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Maintenance of Supplies and Equipment  
CHEMICAL AGENT RESISTANT COATING (CARC)

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**\*This pamphlet is the first edition.**

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For the Commanding General:

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**Summary.** This pamphlet provides guidance and establishes procedures for the management of the Department of the Army Chemical Agent Resistance Coating (CARC) Program. CARC paints protect equipment from corrosion, provides chemical agent resistance, and camouflage.

**Summary of Change.** Not applicable.

**Applicability.** This pamphlet applies to all Eighth United States Army (Eighth US Army) units and contractor operated facilities involved with the application of CARC. It discusses responsibilities, policies, procedures, health and environmental hazards, safety requirements, and proper disposal of hazardous materials.

**Supplementation.** Supplementation of this pamphlet and establishment of command

and local forms are prohibited unless prior approval is obtained from the Commander, 19<sup>th</sup> ESC (EANC-DGM-MAC), Unit #15015, APO AP 96218-5015.

**Forms.** AK forms are available at

[http://www-hr.korea.army.mil/Programs\\_Policy/Publication\\_Records\\_main.asp](http://www-hr.korea.army.mil/Programs_Policy/Publication_Records_main.asp)

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**Suggested Improvements.** The proponent of this pamphlet is the Commander, 19<sup>th</sup> ESC (EANC-DGM-MAC). Users may suggest improvements to the pamphlet by sending a DA Form 2028 (Recommended Changes to Publications and Blank Forms) to the Commander, 19<sup>th</sup> ESC (EANC-DGM-MAC), Unit #15015, APO AP 96218-5015.

**Distribution.** Electronic Media Only (EMO).

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## **Section I**

### **INTRODUCTION**

- 1. Purpose.** This pamphlet provides guidance and establishes procedures for the management of Department of Army (DA) CARC Program. CARC paints protect equipment from corrosion, provides chemical agent resistance, and camouflage.
- 2. References.** Required and related publications are listed in Appendix A.
- 3. Explanation of Abbreviations and Terms.** Abbreviations used in the pamphlet are explained in the glossary.
- 4. Responsibilities.**
  - a. Eighth US Army G4 will provide command direction on CARC painting program. Designate 19th ESC as the CARC painting program manager.
  - b. 19th ESC Support Operations (SPO) will develop and establish policy and procedures, provide staff supervision and guidance for CARC painting processes to include planning, programming, scheduling, and execution of the program. 19th ESC SPO will inspect the CARC paint facilities run by Army maintenance units and local Korean contractors as required. 19th ESC SPO will be the Eighth US Army central collection point for record keeping and will maintain a data file on all equipment which has been completely CARC repainted.
  - c. Materiel Support Command-Korea (MSC-K) is the only Army maintenance facility equipped with CARC paint booths meeting Occupational Safety and Health Administration (OSHA) standards for complete equipment repainting. MSC-K will manage the CARC program for their facilities, to include planning, programming, scheduling and execution. On the last working day of each month, MSC-K will provide 19th ESC SPO a list of CARC painted equipment during the month. The list will include the following information: LIN, Model, NSN, USA, serial number and owning unit of the equipment.
  - d. Bosung Industry CARC paint facilities located in Dongducheon and Ichon accomplish complete ground equipment repainting to satisfy requirements from units. Korean Air Lines (KAL) Co. Ltd paint facility located in Kimhae accomplishes complete aircraft repainting.
  - e. APS-4 and field maintenance units not equipped with a proper CARC paint booth will do touch-up/spot paint in accordance with (IAW) technical bulletin (TB 43-0242). Commanders are responsible for requisitioning required personal protective equipment (PPE), i.e., protective clothing, gloves, footwear, respirators, paints, primers, thinners, solvents, roller, and brushes, necessary to support CARC painting operations. Touch-up/spot painting application and equipment evacuation for repainting procedures must be covered in detail in the Field/Sustainment maintenance unit standing operating procedures (SOP). APS-4 and field maintenance units will make final determination as to which equipment will be completely repainted IAW criteria established.

f. Supporting Safety/Environmental Offices will conduct an annual survey and evaluation of all work centers which use or store CARC paint and provide assistance and guidance to prevent health and environmental hazards.

## **Section II**

### **POLICY AND PROCEDURES**

#### **5. Policies for Painting.**

a. CARC is the approved coating for all combat and combat support equipment, tactical vehicles, aircraft, and essential ground support equipment, to include secondary item containers such as engine, transmission, ammunition containers and appropriate kits. More detailed painting information and procedures are covered by technical manual TM 43-0139 for ground equipment, TB 43-0144 for watercraft, TM 55-1500-345-23 for army aircraft, and TM 38-470 for APS-4 Stocks.

b. Complete repainting should be done only when the existing finish is obsolete or has been deteriorated to the extent that it no longer protects the underlying surface or when higher authority mandates. Complete repainting will be done at MSC-K or contractor operated facilities with equipment and paint booths meeting OSHA standards. Repainting is defined as stripping unserviceable paint down to the bare metal, inspecting for corrosion, pretreatment for corrosion, priming and topcoating. Repainting for the sole purpose of achieving uniformity or cosmetic purposes is prohibited.

c. Tactical equipment designed for single color CARC requirement will be painted with an approved color based upon contingency mission environment.

d. Touch-up/spot painting will be done for the area of scratches, chips, and marring surface observed during the preventive maintenance checks and services (PMCS) or technical inspection using a brush or roller to prevent corrosion damage. Touch-up painting includes restoration of painted surfaces after repair.

e. Only CARC will be used to touch-up/spot paint equipment painted with CARC and to add unit identification markings.

f. If items do not require painting, do not paint them.

g. Consider weather conditions. The ideal temperature is between 75-80 degrees Fahrenheit and with a humidity of 45-50 percent.

h. Do not paint the following with CARC:

(1) Painted items which attain surface temperatures of more than 400 degrees Fahrenheit; serve a heat-conducting function or expand and contract during operation. (manifolds, turbo chargers, cooling fins and rubber hoses).

(2) Displacement watercraft that is subject to prolonged salt water immersion. (Logistic support vessel (LSV) and landing craft utility (LCU)).

(3) Nondeployable equipment and fixed installation systems. (Railroad rolling stock and fixed power generation systems).

(4) Installation/tables of distribution and allowances (TDA) equipment such as military police cars, nontactical fire trucks and buses.

(5) Aluminum transmissions that are enclosed in combat vehicle pack compartment. However, ferrous components of the transmission must be protected with CARC or other rust-preventive agents.

(6) Items made of fabric or which have anodized or parkerized surfaces.

i. Environmentally acceptable paints which do not violate Federal, Department of Defense (DOD), DA, or local command and host nation regulations will be used at all times per technical data package.

j. CARC protected surfaces should not be covered with petroleum or other products to improve the appearance of the equipment. Use of these products reduces the chemical protection provided by CARC and increases the probability of injury.

k. CARC painted major end items and major components will have the word 'CARC' stenciled near the data plate.

**6. Painting Procedures.** The application of CARC consists of four distinct steps; cleaning, pretreating, priming, and topcoating. After proper surface preparation and pretreatment, exteriors will be painted with primer or topcoat.

a. Complete Repainting.

(1) When determination has been made by APS-4 to do complete repainting, a cost reimbursable job order will be initiated by AFSBn-NEA Production Control Division and turned into MSC-K Production Control Division. The job order will be accompanied with the following information: Type of vehicle/equipment, bumper#, USA#, serial number, and a DA Form 2404 that has been signed and approved by the Quality Assurance Division.

(2) Once determination has been made by the Field maintenance to do complete repainting, the equipment owning unit must provide a memorandum for fund citation to 19th ESC SPO (EANC-DGM-MAC), APO AP 96218-5015, with the following information: Type of vehicle/equipment, bumper #, USA #, serial number, owning unit and the date the equipment was turned-in for painting. Equipment scheduled for GSRP will not be job ordered for complete repainting.

(3) When using contracted facilities, units are required to coordinate their requirements directly with 19th SPO for an induction schedule. Under the current ground equipment paint contracts, units will not be required to provide any funding for

material, labor or transportation to or from the paint facility. Under the current aircraft paint contract, units will not be required to provide any funding for contractor labor but all material will be government furnished material (GFM). Units will be notified if there is any change to this policy.

(4) MSC-K, located at Cp Carroll, Waegwan, services all areas on the peninsula for equipment in the General Support and Repair Program (GSRP). Equipment not scheduled in the GSRP will be job ordered as unscheduled maintenance. When a piece of equipment is submitted to MSC-K for unscheduled maintenance, the unit is responsible for the cost of material. Other than Army units are required to reimburse MSC-K for material and labor.

(5) Painting operations:

(a) CARC is intended for use over new or previously painted surfaces. Never apply CARC to bare metal. Apply CARC to bare metal surfaces after completion of primer pretreatment. CARC may be applied over thoroughly prepared existing CARC or alkyd painted surfaces. Detailed painting procedures in TM 43-0139 and MIL-C-53072B (ME) will be followed.

(b) MSC-K paint shop will follow the unique manual for paint booth operation.

b. Spot/Touch-up Painting. Painting at Field maintenance not equipped with a proper CARC paint booth is limited to touch-up or spot painting using a brush or roller.

(1) Spot Painting. Use only CARC when you have to spot paint equipment painted with CARC. Likewise, only use CARC for adding unit identification markings (bumper markings). Steps for spot painting will be IAW TB 43-0242. PS Magazine 598, September 2002, provides an overview of the CARC spot painting procedure.

(2) Touch-up painting. Touch-up painting is done to prevent corrosion, not for purely cosmetic reasons. If the paint is marred but not deep enough to see bare metal, you do not need to paint. Steps for touch-up painting will be IAW TB 43-0242.

## **7. Army Aircraft and Aviation Ground Support Equipment.**

a. CARC Infrared (IR) is the approved coating for all Army aircraft and aviation ground support equipment. Spot painting with CARC IR is authorized. Complete painting of Army aircraft will be with single color CARC IR paint and aircraft will be painted a color based on the contingency mission environment.

b. MSC-K and contractor operated CARC paint shops will be utilized for complete repainting of aviation ground support equipment. Only contracted facilities are authorized to paint Army aircraft.

c. 19th ESC SPO will determine the location (continental United States (CONUS) versus local aircraft maintenance facilities) and method (contract or evacuation) for complete repainting of aircraft.

d. Aviation Unit Maintenance (AVUM) Level.

(1) Limited minor touch-up (spot painting) of aircraft surfaces using CARC will be IAW TM 43-0139 and TM 55-1500-345-23. Use brush or one quart spray bottle for scratches, chips, or marring of painted surfaces.

(2) Aviation ground support equipment painted with CARC will have the word 'CARC' stenciled near the data plate in black one-inch letters.

e. Aviation Intermediate Maintenance (AVIM) Level. AVIM units will perform repainting of large areas of deteriorated aircraft painted surfaces which are beyond capabilities authorized for AVUM. The supporting AVIM will inspect aircraft requiring complete repainting. Aircraft requiring complete CARC repainting as determined by supporting AVIM will be reported to 19th ESC SPO, (EANC-DGM-MAC).

## **8. Health/Environmental Hazards and Safety Requirements.**

### **a. Vapor.**

(1) Spray painting results in significant aerosolization of paint and solvents. Painting materials may also contain lead, zinc chromate, chromium VI and hexamethylene diisocyanate (HDI). Exposure to solvent would be expected in very confined spaces during the brush or roller painting, drying or curing process. Welding and cutting on CARC coated metal release significant quantities of isocyanate.

(2) Every effort must be made to ensure proper ventilation of paint area to rid the area of toxic vapors as quickly as possible. All personnel must be made aware that toxic vapors may be present. Avoid inhaling toxic vapors. An effective respiratory protection program is required which requires close liaison among workers, supervisors, safety, and medical personnel to safeguard life and health through proper selection and use of respirators.

### **b. Fire.**

(1) The mist generated from a spray gun is highly flammable. Open cans, containing paint removers, thinners, paints, primers, and oil or solvent-soaked cloths are a fire hazard.

(2) Accurate mixing of two component coatings, according to instructions provided with each kit, is crucial since sufficient amounts of material cause chemical polymerization to occur. Mixing must be conducted in a well ventilated mixing room or spraying area away from open flames, welding torches, and combustion heaters. All mixing containers must be dry and clean. Personnel doing the mixing should wear eye protection and clothes providing full skin coverage.

### **c. Contact with Paint Material.**

(1) Skin contact with paints, primers, removers and thinner can convey toxic material to food or water during the whole paint process.

(2) Avoid skin contact with paint material. Personal protective equipment will be worn to prevent skin contact.

d. Dust.

(1) Grinding and sanding painted surfaces can expose personnel to hazardous concentrations of lead, zinc, copper, tin, chromium VI dust from primers or paints, and noise and eye hazards associated with grinding.

(2) High efficiency air purifying respirators and hearing protection are required. The area will be posted as a noise hazardous area if noise levels exceed 85dBA.

e. Material Safety Data Sheets (MSDS). MSDS are prepared by the manufacturer and should accompany each single shipment or batch of paint, primer and thinner. It is mandatory that personnel working with these substances read this information. Because of the variations involved, the MSDS must be reviewed for each shipment procured on a single purchase order. MSDSs must be posted or filed in a location readily accessible to workers exposed to the substances. MSDSs also assist management by directing attention to the need for specific control engineering, work practices and protective measures to ensure safe handling and use of material. Along with the product ingredients and specific protection information, the MSDS contains reactivity data, spill and disposal procedures, fire and explosion hazard and health hazards data.

f. Medical Surveillance. Before medical surveillance is initiated or requested, operations involving any spray painting MUST be assessed by the 18<sup>th</sup> Medical Command Area Industrial Hygienist. The Area Industrial Hygienist will assess the potential exposures and determine both personal protection and survey requirements. He/she will provide this information to the Area 18<sup>th</sup> MEDCOM Occupational Health Nurse and to the applicable Safety office(s). Medical surveillance to detect adverse health effects will be determined by the installation medical authority (IMA) based on the assessment of the Industrial Hygienist. Vehicle and equipment operators and unit maintenance section personnel usually do not perform enough brush touch-up painting to warrant medical surveillance. For personnel who require medical surveillance, the supervisor must inform the supporting Civilian Personnel Advisory Center (CPAC) that the individual requires entry into the surveillance program. The CPAC will then notify the Occupational Health Nurse and schedule appointment(s) as required.

g. Storage. Paint thinner and supplies should be stored in an area which meets OSHA and local environmental standards. Once opened, cans containing paint, paint removers and thinners should be covered tightly before being stored. Do not apply heat or flames to drums, cans or other containers which previously contained flammable materials.

**9. Disposal.** Solvent-based coatings primarily contain Volatile Organic Compounds (VOCs) as the carrier. Water-based coatings (e.g. latex paint) contain mostly water but may also contain chemicals such as ethers, alcohols, and other water-soluble VOCs.

Personnel must research MSDSs for all paints to determine if listed solvents are included in ingredients. Solvent-based paint waste is normally considered hazardous waste. It is strongly recommended that the use of solvent-based coatings be avoided where an alternative (water-based) coating is available. Painting methods can also be altered so that preferential water-based coatings may be used. Rags, overspray, and debris generated from grinding and sanding must be cleaned up and managed as hazardous waste. All unusable paint mixtures, paint components, primers, and thinners are also considered hazardous waste and require disposal in accordance with Federal, DOD, DA and local command and host nation hazardous waste regulations. In order to minimize hazardous waste generation all excess paint and solvents should be turned in to the area hazardous materials pharmacy (HAZMART) for reuse/re-issue. Contract operated facilities will comply with Korean disposal and environmental laws and policies. Contractors will make coordination with the Administrative Contracting Officer for proper disposal guidance. This applies to dried paint and primer waste. Consult local environmental personnel for proper disposal guidance.

## APPENDIX A

### References

- a. AR 750-1, 5 September 2006, Army Materiel Maintenance Policy (Available at <http://www.army.mil/usapa/epubs/index.html>)
- b. AR 750-59, 9 December 2005, Army Corrosion Prevention and Control Program (Available at <http://www.army.mil/usapa/epubs/index.html>)
- c. MIL-C-53072B(ME), 15 March 1988, CARC System Application Procedures and Quality Control Inspection (Available at <http://www.arl.army.mil/wmrd/coatings/MILDTL/MIL-DTL-53072C.pdf>)
- d. PS Magazine, The Preventive Maintenance Monthly, Issue 598, September 2002, "Spot Painting Procedure" (Available at <https://www.logsa.army.mil/psmag/pshome.cfm>)
- d. TB 43-0144, November 2005, Painting of Watercraft (Available at <https://www.logsa.army.mil/etms/index.cfm>)
- e. TB 43-0209, W/C 1, 31 October 1990, Color Marking and Camouflage Painting of Military Vehicle, Construction Equipment, and Materials Handling Equipment (Available at <https://www.logsa.army.mil/etms/index.cfm>)
- f. TB 43-0213, 4 December 1990, Corrosion Prevention and Control including Rustproofing procedures for Tactical Vehicles and Trailers (Available at <https://www.logsa.army.mil/etms/index.cfm>)
- g. TB 43-0242, 1 January 1991, CARC Spot Painting (Available at <https://www.logsa.army.mil/etms/index.cfm>)
- h. TB MED 502, February 1982, Occupational and Environmental Health Respiratory Protection Program (Available at <http://chppm-www.apgea.army.mil/tbm.htm>)
- i. TM 43-0139, 27 July 1988, Painting Instructions for Army Materiel (Available at <https://www.logsa.army.mil/etms/index.cfm>)
- j. TM 55-1500-345-23, 12 June 1986, Painting and Marking of Army Aircraft (Available at <https://www.logsa.army.mil/etms/index.cfm>)
- k. TM 38-470, 1 December 2004, Storage and Maintenance of Army Prepositioned Stock Materiel (Available at <https://www.logsa.army.mil/etms/index.cfm>)
- l. TG No. 144, August 1987, Guidelines for Controlling Health Hazards in Painting Operations (Available at <http://chppm-www.apgea.army.mil/documents/TG/TECHGUID/TG144.pdf>)
- m. USFK Pam 200-1, 20 October 2004, Environmental Governing Standard

## **GLOSSARY**

### **ABBREVIATIONS**

CARC	Chemical Resistance Coating
Eighth US Army	Eighth United States Army
IAW	in accordance with
MSC-K	Material Support Command - Korea
MSDS	Material Safety Data Sheets
OSHA	Occupational Safety and Health Administration
SPO	Support Operations