# TEST KIT 89A
## COOLING WATER & BOILER WATER SYSTEM TESTS

**Total (M) & P Alkalinity (Drop Test)**
1. Rinse and fill 25 mL sample tube (#9198G) to 25 mL mark with water to be tested.
2. Add 3 drops R-0638G Phenolphthalein Indicator. Swirl to mix. If sample turns pink, go to Step 3. If sample is colorless, go to Step 4.
3. Add R-0687G Sulfuric Acid .12N dropwise, swirling and counting after each drop, until color changes from pink to colorless. Record number of drops for use in Step 6 below. Always hold bottle in vertical position.
4. Add 3 drops R-0637 Methyl Orange Indicator. Swirl to mix. Sample should turn yellow.
5. Add R-0687G Sulfuric Acid .12N dropwise, swirling and counting after each drop, until color changes from yellow to orange (salmon pink). Record total drops. Always hold bottle in vertical position.
6. Add drops from Step 3 (if any) to drops from Step 5. Multiply the total number of drops by 10 to achieve total (M) alkalinity in parts per million (ppm) as calcium carbonate.
7. For boiler applications when P alkalinity may be required, multiply number of drops from Step 3 above by 10 and record as ppm of P alkalinity as calcium carbonate.

**Chloride (Drop Test)**
1. Rinse and fill 25 mL sample tube (#9198O) to 25 mL mark with water to be tested.
2. Add 2 drops R-0638O Phenolphthalein Indicator. Swirl to mix. If sample turns red, add R-0687O Sulfuric Acid .12N dropwise, swirling after each drop, until color changes from red to colorless.
3. Add 5 drops R-0630 Chromate Indicator. Swirl to mix. Sample should turn yellow.
4. Add R-0706 Silver Nitrate Reagent dropwise, swirling and counting after each drop, until color changes from yellow to a milky salmon (brick) red. Always hold bottle in vertical position.

NOTE: Do not add enough R-0706 Silver Nitrate Reagent to give a brown color. First change from yellow to a milky salmon (brick) red is the endpoint.

5. Multiply drops of R-0706 Silver Nitrate Reagent by 10. Record as parts per million (ppm) chloride.

**Hardness-total (Drop Test)**
1. Rinse and fill 25 mL sample tube (#9198B) to 25 mL mark with wate
2. Add 5 drops R-0619B Hardness Buffer. Swirl to mix.
3. Add 1 dipper R-0620B Hardness Indicator Powder. Swirl until dis present, sample will turn red.
4. Add R-0683 Hardness Reagent dropwise, swirling and counting afte changes from red to blue. Always hold bottle in vertical position.
5. Multiply drops of R-0683 Hardness Reagent by 10. Record as parts hardness as calcium carbonate.

**Nitrite (Drop Test)**
1. Rinse and fill 25 mL sample tube (#9198R) to 5 mL mark with cool water to be tested.
2. Add 4 drops R-0819 Ferroin Indicator. Swirl to mix. Sample should t
3. Add R-0820 CAN Solution dropwise, swirling and counting after changes from red (orange) to blue. Always hold bottle in vertical pos
4. Multiply drops of R-0820 CAN Solution by 40. Record as parts pe nitrite. For closed chilled water systems, this should be 1000 ppn above 185° F, it should be 1500 ppm.

**pH (long range) (Color Comparison)**
1. Rinse and fill 5 mL test cell (#9017) to 5 mL mark with water to be te
2. Add 5 drops R-1003U Long Range Indicator. Cap and mix.
3. Place test cell on white area of pH Long Range color card (#5425). with color standard. Record as pH units.

**Phosphonate (organo-phosphorus) (Drop Test)**
1. Rinse and fill 25 mL sample tube (#9198P) to 25 mL mark with water to be tested.
2. Add:
   1 drop R-0697 Thiosulfate N/10
   10 drops R-0805 Fluoride Masking Agent
   1 level dipper R-0802P XO Indicator Powder
   Swirl to mix.
3. Adjust pH between 2.6 and 3.0:
   Add 1 drop R-0686P Sulfuric Acid N. Swirl to mix. Dip test paper (#9315) into sample, in direction of arrow, for 3 seconds, with all color zones immersed. Match indicator zone (unnumbered square between 2.7 and 3.0 color standards) with color scale. Read printed pH value. If necessary, continue adding R-0686P Sulfuric Acid N dropwise, swirling and checking pH after each drop, until a pH between 2.6 and 3.0 is obtained. Sample should be yellow.
4. Add R-0803 Phosphonate Titrating Solution dropwise, swirling and counting after each drop, until color changes from yellow to purple-pink. Always hold bottle in vertical position. Record as drops in treated sample.
5. Repeat Steps 1 through 4 on makeup water, and record as drops in blank. This will usually take about 2 drops of R-0803 to reach endpoint.
6. Subtract drops of R-0803 Phosphonate Titrating Solution in blank from drops in treated sample (Step 4). Multiply this difference by the appropriate conversion factor (see CONVERSION FACTORS). Record as parts per million (ppm) phosphonate or ppm product.

**CONVERSION FACTORS:**

| To express phosphonate as: | Multiply drops by: |
|---|---|
| Aminotri(methylenephosphonic acid) (ATMP) | 1.0 |
| 1-Hydroxyethylidene-1,1-diphosphonic acid (HEDP) | 0.9 |
| Diethylenetriaminepenta(methylenephosphonic acid) (DTPMP) | 1.45 |
| Col-Treat 233 | 18.0* |
| No. 340 Liquid Scale Inhibitor | 5.5* |
| Ty-Ion C70 | 11.0* |

*Number of drops (Step 6) x factor = ppm of product

**Target Residuals of Treatment Product:**
Cal-Treat 233..... 200-250 ppm
No. 340 L.S.I. ..... 15 ppm
Ty-Ion C70..... 50 ppm for scale and 150 ppm for corrosion

**COMPONENTS (not Bill of Materials):**

**Alkalinity-total (M) & P**
- 1 x 9198G — Sample Tube, Graduated, 25 mL, plastic w/cap and green dot
- 1 x R-0637 — Methyl Orange Indicator, DB
- 1 x R-0638G — Phenolphthalein Indicator (green cap), DB
- 1 x R-0687G — Sulfuric Acid .12N (green cap), DB

**Chloride**
- 1 x 9198O — Sample Tube, Graduated, 25 mL, plastic w/cap and orange dot
- 1 x R-0630 — Chromate Indicator, DB
- 1 x R-0638O — Phenolphthalein Indicator (orange cap), DB
- 1 x R-0687O — Sulfuric Acid .12N (orange cap), DB
- 1 x R-0706 — Silver Nitrate Reagent, DB

**Hardness-total**
- 1 x 9198B — Sample Tube, Graduated, 25 mL, plastic w/cap and blue dot
- 1 x R-0619B — Hardness Buffer (blue cap), DB
- 1 x R-0620B — Hardness Indicator Powder (blue dot)
- 1 x R-0683 — Hardness Reagent, DB

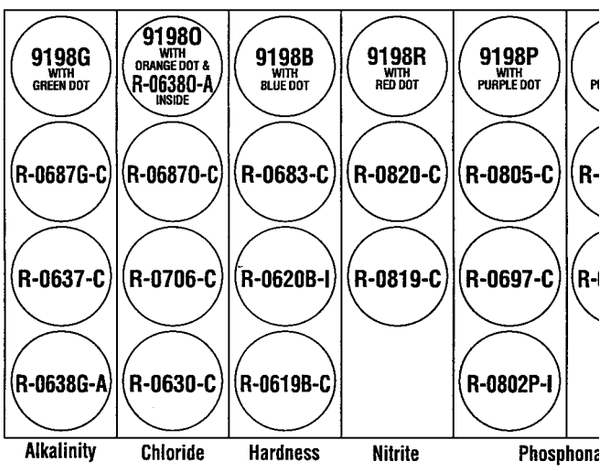
**pH (long range)**
- 1 x 5425 — Comparator, Color Card, pH (long range), 3.0-11.0
- 1 x 9017 — Test Cell, Calibrated 5 mL, square, plastic w/cap
- 1 x R-1003U — Long Range Indicator, DB

**Phosphonate (organo-phosphorous)**
- 1 x 9198P — Sample Tube, Graduated, 25 mL, plastic w/cap and purple dot
- 1 x 9315 — Test Paper, pH, 1.8-3.8
- 1 x R-0686P — Sulfuric Acid N (purple cap), DB
- 1 x R-0697 — Thiosulfate N/10, DB
- 1 x R-0802P — XO Indicator Powder
- 1 x R-0803 — Phosphonate Titrating Solution, DB
- 1 x R-0805 — Fluoride Masking Agent, DB

**Misc.**
- 1 x 5836 — Instruction

**Nitrite**
- 1 x 9198R — Sample Tube, Calibrated 5 mL, plastic and red dot
- 1 x R-0819 — Ferrion Indicator, DB
- 1 x R-0820 — CAN Solution, DB

**TO ORDER REPLACEMENT PARTS AND REAGENTS, CONTACT Y**

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