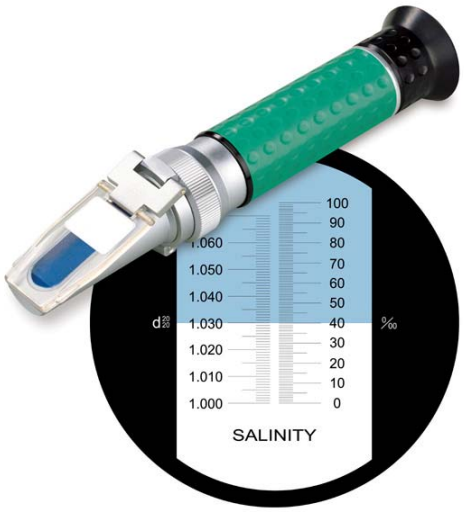
Refractometer Information Sheet

Background

A refractometer is an optical instrument that is used to determine the refractive index of a substance, measuring how light is bent as it moves through the substance. Different types of refractometers are used for measuring gases, liquids such as oils or water-based, and even certain transparent or translucent solids such as gemstones. Most commonly, refractometers are used for measuring fluid concentrations such as sugar content, blood protein concentration, or salinity. Salinity is a measure of the concentration of dissolved salts in water. The salinity concentration of the water causes light to "refract" or scatter when it passes through the water solution. Normal seawater tends to run in the range of approximately 30 parts per thousand. A ballast water sample with more salinity would cause the light to refract more than a sample with less salinity. Salinity can be conveniently measured in a ballast water tank using a refractometer. The instrument works on the *critical angle* principle, utilizing lenses and prisms to project a shadow line onto a small glass reticle inside the refractometer, which is then viewed by the inspector through a magnifying eyepiece.

Types of refractometers

There are four main types of refractometers: traditional handheld refractometers, digital handheld refractometers, laboratory refractometers, and inline process refractometers. The type of refractometer used for Seaway ballast water inspections is a traditional handheld refractometer, specifically, a salinity scale optical refractometer. This particular instrument is exceptionally simple to operate and provides quick, precise measurements. With this device, the inspectors can accurately determine the salinity level of water in ships' ballast tanks.



Using a refractometer

Operation consists of placing 1 or 2 drops of the water sample on the prism, closing a glass plate over the sample, then looking through the eyepiece for the reading. The water sample is sandwiched between the measuring prism and the cover plate. Light traveling through the sample is either passed through or totally internally reflected. The net effect is that a shadow line is formed between the illuminated area and the dark area. It is at the point that this shadow line crosses the scale that a reading is taken.