm Depth 690mm
Weight	115kg
Power	1.5kW, 108-30 or 208-240Vac, 50/60Hz
Accessories	411-01-11 Annealing Adaptor 824-01-00 Fan Assembly
How to Order	ITL-M-17701 Please specify Voltage required

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50 to 700°C

Furnaces
Medium Temperature

- Wide Operating Range
- For Indium, Tin, Zinc and Aluminium Cells
- Three Zone Design

Whilst heatpipe furnaces offer the ideal environment to melt and freeze ITS-90 Fixed Points the temperature range is limited by fluid that flows inside the pipe. Three zone furnaces can offer wider operating ranges and still meet the requirements for "Optimal Realization of the Defining Points of the ITS-90…" CCT/2000-13. In place of a heatpipe the 17703 Medium Temperature furnace uses top and bottom guard heaters to minimise temperature gradients.

The Model 17703 Furnace can be used with Indium, Tin, Zinc and Aluminium Cells. The substantial furnace core is machined from aluminium bronze.

Fixed Points of:
Indium 156.5985°C Tin 231.928°C
Zinc 419.527°C Aluminium 660.323°C
Active and Passive Safety Circuits
Equalizing Block for Comparison Calibration

Model	ITL-M-17703
Temperature Range	50 to 700°C
Uncertainty	<1mK (with cells)
Control	0.1°C Resolution, Gain Scheduling Action and Power Feedback
Interface	Ethernet and USB Host
Core Size	54.7mm x 420mm
Dimensions	Height 960mm Width 600mm Depth 690mm
Weight	115kg
Power	2.6kW, 108-30 or 208-240Vac, 50/60Hz
Accessories	420-02-18 Aluminium Bronze Equalizing Block 824-01-00 Fan Assembly 411-01-11B Annealing Adaptor
How to Order	ITL-M-17703 Please specify Voltage required

New Features

From our own ongoing experience and customer feedback we have updated the Isotech Furnace Range to deliver the same proven performance and advanced features but with a number of convenience upgrades to make your life easier.

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250 to 1200°C

Furnaces
3 Zone High Temperature

- Widest Operating Range
- Three Zone Control
- Long Plateau Length

Whilst heatpipe furnaces offer the ideal environment to melt and freeze ITS-90 Fixed Points the temperature range is limited by fluid that flows inside the pipe. 3 zone furnaces can offer wider operating ranges and still meet the requirements for "Optimal Realization of the Defining Points of the ITS-90…" CCT/2000-13. In place of a heatpipe the Model 465 3 Zone High Temperature Furnace uses top and bottom guard heaters to minimise temperature gradients.

This more recent addition to our long-established range of metrology furnaces offers an alternative for those who prefer 3 zone furnaces to heatpipe technology and need high temperature operation. The three zones create a controlled volume of constant temperature within the furnace in which High-Temperature Fixed Points such as Aluminium, Silver and Copper can be frozen and melted. Because High Temperature thermometers can be easily contaminated by metallic vapors, great care has been taken to eliminate the use of metals throughout the calibration volume.

A ceramic equalizing block is available comprising a closed ended tube, alumina tubes to house the sensors being compared, and alumina powder to act as an equalizing media.

This 3 Zone Furnace can be used for the realizations of Zinc, Aluminium, Silver, Gold and Copper points, or with an optional equalizing block used for annealing or comparison calibration.

Fixed Points of:
Zinc 419.527°C Aluminium 660.323°C
Silver 961.78°C Copper 1084°C
Active and Passive Safety Circuits
3 Zone Control to compensate for End Losses

Model	465
Temperature Range	250 to 1200°C
Uncertainty	<1to 2mK (with cells)
Control	0.1°C Resolution, Gain Scheduling Action and Power Feedback
Interface	Ethernet and USB Host
Core Size	100mm x 500mm
Dimensions	Height 960mm Width 600mm Depth 690mm
Weight	115kg
Power	3kW, 108-30 or 208-240Vac, 50/60Hz
Accessories	465-04-00 Cell Holder Assembly 465-02-06 Ceramic Equalizing Block (four pockets 10mm ID)
How to Order	465 Please specify Voltage required

New Features

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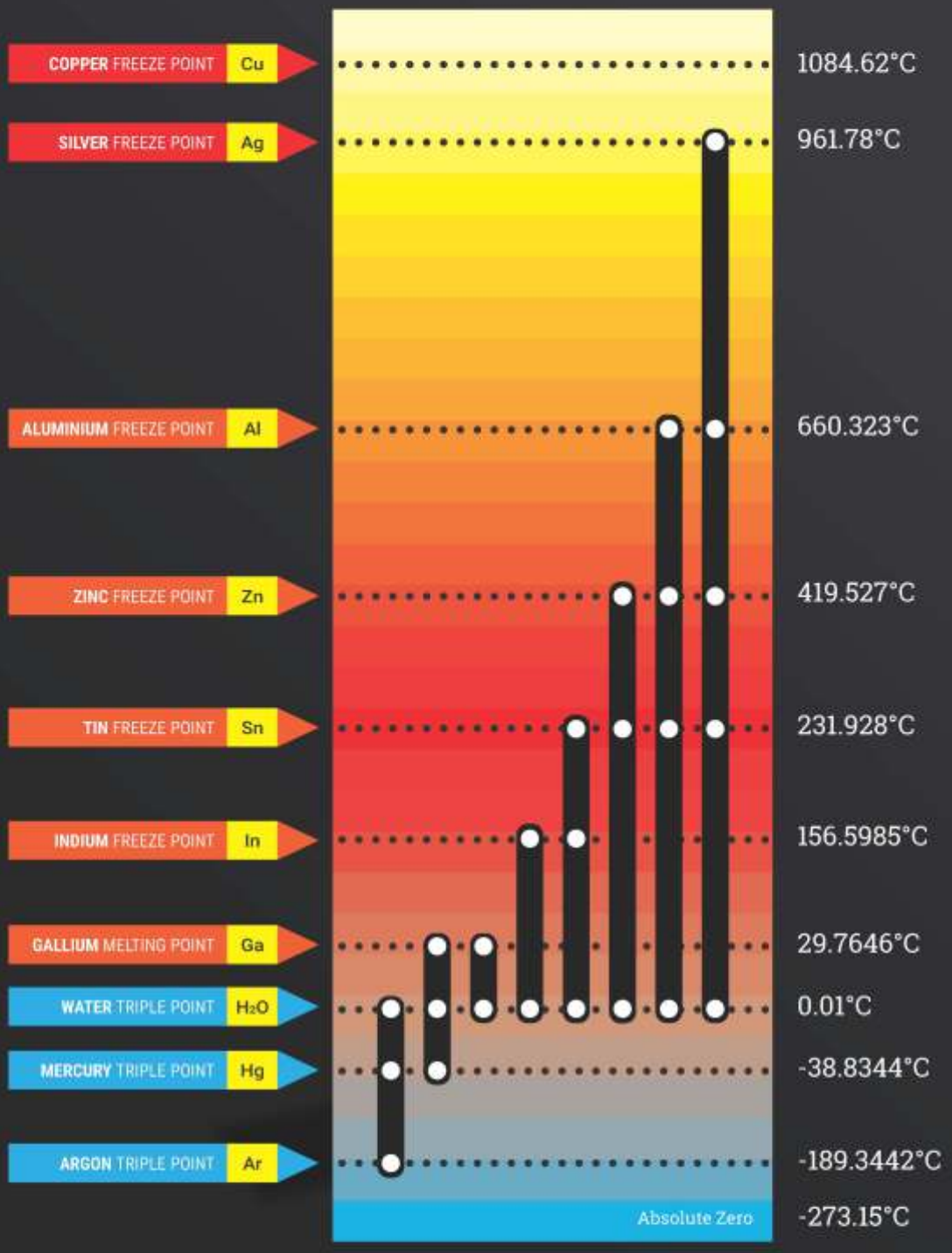
ITS-90 sub-ranges
for Thermometer Calibration



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...the source for calibration professionals

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ISOTECH

About Us

The world leader in temperature metrology, with over 40 years' experience.

Our clients include the world's leading laboratories including National Laboratories, leading ISO 17025 Accredited Laboratories and users in all industries.

For more information: ISOTECH.CO.UK

UKAS Calibration Options

Why Choose Isotech?

> Innovation - winner of the Queen`s Award for Enterprise in the Innovation Category, 2017.

THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION

> Isotech has solutions for all calibration needs, from Primary Laboratories maintaining National Standards to the needs of field engineers calibrating industrial sensors on site. Isotech is truly "The Source for Calibration Professionals".

> Global Network - local support. Isotech has over 90 authorized sales agents worldwide! No matter where you are, we can offer local support.

> The world's leading National Metrology Institutes choose Isotech - shouldn't you?

Temperature Metrology Solutions for:

> ITS-90 Primary Standards
> Industrial Sensor Calibration
> Secondary Temperature Calibration
> Infrared Thermometers
> High Accuracy Temperature Measurement
> Thermocouple Referencing Equipment

ISO 17025 calibration services to the smallest of uncertainties and with international recognition

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