Catalog Number 2884188

Emergency Response Toolbox

User Manual

07/04 1ed

07/04 1ed eac/dk

Table of Contents

Section 1 Specifications

Specifications are subject to change without notice.

Radiation Detector	
Detector	Halogen-quenched Geiger-Mueller tube. Effective diameter 45 mm (1.75 in.). Mica window density 1.5–2.0 mg/cm^2.
Display	4-digit liquid crystal display with mode indicators
Averaging Periods	Display updates every 3 seconds, showing the average for the past 30 second time period at normal levels. The averaging period decreases as the radiation level increases. User can select a fast 3-second averaging period.
Operating Range	mR/hr: 0.001 to 100.000
	CPM: 0 to 300,000
	Total: 1 to 9,999,000 counts
	uSv/hr: 0.01 to 1000.00
	CPS: 0 to 5000
Sensitivity	3500 CPM/mR/hr referenced to Cs-137
Accuracy	±15% 0–50 mR/hr; ± 20% 50–100 mR/hr
Timer	Can set 1–10 minute sampling periods in 1-minute increments, 10–15 minute sampling periods in 10-minute increments, and 1–24 hour sampling periods in 1-hour increments
Count Light	Red LED flashes with each radiation event
Audio	Beeps with each radiation event; can be muted
Outputs	Dual miniature jack drives CMOS or TTL devices, sending counts to a computer or data logger. Submini jack allows for electronic calibration
Anti-saturation	Reading holds at full scale in fields up to 100 times the maximum reading
Temperature Range	–10 to 50 °C (14 to 122 °F)
Power	One 9-volt alkaline battery; battery life is minimum 200 hours at normal background, minimum 24 hours at 1 mR/hr.
Dimensions	150 x 80 x 30 mm (5.9 x 3.2 x 1.2 in.)
Weight	350 g (12.5 oz) with battery
Certifications/Marks	None

Free Chlorine	
Range	0.0 to 3.5 mg/L
Cyanide Test	
Range	0.0 to 0.3 mg/L
Pocket Pal pH	
Range	0.0 to 14.0 pH
Resolution	0.1 pH readout
Accuracy	± 0.2 pH nominal
Dimensions	14.2 x 2.8 x 1.5 cm (5.6 x 1.1 x 0.6 in.)
Ambient Temperature	0 to 50 °C
Battery Life	1000 hours (approx.)
Pocket Pal Conductivity	
Range	10 to 1990 µS/cm
Accuracy	At 25 °C calibration and 25 °C sample, ± 2% of reading. ±10% of reading over 0 to 50 °C range
Dimensions	14.2 x 2.8 x 1.5 cm (5.6 x 1.1 x 0.6 in.)
Weight	65 g
Operating Temperature	0 to 50 °C
Temperature Compensation	Automatic from 5 to 50 °C (41 to 122 °F), or 2%/°C
Battery Life	1000 hours (approx.)

Section 2 General Information

2.1 Safety Information

Please read this entire manual before unpacking, setting up, or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

To ensure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

Use of Hazard Information

DANGER: Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation that may result in minor or moderate injury.

Note: Information that requires special emphasis.

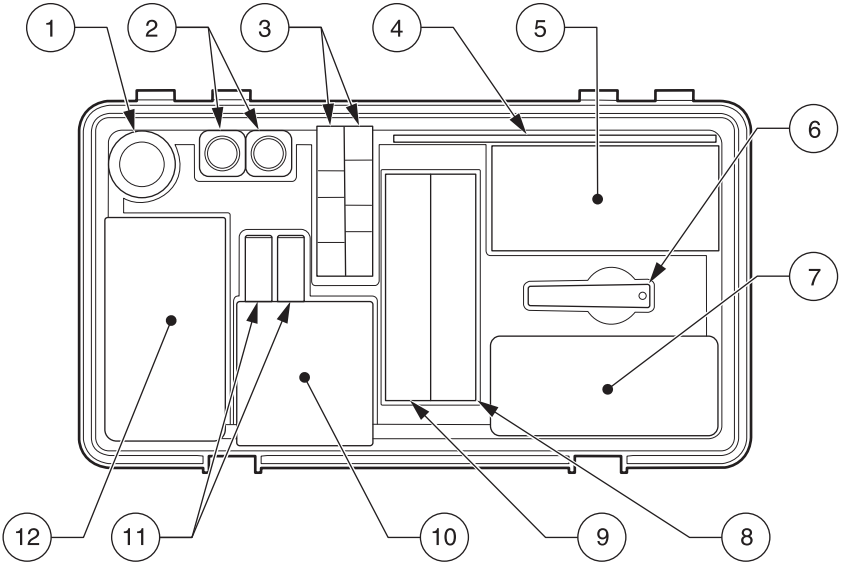
2.1.1 Precautionary Labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists.
	This symbol, if noted on the product, indicates the need for protective eye wear.

2.2 General Product Information

Figure 1 Packaging Guide



Item #	Description
1	Sodium Chloride Standard Solution
2	Mixing Bottle
3	Test Tubes
4	User Manual
5	Singlet™ pH Buffer Solution Multipack
6	Clippers
7	Cyanide Test Kit
8	Pocket Pal™ Conductivity Tester
9	Pocket Pal™ pH Tester
10	Color Comparator
11	Viewing Tubes
12	Radiation Monitor

2.2.1 Theory of Operation

This kit is based upon the USEPA's Response Protocol Toolbox: Planning for and Responding to Drinking Water Contamination Threats and Incidents Module 4: Analytical Guide. The kit contains apparatus and reagents to perform the core testing recommended in the guidance for initial site and water contamination assessment (Radiation, Chlorine residual, Cyanide, pH and Conductivity). It is important in the use and operation of this kit to be aware of the common baseline readings in the system being evaluated for all of the parameters in question. There will be some level of reading present that is deemed normal for a given site. Look for gross deviations from a site's normal levels.

In responding to a perceived event, it is important to verify the safety of the site before water testing can begin. The Radiation Monitor included in the kit is a useful tool for checking the site as well as water contamination. After the site has been deemed safe, water testing can begin. The tests should be run in the following order: Radiation, Free Chlorine, Cyanide, pH, and Conductivity.

After testing with the core tests, further tests such as toxicity screening may be performed and samples can be collected for further laboratory analysis.

Section 3 Radiation Test

3.1 Introduction

Use the Radiation Monitor to conduct the Radiation Test. The Radiation Monitor is a hand-held surface contamination monitor. The device detects low-concentration nuclear (ionizing) radiation and displays readings in mR/hr, CPM, CPS, or m Sv/hr. For more information on Radiation Monitor installation, operation, and maintenance, refer to the manufacturer's manual supplied with the Radiation Monitor.

3.2 Radiation Test Procedure

Prior to the Radiation Test, determine the normal baseline readings for the given site. When conducting the radiation test procedure, look for gross deviations from the normal baseline levels.

1. Turn the instrument on.

2. Select the display reading or Total Timer.

3. Turn the Audio On or Off. If the Audio is turned on, the detector will beep with each radiation event. Turn Audio Off to mute the audio.

4. Adjust the Mode, Timer, and Calibration using the Plus/Minus buttons on the bottom of the detector. See the manufacturer's manual for more information on these features.

5. Scan the surface with the Radiation Monitor. A reading will appear on the digital display. The red LED in the top right corner will flash with each radiation event.

Section 4 Free Chlorine Test

4.1 Measuring Hints and General Information

- Wash all labware between tests. Contamination may alter test results. Clean with a non-abrasive detergent or a solvent such as isopropyl alcohol. Use a soft cloth for wiping or drying. Do not use paper towels or tissue on plastic tubes as this may cause scratches. Rinse with clean water, (preferably demineralized water).
- Rinse all viewing tubes thoroughly with the sample water before testing.
- To open PermaChem® Powder Pillows:

  1. Tap the bottom of the pillow on a hard surface.

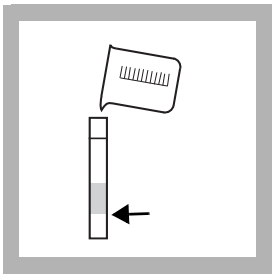
  2. Tear open the pillow along the dashed line.

  3. Open the pillow and form a spout by squeezing the side edges.

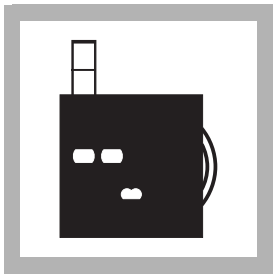
  4. Pour the contents in the sample.

- Accuracy is not affected by undissolved powder.
- Hach strongly recommends that, for optimum results, reagent accuracy be checked with each new lot of reagents. Use the standard solution listed in the Section 9 Replacement Parts on page 23. Follow the instructions included with each standard solution.

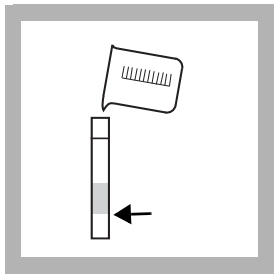
4.2 Free Chlorine Procedure



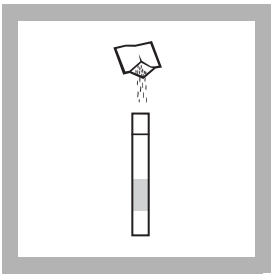
1. Fill a viewing tube to the first (5-mL) line with sample water (the blank).



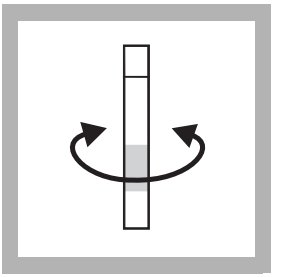
2. Place this tube in the top left opening of the color comparator.



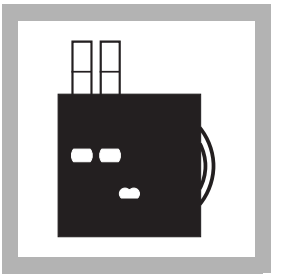
3. Fill another viewing tube to the first (5-mL) line with sample water.



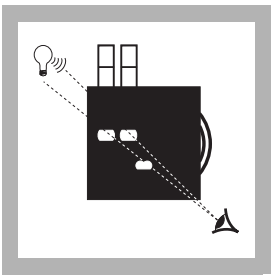
4. Add the contents of one DPD Free Chlorine Reagent Powder Pillow to the second tube. Complete the test and read the result within one minute of the addition of the powder.



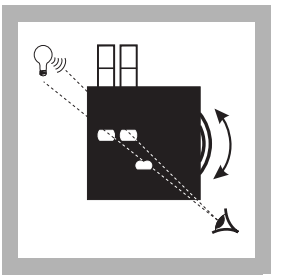
5. Swirl to mix.



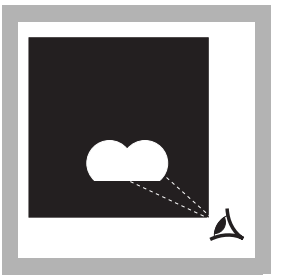
6. Place the second tube in the top-right opening of the color comparator.



7. Hold comparator up to a light source. Look through the openings in front.



8. Rotate the color disc until the color matches in the two openings.



9. Read the mg/L free chlorine in the scale window.

Section 5 Cyanide Test

5.1 Measuring Hints and General Information

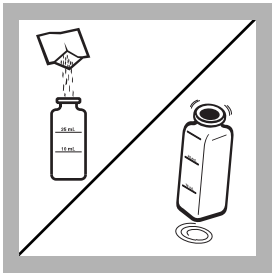
TO ENSURE ACCURATE RESULTS, PLEASE READ CAREFULLY BEFORE PROCEEDING.

The procedure registers only free cyanide, not complexed cyanides. If a total cyanide value is required—i.e., value for both free and complexed cyanide (copper, cobalt, iron, and nickel cyanides)—an acid distillation must be performed prior to analysis. A procedure for sample pretreatment is given in the APHA *Standard Methods for the Examination of Water and Wastewater*, 15th edition, page 317.

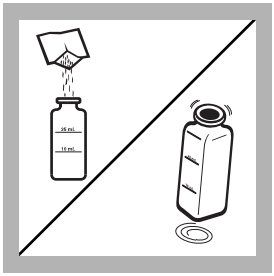
Twenty minutes are required to complete color development at 25 °C. If the sample is colder, a longer time will be required; if warmer, a shorter time will be required. Read the sample when a pure blue color develops. A red to purple color indicates incomplete development. A blue-green color implies the color has developed past the point of making a reading.

CAUTION: The chemicals in this kit may be hazardous to the health and safety of the user if inappropriately handled. Please read all warnings before performing the test and use appropriate safety equipment.

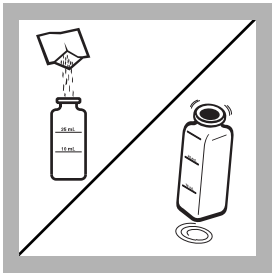
5.2 Free Cyanide Procedure



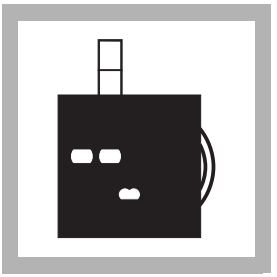
1. Add the contents of one CyaniVer™ 3 Cyanide Reagent Powder Pillow to the mixing bottle. Swirl to mix. Allow to stand undisturbed for one minute.



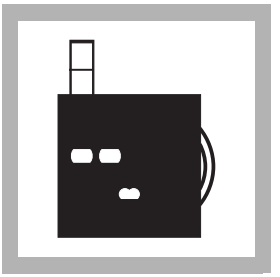
2. Add the contents of one CyaniVer 4 Cyanide Reagent Powder Pillow to the mixing bottle. Swirl to mix. Proceed immediately to step 3.



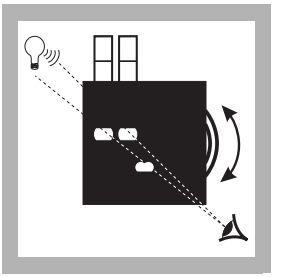
3. Add the contents of one CyaniVer 5 Reagent Powder Pillow to the bottle. Swirl to mix. If cyanide is present, a pink color will develop and turn blue in a few minutes. Allow at least 20 minutes, but not more than 26 minutes for full color development.



4. Fill a color viewing tube to the 5-mL mark with prepared sample. Place the tube in the top-right opening of the color comparator.



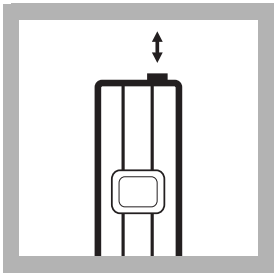
5. Fill the other color viewing tube to the 5-mL mark with untreated water sample. Place it in the top-left opening of the comparator.



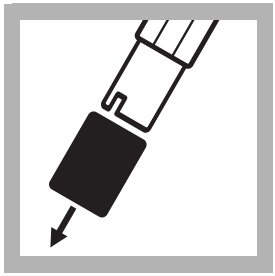
6. Hold the comparator up to a light source such as the sky, a window, or lamp and view through the front openings. Rotate the disc to obtain a color match. Read the mg/L cyanide (CN) through the scale window.

Section 6 Pocket Pal™ pH Tester

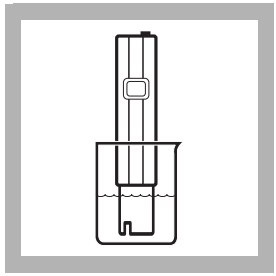
6.1 Using and Caring for the Tester



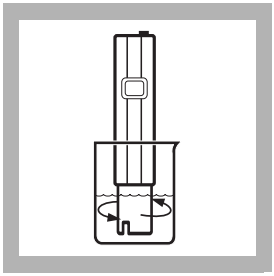
1. Press the ON/OFF switch once to turn the tester on.



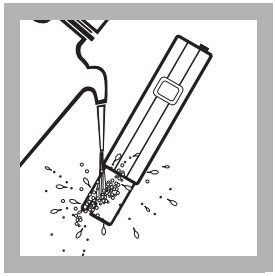
2. Remove the protective cap from the bottom.



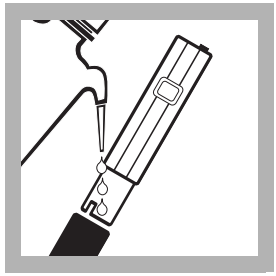
3. Immerse the bottom of the tester 2.5 to 8.9 cm (1.0 to 3.5 in.) into the sample.



4. Using the tester, gently stir the sample for several seconds. When the digital display stabilizes, read the pH value.



5. Rinse the bottom of the tester; replace the cap.



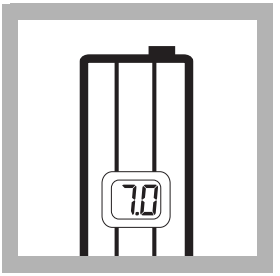
6. For faster response and longer test life, place several drops of deionized water in the protective cap to prevent the glass bulb from drying out between use.

Note: *Soak the electrode tip in tap water for a few minutes each week to condition the electrode.*

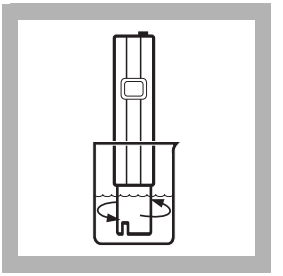
Note: *If pH readings become erratic, replace the batteries as instructed in* *section 8.1 on page 21**.*

Note: *Potassium chloride, used as reference solution electrolyte, may deposit on the tester as a white precipitate. Although the precipitate is normal and does not affect performance, it may be removed with a damp cloth or tissue.*

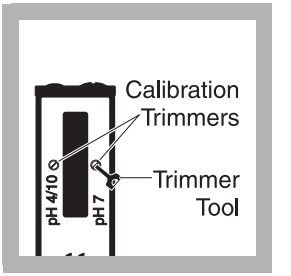
6.2 2-point Calibration



1. Prepare a pH 7.00 and a pH 4.00 or 10.00 buffer.



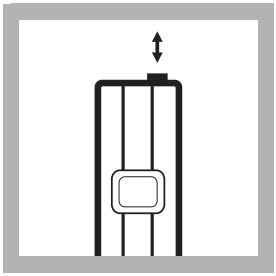
2. Measure the pH using the tester.



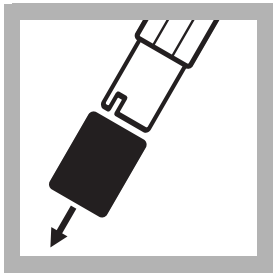
3. If necessary, adjust the Calibration Trimmer using the supplied trimmer tool (or small flat-blade screwdriver) until the reading corresponds to the pH of the buffer (7.0 or 4.0/10.0 pH).

Section 7 Pocket Pal™ Conductivity Tester

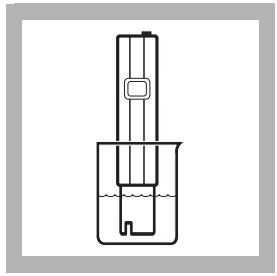
7.1 Using and Caring for the Tester



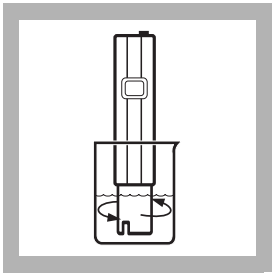
1. Press the ON/OFF switch once to turn the tester on.



2. Remove the protective cap from the bottom.

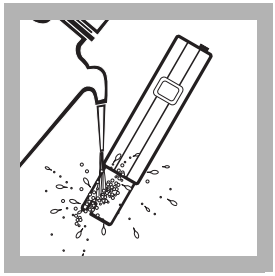


3. Immerse the bottom of the tester 2.5 to 8.9 cm (1.0 to 3.5 in.) into the sample.



4. Using the tester, gently stir the sample for several seconds. When the digital display stabilizes, read the conductivity value.

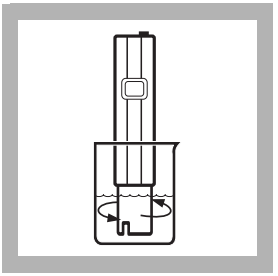
Note: *Readings may not stabilize for up to 2 minutes; this is a function of the temperature sensor.*



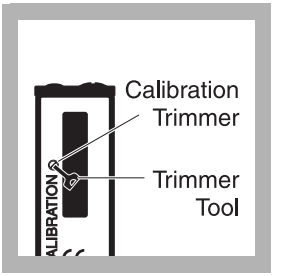
5. Rinse the bottom of the tester; replace the cap.

Note: *Maintain or improve performance by periodically rinsing the stainless steel electrode in isopropyl alcohol.*

7.2 Calibration



1. Measure the µS/cm of a known Calibration Standard using the tester.



2. If necessary, adjust the Calibration Trimmer using the supplied trimmer tool (or small flat-blade screwdriver) until the reading corresponds to the concentration of the known Calibration Standard.

Section 8 Maintenance

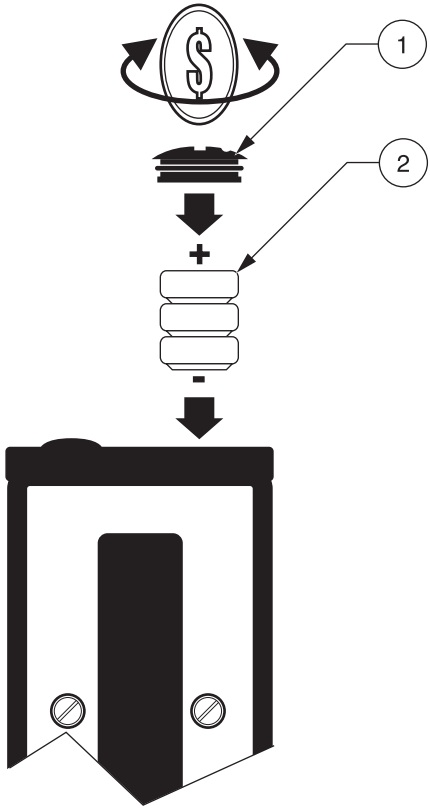
8.1 Pocket Pal™ Battery Replacement

1. Use a coin to turn the battery compartment cover, located on the top of the tester, to the left ¼ turn.

2. Remove the cover. Insert new batteries observing polarity (Everready E675E, Duracell RM675, or Hach Cat. No. 23678-00).

3. Replace the cover.

Figure 2 Replacing the Pocket Pal Batteries



1. Battery Compartment Cover	**2.** Batteries (3)

Section 9 Replacement Parts

Replacements

Description	Qty	Cat. No.
Emergency Response Toolbox (not CE Compliant)	each	28841-00
Emergency Response Toolbox User Manual	each	28841-88
Radiation Detector (not CE compliant)	each	28842-00
Chlorine Test		
Color Compatator Box	each	1732-00
Color Disc, DPD Chlorine, 0–3.5 mg/L	each	21988-00
Color Viewing Tube, plastic, with cap	4/pkg	46600-04
DPD Free Chlorine Reagent Powder Pillows	100/pkg	14077-99
DPD Total Chlorine Reagent Powder Pillows	100/pkg	14076-99
Caps, for Plastic Color Viewing Tubes 46600-04	4/pkg	46600-14
Chlorine Standard Solution, 50–75 mg/L, 2-mL PourRite®Ampule	20/pkg	14268-20
Color Viewing Tube, glass	6/pkg	1730-06
Stoppers, for glass Color Viewing Tubes 1730-06	6/pkg	1731-06
pH		
Pocket Pal™ pH Tester	each	44350-01
Singlet pH 4.01 and 7.00	10 each	27699-20
Singlet pH 7.0 and 10.01	10 each	27698-20
Battery	4/pkg	23678-00
Conductivity		
Pocket Pal™ Conductivity Tester	each	26866-01
Sodium Chloride Standard Solution, 180 µS/cm NaCl 85.47 mg/L as NaCl	each	23075-42
Sodium Chloride Standard Solution, 1000 µS/cm NaCl, 491 mg/L as NaCl	each	14400-42
Sodium Chloride Standard Solution, 1990 µS/cm NaCl, 1000 mg/L as NaCl	each	2105-53
Battery	4/pkg	23678-00
Cyanide		
CyaniVer 3 Cyanide Reagent Powder Pillows	100/pkg	14039-69
CyaniVer 4 Cyanide Reagent Powder Pillows	100/pkg	14040-99
CyaniVer 5 Cyanide Reagent Powder Pillows	100/pkg	14041-69

Replacements

Description	Qty	Cat. No.
Bottle, Square, mixing	6/pkg	439-00
Clippers	each	968-00
Color Comparator	each	1732-00
Color Disc, Cyanide, 0–0.3 mg/L	each	14083-00
Color Viewing Tube	each	1730-00
Stopper for Color Viewing Tube	6/pkg	1731-00

Section 10 How to Order

U.S.A. Customers

By Telephone:

6:30 a.m. to 5:00 p.m. MST
Monday through Friday
(800) 604-3493

By Fax:

(970) 669-2932

By Mail:

Hach Company
P.O. Box 389
Loveland, Colorado 80539-0389 U.S.A.

Ordering information by e-mail: orders@hach.com

Information Required

- Hach account number (if available)
- Your name and phone number
- Purchase order number
- Brief description or model number
- billing address
- Shipping address
- Catalog number
- Quantity

International Customers

Hach maintains a worldwide network of dealers and distributors. To locate the representative nearest you, send e-mail to intl@hach.com or contact:

Hach Company World Headquarters; Loveland, Colorado, U.S.A.
Telephone: (970) 669-3050; Fax: (970) 669-2932

Technical and Customer Service (U.S.A. only)

Hach Technical and Customer Service Department personnel are eager to answer questions about our products and their use. Specialists in analytical methods, they are happy to put their talents to work for you.

Call 1-800-604-3493 or e-mail techhelp@hach.com

Section 11 Repair Service

Authorization must be obtained from Hach Company before sending any items for repair. Please contact the Hach Service Center serving your location.

In the United States:

Hach Company
Ames Service
100 Dayton Avenue
Ames, Iowa 50010
(800) 227-4224 (U.S.A. only)
FAX: (515) 232-3835

In Canada:

Hach Sales & Service Canada Ltd.
1313 Border Street, Unit 34
Winnipeg, Manitoba
R3H 0X4
(800) 665-7635 (Canada only)
Telephone: (204) 632-5598
FAX: (204) 694-5134
E-mail: canada@hach.com

In Latin America, the Caribbean, the Far East, the
Indian Subcontinent, Africa, Europe, or the Middle East:

Hach Company World Headquarters,
P.O. Box 389
Loveland, Colorado, 80539-0389 U.S.A.
Telephone: (970) 669-3050
FAX: (970) 669-2932
E-mail: intl@hach.com

Section 12 Limited Warranty

Hach Company warrants its products to the original purchaser against any defects that are due to faulty material or workmanship for a period of one year from date of shipment unless otherwise noted in the product manual.

In the event that a defect is discovered during the warranty period, Hach Company agrees that, at its option, it will repair or replace the defective product or refund the purchase price excluding original shipping and handling charges. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable products such as chemical reagents; or consumable components of a product, such as, but not limited to, lamps and tubing. Contact Hach Company or your distributor to initiate warranty support. Products may not be returned without authorization from Hach Company.

Limitations

This warranty does not cover:

- Damage caused by acts of God, natural disaster, labor unrest, acts of war (declared or undeclared), terrorism, civil strife or acts of any governmental jurisdiction
- Damage caused by misuse, neglect, accident or improper application or installation
- Damage caused by any repair or attempted repair not authorized by Hach Company
- Any product not used in accordance with the instructions furnished by Hach Company
- Freight charges to return merchandise to Hach Company
- Freight charges on expedited or express shipment of warranted parts or product
- Travel fees associated with on-site warranty repair

This warranty contains the sole express warranty made by Hach Company in connection with its products. All implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

Some states within the United States do not allow the disclaimer of implied warranties and if this is true in your state the above limitation may not apply to you. This warranty gives you specific rights, and you may also have other rights that vary from state to state.

This warranty constitutes the final, complete, and exclusive statement of warranty terms and no person is authorized to make any other warranties or representations on behalf of Hach Company.

Limitation of Remedies

The remedies of repair, replacement or refund of purchase price as stated above are the exclusive remedies for the breach of this warranty. On the basis of strict liability or under any other legal theory, in no event shall Hach Company be liable for any incidental or consequential damages of any kind for breach of warranty or negligence.