

## Water Bath Protocol

This water bath is an RTE 740 and it can go up to 250 C and as low as -40 C. However, when going to such extremes make sure that the fluid and piping can handle the temperatures.

**Tubing:** High-Temperature Silicone Rubber Tubing Firm, 3/8" ID, 1/2" OD, 1/16" Wall, White.  
From McMasterCarr, product # 51135K82.

<b>Part Number:</b> <a href="#">51135K82</a>	1-99 Ft. \$2.19 per Ft. 100 or more \$1.68 per Ft.
<b>Top of Form</b>	
Type	High-Temperature Silicone Rubber Firm Tubing
Material	Silicone
Shape	Single Line
Outside Dia.	1/2" (.5")
Inside Dia.	3/8" (.375")
Wall Thickness	1/16" (.0625")
Available Lengths	5, 10, 25, 50, and 100 feet
Length Note	This tubing can stretch up to 2 times its length and still spring back to its original shape.
Reinforcement	Unreinforced
Color	Semi-Clear White
Maximum Pressure	10 psi @ 72° F
Operating Temperature Range	-94° to +392° F [-70 to + 200 C]
Bend Radius	1/2" (.5")
Durometer	70A (Soft)
Tensile Strength	1,350 psi
For Use With	Air, Beverage, Food, Water
Sterilize With	Steam (autoclave)
Specifications Met	American Society for Testing and Materials (ASTM), United States Food and Drug Administration (FDA)
FDA Specification	CFR21 177.2600
ASTM Specification	ASTM D2000 M7GE 707
Compatible Fittings	Barbed
Chemical Compatibility Link	<a href="#">51845KAC</a>
Caution	McMaster-Carr does not guarantee chemical compatibility because many variables can affect the tubing. Ultimately, the consumer must determine chemical compatibility based on the conditions in which the product is being used.

Bottom of Form <http://www.mcmaster.com/#51135k82/=7ve6jg>

Typical fluids would be distilled water and propylene glycol (food grade). Distilled water can go from 1-95 C. Propylene glycol properties change depending on the mixing ration. Typically you go with a 50/50 mixture.

<b>Propylene Glycol / Water Mixtures</b>		
<b>PG Conc. Wt.% (Vol.%)</b>	<b>Freezing Point, F(C)</b>	<b>Boiling Point, F (C)</b>

0 (0)	32 (0)	212 (100)
10 (10)	25 (-4)	212 (100)
20 (19)	20 (-7)	215 (102)
30 (29)	10 (-12)	215 (102)
40 (40)	-5 (-21)	220 (104)
50 (50)	-30 (-34)	220 (104)
60 (60)	-60 (-51)	225 (107)
70 (70)	<-60 (<-51)	230 (110)
80 (80)	<-60 (<-51)	245 (118)
90 (90)	<-60 (<-51)	270 (132)
100 (100)	<-60 (<-51)	370 (188)

<http://www.ashland.com/pdfs/technical/AD%20Chemicals%20-%20Freeze-Flash%20Point.pdf>

For more choices and requirements for the fluids, see A-1 in the manual.

#### Procedure

Pg 19 of the manual has detailed instructions on how to start.

1. Connect tubing to the bath and to the test fixture. Make sure the pipe is securely attached and that there are no bends in the tubing.
2. Make sure the drain (black outlet) is closed (feels tight when you use a wrench to turn it clockwise, to open it use a wrench and turn it counter clockwise)
3. Fill the bath (lift the lid up) until the fluid level is between the two markers.
4. Turn the system on by pushing the I/O button.
5. Press the clockwise arrow until the first thermometer icon lights up.
6. Use the up and down arrows to set the desired temperature.
7. Press the clockwise arrow again to confirm value and to set the low point. Repeat 6 to set the low temperature.
8. Press the clockwise arrow again to confirm value and to set the high point. Repeat 6 to set the high temperature.
9. If at any point one waits 10 seconds, the temperature value will return to display the current fluid temperature.
10. The program should be set to allow for temperatures higher than 50 C, however, if the bath can not get above 50 C, you will need to program it to allow for it. See page 21 for set by set diagram of how to program the bath.
11. Once tests have been completed, press the I/O button to turn it off

#### Things to note

1. Thermofisher recommends waiting 1 minute after turning the bath off to turn the bath on again.
2. It takes time to get the fluid to desired temperature. To get to 80 C it takes over 40 minutes and for -40 C it takes about 50 minutes. See page 8 of manual.
3. Keep a minimum clearance in front and behind the bath of 12 (30 cm) for airflow cooling.
4. Before moving bath, one needs to drain it.
5. When draining the fluid from the bath, make sure that it is at a safe temperature level (less than 25 C). It is recommended that once you have finished your testing that you set the fluid

temperature to 25 C and that once the fluid is at room temperature, that you turn the system off and drain it.

6. The system weights 87 pounds.
7. Think about the fluid properties such as freeze and boiling points.
8. Sudden jolts or drops can damage system
9. Read other manual before using to further understand safety (pg 4)