Zebra® Refractometer Selection Guide

The Refractometer Scale

Refractometers measure how much light bends as it goes through certain liquids. By placing your coolant mix on the prism and putting the prism cover in place, you create a mini-prism of liquid. If the liquid is pure water, then the refractometer will read zero on its scale (in fact, the light does bend somewhat, but the refractometer is designed so the water is the baseline). The scale on the unit is based on the Brix Scale, which was designed to measure sugars in water. It is not necessarily a direct correlation of coolant concentration. See Refractometer Factor below.

The Refractometer Factor

Since coolant does not always have a direct correlation to that of the Brix Scale, most coolant manufactures will note the coolant's "refractometer factor" on the product's data sheet or even the container label (if not found there, ask your supplier or the manufacturer for it). Then multiply the reading on the refractometer by that of its refractometer factor to determine the actual concentration of the fluid. Examples below:

Factor	Scale Reading	Actual Concentration
1	5	5
1.5	5	7.5
1.9	5	9.5

Refractometer Calibration

- Using water only (distilled whenever available), zero the scale according to the instructions for your unit.
- Manually mix the desired ratio of coolant to water required for the application. This can be done per drop of coolant, per cup, or per whatever volume you like!
- Put a few drops of perfectly mixed coolant on the refractometer prism and cover it with the lens.
- Look through the pre-focused eyepiece and note exactly where the 'horizon' line betweenlight and dark falls. This is the refractometer reading. Multiply this reading by the refractometer factor, if necessary.

QUESTIONS

Please contact us for further assistance:

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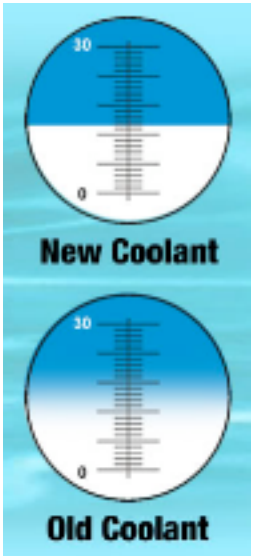

The Horizon Line

The horizon line is the line which is created between the light and the dark areas in the viewpiece of the refractometer. If you have new clean coolant mix, then the line should be fairly sharp. As the coolant ages and as more tramp oil is beaten into it, then the line becomes less distinct. If you let your coolant go long enough,
you will not be able to see any line at all, as there will be only one big blurred area in the field of view. Once it is hard to distinguish the horizon line, it may be time to think about changing the coolant.

Determining Make-up Coolant Concentration by Volume

Selection of the proper refractometer will also depend upon what your end of day concentrations are, as you will need to see any higher values on the scale. Due to the effects of evaporation on a coolant sump, the make-up volume is usually at a lower concentration then that of the initial charge. In order to determine the required concentration of the make-up solution, a calculation using the concentration by volume is necessary. To note, evaporation rates may be different between machines and/or processes. It is best to calculate this rate per machine sump and per process to ensure consistent concentrations. See example below.

Concentration by Volume Example

Known Factors:	Desired Concentration:	5%
	Total Sump Capacity:	50 gallons
	Volume of Make-up Needed:	25 gallons
	Current Concentration:	8%
Unknown:	Required Make-up Concentration:	?

- Determine the volume of concentrate needed for the entire sump (volume of 50 gallons at the desired concentration of 5%):
  05 x 50 = 2.5 gallons of concentration
- Determine the volume of concentrate needed for a make-up solution if only 25 gallons are remaining in sump at 8% concentration:
  25 x .08 = 2.0 gallons of concentrate
  Then
  2.5 gallons of concentrate originally in entire sump
  -2.0 gallons in remaining sump
  .5 gallons of concentrate needed for make-up
- Determine concentration for make-up solution:
  .5 gal of conc. ÷ 25 gal fluid required = .02, or 2% conc.

Answer: The sump now needs to be filled with a 25 gallon make-up batch at a concentration of 2%.