NBC Mask Fit Tester

Type M41 Protection Assessment Test System

NSN 4240-01-365-8241

Now you can be sure your troops are protected.

TSI®

TSI's M41 Protection Assessment Test System lets you test the fit and integrity of NBC protective masks, quickly and reliably.

At mask issue sites, mask training facilities, or even in the field under real-life conditions, you can test your troops in their own protective masks.

- Fully deployed by the U.S. Army, Air Force and Marine Corps, by the German Bundeswehr, and by OPCW field inspectors.
- Gives numerical indication of mask fit and mask integrity
- Verifies that personnel are getting the best possible protection from their assigned masks
- Provides highly sensitive detection of mask leaks
- Helps training personnel to quickly locate and correct problems with mask fit
- Offers results in minutes with no special test chamber
- Uses programmed exercises to simulate normal field activities
- Portable, easy-to-use unit operates almost anywhere
- Includes effective self-test functions

What is the M41 Protection Assessment Test System?

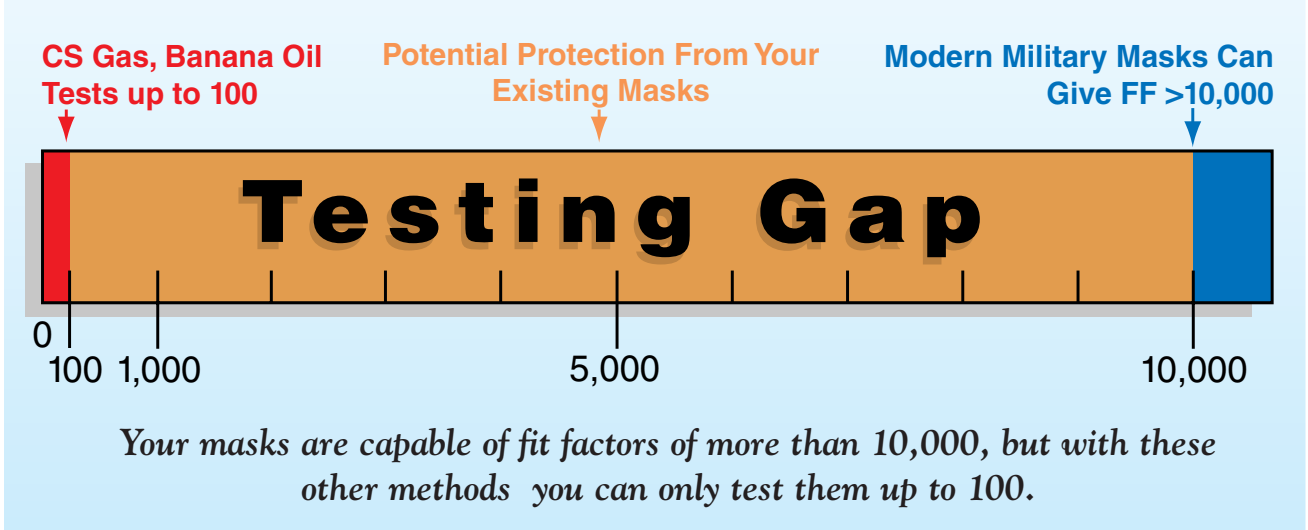
The M41 Protection Assessment Test System is a portable instrument that tests the integrity of the fit of an NBC protective mask on an individual soldier. The test results are displayed as a numerical Fit Factor. The M41 does not require the use of aerosol test chambers or CS gas chambers to perform the mask fit evaluation. It can be used almost anywhere—at mask issue sites, training facilities, or even in the field.

These fast, accurate fit tests help verify that your personnel are getting the best possible protection from their masks. They also help your NBC trainers to quickly locate and correct problems with the fit of a soldier's mask. These numerical test results can be entered into personnel files for a permanent record of training.

How does it compare with earlier mask fit test methods?

With other methods, such as CS gas chambers, banana oil, or irritant smoke tubes, the challenge agent concentration is uncontrolled and unmeasured. You must also rely on the sensitivity of the test subject to detect leakage during the test. For such reasons, there is tremendous variability in the PASS/FAIL evaluations using these other methods. Because of this variability, most industrial health and safety regulations only allow their use when the required fit factor is less than 100. Modern military masks are capable of fit factors of more than 10,000. This leaves a testing gap of more than two orders of magnitude. Your masks are capable of fit factors of more than 10,000, but with these other methods you can only test them up to 100.

The M41 can accurately measure fit factor ratios of more than 50,000. This fit factor measurement is controlled automatically by the M41. It does not depend on the sensitivity of the test subject to CS gas, banana oil, or irritant smoke. The M41 uses microscopic particles which are naturally present in the surrounding air as the challenge agent. The sensor inside the M41 compares the particle concentration outside the mask with the concentration inside the mask and then calculates the fit factor. Since the mask's filter canister stops all particles, any particles which are detected inside the mask must have entered through a leak.



Your masks are capable of fit factors of more than 10,000, but with these other methods you can only test them up to 100.

Why do you need the M41?

Modern military masks are capable of a high degree of protection, but ONLY if they are fitted correctly and donned properly. A mask that is capable of protection factors greater than 10,000 may only give a protection factor of 50 if it is incorrectly donned or is not the optimum size. The M41 is extremely sensitive to mask leakage and can measure fit factors to 50,000 and higher. It is the quickest, easiest way to ensure your masks provide the maximum possible protection for your personnel.

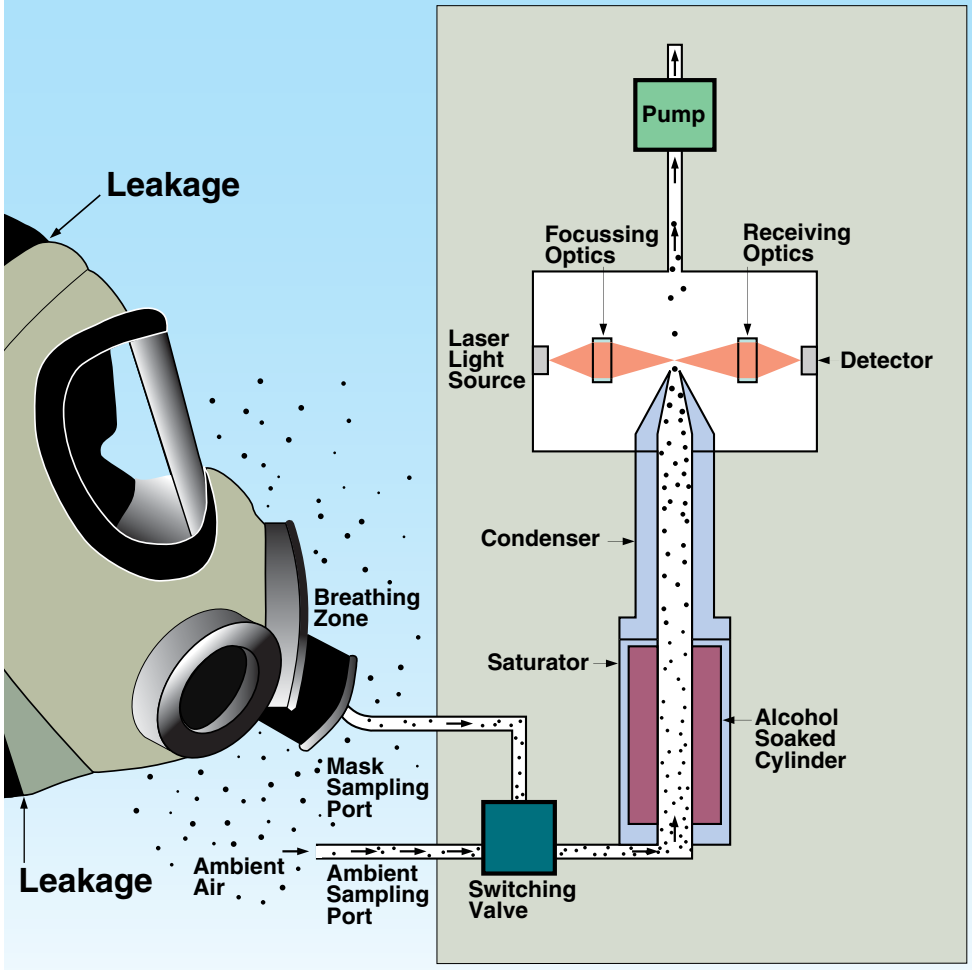
How hard is the M41 to operate?

Operating the M41 couldn't be easier. Just press the START TEST button on the keypad. The M41 automatically runs the fit test protocol while the test subject performs a series of standard exercises. The M41 displays the results of each exercise as well as the overall fit test value at the end of the exercise series.

Who uses the M41 and in what setting?

The M41 is normally used by NBC training staff who issue masks and train personnel. Fit testing is typically done when the mask is issued to a soldier and again at yearly intervals. In critical jobs, such as working near live CBW munitions, personnel will test their mask fit much more frequently. Although the M41 can be used in the field, training and fit testing are normally done indoors in an office or clinic.

How the M41 Works



The M41 measures the concentration of naturally-occurring microscopic dust particles in the air and compares it to the particle concentration measured inside the mask. The particles are extremely small, less than 1 µm in diameter, so they are invisible to the naked eye.

In a well-fitting military mask, the HEPA layer of the cartridge effectively removes these microscopic particles. If there are no leaks in the mask, the air inside the mask is almost completely free of particles. The primary source of leakage into the mask is the face seal. If the mask fits poorly, it will leak "dirty" ambient air into the mask. The ratio of the particle concentration outside the mask to the concentration inside the mask is an indication of the mask fit. This ratio is called a Fit Factor. Properly fitting military masks are capable of Fit Factors of more than 10,000.

The M41 alternately samples the air from outside the mask and then from inside the mask by means of an internal switching valve. The sampled air, containing microscopic particles, is first drawn through the middle of an alcohol soaked cylinder. As the sampled air passes through the cylinder it becomes saturated with alcohol vapor. The air is next drawn through a chilled condenser tube. This cooling forces the alcohol vapor to condense on the microscopic dust particles, creating larger alcohol droplets.

These alcohol droplets then go through a nozzle. The light from a laser diode is focused on the outlet of this nozzle. As the microscopic droplets pass through this laser beam, they produce flashes of light. A detector determines the particle concentration by counting the flashes.

The M41 first measures the particle concentration of the ambient air. The valve then switches and it measures the concentration inside the mask. This process is repeated for each of the required exercises. After each exercise, the Fit Factor is displayed on the LCD screen. At the end of the exercise series, an overall Fit Factor is calculated and displayed.

Items Included With the M41

1 M41 Protection Assessment Test System
2 Alcohol cartridge/fill capsule assemblies
1 AC power supply
2 HEPA filters for system check
2 Twin-tube sampling hoses
1 Mask sampling adapter kit for U.S. Models M40 and M17 masks (adapters for other masks are available)
4 Spare alcohol wicks
1 Operation manual
1 Carrying case

Specifications

Size	
Instrument	240 mm × 190 mm × 140 mm
Carrying case	410 mm × 380 mm × 250 mm
Weight	
Instrument	1.9 kg
Carrying case	10 kg
Fit factor range	1 to greater than 50,000
Particle concentration range	0.01 to 500,000 particles/cm^3
Particle size range	0.02 to greater than 1 µm
Test duration (per exercise)	40 seconds
Power requirements	
AC	115 VAC or 230 VAC, 50/60 Hz, dual-voltage AC power supply
Battery	Optional
Temperature range	
Operation	0 to 38°C
Storage	-40 to 70°C
Sample flow rate	0.7 lpm (nominal)
Alcohol	
Hours of operation per charge	8 hours at 21°C
Alcohol type	Reagent grade isopropyl
Pass/fail settings	User-selectable
Factory recalibration interval	One year
Warranty	One year on workmanship and materials

Optional Accessories

M41 FIT Software
Mask Sampling Adapters (standard and custom)

Specifications are subject to change without notice.

TSI Incorporated
500 Cardigan Road , Shoreview, MN 55126 USA
Tel: 651 490 2811 **Toll Free:** 1 800 874 2811 **Fax:** 651 490 3824 **E-mail:** answers@tsi.com

For current information
www.tsi.com

P/N 2980092 Rev. A 4/05

Printed in U.S.A.