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Technical Bulletin

Mercury and Glass Thermometer - Rejoining Mercury Separations -

Mercury separations commonly occur as a result of shock during shipping and handling, and can generally be corrected by carefully following the procedure below. Please read the instructions completely before attempting to rejoin a separation. Contact us if you have any questions or concerns.

Please - no dry ice or heat yet. You could make the separation more difficult to rejoin as well as damage the thermometer. Read the instructions completely before you attempt to rejoin a separation.

Thermometers are filled above the mercury column with nitrogen gas. It is an inert gas which minimizes the oxidation of the mercury inside the thermometer. When you have a mercury separation in the capillary of the thermometer, the “spaces” are actually nitrogen gas. In most cases it is virtually impossible to “tap” the column back together - the mercury cannot be forced through the gas in such a confined space. So don't bother trying, you'll probably break the glass tube by tapping hard enough to rejoin the separation. To be able to “tap” the mercury back together the separations must be moved into a larger chamber than the confined space of the capillary. Moving the separations into a larger chamber allows them to be manipulated easily, allowing rejoining of the mercury column.

To rejoin a mercury separation in a thermometer the mercury must be moved either to the top of the tube or to the bottom of the tube. At the bottom of the tube is the bulb, which holds a reservoir of mercury and has a much larger diameter bore than the “viewing” lens. At the top of the tube is an expansion chamber for over-range protection which can also be used in rejoining a separation. To rejoin a separation the mercury must be moved to one of these two areas using either the “Cold Method” (preferred) or the “Heating Method”. The “Cold Method” will rejoin a mercury separation in almost every instance. In the event the mercury separation will not rejoin using the “Cold Method” and if the separation is very close to the top of the mercury column the “Heating Method” may be used with extreme caution. Careless use of the “Heating Method” can cause breakage of the tube and spillage of the mercury.

Additionally you may need to understand the meaning of “span” and “range”. The terms are not interchangeable. RANGE is the temperature value at the low end of the scale to the value at the high end of the scale on the thermometer. For example a thermometer with a RANGE of 20-220 F has a scale which starts at a low of 20 F and ends at a high of 220 F. This same thermometer has a SPAN of 200 F which is determined by subtracting the low end from the high end: $220 - 20 = 200$ degree SPAN.

After rejoining a separation, it is highly recommended that the thermometer be verified in a known temperature prior to being placed into use. If the thermometer reads correctly at this known temperature, it may be safely assumed that the separation has been correctly rejoined. If the thermometer's indication at a known temperature is high, this indicates there is a separation remaining. Look at the mercury column to determine if there is a visible separation. If there isn't a visible separation, use the cold method to remove an unseen separation.

If your attempts to rejoin a mercury column are unsuccessful, please contact **Anderson Instrument Co., Inc., Technical Services at 1-800-833-0081**. If the separation cannot be rejoined with our assistance, you will be given an **RMA#** to return the thermometer to our manufacturing facility. We will rejoin the separation and return the thermometer to you “no charge” if within the one year warranty time period. If not within the warranty time, a “rejoin mercury” repair charge will apply.

COLD METHOD (Dry Ice and Alcohol Solution) - Preferred Method

NOTE: Always wear gloves when handling dry ice to prevent direct contact with skin which can cause very rapid freezing of the skin. Freezing of the skin may cause pain and the appearance similar to a skin burn.

- 1. Place a small quantity of small pieces of dry ice into a container with approximately 1/2 to 1 inch of alcohol in it.** (The alcohol will remain a liquid while reaching temperatures far below zero degrees Fahrenheit.)
- 2. Place the bulb portion of the stem of the thermometer into the solution. Allow it to remain there for 3-5 minutes.** Observe the descending column of mercury in the thermometer. It will disappear from view, collecting in the bulb where the separated pieces of mercury will “rejoin” the main mass of mercury. Mercury will freeze at minus 38 degrees Fahrenheit, so 5 minutes is plenty of time to draw the mercury down into the bulb.
- 3. Remove the thermometer from the solution and LIGHTLY tap the end of the bulb on a hard surface.** The tapping will permit any separated pieces of mercury to “fall” and rejoin the main mass of mercury. Rapping the end of the bulb too hard could introduce additional mercury separations, so be sure to tap lightly!
- 4. Allow the thermometer to warm to room temperature naturally.....do not heat it.....with the “viewing” portion of the thermometer in a vertical position.** If the thermometer is not allowed to warm without heat, separations may be reintroduced. Also if the “viewing” portion of the glass tube is not in a vertical position as it warms to room temperature, separations can be reintroduced.
- 5. Observe the mercury column in the “viewing” area of the thermometer. It should now be rejoined.** If there is still a separation in the mercury column, go back to step 2 and repeat the procedure.

HEATING METHOD

DO NOT ATTEMPT THIS METHOD WITH THERMOMETERS WHOSE RANGE EXTENDS ABOVE 300 F (150 C) OR DAMAGE MAY RESULT.

1. The amount of separated mercury must be very small, not more than a couple of divisions in length, and near the top of the mercury column. The thermometer's range must not exceed 300 F (150 C).
2. Determine the maximum temperature to which the thermometer can be exposed without breaking (25% of the span added to the top end of the range equals the maximum temperature). Do not expose the bulb to a temperature higher than this value.
3. The thermometer may be heated (in hot water, hot oil or other suitable medium compatible with the temperature to be obtained) SLOWLY so the separation enters the expansion chamber followed by a small portion of the main (intact) column of mercury. GREAT CARE MUST BE EXERCISED TO NOT FILL THE EXPANSION CHAMBER MORE THAN HALFWAY OR BREAKAGE OF THE BULB (AND SPILLAGE OF THE MERCURY) MAY OCCUR.
4. The separation will normally fall to the side of the expansion chamber and the main column will come into contact with it. Remove the thermometer from the heat, tap the bulb LIGHTLY to rejoin the separation, maintain the tube in a vertical position and observe the mercury column as it retreats to insure it is intact.
5. If the separation returns or there is another separation to be rejoined, go back to step 2 and repeat the procedure.