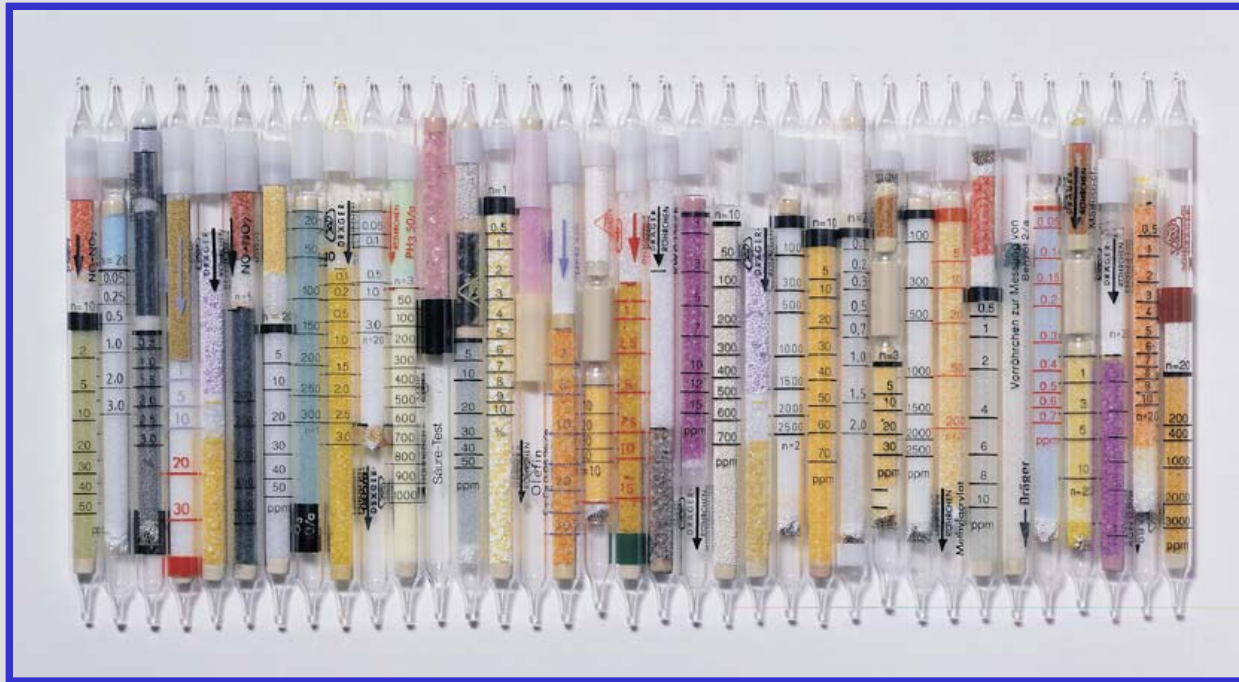


Draeger-Tube® and Pump Training Program

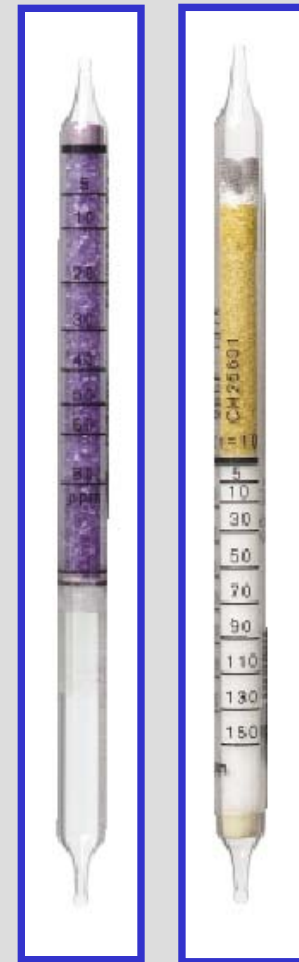


Disclaimer

- This visual presentation is intended to help the user understand and correctly use the Draeger-Tube & Pump System. It is not intended to substitute for any specific instruction sheets provided with the tubes and the pump.
- ***IT IS THE USER'S RESPONSIBILITY TO READ AND UNDERSTAND ALL MANUALS AND INFORMATION PROVIDED WITH THE TUBES AND THE PUMP!***
- Pictures may not represent actual application scenarios, but are merely provided for illustration purposes.

What are Dräger-Tubes?

- Dräger tubes are glass tubes filled with a chemical indicator.
- The chemical indicator is designed to produce a color change when an air sample containing that specific substance or substances are pulled through the tube.



Examples of
tube types

Parts of the Tube

Hermetically-sealed glass tube housing

Determine reading using the length of color stain

Part number

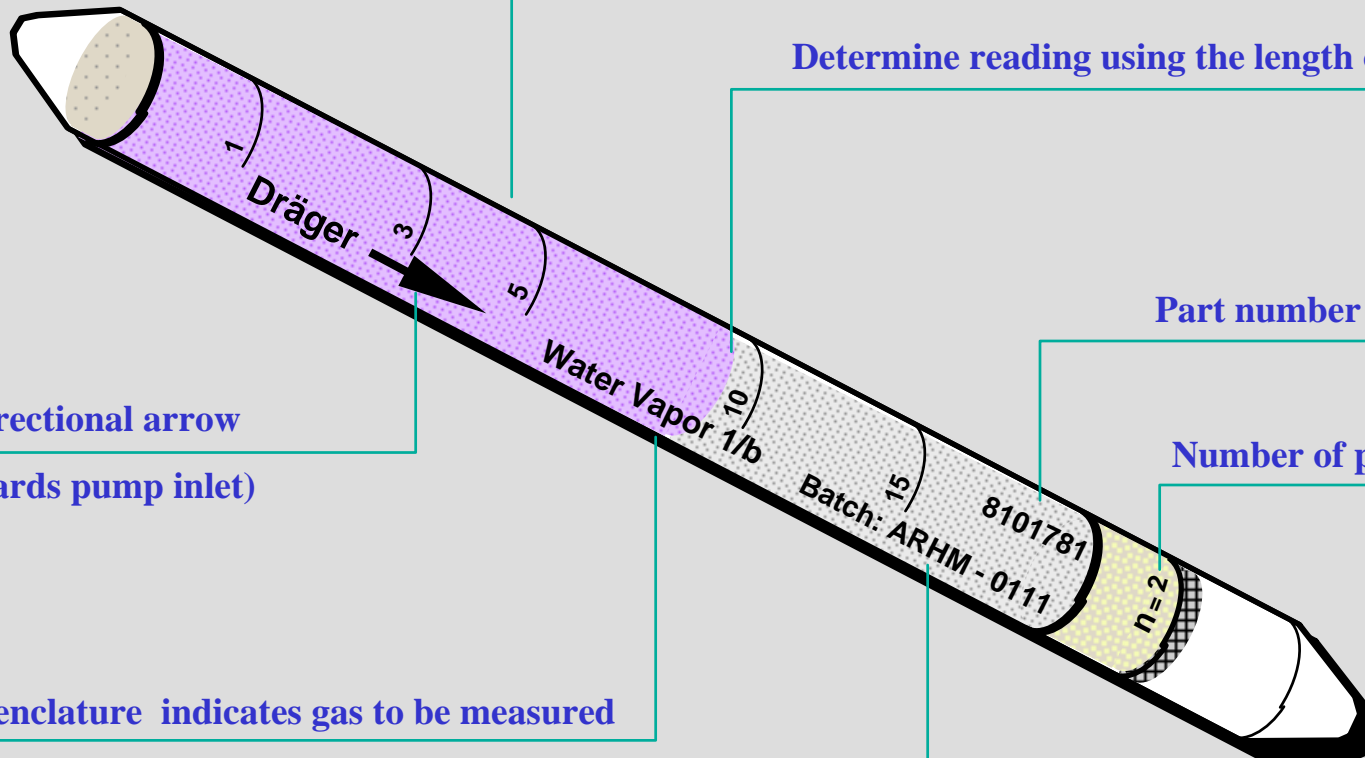
Airflow directional arrow

(Aim towards pump inlet)

Number of pump strokes

Tube nomenclature indicates gas to be measured

Quality control batch number



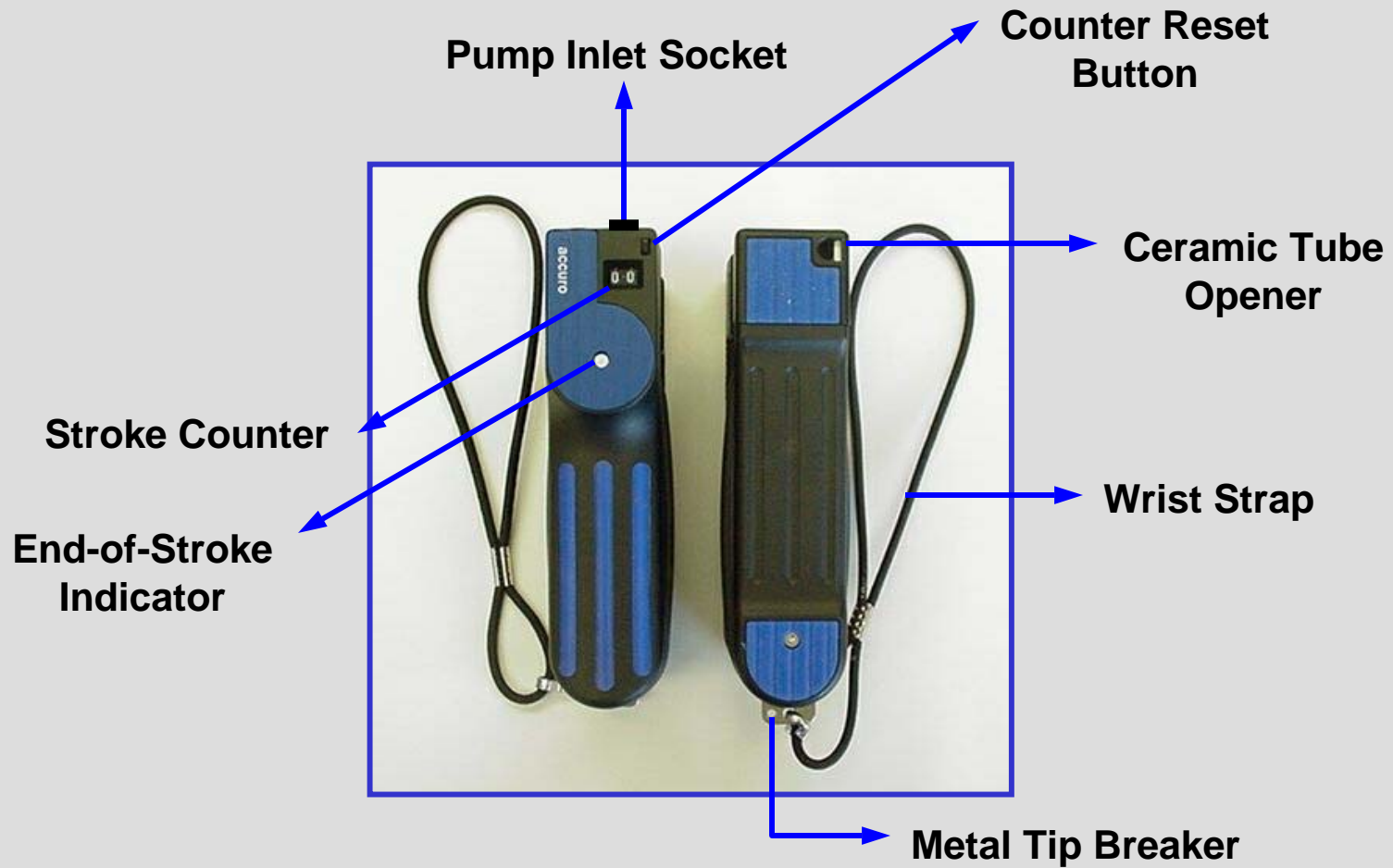
What is a Dräger accuro Pump?

- The Dräger accuro pump is the device used to draw a calibrated 100 ml of air sample through the Dräger-Tube.



Dräger accuro pump

Parts of the Pump



Taking a Measurement

- **Reset the counter on the pump to zero by depressing the reset button using a pen or unbroken tube.**



Taking a Measurement

- Break the tips of the detector tube.

Deluxe Tube Opener



- 1 Twist to score
- 2 Push to clip tip

Cutter on Pump



- Scrape to score
- Bend against cutter to break

Taking a Measurement

- **Break the tips of the detector tube.**

Metal Tip Breaker



**Metal Tip
Breaker**

Insert the tube tip and bend to break each tip.

CAUTION: The metal tip breaker will cause jagged glass tips

Taking a Measurement

- **Insert the tube into the pump inlet with the arrow pointing toward the pump.**



Taking a Measurement

- **Grip the pump according to the photo. Compress the bellows completely (stroke counter will advance), then release your grip; the air sample begins to be pulled through the tube.**

End of stroke indicator is dark when pump is under vacuum.



Taking a Measurement

- **Wait for the end of stroke indicator to pop up (white).**



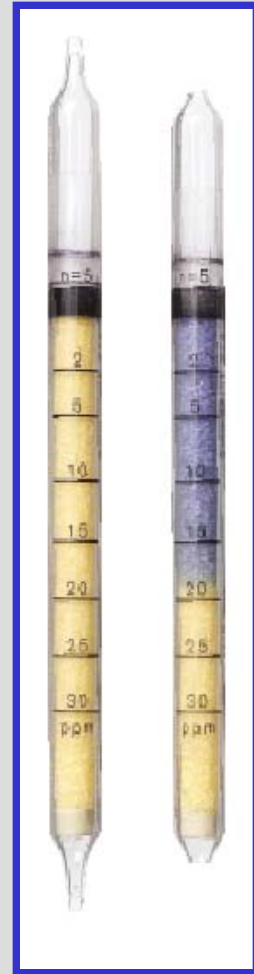
Signifies completion of the stroke

Take the required number of strokes according to the instructions

The time per stroke will vary based on the specific tube used

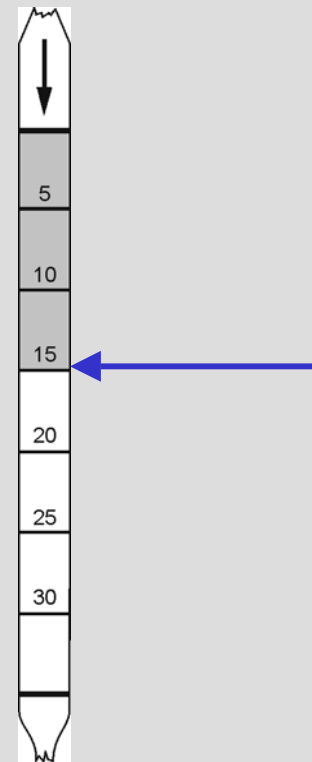
Taking a Measurement

- **Remove the tube from the pump at the end of the last stroke and read the tube immediately (unless the instructions specify otherwise)**



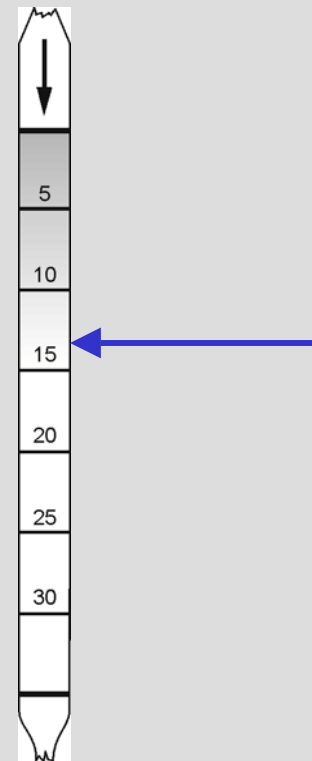
Reading Draeger-Tubes

- Read the total length of the discoloration



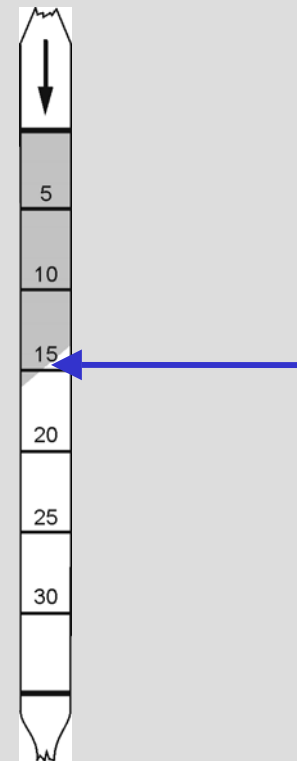
Reading Draeger-Tubes

- If the discoloration becomes progressively lighter, read to the point where the faintest discoloration is just visible.



Reading Draeger-Tubes

- If the indication is a distinct diagonal across the length of the tube, read to the midpoint.



Tips for Reading Draeger-Tubes

- Adequate lighting - no direct sunlight
- Hold tube against light colored background
- Compare with an unused tube
 - ◆ Using a light background like a white sheet of paper and comparing with an unused tube will enhance the color distinction



Extending the Measurement Range

- **Operating Instructions**
- **Draeger-Tube Handbook**
- **Draeger VOICE**

DO NOT assume that the measuring range is linear for all sample volumes!

WARNING!!

- Draeger detector tubes and gas detection pumps are designed and calibrated as a unit.
- Interchanging Dräger pumps and tubes with other manufacturer's products is not recommended nor permitted according to OSHA regulations
- The American National Standard for gas detector tube units, ANSI/ISEA 102-1990, "Short Term Type for Toxic Gases and Vapors in Working Environments" was reaffirmed for five years on November 3, 1998. The new reference for the standard is ANSI/ISEA 102-1990 (R1998).

Short-term Tube Nomenclature

Acetone 100/b (100 - 12,000 ppm)

- **Calibrated gas / vapor to be detected**

- ◆ This tube is calibrated for acetone
- ◆ Other ketones (MEK, MIBK) are also indicated, but the sensitivity may differ requiring a correction factor

Short-term Tube Nomenclature

Acetone **100/b** (100 - 12,000 ppm)

- Typically indicates the first scale mark or lowest concentration for the standard range
 - ◆ Information to extend the range to measure higher or lower concentrations may be found in the instructions, the handbook, or VOICE

Short-term Tube Nomenclature

Acetone 100/b (100 - 12,000 ppm)

- **Indicates the latest revision to enhance the properties of the tube**
 - ◆ The letter designation is typically lower case
 - ◆ Lower case: 5" tubes
 - ◆ Upper case: 8" tubes
 - e.g. Hydrogen Sulfide 0.2%/A

Short-term Tube Nomenclature

Acetone 100/b (100 - 12,000 ppm)

- **Specifies standard measuring range**

- ◆ Generally in units of ppm
- ◆ Other units for various gases or vapors:
 - Vol.%, mg/m³, mg/L, lbs/mmcf
- ◆ Tubes calibrated in Vol.% are an exception and show “%” in the name
 - e.g. Oxygen 5%/C

Information on Front of Box

- Part Number
- Batch / Lot Number
- Total Number of Tests
(10, 9, 8, 5)
- Measuring Range
- ISO 9001



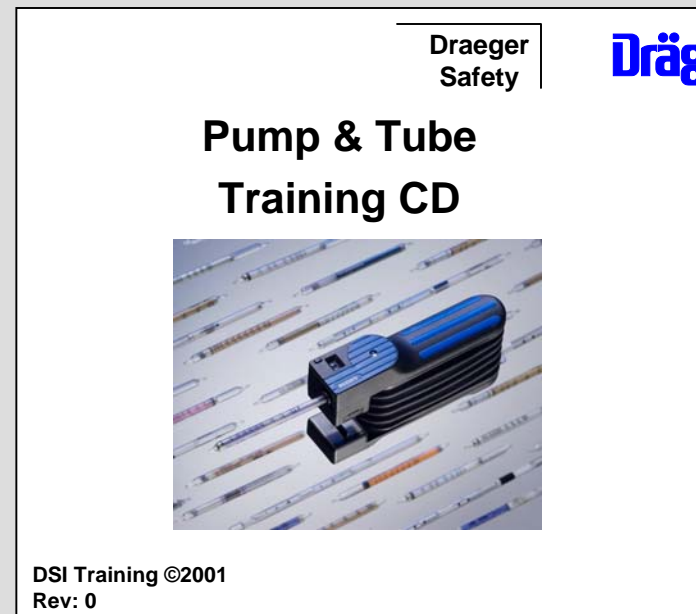
Information on Back of Box

- **Storage Temperature (25 °C / 77 °F)**
 - ◆ Keep tubes below 77° F, but do not freeze!
- **Expiration Date**
 - ◆ Do not use expired tubes for testing!
 - ◆ Shelf life of most Draeger-Tubes is 24 months



Draeger Support

- VOICE™ database software
 - ◆ **VOICE 4.0, now on Draeger.net**
- Draeger-Tubes / CMS Handbook
- Detector Tube Catalogs
- Technical Product Data
- Training CDs



Additional Questions?

- Draeger is always happy to assist you with any additional questions you have regarding use of Draeger-Tubes®.
- **Please call us toll free:**
800/922-5518 in the USA
877/372-4371 in Canada
- To contact us online:
 - ◆ www.draeger.net
- To Run Draeger's Voice® Software Click the link below:
 - ◆ www.draeger.com/voice

