

SMILE Suggestions for Choosing NIST-Certified Non-Mercury Thermometers

Background Information:

There are many options for NIST-certified (traceable) thermometers. This document provides examples of thermometers that are available. The examples are divided into categories based on their possible uses. However, the thermometers may be used for activities other than those listed below. Also, there are other options besides those in this document. Contact the manufacturer to determine prices and if they can be shipped to your laboratory.

Purpose: The purpose of this document is to provide a list of possible NIST-certified (traceable), non-mercury thermometers to be used for verifying calibration and monitoring temperatures of laboratory space (ambient room temperature) and equipment (e.g. refrigerators, freezers, incubators, water baths, etc.).

Note: Resolution is also referred to as subdivisions.

Note: For digital thermometers: Do not put display portions in refrigerators or freezers.

Thermometers Recommended for Verifying Calibration of Other Thermometers:

1) Traceable Digital Thermometer

Manufacturer/Distributor: Control Company (Catalog Number 4000)

Website: <http://www.control3.com/4000p.htm>

Temperature Range: -50° to 150°C with probe that comes with thermometer at purchase.

- Other probes for different temperature ranges may be purchased, but the accuracy of measurements will differ based on the probe used.

Resolution: 0.001°

Accuracy: $\pm 0.05^\circ \text{C}$ between 0° to 100°C

Other Information:

- An internal data logger captures the minimum and maximum temperatures every hour for 24 hours and can show exactly when a certain temperature reading occurred, allowing you to monitor temperatures when staff are not present.
- International delivery is available.



2) Traceable Memory Wide-Range Thermometer

Manufacturer/Distributor: Control Company (Catalog Number 4007)

Website: <http://www.control3.com/4007p.htm>

Temperature Range: -212° to 1200°C with probe that comes with thermometer at purchase.

- Other probes can be purchased, but the accuracy of measurements will differ based on the probe used.

Resolution: 0.1° between -99.9° to 999.9°; Resolution is 1° outside of that range.

Accuracy: $\pm 1^\circ\text{C}$

Other Information:

- Can be used to measure temperatures of liquids, air/gas, and semi-solids.
- Minimum and maximum readings can be recalled.
- International delivery is available.



3) Traceable Workhorse Thermometer

Manufacturer/Distributor: Control Company (Catalog Number 4425)

Website: <http://www.control3.com/4425p.htm>

Temperature Range: -50° to 1300°C (-50° to 230°C range for probe that comes with thermometer at purchase)

Resolution: 0.1° between -50 to 200°; Resolution is 1° outside of that range

Accuracy:

- At -50°C: $\pm 4^\circ\text{C}$
- At -40°C: $\pm 3^\circ\text{C}$
- At -20°C: $\pm 2^\circ\text{C}$
- Between 0 to 500°C: $\pm (1^\circ\text{C} + 0.75\%)$
- Between 500 to 750°C: $\pm (1^\circ\text{C} + 1\%)$
- Between 750 to 1000°C: $\pm (1^\circ\text{C} + 2\%)$
- Between 1000 to 1200°C: $\pm (3^\circ\text{C} + 4\%)$

Other Information:

- International delivery is available



4) Traceable RTD Platinum Thermometer

Manufacturer/Distributor: Control Company (Catalog Number 4132)

Website: <http://www.control3.com/4132p.htm>

Temperature Range: -50 to 400°C

Resolution: 0.01° below 200°C; 0.1° above 200°C

Accuracy: $\pm (0.1\% + 0.2^\circ\text{C})$ below 200°C; $\pm (0.15\% + 0.5^\circ\text{C})$ above 200°C

Other Information:

- International delivery is available



Thermometers for Monitoring Refrigerators/Freezers

1) Traceable Refrigerator/Freezer Thermometer:

Manufacturer/Distributor: Control Company (Catalog Number 4127)

Website: <http://www.control3.com/4127p.htm>

Temperature Range: -50° to 70°C

Resolution: 1°

Accuracy: $\pm 1^\circ\text{C}$

Other Information:

- Probe is sealed in a bottle containing a glycol solution to insulate the probe from rapid temperature changes when the refrigerator/freezer door is opened
- Can be used to monitor temperatures of freezers, water baths, heating blocks, incubators, and refrigerators
- Triple display shows high, low, and current temperatures
- Can be used to monitor high and low readings overnight, on weekends, or for any time period. This is useful for monitoring the range of temperatures throughout the day or when the lab is closed.
- Alarm feature provides an alert when temperatures exceed tolerance limits that you set
- International delivery is available



2) Traceable Thermometer with Time/Date Max/Min Memory

Manufacturer/Distributor: Control Company (Catalog Number 4105)

Website: <http://www.control3.com/4105p.htm>

Temperature Range: -40° to 80°C

Resolution: 0.5°

Accuracy: $\pm 1.5^{\circ}\text{C}$

Other Information:

- Ambient and probe sensors
- Triple display shows current, minimum, and maximum temperatures and the times and dates that those temperatures occurred.
- Ideal for monitoring solutions, refrigerators, and room temperatures
- International delivery is available



3) Traceable Thermometer with Time/Date Max/Min Memory (with bottle probe for Refrigerators/Freezers)

Manufacturer/Distributor: Control Company (Catalog Number 4305)

Website: <http://www.control3.com/4105p.htm>

Temperature Range: -40° to 80° C

Resolution: 0.5°

Accuracy: $\pm 1.5^{\circ}\text{C}$

Other Information:

- Triple display shows current, minimum, and maximum temperatures and the times and dates that those temperatures occurred
- Comes with a special bottle probe specifically for refrigerator/freezer applications
- International delivery is available



4) Alarm Thermometer with Min/Max Display and Alarm Tone

Manufacturer/Distributor: TIP TEMPerature Products (Product Number THOSEN001)

Website: <http://www.tiptemp.com/Product.aspx?ProductID=19025>

Temperature Range: -50° to 70°C

Resolution: 0.1°

Accuracy: ± 1.0°C

Other Information:

- Unit reads ambient or probe temperatures.
- Triple display shows current, high, and low temperatures. The minimum/maximum memory feature permits monitoring of conditions for any time period.
- Alarm sounds when temperature exceeds set tolerance limits.



5) Alarm Thermometer with Min/Max Display and Alarm Tone (with bottle probe)

Manufacturer/Distributor: TIP TEMPerature Products (Product Number THOSEN002)

Website: <http://www.tiptemp.com/Product.aspx?ProductID=19025>

Temperature Range: -50° to 70°C

Resolution: To 0.1°

Accuracy: ± 1.0°C

Other Information:

- Probe is submerged in bottle containing a glycol solution to insulate the probe from rapid temperature changes when the refrigerator/freezer door is opened
- Triple display shows current, high, and low temperatures. The minimum/maximum memory feature permits monitoring of conditions for any time period.
- Alarm sounds when temperature exceeds set tolerance limits.



6) Traceable Thermometer with Time/Date Max/Min

Manufacturer/Distributor: TIP TEMPerature Products (Product Number TDTH-4105)

Website: <http://www.tiptemp.com/Product.aspx?ProductID=21799>

Temperature Range: -40° to 80°C

Resolution: 0.5°

Accuracy: ± 1.5°C

Other Information:

- The display shows current, minimum, and maximum temperatures and the times and dates that those temperatures occurred.
- Ambient and probe sensors - can measure solutions, room temperature, and refrigerators



7) Traceable Sentry Thermometer + Bottle Probe for Refrigerator/Freezer Applications

Manufacturer/Distributor: TIP TEMPerature Products (Product Number SETH-4321)

Website: <http://www.tiptemp.com/Product.aspx?ProductID=21802>

Temperature Range: -50° to 70°C

Resolution: 1°

Accuracy: ± 1°C

Other Information:

- The display shows current, low, and high temperatures.
- It can be used to monitor ambient temperature, under water, freezers, and refrigerators.
- Probe is submerged in bottle containing a glycol solution to insulate the probe from rapid temperature changes when the refrigerator/freezer door is opened
- This thermometer does not have an alarm.



8) Fisherbrand Exact-Temp Bottle-Encased Freezer Thermometer

Manufacturer/Distributor: Fisher Scientific

Website:

<http://www.fishersci.com/wps/portal/PRODUCTDETAIL?productId=684747&catalogId=29104&brCategoryId=null&fromCat=yes&fromSearch=Y>

Temperature Range, Resolution, Accuracy:

Catalog #	Fill Type	Bottle Size	Temperature Range	Resolution	Accuracy
15-060-271	Blue Spirit	60 mL	-25° to -5°C	0.1°	+ 0.2°C
15-059-338	Red Spirit	30 mL	-30° to 0°C	0.5°	+ 1°C

Other Information:

- Probe is submerged in a bottle containing a glycol solution to insulate the probe from rapid temperature changes when the freezer door is opened
- International delivery is available with \$500.00 USD minimum order



9) Fisherbrand Exact-Temp Bottle-Encased Refrigerator Thermometer

Manufacturer/Distributor: Fisher Scientific

Website:

http://www.fishersci.com/wps/portal/!ut/p/ s.7 0 A/7 0 K9/.cmd/ad/.ar/sa.Portlet NAVAction/.c/6 0 AJ/.ce/7 0 AL9/.p/5 0 33V/.d/0?ru=http%3A%2F%2Fprodwcsserver%2Fwebapp%2Fwcs%2Fstores%2Fservlet%2FFisherProductDisplay&catalogId=29104&productId=687750&langId=-1&distype=2&isChemical=false&fromCat=yes&catCode=RE_SC&brCategoryId=null&hlpi=&highlightProductsItemsFlag=&fromSearch=Y

Temperature Range, Resolution, Accuracy:

Catalog #	Fill Type	Bottle Size	Temperature Range	Resolution	Accuracy
15-060-272	Blue Spirit	60 mL	-2° to 10°C	0.1°	+ 0.2°C
15-059-337	Red Spirit	30 mL	-5° to 15°C	0.5°	+ 1°C

Other Information:

- Probe is submerged in a bottle containing a glycol solution to insulate the probe from rapid temperature changes when the freezer door is opened
- International delivery is available with \$500.00 USD minimum order



10) Streck Temp-Chex Refrigerator or Freezer Thermometers

Manufacturer/Distributor: Fisher Scientific

Website:

<http://www.fishersci.com/wps/portal/PRODUCTDETAIL?productId=671049&catalogId=29104&brCategoryId=null&fromCat=yes&fromSearch=Y>

Temperature Range, Resolution, and Accuracy:

Catalog #	Use	Fill Type	Temperature Range	Resolution	Accuracy
11-716-185B	Refrigerator	Red Spirit	-5° to 15°C	0.5°	± 0.5°C
11-716-186B	Freezer	Red Spirit	-30° to 1°C	0.5°	± 0.5°C

Other Information:

- Enclosed in plastic tube to protect thermometer and to contain contents in case of breakage
- International delivery is available with \$500.00 USD minimum order
- See Streck Website for more information:
<http://www.streck.com/products/gc/tempchex.asp>



Thermometers for Monitoring Incubators/ Ambient/Room Temperature

1) Fisherbrand Exact-Temp Bottle-Encased Incubator Thermometer

Manufacturer/Distributor: Fisher Scientific

Website:

http://www.fishersci.com/wps/portal/!ut/p/ s.7 0 A/7 0 K9/.cmd/ad/.ar/sa.Portlet NAVAction/.c/6 0 AJ/.ce/7 0 AL9/.p/5 0 33V/.d/0?ru=http%3A%2F%2Fprodw sserver%2Fwebapp%2Fwcs%2Fstores%2Fservlet%2FFisherProductDisplay&catalogId=29104&productId=684759&langId=-1&distype=2&isChemical=false&fromCat=yes&catCode=RE_SC&brCategoryId=null&hlpi=&highlightProductsItemsFlag=&fromSearch=Y

Temperature Range, Resolution, Accuracy:

Catalog #	Fill Type	Bottle Size	Temperature Range	Resolution	Accuracy
15-060-275	Blue Spirit	60 mL	25° to 4°C	0.1°	± 0.2°C
15-059-329	Red Spirit	30 mL	18° to 50°C	0.5°	± 1°C

Other Information:

- International delivery is available with \$500.00 USD minimum order



2) Fisherbrand Exact-Temp Bottle-Encased Ambient Temperature Thermometer

Manufacturer/Distributor: Fisher Scientific

Website:

http://www.fishersci.com/wps/portal/!ut/p/ s.7 0 A/7 0 K9/.cmd/ad/.ar/sa.Portlet NAVAction/.c/6 0 AJ/.ce/7 0 AL9/.p/5 0 33V/.d/0?ru=http%3A%2F%2Fprodwc sserver%2Fwebapp%2Fwcs%2Fstores%2Fservlet%2FFisherProductDisplay&cat alogId=29104&productId=683229&langId=-1&distype=2&isChemical=false&fromCat=yes&catCode=RE_SC&brCategoryId=null&hlpi=&highlightProductsItemsFlag=&fromSearch=Y

Temperature Range, Resolution, Accuracy:

Catalog #	Fill Type	Bottle Size	Temperature Range	Resolution	Accuracy
15-060-274	Blue Spirit	60 mL	15° to 30°C	0.1°	± 0.2°C
13-990-270	Red Spirit	30 mL	10° to 30°C	0.5°	± 1°C

Other Information:

- Probe is submerged in a bottle containing a glycol solution
- International delivery is available with \$500.00 USD minimum order



3) Streck Temp-Chex Incubator/Room Temperature Thermometer

Manufacturer/Distributor: Fisher Scientific (Catalog #11-716-187B)

Website:

http://www.fishersci.com/wps/portal/!ut/p/ s.7 0 A/7 0 K9/.cmd/ad/.ar/sa.Portlet NAVAction/.c/6 0 AJ/.ce/7 0 AL9/.p/5 0 33V/.d/1?ru=http%3A%2F%2Fprodwc sserver%2Fwebapp%2Fwcs%2Fstores%2Fservlet%2FFisherItemDisplay&catalogId=29104&productId=3294146&parentProductId=671049&langId=-1&distype=0&fromCat=yes&catCode=RE_SC&brCategoryId=null&fromSearch=Y

Temperature Range: 15° to 30°C

Resolution: 0.5°

Accuracy: ± 0.5°C

Other Information:

- Enclosed in plastic tube to protect thermometer and to contain contents in case of breakage
- International delivery is available with \$500.00 USD minimum order
- See Streck Website for more information:

<http://www.streck.com/products/qc/tempchex.asp>



General Purpose Thermometers

1) Traceable Total-Range Thermometer

Manufacturer/Distributor: Control Company (Catalog number 4015)

Website: <http://www.control3.com/4015p.htm>

Temperature Range: -200° to 1370°C – Different probes provide different temperature ranges. You can purchase a Type-K probe from Control Company to use with the thermometer. Two examples are:

- Control Company Type K Surface Probe - This probe can be used for temperatures from -73° to 760°C. (<http://www.control3.com/4008p.htm>)
- Control Company Low Temperature Type K Probe – This probe can be used for temperatures from -240° to 220°C. (<http://www.control3.com/8039p.htm>)

- Resolution: 1°

Accuracy: For meter only: $\pm 1^\circ\text{C}$ between -50° and 740°C; $\pm 2^\circ\text{C}$ outside that range. Accuracy differs with probe used.

Other Information:

- Triple display shows current, minimum, and maximum temperatures
- Alarm feature provides an alert when temperatures exceed tolerance limits that you set
- International delivery is available



2) Ertco Non-Mercury Thermometers with 10/30 Std. Tpr Joint

Manufacturer/Distributor: Fisher Scientific

Website:

http://www.fishersci.com/wps/portal!/ut/p/ s.7_0_A/7_0_K9.cmd/ad/.ar/sa.Portlet NAVAction/c/6_0_AJ/.ce/7_0_AL9/p/5_0_33V/.d/0?ru=http%3A%2F%2Fprodwcsserver%2Fwebapp%2Fwcs%2Fstores%2Fservlet%2FFisherProductDisplay&catalogId=29104&productId=671025&langId=-1&distype=2&isChemical=false&fromCat=yes&catCode=RE_SC&brCategoryId=null&hlpi=&highlightProductsItemsFlag=&fromSearch=Y

Temperature Range, Resolution, Accuracy:

Catalog #	Temperature Range	Resolution	Accuracy
15-059-351	-10° to 150°C	1°	$\pm 2^\circ\text{C}$
15-059-335	-10° to 250°C	1°	-10° to 100°C: $\pm 2^\circ\text{C}$ Above 100°C: $\pm 4^\circ\text{C}$

Other Information:

- International delivery is available with \$500.00 USD minimum order



3) Traceable Sentry Thermometer

Manufacturer/Distributor: TIP TEMPerature Products (Product Number SETH-4120)

Website: <http://www.tiptemp.com/Product.aspx?ProductID=21802>

Temperature Range: -50° to 70°C

Resolution: 1°

Accuracy: ± 1°C

Other Information:

- The display shows current, low, and high temperatures.
- It can be used to monitor ambient temperature, under water, water baths, incubators, freezers, and refrigerators.
- This thermometer does not have an alarm.



4) Fisher Scientific-Ertco* PTFE-Coated Spirit-Filled Safety Thermometers

Manufacturer/Distributor: Fisher Scientific

Website:

http://www.fishersci.com/wps/portal/!ut/p/_s.7_0_A/7_0_K9/.cmd/ad/.ar/sa.PortletNAVAction/.c/6_0_AJ/.ce/7_0_AL9/.p/5_0_33V/.d/2?ru=http%3A%2F%2Fprodwcserver%2Fwebapp%2Fwcs%2Fstores%2FServlet%2FFisherProductDisplay&catalogId=29104&productId=666477&langId=-1&distype=2&isChemical=false&fromCat=yes&catCode=RE_SC&brCategoryId=null&hlpi=&highlightProductsItemsFlag=&fromSearch=Y

Temperature Range, Resolution, Accuracy:

Catalog #	Temperature Range	Resolution	Accuracy
15-059-960	-35° to 50°C	1.0°	±2°C
15-059-962	-20° to 150°C	1.0°	±2°C
15-059-65	-50° to 50°C	1.0°	±2°C
15-059-66	-100° to 50°C	1.0°	±2°C

Other Information:

- International delivery is available with \$500.00 USD minimum order



Contact Information for Manufacturers/Distributors

- **Control Company**

Website: <http://www.control3.com/>

Address: Control Company
4455 Rex Road
Friendswood, Texas 77546
USA

Telephone: 281-482-1714

Fax: 281-482-9448

Email: sales@control3.com

- **TIP TEMPerature Products**

Website: <http://www.tiptemp.com/>

Address: TIP TEMPerature Products
415 Keim Blvd.
Burlington, NJ 08016
USA

Toll Free Phone Number: 800-TIP TEMP (800-847-8367)

International Phone Number: (609) 239-1900

Fax Number: (609) 239-1911

Email: tech-help@tiptemp.com

- **Fisher Scientific**

Website: <http://www.fishersci.com>

Address: Fisher Scientific
2000 Park Lane Drive
Pittsburgh, PA 15275

Telephone: 800-766-7000

Fax: 800-926-1166

International Website Access (Provides links to contacts for individual countries – just click your country on the map):

http://www.thermofisher.com/global/en/buy_products/home.asp

- **Streck**

Website: <http://www.streck.com>

Address: Streck
7002 South 109th Street
Omaha, NE 68128

For Customer Service:

Telephone: 800-228-6090

Fax: 402-333-6017

Email: custserv@streck.com

For Sales:

Telephone: 800-843-0912

Fax: 402-333-4094

U.S. Sales Email: custserv@streck.com

International Sales Email: international@streck.com

For Technical Service:

Telephone: 800-843-0912

Fax: 402-691-7518

Email: technicalservices@streck.com