

# Chlorine Testing



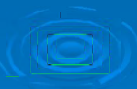
By Ivars Jaunakais / Industrial Test Systems, Inc.

Thursday, March 11<sup>th</sup> WQA 2010

10:30 – 10:55 am

# Water

- It's the most important natural resource in our environment
- Not pure - contains microorganisms and dissolved minerals which need to be controlled so water can be used safely



# Chlorine in Water

- Effective against a broad range of microorganisms
- Chlorine first used in 1908 for public health
- More than 79,000 tons of chlorine are used per year in the United States and Canada to treat water
- The primary disinfectant for drinking water in the world
- Monitoring chlorine is very important

# Chlorine in Water

- Chlorination has plays a critical role in protecting America's drinking water supply from waterborne infections
- 98 percent of systems that treat water employ chlorine-based disinfectants
- Over 200 million Americans receive chlorine-disinfected drinking water every day

# Sources of Chlorine

Chemical Name	Chemical Formula	Form	% Chlorine
Chlorine Gas	$\text{Cl}_2$	Gas	100%
Calcium Hypochlorite	$\text{Ca}(\text{OCl})_2$	Solid	65-70%
Sodium Hypochlorite	$\text{NaOCl}$	Liquid	~12%

# SenSafe Free Chlorine Water Check #481026

- First approved EPA test strip for compliance testing
- Published in the 2007 Federal Register (*vol 72, no 47, Monday, March 12, 2007 p. 11204, ITS method D99-003*)
- Approved for use by most U.S. States
- Patented procedure (*US Patents 6541269, 5491064*)
- Detection levels 0, 0.05, 0.1, 0.2, 0.4, 0.6, 0.8, 1.2, 1.5, 2.0, 2.6, 4.0, >6.0 pm (mg/L)



# Benefits of SenSafe™ Free Chlorine Water Check #481026

- Safe and non-hazardous
- No monochloramine interferences
- Reagents impregnated on test strip pad
- No external chemicals needed
- Very stable



# Benefits of SenSafe™ Free Chlorine Water Check #481026

- No instrument required
- Results in under a minute
- Four year shelf-life
- Patented aperture strip is 10 times more sensitive than regular test strips



# Benefits of SenSafe™ Free Chlorine Water Check #481026

- Uses patented TMB indicator pad - *U.S. patent # 5491094*
- Allowed by the USDA for use in food processing facilities
- No indicator bleach out even at 500 ppm (mg/L) Chlorine
- Ideal for measuring cloudy and turbid water samples with no effect on test results



# EPA Approved in 2003

- Defined as products **approved** by the United States Environmental Protection Agency (EPA) for reporting and recording purposes
- Published in 2007 in the U.S. Federal Register (*vol 72, No. 47, Monday March 12 p.11204, ITS Method D99-003*)
- Each state may have different requirements and approvals

# SenSafe™ Free Chlorine Water Check Label #481026

**SenSafe™**  
**Free Chlorine**  
**Water Check**

**This product may be used for compliance monitoring.**

See [www.sensafe.com](http://www.sensafe.com) for ITS method D99-003 [Revision 3, Nov. 21, 2003] in EPA format. For compliance monitoring purposes the test strip must be used as described in method D99-003.

For technical support, call 1-803-329-0162, email [its@sensafe.com](mailto:its@sensafe.com), or visit [WWW.SENSAFE.COM](http://WWW.SENSAFE.COM)



**MCL = Maximum Contaminant Level**

US PATENT 5491094  
US PATENT 6541269

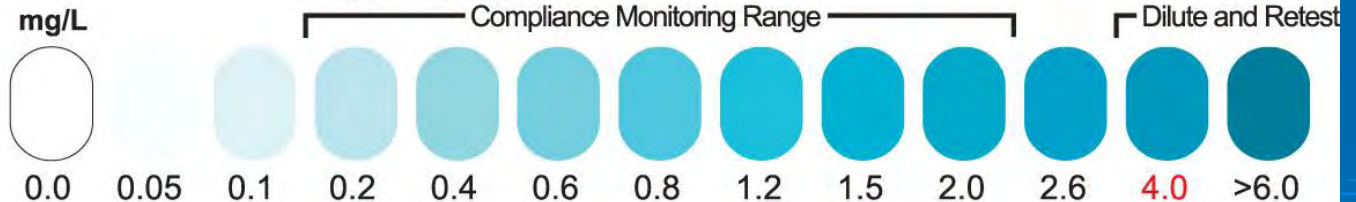
**Part Number 481026**

**Contains 50 Test Strips**

## Test Procedure:

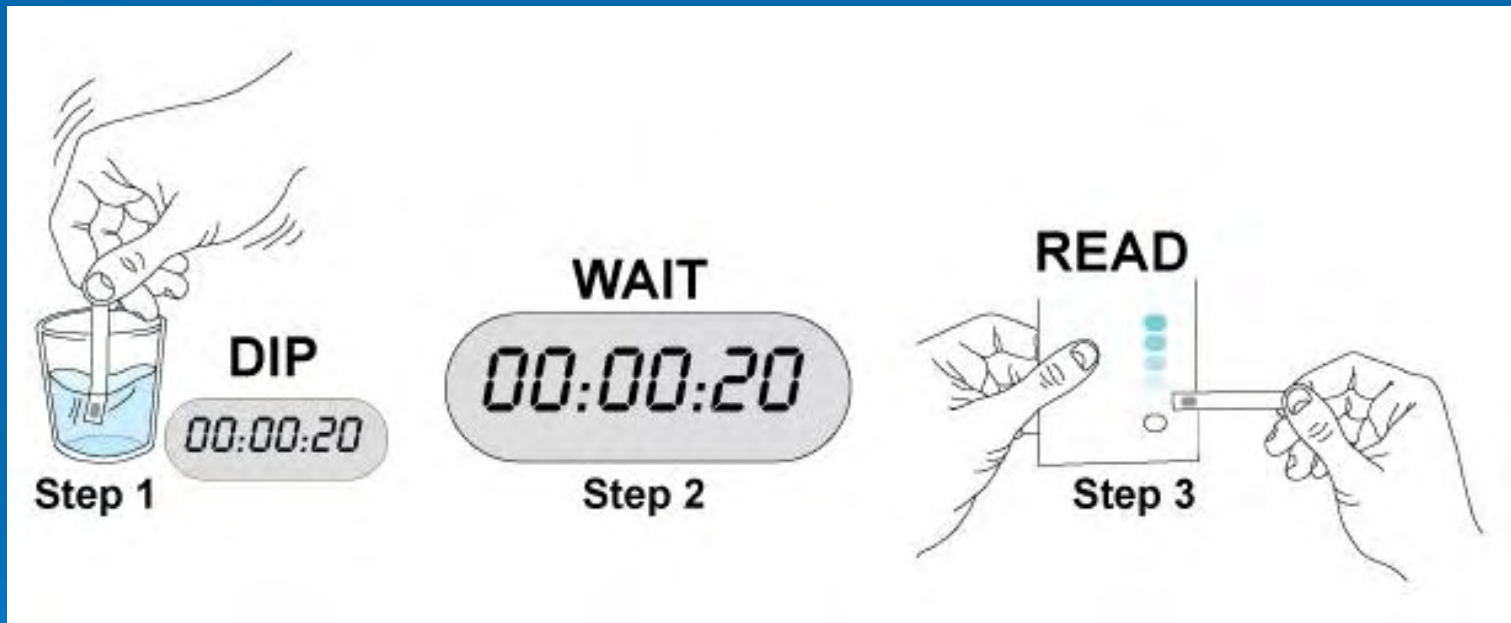
Dip one (1) test strip into a **50 ml (about 2 oz.)** sample for **twenty (20) seconds** with constant, gentle back-and-forth motion that maximizes the liquid flow through the indicator pad (aperture). Remove and shake strip once briskly to remove excess water. **Wait 20 seconds** and match with the best color to determine Parts per Million (PPM) or mg/Liter concentration of Free Chlorine. Complete the color matching **within one (1) minute**.

**NOTE:** Color chart prepared with standards at R.T. (22°C - 27°C). If outside this temperature range, refer to chart.



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# SenSafe™ Free Chlorine Water Check #481026 Procedure



# Benefits of SenSafe™ Free Chlorine Water Check #481026

## ➤ Accuracy

- No chemicals to mix and no instrumentation to calibrate, SenSafe™ Free Chlorine Water Check minimizes user error.



# Benefits of SenSafe™ Free Chlorine Water Check #481026

## ➤ Ease

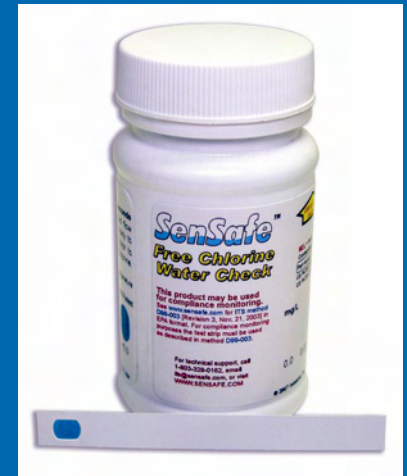
- Professional accuracy for non-technical user with no special training needed



# Benefits of SenSafe™ Free Chlorine Water Check #481026

## ➤ Time

- No set up is required so results are available in a fraction of the time required by other methods



# Benefits of SenSafe™ Free Chlorine Water Check #481026

## ➤ Safety

- SenSafe™ Free Chlorine Water Check is classified by OSHA to be non-hazardous because of the small amount of chemicals involved



# Benefits of SenSafe™ Free Chlorine Water Check #481026


## ➤ Transport

- Small and portable - makes it ideal for field testing





# Total Chlorine Test Available

## Total Chlorine Test #480010



8 09762 80010 7

**Total Chlorine Check™**  
Free Chlorine + Monochloramines

**Part Number 480010**   **Contains 50 Test Strips**

**DO NOT STORE IN DIRECT SUNLIGHT OR ABOVE 90°F**

**NOTE:** For better color matching fold the white plastic handle of the test strip under the aperture so that it produces a white viewing background (see Figure 1).

Color chart prepared with Sodium Hypochlorite and Ammonium Chloride in distilled water at pH 5.8-6.2.

For Technical Assistance, Call: 1-803-329-0162  
[www.SENSAFE.com](http://www.SENSAFE.com)

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**METHOD A:**  
Dip one test strip into a 250ml water sample for 5 seconds with a constant, gentle back and forth motion. Remove the strip and wait 30 seconds, then match with Method A colors. Complete color matching within 15 seconds.

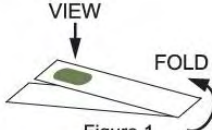


Figure 1

\*MCL = Maximum Contaminant Level

PPM (mg/L)	0.0	
	0.1	
	0.2	
	0.5	
	0.8	
	4.0*	
	10.0	

**METHOD B:**  
Dip one test strip into a 250ml water sample for 10 seconds with a constant, gentle back and forth motion. Remove the strip and wait 30 seconds, then match with Method B colors. Complete color matching within 15 seconds.

US Pat. No. 6541269  
**FOR BEST RESULTS, PLEASE FOLLOW INSTRUCTIONS CAREFULLY.**  
**INTERFERENCES:** Bromine, Iodine, and Ozone will give a similar color reaction.

PPM (mg/L)	0.0	
	0.05	
	0.1	
	0.15	
	0.2	
	0.5	
	1.0	

# To achieve good test results

1. Test is acceptable or compliant
2. Test is appropriate for the staff technical ability
3. Test is robust, reagents and equipment are reliable & stable
4. Test is not affected by interferences
5. Test is accurate when staff performs the test correctly



# TEST KIT PERFORMANCE IN A LAB

- Analysis will provide good results in a Laboratory setting
- A lab is a controlled environment where Reagent stability is assured
- Recalibration of test kit reagents or kit performance can be easily confirmed

# TEST KIT ON-SITE PERFORMANCE (Challenges)

- Test kits and instruments on-site operate under different environmental conditions
- Customer home or business can have a great deal of affect on results and operator
- Distractions like noise and activity
- For some tests (especially Liquid reagents) stability is affected by elevated Temperature in transport vehicle
- On-site precise results are a challenge
- Easy, non-technical procedures are desirable

# EPA Endorsement

“We (EPA) believe that the ITS test strips will provide the regulatory community with a valuable option for monitoring free chlorine levels in drinking water.”





# Questions?

Industrial Test Systems, Inc.

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