



Washing Respirators in a Clothes Washer

Respirators: When using respirators to control or reduce exposures to toxic metals it is essential that workers receive a clean and sanitized respirator to start each day. We have developed a low cost and rapid means to clean, sanitize and test the cleanliness of respirators. The following procedure can be used in a top load clothes washer. This procedure can be adapted for use in an ultra-sonic respirator washer or dishwasher. We have issued a separate procedure detailing this procedure adapted for use in sinks or buckets.

Cleaning & Sanitizing Respirators with D-Lead® Respirator & Laundry Detergent & D-Bact™ Industrial Disinfectant¹

- ✓ ESCA Tech products can be used to improve the speed and efficiency of your respirator cleaning program (OSHA 40 CFR §1910.134).
- ✓ Respirators can be washed in a top load clothes washer (preferred) or a dishwasher. Clothes washers are available in various sizes.
- ✓ In an inexpensive super capacity washer you can clean and sanitize 30 to 40 half face piece respirators in less than 30 minutes with cold water.

OSHA 1910.134 Standard for Respiratory Protection specifies “Disinfection.” “Sanitizing” is not permissible. Disinfection is the reduction of the micro-organism count by 10,000 to 1. Sanitation is a reduction of micro-organism count by 1,000 to 1. **D-Bact™ Industrial** is registered by the US EPA as an effective disinfectant for respirators and other Personal Protective Equipment.

Materials:

- D-Wipe® Towels <https://esca-tech.com/product/d-wipe-towels/>
- Delicate Clothes Bag
- D-Lead® Respirator & Laundry Detergent (3235ES) <https://esca-tech.com/product/d-lead-respirator-laundry-detergent/>
- D-Bact™ Industrial (7102ES) <https://esca-tech.com/product/d-bact-industrial/>

Washing Machine Selection:

- ✓ A top load washer is preferred. The tumbling action in a front load washer will shorten the respirator’s life and can crack the lens in full face respirators. Unless you have a machine that allows you to custom program the wash cycles, a front load washer should be avoided.
- ✓ We recommend a standard efficiency washer. There are 2 reasons to avoid a high efficiency washer for this application:
 - Reduced water usage. Rinsing with plenty of water is a key aspect of achieving lowest residual metals on respirators. HE washers use low water levels.
 - With an HE clothes washer your detergent selection is limited to only HE detergents. This means 2/3 of the available detergents can’t be used.
- ✓ The fabric softener reservoir can be used to automatically dispense disinfectant into the first rinse cycle, reducing operator interaction during the wash cycle.

Procedure:

1. Remove filters or cartridges and any parts not water washable. Clean the exterior of cartridges with a D-Wipe® Towel.
2. Place up to 10 half mask respirators or 4 - 5 full face respirators into each delicate wash bag.

¹ D-Bact™ Industrial is a hospital grade disinfectant for use in industrial and commercial facilities. EPA Reg No. 10324-81-74928

- a. A super capacity washer will hold 30 to 40 half face pieces, or 10 to 20 full face pieces. A standard capacity washer will hold about 20 to 30 half face pieces.
3. Set the washer on the delicate cycle.
 - a. Temperature of the wash and rinse cycle does not seem to matter with D-Lead[®] Detergents. However, OSHA 1910.134, Appendix B-2 states: "Wash components in warm (43 °C [110 °F] maximum) water..." and "Rinse components thoroughly in clean, warm (43 °C [110 °F] maximum) water..."
4. Add D-Lead[®] Respirator & Laundry Detergent (3235ES) to the wash cycle.
 - a. For a super capacity washer, add 6 ounces (175 ml)
 - b. For a standard capacity add 4 oz (120 ml).
 - c. Add 4 ounces (120 ml) of D-Bact[™] Industrial Disinfectant (7102ES) to the fabric softener reservoir (it will automatically feed during the first rinse cycle).
5. Evenly load the respirators into the tub, and then start the DELICATE wash cycle.
6. Run the washer through 1 wash cycle (D-Lead[®]), 1 rinse cycle (D-Bact[™]) and a final rinse. Rinse components thoroughly in clean, warm water with a maximum temperature of 43 °C [110 °F].
7. A second rinse cycle is recommended and can be done with cool or cold water.
8. After the spin cycle, remove the respirators and drain any water from the face pieces.

Drying Clean Respirators:

- Air drying can result in dust settling on the respirators. The best way is with filtered air.
- You can build an inexpensive respirator dryer from a steel storage cabinet with wire mesh shelves. Mount a small exhaust blower on top and install air intake filters on the lower sides. Heat can be provided by infrared lamps or a small electric heater. See attached drawing.

Really Dirty Respirators:

- ✓ When a respirator comes to the laundry really dirty, it is bagged separately instead of washed.
- ✓ The operator is issued a new respirator the next day and the bagged dirty mask is handed to their supervisor for discussion with the worker.
- ✓ After a discussion between operator and supervisor, the respirator is then washed and re-issued.

After Drying Respirators:

- When the respirators are dry, inspect all of the valves, straps, face seal, and replace parts in accordance with manufacturer's recommendations.
- Install filters or cartridges.
- Place in plastic bags with an individual D-Wipe[®] Towel for use in mid-shift clean up.

Notes:

- For very hard water use 25% more D-Lead[®] Detergent.
- Or use D-Lead[®] Extra Strength Detergent, # 3236ES. It was formulated for very hard water.
- Tumbling respirators in a dryer will shorten their life and full face respirators may crack the lenses. If you must use a clothes dryer:
 - ❖ Be aware that the air intake for the clothes dryer will be inside the laundry room, and potentially re-contaminate the respirators.
 - ❖ The dryer should not be the same one used for work clothes, as the residual dirt on the clothes will contaminate the dryer drum, and then the respirators.

Testing: A convenient method for testing the cleanliness of respirators is to use the **D-Lead® Test Kit**. See <https://esca-tech.com/product/d-lead-test-kits-for-lead-dust/>. Typically, one respirator is tested at random per batch after it is clean and dry. The **D-Lead® Test Kit** will give a visible yellow color on the test pad if 20 micrograms or more of lead is recovered from the mask. If the dry respirator tests high, you can use the test to determine if the contamination was the result of improper washing, or dust deposition during or after drying. After testing the respirator should be washed, but at a minimum, rinsed with clean water or wiped down with a **D-Wipe® Towel** before it is issued.

1. Spray a test pad with solution 1.
2. Wipe the entire respirator inside and out.
3. Spray the test pad with solution 2. If any lead is present on the wipe, it will immediately turn yellow. The intensity of the yellow color is proportional to the amount of lead present.
4. The detection limit is 20 micrograms total lead. That is the minimum amount of lead present that the average person can see.
5. Use this as your pass / fail criteria for evaluating the respirator laundry performance and to see if you need to adjust the wash time, scrub effort or concentration of cleaner.



<https://esca-tech.com/technical-info/lead-dust-test-kits/>