

INSTRUCTIONS

Read all instructions before sample collection

Before collecting samples, review the contents of this test kit (page 4). This kit allows testing of *five* samples.

Test samples from the following locations:

1. Make-up water
2. Riser — system side
3. Three other locations (including inspectors test valve & remote locations)

Process samples immediately after collection.

If testing water samples, let water flow for 30 to 60 seconds before collecting water.

Important: Properly dispose of all testing materials. Needles must be destroyed before disposal by cutting or bending back the needle. Syringes must be destroyed by breaking or shattering the barrel. Federal and local laws apply.

SECTION 1. MICROBIOLOGICAL TESTS

1A. Collection: Solid Samples (Nodules, Corrosion Product, Soil, Etc.)

1. Unscrew cap from one of the 15 ml sampling tubes labeled “Sterile DI Water.” *Be careful* not to touch inside of cap or mouth of tube with hands or tools.
2. Use a sterile tongue depressor to add a portion of sample—about ½ teaspoon—to sampling tube.
3. Replace cap.
4. Shake vigorously to homogenize sample. You have just created what is known as a *slurry*.
5. Proceed to step 1D-1.

1B. Collection: Samples of Surface Scale or Biofilm

1. Unscrew cap from one of the 15 ml sampling tubes labeled “Sterile DI Water.” *Be careful* not to touch inside of cap or mouth of tube with hands or tools.
2. Dip a sterile cotton-tipped swab into water in tube to wet swab.
3. Swab an area of approximately one square inch of surface to be sampled.
4. Place cotton tip of swab into tube. Break off wooden portion of swab touched by your fingers, and discard.
5. Replace cap.
6. Shake vigorously to homogenize sample. You have just created what is known as a *slurry*.
7. Proceed to step 1D-1.

1C. Collection: Liquid Samples

1. Unscrew cap from one of the 15 ml sampling tubes labeled “Sterile DI Water.” *Be careful* not to touch inside of cap or mouth of tube with hands or tools.
2. Discard water.
3. Fill tube with liquid sample.
4. Replace cap.
5. Proceed to step 1D-1.

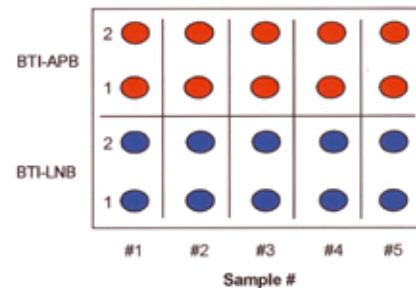
1D. Inoculation of Media

Note: Use the following procedures for each sample.

1. Using a marking pen, label media tray and media

bottles as shown in Figure 1.

Figure 1



2. Remove and discard wrappers from a sterile 1 ml syringe and an 18g needle. Without touching tip of syringe or opening of needle, place needle onto syringe. Tighten needle onto syringe by pushing in and turning needle shield clockwise.
3. Remove needle shield. Place syringe/needle into sample or slurry in 15 ml sampling tube.
4. Withdraw 1.0 ml of sample/slurry from sampling tube by gently pulling up on syringe plunger until sample/slurry reaches the 1.0 ml mark.
5. Flip plastic cap off first purple-capped bottle (labeled #1).
6. Insert syringe needle through rubber stopper of first bottle. Inject sample/slurry into bottle by depressing plunger.
7. Keep needle in bottle. Mix solution in bottle by gently withdrawing plunger, drawing up 1.0 ml of media-sample/slurry mixture, and then depressing plunger, reinjecting liquid into bottle. Repeat several times.
8. Now, withdraw **0.1** (one-tenth!) ml of solution from purple bottle #1 and inject into purple bottle #2.
9. Using the same syringe, repeat steps 3 through 8 for red-capped bottles.
10. Using a new syringe and needle, repeat steps 2 through 9 for samples #2 through 5.
11. Keep all bottles of media in closed kit box at room temperature. Proceed to Section 2.

SECTION 2. CHEMICAL TESTS

Perform all chemical tests on sample/slurry used in Section 1. Use following procedures for each sample/slurry. Record results in attached FPS System Information Form.

2A. Dissolved Oxygen Test (for Water Samples Only)

Skip this test if testing solid or swab samples.

1. Place plastic tubing up into pipe from which water sample will be collected.
2. Flow water sample through tubing and into bottom of 15 ml sampling tube until it is overflowing and no air bubbles are present in sampling tube.
3. Place dissolved oxygen ampoule, tapered end first, into sampling tube until ampoule is 3/4 submerged in sample.
4. Snap tip by *gently* pressing end of ampoule against side of sampling tube. Let ampoule fill with sample.
5. Remove ampoule from sampling tube. Invert several times, allowing air bubble to travel from end to end.
6. Wait **2 minutes**.
7. Compare ampoule color with attached Dissolved Oxygen Color Chart (page 5). Chart should be illuminated from above by a bright, white light. Be sure to place ampoule on both sides of color chart before concluding it gives the best match. Placing ampoule between and parallel to color bars aids in readings.

2B. Extended Range pH, Total Alkalinity, Total Hardness Tests

Be careful not to touch test zones on test strips. Make all color comparisons under a bright, white light.

Remove each test strip from its packet. Use **care** not to rip into instructions or color charts on the wrappers! Follow instructions provided on wrappers.

2C. Chloride Test

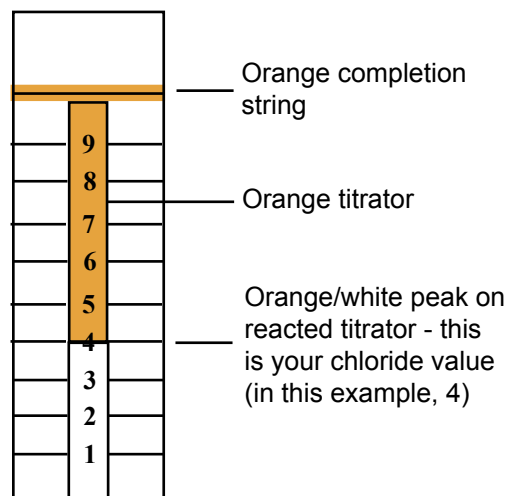
1. Dip lower end of chloride test strip into sample/slurry. **Do not** dip test strip further than the 9 mark.
2. Wait for sample/slurry to saturate orange titrator and turn orange completion string dark (Approx. 5 min.).
3. Note where the tip of orange/white peak on reacted titrator falls on number scale on test strip (see Figure 2).

For technical assistance, to request MSDS, or to place an order:

Call Toll Free: 970.884.4629

Or E-mail: products@bti-labs.com

Figure 2



2D. Carbonates and Sulfide Tests

Caution: 2 Normal hydrochloric acid (2N HCl) is a strong acid. Avoid contact with skin and eyes, and avoid breathing vapors! If contact is made with skin or eyes, flush with large amounts of fresh water.

1. Remove cap from the 15 ml sampling tube labeled “2N HCl.”
2. Using the plastic pipette, draw up a small amount of the 2N HCl.
3. Add **4 drops** of 2N HCl to sample/slurry tube.
4. Expel any 2N HCl remaining in the pipette into the 15 ml tube labeled “2N HCl.” Replace cap on 2N HCl tube.
5. If solution in the sample/slurry tube bubbles, this indicates the presence of carbonates.
6. Hold mouth of sample/slurry tube about six inches from your nose. With your hand, wave any vapors from tube toward your face. If solution smells like rotten eggs, this indicates the presence of sulfide. **Avoid directly breathing vapors!**
7. Save 2N HCl tube and plastic pipette for future tests.

2E. Total Iron Test

1. Pour 4 ml of the sample/slurry from 15 ml sampling tube into 5 ml sampling tube. Add contents of iron reducer pack and mix. Reducer contents will not dissolve completely.
2. Perform total iron test on sample/slurry in 5 ml sampling tube. Follow instructions on wrapper (Method A), and use same precautions as for other test strips.
3. Discard sample/slurry in 5 ml sampling tube appropriately—remember, this tube contains hydrochloric acid.
4. Proceed to Section 3.

SECTION 3. INTERPRETATION

3A. Interpretation of Microbiological Results

After 5 days incubation, compare bottles with written descriptions, below, and record results in attached FPS System Information Form. Check results again after 15 days, and record any changes. Compare microbiological results in Section 1 with Interpretations Chart, below.

1. Purple-capped bottles detect low nutrient bacteria (LNB). These bottles will turn cloudy if LNB are present.
2. Red-capped bottles detect organic acid-producing bacteria (APB). These bottles will turn cloudy orange or cloudy yellow if APB are present.

3B. Interpretation of Chemical Results

Compare chemical results in Section 2 with Interpretations Chart, below.

3C. Formal Interpretation

For a formal written report on results, interpretation, conclusions, and recommendations, return completed FPS System Information Form (attached) and completed test kit to BTI Products. An additional fee is assessed for this service. Call 970.884.4629 for details.

Interpretations Chart

Microbiological Tests	Results	Interpretations	Explanations
Low nutrient bacteria (LNB)	0 positive bottles	None (0)	2 positive LNB bottles is a strong indication of MIC.
	1 positive bottle	Low level (1 to 10)	
	2 positive bottles	High level (>100)	
Acid-producing bacteria (APB)	0 positive bottles	None (0)	1 or more positive APB bottles indicates advanced MIC.
	1 positive bottle	Low level (1 to 10)	
	2 positive bottles	High level (>100)	
Chemical Tests	Results	Interpretations	Explanations
Dissolved Oxygen	0 ppm	None	Greater likelihood for oxygen-related corrosion & microbial growth as oxygen levels increase.
	1 - 2 ppm	Low	
	>3 ppm	Moderate to high	
pH	<7	Acidic	Values below 7 are increasingly acidic & corrosive.
	7	Neutral	Value of 7 is neutral.
	>7	Alkaline	Values above 7 are increasingly alkaline & scaling.
Total Alkalinity	0 - 40 ppm	Low	The higher the alkalinity value, the higher the scaling potential.
	40 - 100 ppm	Moderate	
	>100 ppm	High	
Total Hardness	0 - 75 ppm	Soft	The higher the hardness value, the higher the scaling potential.
	75 - 150 ppm	Moderately hard	
	150 - 300 ppm	Hard	
	>300 ppm	Very hard	
Chloride	1.4 - 2.0	Relatively low	The higher the chloride value, the greater the potential for chloride-assisted pitting corrosion.
	2.0 - 3.4	Moderate	
	3.4 - 5.0	High	
	>5.0	Very high	
Carbonates	No bubbling	Absent	Indication of little potential for scaling.
	Bubbling	Present	Indication of potential for scaling.
Sulfide	No "rotten egg" odor	Absent	Neutral with respect to MIC.
	"Rotten egg" odor	Present	Strong indication of MIC.
Total Iron	0 ppm	None	The greater the iron value, the more corrosion is indicated.

MIPkit® FPS: List of Kit Contents

1. 10 Bottles BTI-LNB Medium (Purple Flip-Off Caps)
2. 10 Bottles BTI-APB Medium (Red Flip-Off Caps)
3. 5 Dissolved Oxygen Ampoules
4. 5 Total Alkalinity Test Strips
5. 5 Extended Range pH Test Strips
6. 5 Total Hardness Test Strips
7. 5 Chloride Test Strips
8. 5 Total Iron Test Strips
9. 5 Iron Reducer Packs
10. 5, 5 ml Centrifuge Tubes
11. 1 Plastic Tubing
12. 5, 15 ml Sampling Tubes with 14 ml Sterile Deionized Water—Labeled “Sterile DI Water”
13. 1, 15 ml Sampling Tube with 3 ml Dilute Acid—Labeled “2N HCl”
14. 5 Sterile Tongue Depressors
15. 5 Sterile Cotton-Tipped Swabs
16. 5, 1 ml Syringes
17. 5, 18g Needles
18. 1 Plastic Pipette

Rev 2/15/22

WARRANTY

BTI Products, LLC's products are warranted by **BTI Products, LLC** to perform as described in the technical literature supplied with each product, provided the products are used, stored, and maintained in accordance with the directions provided. They must also be used before the expiration date. Adequate quality control must be done by the user of the products.

BTI Products, LLC disclaims any implied warranty of merchantability or fitness of its products for any other purpose than described in its technical literature, and in no event shall **BTI Products, LLC** be held liable for any consequential damages arising out of the aforesaid express warranty.

Should you have questions about this product or any of the products and services we provide, please call or write:

BTI Products, LLC
652 Silver Hills Road
Bayfield, CO 81122
970.884.4629products@bti-labs.com

We welcome all comments and inquiries.

Usage & Storage: Use by expiration date printed on kit box label. Store test materials in a cool, dry place out of direct sunlight. Do not eat or drink any of the contents of the kit. Keep out of the reach of children. Material Safety Data Sheets available upon request.

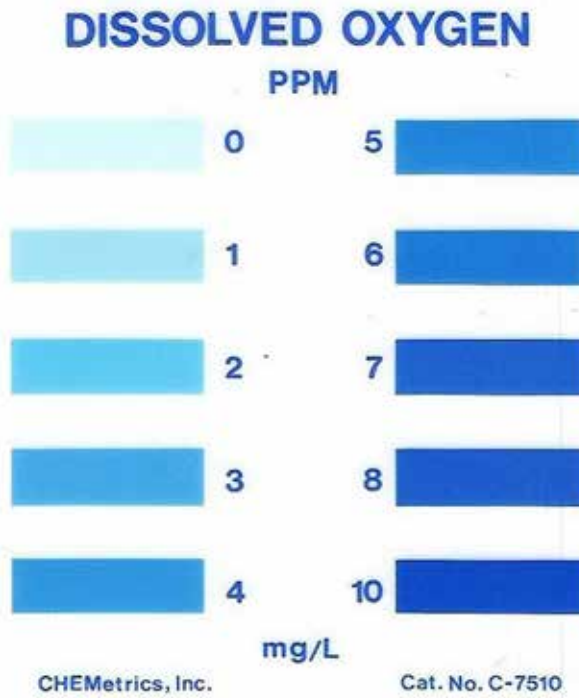
Disposal of Test Materials: Properly dispose of all kit components. Needles must be destroyed before disposal by cutting or bending back the needle. Syringes must be destroyed by breaking or shattering the barrel. Federal and local laws apply.

Used media bottles must be properly disposed of according to local regulations. Alternatively, bottles/kits may be returned to **BTI Products, LLC** for proper disposal for a fee of \$30.00 per kit.

Need Help?

Call 970.884.4629

Dissolved Oxygen Color Chart



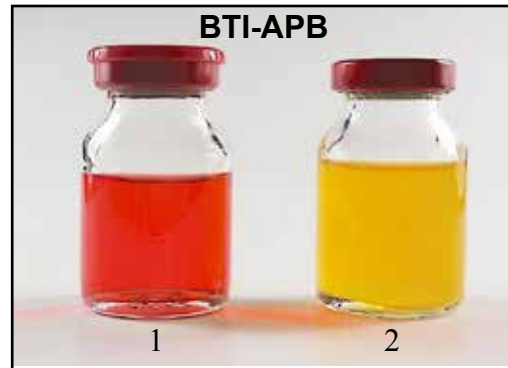
Chloride Conversion Chart

Number on chloride test strip	ppm (mg/L) Chloride	Number on chloride test strip	ppm (mg/L) Chloride
1.0	26	4.4	190
1.2	32	4.6	205
1.4	39	4.8	221
1.6	45	5.0	239
1.8	53	5.2	257
2.0	60	5.4	277
2.2	68	5.6	297
2.4	76	5.8	320
2.6	85	6.0	344
2.8	94	6.2	370
3.0	104	6.4	397
3.2	114	6.6	428
3.4	125	6.8	461
3.6	137	7.0	497
3.8	149	7.2	537
4.0	162	7.4	581
4.2	176	7.6	631

MIPkit® FPS - Positive Reactions Sheet



1. Uninoculated (Negative)
2. Positive—Cloudy with possible slime formation



1. Uninoculated (Negative)
2. Positive—Cloudy orange or yellow
-Slime formation without a color change does not indicate a positive



BTIproductsLLC

ANALYTICAL REQUESTS SHEET

Please fill out completely and return with the sample(s).

Send to: BTI Products, LLC

652 Silver Hills Road

Bayfield, CO 81122

970.884.4629

Email: products@bti-labs.com

I. Sample Information

1. Sample name or site designation _____
2. Date sample collected _____
3. Date sample shipped _____
4. Type and location of sample _____
5. Company name and address _____
6. Contact name _____
7. Telephone and email _____
8. PO or Credit Card # _____
9. Name on card _____
10. Billing address _____

Please indicate below which analyses you wish to have performed on the sample. If you have any questions, please contact us at 970.884.4629.

II. Sample Analyses

A. Microbiological Analyses

- | | Cost Per Sample | Yes |
|--|-----------------|-------|
| 1. Viable culture | | |
| a. MIPkit® FPS – Inoculated by client and read by BTI Products | \$625 | _____ |
| b. MIPkit® FPS -- Inoculated and read by BTI Products | \$880 | _____ |
| 2. Other (specify) _____ | _____ | _____ |

B. Other

- | | | |
|--------------------------|-------|-------|
| 1. Pipe analysis | Quote | _____ |
| 2. Photodocumentation | Quote | _____ |
| 3. Other (specify) _____ | _____ | _____ |

FPS SYSTEM INFORMATION FORM

For use with BTI Products, LLC's MICKit® FPS & MIPKit® FPS test kits
A tool to aid in diagnosis of deposition, corrosion, and MIC in fire protection systems

CLIENT & TESTING INFORMATION				
Client Name, Address, Phone	Facility	Water Purveyor	Facility Use	Other Comments
TEST DATA				
FPS system number				
Name of sample locations (e.g., Main Drain)				
Geographic location (e.g., South, 1st Floor)				
Test date				
Test method used (MICKit® FPS, MIPKit® FPS, other)				
Type of sample tested (water, swab of surface scale/biofilm, solid)				
Pipe ID (inches)				
Horizontal or vertical pipe				
Dissolved Oxygen (ppm)				
pH				
Total Alkalinity (ppm)				
Total Hardness (ppm)				
Chloride (ppm)				
Carbonates (yes or no)				
Sulfide (yes or no)				
Total Iron (ppm)				
Particulates/oils (specify which present)				
Color of particulates (rust-colored, black, etc.)				
Texture of particulates (fluffy, granular, fine, etc.)				
Amount particulates present (ml in tube)				
Low nutrient bacteria (per ml)				
Iron-related bacteria (per ml)				
Anaerobic bacteria (per ml)				
Acid-producing bacteria (per ml)				
Sulfate-reducing bacteria (per ml)				

SYSTEM INFORMATION	System #1	System #2	System #3	System #4	System #5
Type of system (wet, dry, including preaction, or deluge)					
Date system installed (month, year)					
Date of major renovations (month, year)					
Number of floors					
Number of risers					
Grid, loop, or tree system					
Fire and/or jockey pump (yes or no)					
Static pressure (psi)					
System volume (gal)					
Type backflow preventer					
Type pipe material (black steel, galvanized, copper, plastic)					
Mains: pipe schedule (5, 10, 30, 40, other)					
Branch lines: pipe schedule (5, 10, 30, 40, other)					
Fittings on mains (welded, screwed, roll grooved, cut grooved, other)					
Fittings on branch lines (welded, screwed, roll grooved, cut grooved, other)					
Sprinkler orientation (upright, pendent, sidewall)					
Source of make-up water (municipal, well, reservoir, pond, river, other)					
Storage tank volume (gal)					
Storage tank material (steel, concrete, wood, synthetic, other)					
Underground volume (gal)					
Underground materials of construction (steel, ductile, CPVC, other)					
Frequency of main drain test					
Frequency of inspectors test					
Location of inspectors test (riser, remote)					
Total number of times system was drained and refilled (last 5 years)					
Slime present (yes or no & clock position in pipe)*					
Tubercles present (yes or no & clock position in pipe)*					
Sediment present (yes or no & clock position in pipe)*					
Pipe obstructed (yes or no—if yes, cross section % obstructed)*					
Pitting corrosion present (yes or no & clock position in pipe)*					
Pinholes present (yes or no & clock position)					
Date(s) first leak(s) detected					
Location of leaks (riser, feed main, cross main, branch lines—all that apply)					

Answers to items marked with an asterisk () are obtained through visual inspection of inner diameters of pipe. This can be done using BTI Products, LLC's MICKIt® Pipe Inspection Kit or similar test method.