

Sostmann-Isotech

Gallium Cell

INTRODUCTION

Second only to the Water Triple Point and in many ways, because of its ease of use and purity, superior to it, is the Gallium Melt Point. At 29.7646°C this is a very convenient temperature. Its existence on the ITS-90 Temperature Scale is due almost entirely to the efforts of one man, the late Henry Sostmann.

Henry, and a small team of dedicated metrologists created commercially available and user friendly versions of the fixed points required to calibrate the highest quality standard thermometers from the Triple Point of Mercury to the Silver Point. It is no exaggeration to say that modern Fixed Point thermometry would not exist as we know it without Henry.

In 1988 his adopted company Yellow Springs Incorporated decided to sell off the Metrology Division, and Isotech was fortunate enough to become the custodian of these wonderful products. Henry continued to work as a consultant for Isotech until his untimely death in 1999.

The Gallium Cell and Apparatus epitomises his efforts in metrology and in recognition of his work we asked and got his permission to call it the Sostmann-Isotech Gallium Cell.

Henry presented a paper in which he described the history of thermometry and the development of the Gallium Cell and his other Sealed Fixed Points. Please ask for a free copy.

Following Henry's original work, recently Isotech have fully reconsidered his design for the Millennium. We have upgraded the purity of the Gallium, compared 10 and more recently 20 year old cells with a newly made

Features:

- 20 years of deliveries world-wide without a breakage
- 99.999,999% purity. Yes 8N! For a slope-free plateau.
- A new Gallium plateau every day, all day, forever. Switch it on and forget it!
- Long term stability.
After 10 years our Cell is still within 40µK of our newly made Reference Cell, audited to within 0.000030°C of our Nation's Standard Cell, and within 0.000,031°C of Italy's National Standard.
- Reproducibility day to day of ±0.000,025°C.
- Elapsed time indicator tells where you are on the plateau.
- 250mm immersion.
- No maintenance.
- No attention required.
- No liquids.
- UKAS certification available relating the Cell to ITS-90.

cell, and intercompared cells with National Standards. The result of these investigations have left us satisfied that Henry's original design of cell needed no changes to meet the requirements of "optimal realisations" - the highest standard so far defined.

Henry's Melting Point Apparatus has been changed a little by fitting a timer to enable the Gallium Point to be automatically available every day of the year.

You will find this ITS-90 Fixed Point the very best that exists. *Some of its performance and other features are described overleaf.*

Our Gallium design is so good that if you prefer to put the Cell into a glass tube so that you can control the gas and its pressure, if you prefer a 2 week, or longer, plateau length, if you prefer liquid baths, if you want a housing for more than one Gallium Cell:

Isotech can supply the following accessories:

- Re-sealable Glass Holder
- 915 Bath for One Cell
- Gallium Maintenance Bath for up to Five Cells

TRANSPORTATION

Gallium Fixed Point Cells cannot legally be hand carried on aeroplanes. They must be packed in dry ice for air freight and shipped in accordance to IATA specifications.

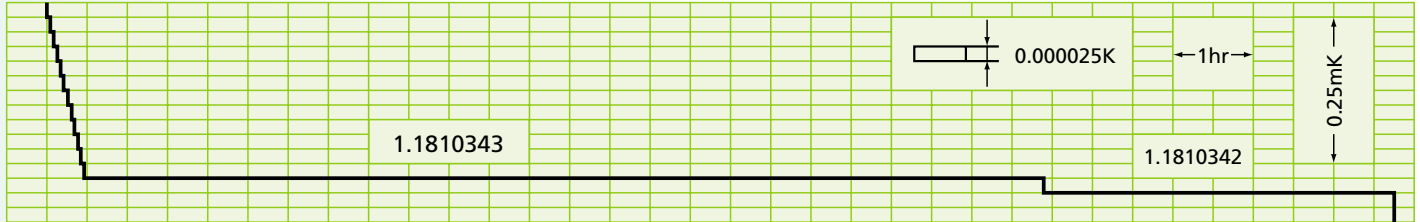
The design of the Sostmann-Isotech Gallium Cell is ideally suited to this method of transportation and for 20 years over 600 of our Gallium Cells have been transported to all parts of the globe without damage.



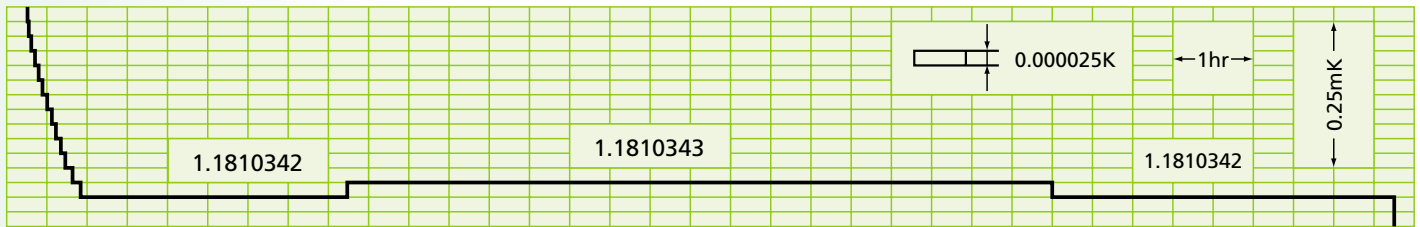
The Perfect Gallium Point

for the new Millennium

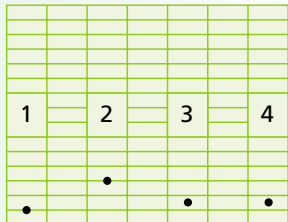
Melt 1 Day1



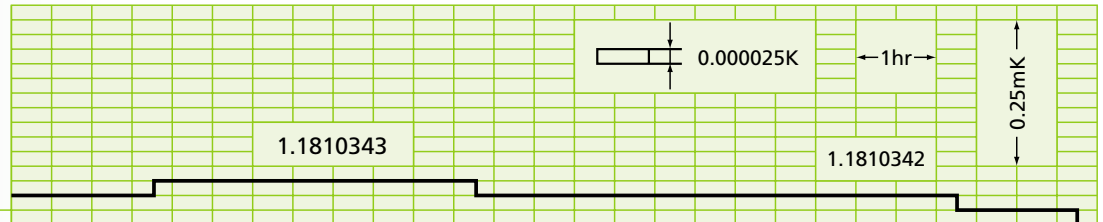
Melt 2 Day2



Shown on the same scale

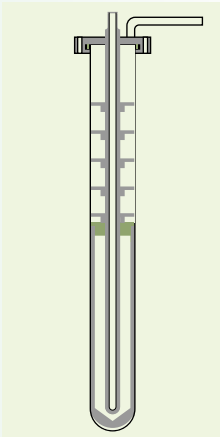


Melt 3 Day3



- 1 Value of 10 years old Cell
- 2 Value of N.P.L.'s Cell
- 3 Value of I.M.G.C.'s Cell
- 4 Value of Cell open for over 3 years

Re-sealable Glass Holder



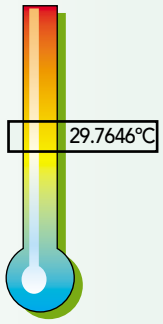
Gallium Maintenance Bath
(For up to Five Cells)



915 Parallel Tube Liquid Bath
(For One Cell)



The Gallium Apparatus



Model 17402B Gallium Apparatus is not an adaptation from general purpose equipment, but is designed specifically to realize and maintain the Gallium Cell on the melt plateau, for calibration of thermometers on the International Temperature Scale of 1990.

The Cell will realize the melt plateau of gallium (29.7646°C). It is furnished with a certificate of verification or optionally full UKAS calibration can be provided at extra cost.

The apparatus will permit the gallium to melt coaxially over 12 to 16 hours. It is uniquely designed to also freeze the cell from the bottom up, which eliminates the danger of damage due to the expansion of gallium during freezing.

1. The Cell contains about 0.5 kg of electronic grade gallium, 99.999999% pure. The gallium is contained within a resilient inner housing, which safely allows its solidus expansion, surrounded by an aluminium sleeve for longitudinal uniformity of temperature.

2. Since the melting temperature of pure gallium is a recognized constant of nature (and a defining Fixed Point of ITS-90) recertification is normally never required.

3. Model 17401 Gallium Cell may be used, without the thermal environment provided by Model 17402B Gallium Apparatus, in a well controlled bath (see Databook 2). However, the advantages of automatic operation, convenience and cell protection, recommend the use of the Model 17402B environment in most cases.

4. No external connections other than power are required.

5. A completely automatic electronic control system provides a precise means for realization and maintenance of the plateau. The Apparatus can be turned on by a timer an hour before the laboratory day begins, the plateau utilized throughout the working day and the system recycled overnight. A thermal sink is provided which forces the gallium to refreeze upwards from the bottom (gallium expands when it freezes, requiring a specific freeze orientation to avoid rupturing the cell).

6. Confidence is a major requirement in a standard. The Isothermal Gallium Cell and Apparatus have a long (20 year) history and have been successfully used in most National and Primary Laboratories world-wide. This is one of the main reasons for choosing the Isothermal Cell and Apparatus.

7. The Cell and Apparatus are manufactured to the strict requirements of BS 5750 and ISO 9000. Each finished unit becomes part of the Isotech UKAS working Calibration Laboratory for two weeks or more, during which use the control circuits are set and checked for optimum performance. It is released only when Isotech is entirely satisfied with its performance.

Model	ITL-M-17401 cell ITL-M-17402B cell apparatus
Temperature Range	29.7646°C
Accuracy	Refer to page 15
Ambient Limits	15°C to 28°C
Cycle Time	With cell at 20°C, time to plateau is 1 hour maximum. Recycling, including freezing the cell is typically 3 to 4 hours
Plateau Duration	Not less than 12 hours under specified ambient conditions; 16 hours typical
Power	75 Watts typical 100-130 or 208-240VAC* 50/60Hz * field Changeable
Dimensions	Height 429mm Width 259mm Depth 181mm
Weight	7kg

An International intercomparison between our open Gallium Cell and NISTs standard agreed within 10 micro Kelvins. Our uncertainty of Gallium Cell certificate is now the smallest outside the USA.

How to order

Model ITL-M-17402B

Gallium Apparatus (without cell)

Please specify voltage required.

Model ITL-M-17401

Gallium Cell