

<http://www.publichealth.va.gov/PUBLICHEALTH/exposures/carc-paint/index.asp>

## **CARC Paint**

CARC (Chemical Agent Resistant Coating) is a paint used on military vehicles to make metal surfaces highly resistant to corrosion and penetration of chemical agents. Inhaling CARC during the painting and drying process can be harmful. Dry CARC poses no hazards, except during welding or sanding. If you are concerned about exposure to CARC paint during your military service, talk to your health care provider or local VA Environmental Health Coordinator.

### How Veterans may have been exposed to CARC paint

Gulf War Veterans who painted combat vehicles and equipment during their military service may have been exposed to CARC paint or fumes without adequate respiratory protection. Other Veterans who painted tanks, armored personnel carriers, and other motor pool equipment may have been exposed. Some civilian units and support units may have been exposed. Learn more about exposure to CARC paint from the Deployment Health Clinical Center.

### Health problems associated with CARC paint

Paint fumes present the most potential risk to users especially when CARC is spray painted, rather than applied with a brush or roller. CARC paint contains several chemical compounds that can be hazardous when inhaled or exposed to the skin:

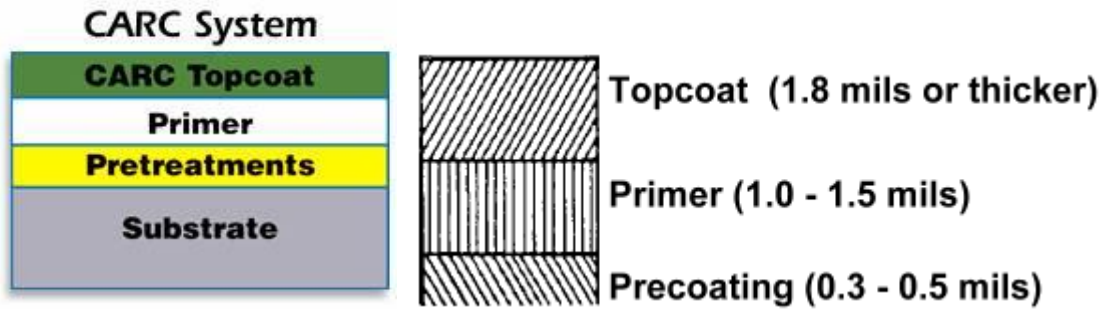
- Isocyanate (HDI) - Highly irritating to skin and respiratory system. High concentrations can cause: itching and reddening of skin; burning sensation in throat and nose and watering of the eyes; and cough, shortness of breath, pain during respiration, increased sputum production, and chest tightness.
- Solvents - Inhaling high concentrations can cause coughing, shortness of breath, watery eyes, and respiratory problems, including asthma
- Toluene diisocyanate (TDI) - High levels released during the drying process can cause kidney damage.

- See more at: <http://www.publichealth.va.gov/PUBLICHEALTH/exposures/carc-paint/index.asp#sthash.3gbsl3wo.dpuf>

<http://www.inetres.com/gp/military/cv/carc.html>

## **CARC**

The U.S. CARC system is a combination of pretreatments, primers and topcoats. After surface preparation and pretreatment, exteriors of vehicles are painted with an epoxy primer, then with an aliphatic polyurethane topcoat. The interior of hull-type vehicles gets an epoxy enamel over the epoxy primer.



Army Research Laboratory website: CARC TB 43-0242: CARC

CARC resists corrosion and the penetration of chemical agents. It does not soak up chemical agents the way alkyd paint does. It also resists removal by decontaminating solutions.

CARC is required on all combat, combat support, and combat service support equipment.

Major end items and major components with exposed surfaces painted with CARC will have the word "CARC" stenciled on them in close proximity to the data plate.

Solvent-Based CARC Paints:

MIL-C-46168 a two-component aliphatic polyurethane used on exterior surfaces and those interior surfaces frequently exposed (eg, ramps, hatches). Cancellation due September 2005. Replacement with MIL-DTL-64159 and MIL-C-53039

MIL-C-53039 a single component aliphatic polyurethane used wherever MIL-C-46168 may be used.

MIL-C-22750 a two-component epoxy polyamide enamel used only on interior surfaces.

Chemical agent resistant coating (CARC) paint contains isocyanate (HDI), which is highly irritating to skin and respiratory system. High concentrations of HDI can produce symptoms of itching and reddening of skin, a burning sensation in throat and nose, and watering of the eyes. In extreme concentrations, HDI can cause cough, shortness of breath, pain during respiration, increased sputum production, and chest tightness. The following precautions must be taken whenever using CARC paint:

ALWAYS use air line respirators when using CARC paint unless air sampling shows exposure to be below standards. Use chemical cartridge respirator if air sampling is below standards.

DO NOT let skin or eyes come in contact with CARC paint. Always wear protective equipment (gloves, ventilation mask, safety goggles, etc.).

DO NOT use CARC paint without adequate ventilation.

Mixed CARC is extremely flammable. Use only in well-ventilated areas. Keep away from open flames, sparks, and other ignition sources.

DO NOT use CARC for items like manifolds and mufflers that exceed 400°F. Doing so may produce toxic fumes and/or equipment damage.

NEVER weld or cut CARC-coated materials.

DO NOT grind or sand painted equipment without high-efficiency air purifying respirators in use.

BE AWARE of CARC paint exposure symptoms; symptoms can occur a few days after initial exposure. Seek medical help immediately if symptoms are detected.

Unusable chemical agent resistant coating (CARC) mixtures are considered hazardous waste.

**Notes on use:**

CARC colors should not be mixed with one another as this will alter their individual effectiveness when applied to the end item. Blending is not permitted.

Do not use CARC on items which are flexible. Because of its rigidity, the finish may crack when item is bent.

Do not use CARC on rubber, lacquer coatings, or vinyl.

CARC is not used on fabric, metals that have anodized or parkerized finishes (like weapons).

CARC won't last as well on wood. Wood expands and contracts with weather changes. CARC does not. It is not flexible enough to move with the wood, so it cracks and can peel off.

MIL-DTL-64159 Water Dispersible CARC:

The replacement for solvent-based CARC (MIL-C-46168)

Contains water and is thinned with water.

The solvent content of WD CARC is less than half that of solvent-based CARC. It also contains no hazardous air pollutants.

Is fully compatible with all existing CARC primers and topcoats,

Is more flexible after application.

Is more durable and doesn't scratch as easily as the old CARC.

Is much more durable in all weather conditions.

Doesn't fade like the old CARC.

The personal protective equipment required during spray and brush application remains the same as for solvent-based CARC.