



Copper T

M150

0.05 - 5 mg/L Cu<sup>a)</sup>

Cu

Biquinoline

## Instrument specific information

The test can be performed on the following devices. In addition, the required cuvette and the absorption range of the photometer are indicated.

Instrument Type	Cuvette	$\lambda$	Measuring Range
MD 100, MD 110, MD 200, MD 600, MD 610, MD 640, MultiDirect, PM 600, PM 620, PM 630, Test Kit	ø 24 mm	560 nm	0.05 - 5 mg/L Cu <sup>a)</sup>
SpectroDirect, XD 7000, XD 7500	ø 24 mm	559 nm	0.05 - 5 mg/L Cu <sup>a)</sup>
MD50	ø 24 mm	555 nm	0.05 - 5 mg/L Cu <sup>a)</sup>

## Material

Required material (partly optional):

Reagents	Packaging Unit	Part Number
Copper No. 1	Tablet / 100	513550BT
Copper No. 1	Tablet / 250	513551BT
Copper No. 2	Tablet / 100	513560BT
Copper No. 2	Tablet / 250	513561BT
Set Copper No. 1/No. 2 100 Pc.#	100 each	517691BT
Set Copper No. 1/No. 2 250 Pc.#	250 each	517692BT
ValidCheck Copper 2 mg/l	1 pc.	48141525

## Application List

- Cooling Water
- Boiler Water
- Waste Water Treatment
- Pool Water Control
- Drinking Water Treatment
- Galvanization



## Preparation

1. Strong alkaline or acidic water samples must be adjusted to pH 4 to 6 before analysis.



## Determination of Copper, free with tablet

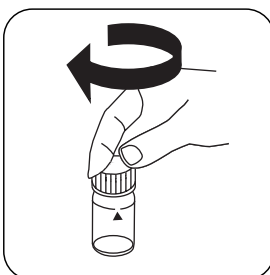
Select the method on the device.

In addition, choose the test: free

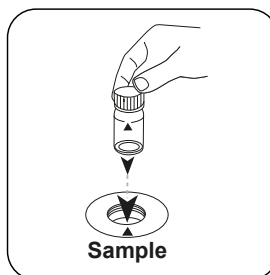
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



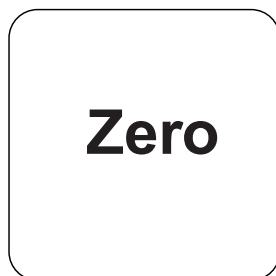
Fill 24 mm vial with **10 mL sample**.



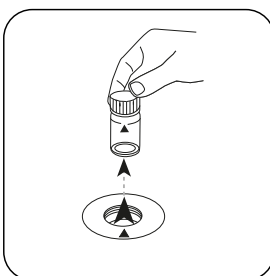
Close vial(s).



Place **sample vial** in the sample chamber. Pay attention to the positioning.

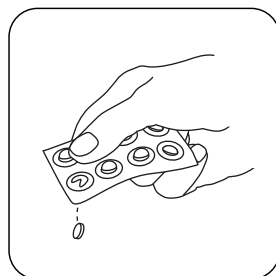


Press the **ZERO** button.

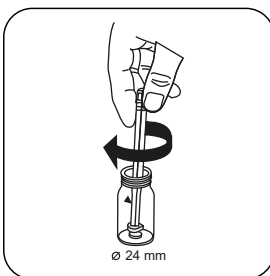


Remove the vial from the sample chamber.

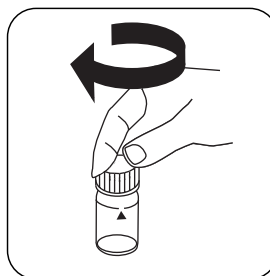
For devices that require **no ZERO measurement**, start here.



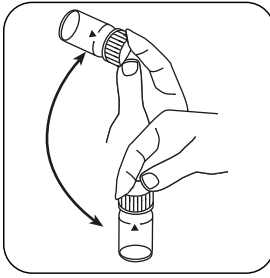
Add **COPPER No. 1 tablet**



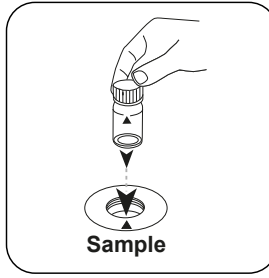
Crush tablet(s) by rotating slightly.



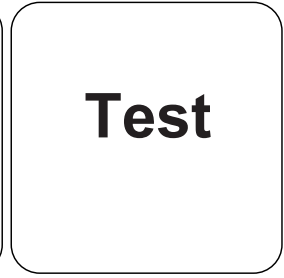
Close vial(s).



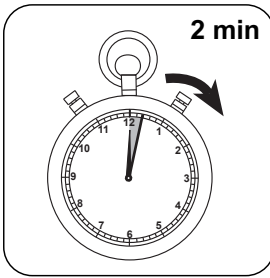
Dissolve tablet(s) by inverting.



Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically. The result in mg/L free Copper appears on the display.



## Determination of Copper, total with tablet

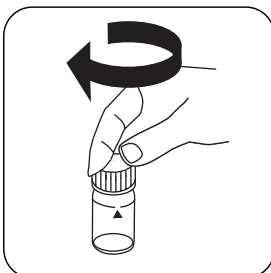
Select the method on the device.

In addition, choose the test: total

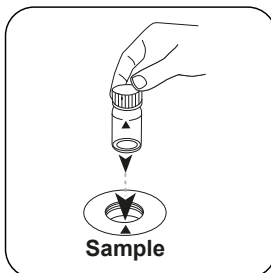
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



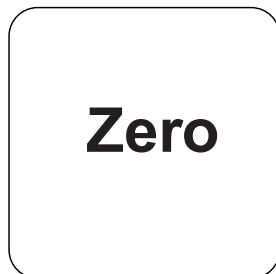
Fill 24 mm vial with **10 mL sample**.



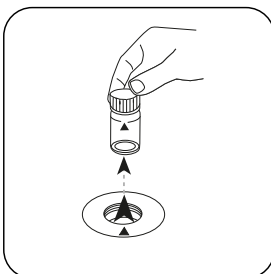
Close vial(s).



Place **sample vial** in the sample chamber. Pay attention to the positioning.

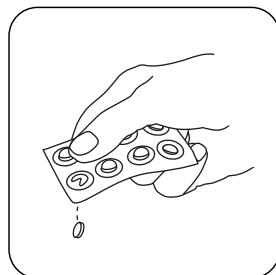


Press the **ZERO** button.

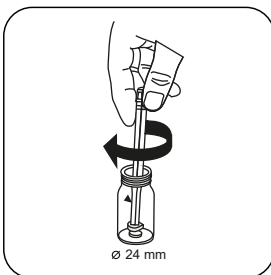


Remove the vial from the sample chamber.

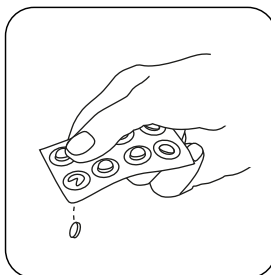
For devices that require **no ZERO measurement**, start here.



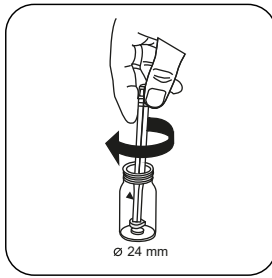
Add **COPPER No. 1 tablet**



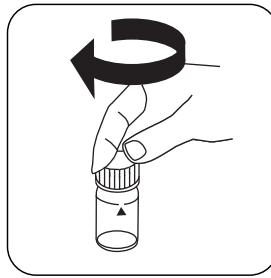
Crush tablet(s) by rotating slightly and dissolve.



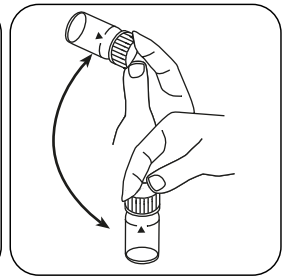
Add **COPPER No. 2 tablet**.



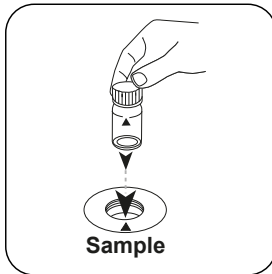
Crush tablet(s) by rotating slightly.



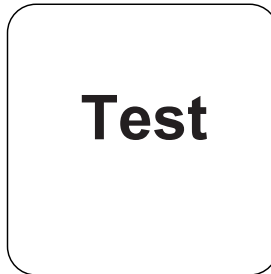
Close vial(s).



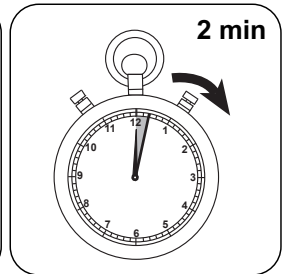
Dissolve tablet(s) by inverting.



Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.



Wait for **2 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically. The result in mg/L total Copper appears on the display.



## Determination of Copper, differentiated determination with Tablet

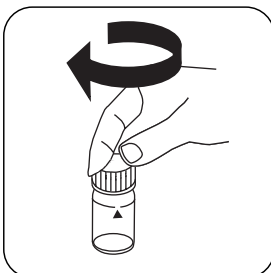
Select the method on the device.

In addition, choose the test: differentiated

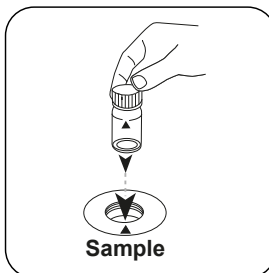
For this method, a ZERO measurement does not have to be carried out every time on the following devices: XD 7000, XD 7500



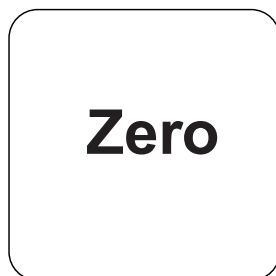
Fill 24 mm vial with **10 mL sample**.



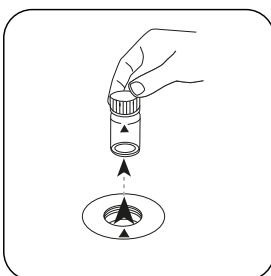
Close vial(s).



Place **sample vial** in the sample chamber. Pay attention to the positioning.

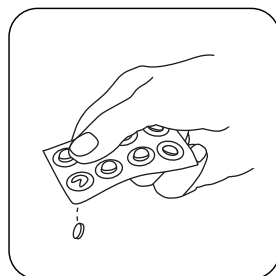


Press the **ZERO** button.

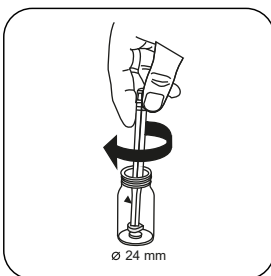


Remove the vial from the sample chamber.

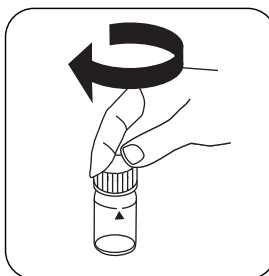
For devices that require **no ZERO measurement**, start here.



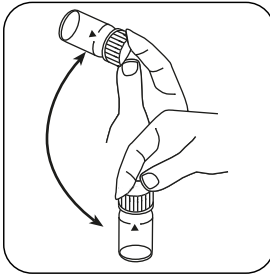
Add **COPPER No. 1 tablet**



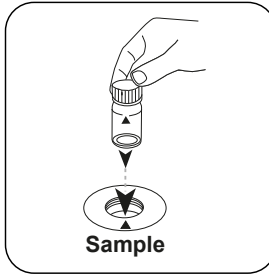
Crush tablet(s) by rotating slightly.



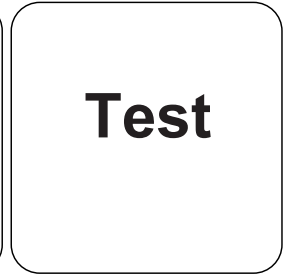
Close vial(s).



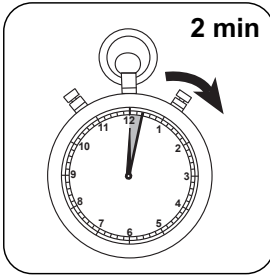
Dissolve tablet(s) by inverting.



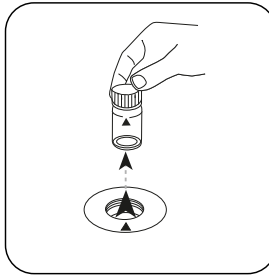
Place **sample vial** in the sample chamber. Pay attention to the positioning.



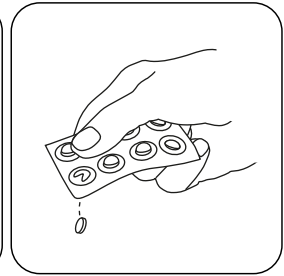
Press the **TEST** (XD: **START**) button.



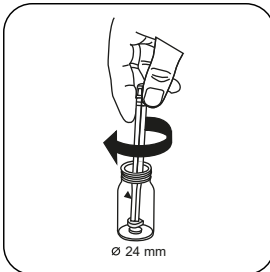
Wait for **2 minute(s) reaction time**.



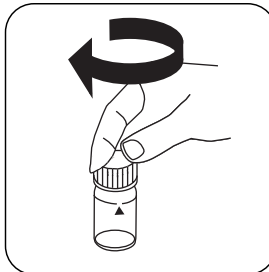
Remove the vial from the sample chamber.



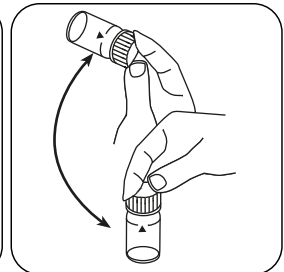
Add **COPPER No. 2 tablet**.



Crush tablet(s) by rotating slightly.

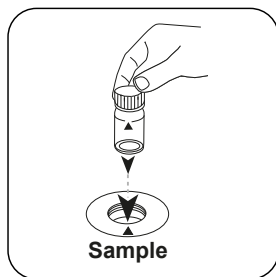


Close vial(s).

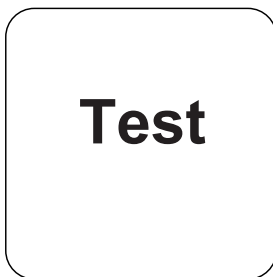


Dissolve tablet(s) by inverting.

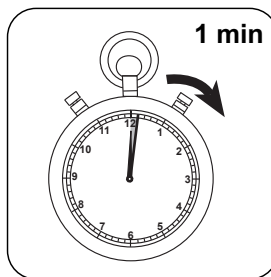




Place **sample vial** in the sample chamber. Pay attention to the positioning.



Press the **TEST** (XD: **START**) button.



Wait for **1 minute(s) reaction time**.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/L free Copper; combined Copper; total Copper appears on the display.

## Chemical Method

Biquinoline

## Appendix

### Calibration function for 3rd-party photometers

Conc. =  $a + b \cdot \text{Abs} + c \cdot \text{Abs}^2 + d \cdot \text{Abs}^3 + e \cdot \text{Abs}^4 + f \cdot \text{Abs}^5$

	∅ 24 mm	□ 10 mm
a	$-4.78562 \cdot 10^{-2}$	$-5.12445 \cdot 10^{-2}$
b	$3.79263 \cdot 10^{+0}$	$8.20998 \cdot 10^{+0}$
c		
d		
e		
f		

## Interferences

### Persistent Interferences

1. Cyanide  $\text{CN}^-$  and Silver  $\text{Ag}^+$  interfere with the test result.

## Method Validation

<b>Limit of Detection</b>	0.05 mg/L
<b>Limit of Quantification</b>	0.15 mg/L
<b>End of Measuring Range</b>	5 mg/L
<b>Sensitivity</b>	3.8 mg/L / Abs
<b>Confidence Intervall</b>	0.026 mg/L
<b>Standard Deviation</b>	0.011 mg/L
<b>Variation Coefficient</b>	0.42 %

## Bibliography

Photometrische Analyse, Lange/Vedjelek, Verlag Chemie 1980

<sup>a)</sup> determination of free, combined and total | <sup>#</sup> including stirring rod, 10 cm