# CHAPTER 18

# SURFACE PRESERVATION

*Summer seas and a good ship—life has nothing better*.

—Mark Twain

Just about everyone has been involved in cleaning, preserving, and maintaining something. Painting the family home or washing and waxing your car are good examples. What you did was to protect a surface from the effects of weather or exposure, to extend its lifetime, and to improve its appearance.

The U.S. Navy has a far greater problem because all Navy ships operate in a much harsher environment than your home or car. Constant exposure to the sea and saltwater corrosion can quickly turn the exterior of a ship into a mass of rust. Interior spaces have their problems as well. Constant changes in the weather and in the surrounding water temperature cause moisture, humidity, and chemical reactions that affect electrical systems and machinery. To overcome these harsh conditions, the Navy expends a great deal of time, effort, and money applying surface preservatives. These preservatives range from detergent and fresh water to paint and lubricants. How well these preservatives work depends on you.

## CLEANING

**Learning Objectives**: When you finish this chapter, you will be able to—

- Recognize the purpose of cleaning and preserving.
- Identify the cleaning bill.
- Recall the purpose of compartment cleaning, sweepers, cleaning process, field day, and zone inspections.

Maintaining clean conditions aboard ship and ashore is an important job. Cleaning involves practically every member, from the compartment cleaner to the inspecting officer. Navy life requires each of us to have a personal interest in our living and working areas, not only for the sake of appearance but for our health and safety as well.

### THE CLEANING BILL

Each area of the ship is divided into various departments for upkeep. The Cleaning, Preservation, and Maintenance Bill describes these areas and outlines the department that is responsible for them. This bill is carefully planned to make sure all interior areas and exterior areas of the ship's hull are assigned to personnel for upkeep and that no areas overlap or are left out. Each division within the department assigns its personnel to the spaces it's responsible for. Division personnel carry out the duties of cleaning, preserving, and maintaining.

### COMPARTMENT CLEANING

The term *compartment cleaner* generally applies to persons assigned to clean living or berthing compartments or spaces, such as passageways and heads. If you are assigned compartment cleaner duties, you will be responsible for keeping your spaces clean, preserved, and in good order. Newly assigned personnel are closely supervised to make sure they understand what to clean and how to clean it. Items, such as electrical and mechanical devices, might be unfamiliar to you. These types of items are located in almost every space aboard ship. With this in mind, caution must be observed at all times. Ask your supervisor to point out any hazardous items located in your compartment and observe all special cleaning instructions.

Cleaning gear is stocked in and issued from the first lieutenant's storeroom. Each division is periodically issued cleaning gear and is then responsible for its proper stowage and care. Because cleaning compounds and solvents are often flammable or toxic, or both, they must **never** be left unattended or improperly stowed. You should always read warning labels and follow their directions carefully. Gear, such as brooms and swabs (mops), must be cleaned after each use and placed in their stowage racks. Gear adrift, such as rags, clothing, or personal gear, must be "policed up" immediately. If left adrift, these items are a tripping or fire hazard—or

worse, they might clog up dewatering equipment if the space were flooded.

**SWEEPERS**

"Sweepers" is piped shortly after reveille, before the end of the regular working day, and at other times as scheduled. At these times, all persons assigned as sweepers draw their gear and sweep and swab down their assigned areas. All trash and dirt are picked up in a dustpan and placed in a trash receptacle.

**NOTE**

If dirt is swept over the side, the wind may blow it back on board or the dirt may stick to the side of the ship. In either case, additional work is necessary to clean the ship.

At this time you should empty all butt kits (make sure no butts are still burning) and trash receptacles as instructed. **Never** dump trash or garbage over the side of the ship without first obtaining permission from the officer of the deck. At times, all trash must be kept in a safe area aboard the ship until it can be properly removed.

**CLEANING PROCESS**

Dirt, soil, and contamination all describe the same thing—a foreign material on a surface where it is not wanted. Soil includes grease, oil, tarnish, rust, food residue, and stains. Most exposed surfaces that have been soiled may be cleaned with the proper use of cleaning agents.

Detergents are materials that have the ability to remove contamination and soil. There are other ways of cleaning besides using detergents or cleaning compounds. These include purely mechanical processes, such as removing rust from steel by sand-blasting or cleaning decks by sweeping. For many cleaning problems, chipping, sweeping, sanding, or brushing may be needed. However, when detergent compounds are coupled with the mechanical action, a cleaner surface is usually produced with less time and work.

The steps used in most detergent cleaning operations are as follows:

1. Wetting—The soil and the surface of the object being cleaned must be wetted. If the surface is not wetted properly, cleaning results will be poor. Contrary to popular belief, water has very poor wetting properties. Its wetting ability, and therefore its cleaning ability, is improved by adding other materials, such as soap or synthetic detergents. Adding soap or synthetic detergents cause the water to flow into tiny crevices and around small particles of soil.

2. Scrubbing—Dirt is loosened by the mechanical action of rubbing or scrubbing. For example, oil droplets are emulsified; that is, they are coated with a thin film of soap and prevented from recombining, and then they rise to the surface. In a somewhat similar manner, solid particles are suspended in solution.

3. Rinsing—Rinsing is very important. Rinsing removes loosened dirt from the surface along with the cleaning material.

**FIELD DAY**

Field day is cleaning day. Periodically, a field day is held. All hands "turn to" and thoroughly clean the ship inside and out, usually in preparation for an inspection. Fixtures and areas that sometimes are neglected during regular sweepdowns (overhead cables, piping, corners, spaces behind and under equipment, and so on) are cleaned. Bulkheads, decks, ladders, and all other accessible areas are scrubbed. Knife edges and door gaskets are checked; any paint, oil, or other substances are removed; all brightwork is shined; and clean linen is placed on each bunk. Field days improve the appearance and sanitary condition of the ship, aid in the preservation of the ship by extending paint life, and reduce the dirt intake caused by operating equipment.

Because of weather conditions, there are many days at sea when the ship's topside areas can't be cleaned. At the first opportunity, all topside surfaces are cleaned with freshwater and inspected for signs of rust and corrosion. If such signs are discovered, you should tend to the area immediately. A little work at that time will save you a lot of work later.

***Student Notes:***

## DECK COVERS

Aboard ship, deck coverings get more wear than any other material. Unless deck coverings are properly cared for, costly replacement is required. There are several materials used for covering decks, but only two types are covered here. These are the resilient and the nonslip (nonskid paint) types.

**Resilient deck coverings** include vinyl tile, vinyl asbestos tile, and linoleum. These deck coverings do not need painting; however, daily sweeping and wiping away spills as soon as possible are required. Resilient deck covering is clamped down (cleaned with a damp swab) frequently, allowed to dry, and then buffed with a buffer. For more thorough cleaning when the deck is unusually dirty, apply a solution of warm water and detergent with a stiff bristle brush or buffer and rinse with clean water to remove residual detergent. Stubborn dirt and black marks left by shoes can be removed by rubbing lightly with a scouring pad, fine steel wool, or a rag moistened with mineral spirits.

After the deck covering is washed and dried, it can be polished (with or without waxing) with a buffer, or it may be given a coat of self-polishing wax and allowed to dry without buffing. Deck coverings can be buffed several times before rewaxing.

No wax should be applied to the deck when the ship is going out to sea or when heavy weather is anticipated. This is an added precaution against slipping, even though the approved floor waxes are designed to be slip resistant.

**Nonslip (nonskid paint) deck coverings** contain pumice, which provides a better footing. To clean a nonskid painted deck, use a cleaning solution of detergent and dishwashing compound. To make the solution, mix 1 pint of detergent and 5 tablespoons of dishwashing compound. You can mix this compound with freshwater to make 20 gallons of cleaning solution. Apply the solution with a hand scrubber, let it soak for 5 minutes, and then rinse with freshwater. **Don't** wax or paint nonskid deck coverings. Waxing or painting reduces their nonskid properties.

**NOTE**

If it becomes necessary to spruce up the appearance of a nonskid deck cover, brush it with deck paint diluted with mineral spirits. The diluted paint should be as thin as possible so that the nonskid properties are not affected.

## ZONE INSPECTION

Frequent inspections are held to make sure that all spaces, machinery, and equipment are in a satisfactory state of operation, preservation, and cleanliness. One type of inspection, the zone inspection, divides the ship or station into various sections. Each zone is then assigned to an inspection party or team. Usually the CO will head one team, while an officer or chief petty officer will head each of the remaining teams. If you are assigned to present a compartment, you present the space to the inspecting officer by saluting and greeting the inspector in the following manner: "Good morning (afternoon), sir/ma'am; Seaman Apprentice Frost (your rank and name) standing by compartment (name or number), for your inspection, sir/ma'am." You will then stay with the inspecting officer during the inspection of your spaces to answer questions and provide assistance. Such things as stowage cabinets, lockers, and drawers should be unlocked before the inspection for easy access. Usually the inspecting officer will give an overall grade to the space; for example, a grade of outstanding would indicate that no new discrepancies were noted and all previous discrepancies have been corrected. You can be proud of an outstanding grade.

### REVIEW 1 QUESTIONS

Q1. The responsibility for cleaning and maintaining certain spaces in the ship is listed in what publication?

Q2. What person is generally assigned to clean living or berthing spaces?

***Student Notes:***

Q3. You should pick up and put away gear that has been left adrift for what reason?

Q4. True or False. When sweeping exterior decks, you can sweep dirt over the side.

Q5. List the three steps used in most detergent cleaning.

a.

b.

c.

Q6. List two types of deck covers.

a.

b.

## CLEANING SOLVENTS

Learning Objectives: When you finish this chapter, you will be able to—

- Identify types of cleaning solvents.
- Recall the precautions to be followed when working with cleaning solvents.

No matter what the job, from paint removal to swabbing the decks, take precautions against carelessly using cleaning solvents. Look at the following example:

> Seaman Joe Frost didn't read the labels on the chlorine-based cleaning material he was using to clean the commode. He decided to clean the drains at the same time and added a granulated drain cleaner to the chlorine-based cleaner. Then he left the head. A few minutes later he heard a loud explosion. The reaction between the chlorine-based cleaner and granulated cleaner caused the explosion. Luckily, no one was hurt, but the head was a mess.

Solvents used in paints, adhesives, rubber and plastic materials, and degreasing solutions are hazardous to your health. Most solvents are toxic and, with a few exceptions, are flammable. Take the appropriate measures to reduce their toxic and flammable effects. In addition, solvents that come in contact with your skin can cause serious skin problems. When using solvents, always observe the following precautions:

- **Make** sure the space in which you are working has adequate ventilation.
- **Wear** protective clothing, goggles, respirators, gloves, and other appropriate equipment.
- **Make** sure accessible fire-fighting equipment is nearby.
- **Take** every precaution to prevent excessive vapors from contaminating the air.
- **Check** the labels on all containers of liquids.
- **Wipe** up spilled solvents immediately.
- **Avoid** contact with your eyes, skin, or clothing.
- **Never** swallow solvents.
- **Avoid** breathing the vapors.
- **Keep** solvent containers tightly closed when you are not using them.
- **Check** containers for leakage.
- **Transfer** solvents from a defective/leaking container to a new container.
- **Make** sure containers are empty before you discard them. You must observe the approved practices for disposal of solvents, cleaners, and their containers.
- **Label** all containers used to store solvents.

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- **Read** and comply with all instructions and precautions on the label.

**PRECAUTIONS**

Always follow safety precautions when working with solvents. **Never** use solvents in an unventilated space under any circumstances. Special clothing requirements also must be observed when using some solvents. **Always follow safety precautions!** Carelessness on anyone's part could cause a mishap, resulting in injuries or even deaths. By observing safety precautions, you will reduce mishaps and save lives.

**Ventilation**

When you think of ventilation, you usually think of air conditioning and cooling. However, when working with solvents, the term *ventilation* means providing fresh air and exhaust to the area in which you are working. Make sure the work area is properly ventilated. That includes topside areas of a ship because some topside areas are enclosed on three sides and will not allow proper ventilation.

When applying flammable coatings or using solvents, you **must** provide adequate ventilation, which will help prevent accidental ignition. You may have to use extra fans or local exhaust to ventilate a space, especially in spaces where pockets can develop. A *pocket* is the buildup of vapors and poisonous air in an area, causing an explosion. **Always follow safety precautions and make sure spaces are ventilated properly when solvents are used!** When in doubt, contact your supervisor for additional guidance.

**Preventing Excess Vapors**

Any type of solvent will give off some type of vapor. These vapors may be toxic or flammable. Always use proper ventilation to prevent a buildup of vapors. As you have learned, some vapors can linger in pockets of spaces; therefore, make sure the complete work area is fully ventilated. Before starting a job, ask a gas free engineer to examine the area for toxic gases and ask for the proper ventilation plan for the space. Be sure to have the space checked frequently for excessive vapors. If vapors are found to be excessive, stop all work immediately and have all personnel clear the area until it is safe to return.

**Protective Clothing**

When working with solvents, you always face the risk of their contacting your skin through splatters or spills. Some caustic solvents will actually eat the skin off your body. Make sure that you have all the protective clothing needed for the job.

When working with solvents, you **must** wear adequate protective clothing and gloves to prevent skin contact with the solvents and cleaning materials. **Do not** wear jewelry or clothing with cuffs, loose pockets, rips, or loose ties. Observe the following safety precautions when working with solvents:

- Wear chemical splash goggles at all times.
- Wear acid-resistant aprons, face shield with goggles, gloves, and boots when handling acid or caustic cleaners.
- Wear nonskid rubber-soled shoes when working in enclosed spaces or when flammable vapors may be present (spark prevention).
- Never work in an enclosed space without using the buddy system.
- Respiratory protection, with either an organic vapor cartridge or supplied air, should be worn when dispensing, handling, or cleaning using solvents.

Using solvents for cleaning saves time; but, make sure you read all the labels before using the solvent. Many solvents are corrosive and can irritate or cause serious injuries to your eyes, skin, and lungs. **Always check the caution labels before using any solvents!**

**Fire-Fighting Equipment Required While Using Solvents**

Nothing ruins a CO's day faster than receiving word that the ship is burning. A fire can cause injury and loss of life **and** take a ship off the line for a long time. When working with solvents, you have no room for error. If you're on a work detail that requires the use of solvents

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or solvent-based paint, make sure the proper fire-fighting equipment is located close to the work area. One little spark can set the vapors of some solvents into a roaring fire that can take life and destroy a ship. Proper equipment may include fire extinguishers, charged fire hoses, or foam. You always need to be prepared. An ounce of prevention goes a long way. Ask your supervisor to check the type of fire-fighting equipment you are going to use to see if more equipment or some other type is needed for the job at hand.

While working with people using solvents or solvent-based paint, make sure you know the location of the nearest fire alarm. Also, make sure all the people working know the nearest fire escape route. Always notify damage control central (DCC) when you are using flammable materials.

**Wiping Up Solvent Spills**

When using solvents, be careful not to spill them on the deck or get them on anything except what you are cleaning. Solvents may cause paint to bubble and peel off surfaces. The corrosive nature of some solvents can damage equipment. When mixed with some tile compositions, solvents can form toxic vapors that can irritate your lungs and make you sick. If you spill solvent, clean it up as soon as possible. If you think the spill has caused some type of damage, contact your supervisor for guidance.

When a spill involves more than 5 gallons of solvent or presents a threat to the ship or the health of the crew, report it immediately to your supervisor, DCC, or the OOD. Each ship has a hazardous material response kit to handle such emergencies. Spilled material and contaminated clothing or rags become hazardous waste and must be treated as hazardous material (HAZMAT). Your supervisor will tell you the proper disposal procedures for your command.

**Dangers**

Working with solvents is dangerous. Avoid inhaling vapors. Personnel with a history of chronic skin disease, allergies, or asthma should not be permitted to work with paint, solvents, and thinners.

When you handle a solvent, don't let it contact your skin. If a solvent does contact your skin, flush it with clear water as soon as possible. If solvent contacts your skin or eyes, report to the nearest medical facility as soon as possible for treatment.

When working with solvents, wear an approved respirator and protective clothing at all times. If you think that your respirator isn't working properly, request an air line mask. The safety department of your ship usually provides these items.

If you breathe some of the vapors given off by solvents, get to a doctor as soon as possible.

**Respirators**

The National Institute for Occupational Safety and Health/Mine Safety and Health Administration (NIOSH/MSHA) must approve all respirators and pumps. Users must be medically qualified and fit-tested before wearing a respirator. The following text describes the air-purifying respirators and air-supplied or self-contained breathing apparatus (SCBA) approved for use by the Navy:

- Air-purifying respirators use a filter, a chemical cartridge, or a combination of the two to remove air contamination. Filters capture particles of dust or metal fumes. The cartridges may contain a chemical or carbon to absorb vapors or gases. A combination of filter and cartridge is used for a combination of hazards, such as spray painting. The filter captures the spray mist and the cartridge absorbs the paint vapors, protecting the wearer.

- Air-supplied or self-contained breathing apparatus (SCBA) provides fresh air when the vapor or gas concentration is too high or the area lacks oxygen. Air-supplied or SCBA is required for all internal shipboard spray painting operations. Air for supplied air masks is provided by certified breathing air compressors or breathing air pumps.

The use of proper equipment may save your life and the lives of your shipmates. If you are in doubt about the type of equipment to use, be sure to check with your supervisor.

***Student Notes:***

**Keep Solvent Containers Tightly Closed**

Most fires in paint and solvent storage areas are caused by a buildup of vapors. Usually, vapors escape from containers that are not closed tightly. It only takes a small spark to ignite these vapors. Since vapors can quickly displace the oxygen in a storage space, there may not be enough oxygen left to sustain life.

All containers **must** be tightly closed when not in use. Besides the danger of vapors accumulating, air can cause a chemical breakdown of some solvents. After a short time, the solvent may evaporate or decay to the point that it can't be used.

**Check Containers for Leakage**

The Navy uses many types of corrosive materials that can eat through a container. You must make sure this doesn't happen. How can you do that? **Don't accept containers until they are inspected!** If you are inspecting the containers, check all the seams carefully for leaks or cracks. Check the sides of the containers for dents. If a container is dented, that means the side of the container may have been weakened and will eventually leak. Don't sign for material in damaged containers. If you are unsure of the condition of a container, ask your supervisor to inspect it.

If you discover a leaking container while inspecting your storage areas, find the name of the material or solvent on the label of the container. Then immediately inform your supervisor of the problem. The material or solvent in the container may be caustic and highly flammable. You and your supervisor should inspect the damaged container and the surrounding area. Then the material or solvent should be transferred to another container using a standard Navy transfer pump. This container must be equal to or surpass the storage requirements of the damaged container.

**Ensure Containers Are Empty Before Discarding**

One of the most dangerous practices is to discard (throw away) a container partially filled with a solvent or some type of caustic or flammable substance. For example, several years ago a container of highly flammable liquid was discarded into a dumpster in Charleston, South Carolina. The dumpster was taken to the trash disposal area where the driver, thinking that the dumpster only contained burnable trash, dumped the contents of the dumpster into a small fire. As the flammable liquid drained from the container, it ran into the fire and created an explosion that was heard for miles around. The dumpster and the truck were destroyed, and the driver was killed instantly.

Solvent containers are considered hazardous waste, so you **must** dispose of them according to local hazmat regulations. When at sea, **never** throw solvent containers over the side; they contaminate the seas. Stow containers in a disposal storage area until you reach your next port of call and then have them disposed of in the proper manner.

**Label All Containers**

On board naval ships, paints and solvents are stored in a storeroom designated for flammable liquids. The storeroom should be neat, clean, cool, and dry. Make sure a label appears on the door of the space to show the space contains flammable liquids. Store paints or solvents in tightly sealed cans or containers. Mark the container with the name, formula number, solvent composition, Navy hazard identification label or Department of Transportation hazard identification label, and manufacture date of the paint or solvent it contains.

Inspect the contents of any paint or solvent container more than 2 years old. If the container is unfit, properly dispose of it. If you're not sure whether the paint or solvent is usable (particularly large quantities), send samples to the nearest laboratory for testing.

**Working in Closed compartments**

Tests are performed with a combustible gas indicator (explosimeter), toxic gas detectors, and an oxygen indicator. Personnel who test a space are required to wear an oxygen-breathing apparatus (OBA) or air-line mask. If the atmosphere is found unsafe, the space is thoroughly ventilated and provided with adequate forced fresh air circulation. Only after the space has been retested and pronounced safe to enter can personnel without an OBA or air-line mask enter it. After personnel (other than testing personnel) have

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entered a declared safe space, periodic tests are made to determine that it is still safe. Upon the detection of an unsafe condition, an order must be given for all personnel to evacuate the space.

Because a space cannot be guaranteed to remain safe, you should be aware of the symptoms of bad air. Symptoms of bad air include the following:

- Labored breathing
- Excessive fatigue from slight exertion
- Headache
- Dizziness

If you feel any of these symptoms, warn others and get to fresh air immediately.

A more dangerous situation exists if a compartment has no, or very little, oxygen. If this happens, a person can lose consciousness almost immediately without warning. If such an incident occurs while you are in an area, **do not** enter the space without wearing an OBA or air-line mask; otherwise, you will become a casualty. Always summon (call for) help before making a rescue attempt. Also, have a person stationed at the entrance to maintain communications while watching to see that you are not overcome.

## TYPES OF SOLVENTS

As you have already learned, the Navy uses many types of solvents for many cleaning assignments. You also know that many of these solvents are highly toxic and some are highly flammable. Take special care when using many of these solvents; make sure you store them in cool, dry areas. Material Safety Data Sheets (MSDSs) list the storage requirements for solvents. You should refer to the MSDS for solvents you are using.

Most cleaning solvents contain toxic substances. These substances can cause injuries if they are inhaled, absorbed by the skin, or ingested. All toxic materials must be handled carefully to prevent injury. Many of them have additional hazards, such as flammability. The following paragraphs contain information about general categories of toxic cleaning solvents. If you have any questions about the solvent you are going to use, check the Maintenance Requirement Cards (MRCs) for the task or ask your supervisor.

The three types of solvents covered in this section are chlorinated cleaning solvents, organic cleaning solvents, and fluorocarbon refrigerants and solvents.

### Chlorinated Cleaning Solvents

Chlorinated cleaning solvents can be highly toxic if used improperly. They may be irritating to skin and toxic if ingested. In confined spaces, in spaces with inadequate ventilation, or when the vapor concentration is increased by heating, toxic vapors may cause damage to the lungs, eyes, and nervous system. Solvents decompose at high temperatures and produce gases more toxic than the solvents themselves. Solvents react with alkalies, oxidizers, and powdered metals to produce toxic gases.

Common types of chlorinated cleaning solvents are trichloroethane (inhibited methyl chloroform), trichloroethylene, tetrachloroethane, and tetrachloroethylene (perchloroethylene, dry-cleaning solvent). Because of the extreme dangers involved, the Navy severely restricts the use of these solvents.

You should observe the following precautions when working with chlorinated cleaning solvents:

- Never stow chlorinated cleaning solvents near heat sources or open flames.
- Don’t allow them to come in contact with hot surfaces.
- Make sure stowage areas are well ventilated and monitored regularly by the gas free engineer. Don’t stow these solvents near incompatible materials. (**NOTE**: Incompatible materials include strong alkalies, such as sodium hydroxide; oxidizers, such as calcium hypochlorite and sodium nitrate; or powdered metals, such as aluminum.)

When handling chlorinated cleaning solvents, wear the following personal protective equipment (PPE):

- Neoprene gloves

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- Safety goggles that will protect against splashes, or a face shield
- A chemical cartridge respirator for protection against small amounts of organic vapors or for protection for a short duration; or an air-line respirator (or some other type of supplied-air respirator) if use is extensive or in a confined space
- Coveralls

Make sure work areas in which you use chlorinated cleaning solvents have proper ventilation. For enclosed spaces, an air change every 3 minutes is recommended. Consult the gas free engineer to determine if the ventilation is adequate.

**Organic Cleaning Solvents**

Organic cleaning solvents include the following:

- Toluene
- Xylene
- Some alcohols
- Acetone
- Methyl ethyl ketone
- Ethyl acetate
- Dry-cleaning solvent
- Kerosene
- Petroleum
- Ether
- Turpentine
- Morpholine and other related compounds

These compounds are highly flammable and highly to moderately toxic. Some are also corrosive. Inhalation of concentrated vapors may cause dizziness, nausea, or vomiting.

Organic cleaning solvents should be stowed as follows:

- Stow organic cleaning solvents in a flammable liquid storeroom, ready service storeroom, or a flammable locker.
- Keep them away heat, open flames, or spark-producing devices.
- Stow them away from oxidizers, such as calcium hypochlorite, sodium nitrate, and hydrogen peroxide.

When handling organic cleaning solvents, wear the following PPE:

- Neoprene gloves
- Safety splash goggles
- Protective coveralls (recommended)

In addition, if vapors accumulate over 100 parts per million (ppm), wear an OBA and notify the gas free engineer.

**Fluorocarbon Refrigerants and Solvents**

Fluorocarbon refrigerants and fluorocarbon solvents, such as trichlorotrifluoroethane (Freon 113, Freon TF, Genetron 113, R-113), are commonly found aboard ship. They are used in food storage compartments and air-conditioned spaces and as solvents in engineering spaces.

Fluorocarbon vapors have the following characteristics:

- They are colorless and almost odorless.
- They cannot be detected without special instruments.
- They are nonflammable and nonexplosive; however, exposure to flames or hot surfaces will cause these compounds to generate hydrogen chloride, hydrogen fluoride, and other poisonous gases.
- They aren't irritating, but contact may cause frostbite.

Operations involving trichlorotrifluoroethane (Freon 113) are considered hazardous. An industrial hygienist or a gas free engineer must evaluate and approve these operations to ensure the work process meets safety requirements.

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When exposed to the atmosphere, fluorocarbon vapors will accumulate in low spaces unless local ventilation is provided. Since these vapors are heavier than air, they can displace oxygen. Inhaling vapors at high concentrations (4,500 ppm or greater) will cause dizziness or narcosis. If fluorocarbon vapors displace oxygen, suffocation occurs.

When handling fluorocarbon refrigerants and solvents, wear the following PPE:

- Rubber gloves
- Safety splash goggles
- Protective clothing

In addition, if vapors accumulate over 1,000 ppm, wear an OBA or air-line respirator; and notify the gas free engineer.

**REVIEW 2 QUESTIONS**

Q1. When you are working with solvents, what does the term *ventilation* mean?

Q2. List the protective equipment you should wear when handling acid or caustic cleaners.

a.

b.

c.

d.

Q3. How must the material and rags used to clean up a solvent spill be treated?

Q4. List two types of respirators used by Sailors when handling solvents.

a.

b.

Q5. What causes most fires in paint and solvent storage areas?

Q6. List the symptoms personnel might have when working in a compartment having bad air?

a.

b.

c.

d.

**PAINTING AND PRESERVATION**

**Learning Objectives**: When you finish this chapter, you will be able to—

- Identify the equipment and procedures used for surface preparation.
- Identify types of paint and recognize their use.
- Recall fixtures, devices, and surfaces that should not be painted.
- Recall painting safety precautions.
- Recall methods used when painting to include care of brushes and rollers.

The Navy uses from 25 to 30 million gallons of all types of paint a year. Roughly 20 million gallons are used for preservation, some of which you will apply. Paintbrush purchases also run into millions of dollars. It is no exaggeration to state that millions of man-hours a year are expended in cleaning, chipping, and painting.

To paint a ship's exterior with one coat takes 20 gallons on a tugboat, 50 gallons on a submarine, and as much as 950 gallons on a carrier. The average basic

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paint requirements for preservation of a destroyer every 60 to 70 days are 270 gallons. All of this is a way of saying the Navy uses a lot of paint. The more attention you pay to the basic instructions, the less paint you will have to use.

The Navy uses paint primarily to preserve surfaces. It seals the pores of steel and other materials, prevents decay, and arrests (stops) rust and corrosion. Paint also serves several other purposes. It is valuable as an aid to cleanliness and sanitation because of its antiseptic properties and because it provides a smooth, washable surface. Paint is also used to reflect, absorb, or redistribute light. For example, light-colored paint on a ship's interior distributes natural and artificial light to its best advantage.

Learning to paint properly requires the selection of suitable paints for the surfaces to be covered, the proper preparation of the surfaces before painting, and the correct methods of applying paint. Though the selection of suitable paints won't concern you now, you should know how to prepare the surface and how to apply paint with a brush and roller. Improper surface preparation and paint application, in that order, are the greatest reasons for paint failure.

## PREPARING THE SURFACE

For paint to stick to a surface, all salt, dirt, oil, grease, rust, and loose paint must be removed completely, and the surface must be thoroughly dry. Salt and most dirt can be removed with soap or detergent and freshwater. Firmly imbedded dirt may require scrubbing with scouring powder. When scrubbing won't remove oil and grease, they may be removed with paint thinner or other approved solvents. After scrubbing or scouring, always rinse the surface with freshwater.

### Equipment and Procedures

The removal of rust, scale, and loose paint requires the use of hand tools or power tools, paint and varnish removers. Hand tools are usually used to clean small areas. Power tools are used to clean larger areas and for completely cleaning decks, bulkheads, and overheads covered with too many coats of paint. Paint and varnish removers are used to remove paint from wood.

**HAND TOOLS**.—The most commonly used hand tools are sandpaper, wire brushes, and hand scrapers**.**

**Sandpaper**.—Use sandpaper to clean corners and to feather paint. (**NOTE**: To feather paint, you taper the edges of chipped areas down to the cleaned surface so that no rough edges remain.) Paint will bond best to a clean surface that has been lightly sanded.

Sandpaper is graded from 12 to 600, which corresponds to the size of the abrasive grit on its surface. For example, the coarsest sandpaper is 12 grit and the finest is 600 grit. Very fine emery (a natural abrasive) paper is sometimes used to polish unpainted steel surfaces. However, **never** use abrasives, such as sandpaper, on unpainted galvanized metal (brass, copper, nickel, or aluminum) surfaces.

**Hand Wire Brush**.—A hand wire brush is a handy tool for light work on rust or on light coats of paint. You can also use hand wire brushes for brushing weld spots and cleaning pitted surfaces.

**Hand Scraper**.—Hand scrapers are made of tool steel. The most common type is L-shaped, with each end tapered to a cutting edge like a wood chisel. Hand scrapers are useful for removing rust and paint from small areas and from plating less than 1/4 of an inch thick when it's impractical or impossible to use power tools.

**Chipping (Scaling) Hammer**.—Occasionally, it's necessary to use a chipping or scaling hammer. However, take care to use only enough force to remove the paint. Too much force dents the metal, resulting in high and low areas. In painting, the paint naturally is thinner on the high areas. Therefore, if you leave high and low spots, rust will form on the high spots and, in time, spread under the good paint.

**PORTABLE POWER TOOLS**.—The most useful power tool is the portable grinder (fig. 18-1). Portable grinders are usually equipped with a grinding wheel that may be replaced by either the rotary wheel wire brush or the rotary cup wire brush. Light-duty brushes are made of crimped wire. Use them to remove light rust. Heavy-duty brushes are made by the twisting of several wires into tufts. Use them to remove deeply imbedded rust.

***Student Notes:***

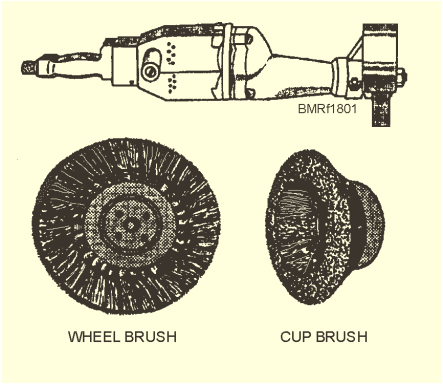


**Figure 18-1.—Portable grinder and wire brush.**

Scaling is done by using either tool shown in figure 18-2. A chisel is used with the pneumatic hammer and must be held so that the chisel strikes the surface at approximately a 45º angle. As with the hand scaling hammer, take care that you don't dent the surface. The rotary scaling and chipping tool shown in figure 18-2 (called a *deck crawler*) has a bundle of cutters or chippers mounted on either side. As it is pushed along the surface to be scaled, the rotating cutters do the work. This tool is particularly helpful on large deck areas.

The electric disk sander is another useful tool for preparing surfaces. However, it must be used with care. If too much pressure is applied or it is allowed to rest in one place too long, it will quickly cut into the surface, particularly wood and aluminum surfaces.

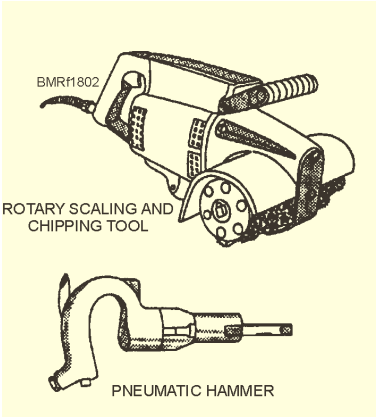


**Figure 18-2.—Power scaling tools.**

**POWER TOOL SAFETY PRECAUTIONS**.—You must be trained and qualified before you operate portable power tools**.** You **must** observe the following safety precautions when working with electrical and pneumatic (air) tools:

- Wear eye and ear protection while chipping, grinding, sanding, or wire brushing. If dust is excessive, also wear a respirator. Do not wear jewelry or loose fitting clothing.
- Do not use defective tools. If you have any doubt about the condition of any tool, show it to your supervisor, who will have its condition determined.
- Make certain that electrical power tools are grounded properly. Every portable electrical power tool must be provided with a ground lead that connects the tool casing to the ship's structure and an up-to-date electrical safety tag.
- Give your full attention to your job.
- Give electricity the respect it is due—115 volts can and does kill.
- Do not operate power tools in areas where flammable vapors, gases, liquids, or exposed explosives are present.
- Do not allow power cords and air hoses to kink or come in contact with oil, grease, hot surfaces, or sharp objects.
- Do not lay power cords and air hoses over ladders, steps, scaffolds, or walkways in such a manner as to cause a trip hazard.
- Do not use compressed air to clean clothing being worn or to blow dust off the body.

## PAINT

Paint consists of four essential ingredients:

- Pigment
- Vehicle (known as the *base*)
- Drier
- Thinner

**Pigment** provides the coloring, rust prevention (in primers), and the lasting quality of the paint. The most common pigments are made of metals, such as lead, zinc, or titanium.

***Student Notes:***

The vehicle is the liquid portion in a paint. It wets the surface being painted, penetrates into the pores, and ensures adhesion. Until recently, the base of most paints was oil, such as linseed oil, but few paints today contain oils. Some have vehicles of processed oils in combination with synthetic resins; others have vinyl chlorinated bases that are quick drying.

To add to the drying properties of paint, certain metallic compounds, called **driers**, are added to the paint. When mixed with oil, they act as conveyers of oxygen, which they take from the air and add to the oil, speeding up the drying process.

**Thinners** are used for thinning the paint to the proper degree for spraying, brushing, or rolling. They also increase the penetration of the paint into the surface and cut down the gloss. Too much thinner affects the durability of the paint. The most common type of thinner is made of mineral spirits, but the proper type to use depends on the paint base. **Never use diesel oil or kerosene to thin pain**t.

### Types of Paint

Paints are of many different kinds, and the Navy constantly works and experiments to improve them. As a result, you are provided the best paints available for the type of surface to be covered. Most Navy paints are named according to color and/or use, such as exterior gray deck and pretreatment coating (primers).

**PRIMERS.**—Primers are base coats of paint that stick firmly to bare woods and metals, providing a smooth surface for finishing coats. They also serve to seal the pores, and those applied on steel are rust inhibitors as well.

A minimum of two coats of primer should always be used after the surface is cleaned down to the bare metal. A third coat should be added at all outside corners and edges. At least 8 hours of drying time should be allowed between primer coats.

**SYNTHETIC PAINTS.**—Synthetic resin coatings, such as epoxies, urethanes, and inorganic zinc, are used for areas subject to severe service or exposure, such as bilges, tanks, and decks. The base coating is mixed with a converter (hardener) to cure or harden the paint film.

**EXTERIOR PAINTS.**—Vertical surfaces above the upper limit of the boot topping (waterline area, painted black) are given two coats of haze gray. Horizontal surfaces are painted with exterior deck gray (darker than haze gray) except the underside of deck overhangs, which are painted white.

A nonskid deck paint is used on main walkways, flight decks, and hangar decks. It contains a small amount of pumice, which helps to give a better footing. Top-hamper areas subject to discoloration from smoke and stack gases and the tops of stacks are painted black.

**INTERIOR PAINTS.**—Depending on the use of individual compartments, several colors are authorized or prescribed for interior bulkheads, decks, and overheads.

The choice of colors for berthing, messing, and recreation spaces usually is left to the individual ship. All other shipboard spaces are painted the color prescribed by the Naval Sea Systems Command. Deck paint colors, for example, are dark green in the wardroom and officers' quarters, dark red in machinery spaces, and light gray in enlisted personnel living spaces.

Some common bulkhead colors are green for offices, radio rooms, the pilothouse, and medical spaces; gray for the flag plot, the combat information center, and the sonar control room; and white for storerooms and sanitary and commissary spaces. Overhead colors are either the same as the bulkhead or white.

***Student Notes:***

**REVIEW 3 QUESTIONS**

Q1. List the most common hand tools used to remove paint and rust from small areas.

a.

b.

c.

Q2. How should you prepare chipped edges of paint to make ready for painting?

Q3. List the two main reasons for a bad paint job.

a.

b.

Q4. List the four main essential ingredients in paint.

a.

b.

c.

d.

Q5. How many coats of primer should be applied to bare metal?

**WHAT NOT TO PAINT**

**Never** paint the following items:

- Start-stop mechanisms of electrical safety devices and control switchboards on machinery elevators
- Bell pulls, sheaves, annunciator chains, and other mechanical communications devices
- Composition metal water ends of pumps
- Condenser heads and outside surfaces of condensers made of composition metal
- Sprinkler piping within magazines
- Exposed composition metal parts of any machinery
- Glands, stems, yokes, toggle gear, and all machined external parts of the valves
- Heat exchange surfaces of heating or cooling equipment
- Identification plates
- Joint faces of gaskets and packing surfaces
- Lubricating gear, such as oil holes, oil or grease cups, grease fittings, lubricators, and surfaces in contact with lubricating oil
- Lubricating oil reservoirs
- Machined metal surfaces (working surfaces) of reciprocating engines or pumps
- Metal lagging
- Rods, gears, universal joints, and couplings of valve operating gear
- Rubber elements of isolation mounts
- Ground plates
- Springs
- Strainers
- Threaded parts
- Zincs
- Working surfaces
- Hose and applicator nozzles
- Knife edges; rubber gaskets; dogs; drop bolts; wedges; and operating gear of watertight doors, hatches, and scuttles

***Student Notes:***

- Electrical contact points and insulators
- The original enamel, lacquer, or crackle finish on all radio, electrical, and sound equipment, unless existing damage makes refinishing essential
- Decorative plastic, such as tabletops

**SURFACES TO PAINT**

The Navy uses a variety of metal, metal compounds, and synthetic materials to build a ship or boat. Each type of surface requires special preparation and special primers and paint to extend its life cycle. In this section, you will learn about various surfaces and the procedures needed to maintain them properly.

**Aluminum Surfaces**

Aboard ship, aluminum surfaces are a special problem. If they're not treated properly, corrosion results. Corrosion is greater when dissimilar metals (for example, aluminum and steel) are in contact with each other **and** are exposed to seawater. Seawater is an electrolyte (an electrical conductor). As such, the seawater causes an electrical current to flow between the steel and aluminum surfaces, resulting in galvanic corrosion of the aluminum. The first sign of aluminum corrosion is a white, powdery residue in the area where the two dissimilar metals make contact. Later, the aluminum surface is pitted and scarred. Finally, there is a complete deterioration of the aluminum area. Holes in aluminum plate enlarge and screws, bolts, or rivets pull out, or they may even disintegrate.

Before joining aluminum to another metal, give each surface a pretreatment formula and two coats of primer formula.

**NOTE**

Never use red lead as a primer on aluminum.

If the joint is exposed to the weather, use insulation tape between the two surfaces, and fill the joint with caulking compound. When aluminum is joined to wood, give the wood one coat of phenolic varnish. Replace any missing fasteners (screws, bolts, rivets, and so on) with items of the original type. (**NOTE**: Replacements of stainless or galvanized steel may be used.) When painted, the best way to prepare the aluminum surface for repainting is to use hand scrapers, hand and power wire brushes, or fine grit sandpaper. Be careful if you use a power sander to prepare the aluminum surface for repainting.

**NOTE**

Never use scaling hammers on aluminum.

**Steel Surfaces**

When painting a steel surface, preparation of the surface is important. Steel surfaces **must** be completely free of rust, loose paint, dirt, scale, oil, grease, salt deposits, and moisture before they are painted. Old paint in good condition is an excellent base for repainting. Smooth, thoroughly clean, and dry the surface before applying new paint.

In touch-up painting (when only small areas or spots need repainting), remove old paint to the edges of the spot or area until an area of completely intact paint is reached. (**NOTE**: This area must be free of rust or blisters underneath the paint.) Feather the edges of the remaining paint.

When completely reworking an old painted surface, take the old paint down to the bare metal. Then apply a primer before painting. Never leave a base metal surface exposed overnight. Always put on a primer coat before you secure for the day.

**Fillers**

Fill holes, dents, and cracks in all surfaces and open-grained woods before they are finished. Putty, wood fillers, and even sawdust mixed with glue can be used on wood. Use epoxy fillers on steel and aluminum surfaces. The method you use varies with the type of filler. Therefore, follow the instructions carefully. Allow all fillers to dry and then sand them smooth before you apply the first finishing coat.

**Paint and Varnish Removers**

Paint and varnish removers are most often used on wood surfaces. However, you can use paint and varnish

***Student Notes:***

on metal surfaces that are too thin to be chipped or wire brushed. The three types of removers generally used are flammable, nonflammable, and water-base alkali. They are hazardous materials, and you must strictly observe safety precautions when you use them. Use these removers only in well-ventilated spaces. Don't use the alkali type on aluminum or zinc because of its corrosive properties.

The procedures you follow when using paint and varnish removers are the same regardless of type. Wet the surface with a smooth coat of the remover and let it soak thoroughly until the paint or varnish is loosened. Then lift the paint off with a hand scraper. After the surface is cleaned, wet it again with the remover and wipe it off with a rag. Finally, wash the surface thoroughly with paint thinner or soap and water. The final rinse gets rid of any wax left by the remover and any acids that may have worked into the grain of the wood.

**Paint and Varnish Remover Safety Precautions**

The following safety precautions should be observed when you use paint and varnish removers:

- Never use paint and varnish removers around an open flame. Some types are highly flammable.
- Do not use removers in confined spaces because their dangerous anesthetic or toxic properties can kill or cause injury if you are exposed to them for long periods.
- Do not use paint or varnish removers if you have an open cut or sore on your hand **unless** you wear rubber gloves.
- Do not let the remover touch your skin; watch out particularly for your face, eyes, and mouth. If paint or varnish remover should come in contact with the skin, wash it off immediately with cold water; seek medical attention as soon as possible if it gets into your eyes or mouth.
- Never use turpentine or mineral spirits as hand cleaners because they are absorbed through the skin pores. Gasoline also is dangerous and must never be used. To clean paint or varnish remover from your hands, use soap and water only.

**PAINTING SAFETY PRECAUTIONS**

Painting can be dangerous if one is careless. Many paints are highly flammable, others are poisonous, and some are both flammable and poisonous. To increase your chances of remaining alive and healthy, observe the following precautions:

- Keep paint off your skin as much as possible. Wash your hands, arms, and face with soap and warm water before eating. Do not put your fingers, food, or cigarettes in your mouth if they are contaminated with paint.
- Be sure you have adequate ventilation, and wear an approved paint/spray respirator whenever there is reason to believe the ventilation is inadequate in the place you are painting. At the first sign of dizziness, leave the space and get to fresh air.
- Do not smoke, use an open flame, or use spark-producing tools in the vicinity of painting operations.
- Use only explosion-proof lights near painting operations.
- Do not wear nylon, orlon, or plastic clothing or covering. These materials generate static electricity, which may spark and ignite paint vapors.
- Do not carry matches or cigarette lighters or wear steel buckles or metal shoe plates. Too often one forgets and strikes a match or lights a cigarette lighter in areas filled with explosive vapors. Also, steel buttons, buckles, and tabs can strike sparks that are invisible to your eyes but are capable of igniting paint vapors.
- When pouring solvents, make sure the containers are touching each other to prevent sparks.
- Never paint during electrical storms.
- Keep food and drink away from areas being painted.

***Student Notes:***

- Do not use gasoline, turpentine, mineral spirits, or other solvents to remove paint from the skin, as the skin will absorb them.
- Follow the instructions of your supervisor carefully.

**PAINT ISSUE**

Before paint is issued, several events must occur.

1. The division petty officer inspects the area to make sure all preparations have been made. The petty officer will check for the following:

   - Are all items not to be painted properly identified or masked?
   - Are all safety precautions understood and properly observed?
   - Is the surface ready to be painted?

2. Having checked out these items, you must fill out the paint request; and describe the area to be painted, including the paint color, type, and approximately how much paint is needed. Completing the paint request chit reduces the waste of materials and time spent redoing a paint job. Your division officer may also inspect the area to be painted before signing the paint chit.

3. The next step is the approval of the request by the first lieutenant, who regulates the issue of paint.

As you can see, sometimes getting ready to paint takes longer than the actual painting. Remember, if you spill paint (oil, grease, and so on), you are responsible for cleaning it up. At the end of working hours, return all paint and brushes to the paint locker. Store the paint in its proper container, and clean all brushes and rollers.

**PAINTING**

Three means of applying paint are used in the Navy—brush, roller, and spray. The majority of Sailors don't use paint sprayers; therefore, they aren't covered in this section. However, you will learn about using brushes and rollers to apply paint. Everyone in the Navy should be familiar with these items.

**Paint Application by Brush**

Smooth and even painting depends as much on good brushwork as on good paint. There is a brush for almost every purpose. You should use the proper brush and keep it in the best condition.

The two most useful brushes are the flat brush and the sash tool brush. These brushes and some others commonly used aboard ship are shown in figure 18-3. With a flat brush, you can paint almost anything aboard ship. Flat brushes are wide and thick. They carry a large quantity of paint and provide a maximum of brushing action. Sash brushes are handy for painting small items, for cutting in at corners, and for hard-to-get-at spaces. The fitch brush also is useful for small surfaces. The painter's dusting brush is used for cleaning surfaces.

The following are hints to help you use a paintbrush properly:

- Grip the brush firmly, but lightly as shown in figure 18-4. Don't put your fingers on the bristles below the metal band (ferrule). The grip shown permits easy wrist and arm motion. To hold it otherwise restricts your movements and causes undue fatigue.

- When using a flat brush, don't paint with the narrow edge. This practice wears down the corners and spoils the shape and efficiency of the brush. When using an oval brush, don't revolve it too much or it soon wears to a pointed shape and becomes useless. Do not poke oversized brushes into corners and around moldings. Such a practice bends the bristles, eventually ruining a good brush. Use a smaller brush that fits into such odd spots.

- Dip the brush into the paint, but not over halfway up the bristles. Remove the excess paint by patting the brush on the inside of the pot. (Avoid overfilling the

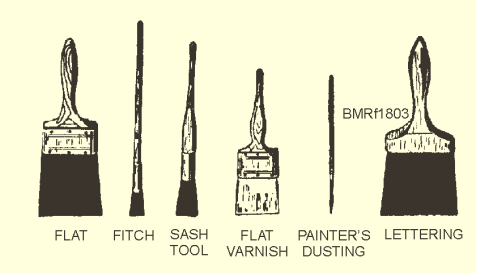


**Figure 18-3.—Types of brushes.**

***Student Notes:***

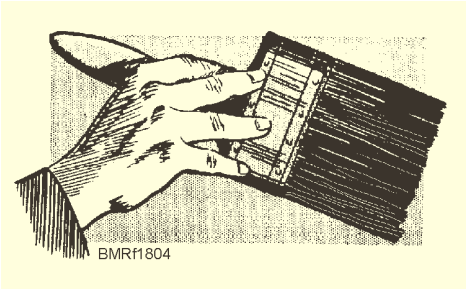


**Figure 18-4.—Correct way to hold a brush.**

brush; otherwise, paint will drip on the deck or other surfaces and run down the handle.)

- Hold the brush at right angles to the surface being painted, with the ends of the bristles just touching the surface. Lift the brush clear off the surface when starting the return stroke. If the brush is not held correctly and is not lifted, the painted surface will be uneven, showing laps and spots and a daubed appearance. Also, a brush that is held at any angle other than a right angle will soon wear away at the ends.

For complete and even coverage, follow the Navy method and first lay on, and then lay off. "Laying on," means applying the paint first in long strokes in one direction. "Laying off," means crossing your first strokes. The proper method is shown in figure 18-5. By using the recommended Navy method and crossing your strokes, you can distribute the paint evenly and completely with a minimum amount of paint being used.

Always paint the overhead first, working from the corner that is farthest from the entrance of the compartment. By painting the overhead first, you can wipe drippings off the bulkhead without smearing the bulkhead paint.

When overhead surfaces are being painted, sections should normally be painted in a fore-and-aft direction; beams, in an athwartship direction. But where sections of the overhead contain many pipes running parallel with the beams, it is often difficult to lay off the paint in a fore-and-aft direction. In such situations, better results are obtained by laying off the paint parallel with the beams.

To avoid brush marks when finishing up an area you have painted, use strokes directed toward the last

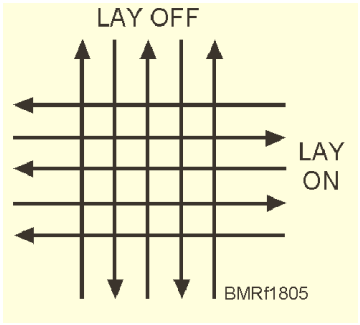


**Figure 18-5.—Laying on and laying off.**

section finished, gradually lifting the brush near the end of the stroke while the brush still is in motion. Every time the brush touches the painted surface at the start of a stroke, it leaves a mark. For this reason, never finish a section by brushing toward the unpainted area. Instead, always end up by brushing back toward the area already painted.

When painting pipes, stanchions, narrow straps, beams, and angles, lay the paint on diagonally, as shown in figure 18-6. Lay off along the long dimension.

Always carry a rag for wiping up dripped or smeared paint. Carefully remove loose bristles sticking to the painted surface.

### Cutting In

After you master the art of using a paintbrush properly, learn to cut in. Cutting in is a simple procedure that you can learn in a short time.

Suppose you have to cut in the angle between an overhead and a bulkhead, as shown in figure 18-7. Start at one corner. Hold your brush at an angle of about 76° to 80° from the bulkhead and about 10° from the overhead. Draw your brush along in fairly long, smooth strokes. This is one job where working slowly does not produce better results. The slower you stroke, the wavier your line will be.

### Use of Rollers

The type of paint roller (fig. 18-8) used in the Navy is equipped with a replaceable cylinder of soft fabric over a solvent-resistant paper core. It rotates on the shaft of a corrosion-resistant steel frame.

***Student Notes:***

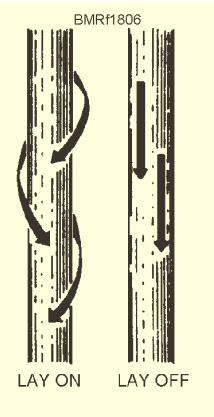


**Figure 18-6.—Painting pipes and stanchions.**

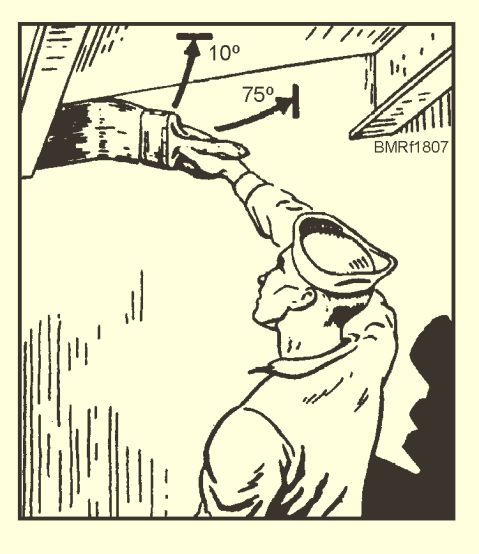


**Figure 18-7.—Cutting in.**

Large areas, such as ships' decks and sides (free of rivets, bolts, cable, pipes, and so on), can be covered with paint quickly by the roller method. The paint should be laid on and laid off the same way as when brushes are used. Apply a moderate amount of pressure to the roller to make sure the paint is worked into the surface. If pressure is not applied, the paint doesn't stick and soon peels off. When the paint roller is properly used, it will apply a more even coat and use less paint than with a brush.

## CARE OF BRUSHES AND ROLLERS

Unfortunately, too many good paintbrushes and rollers are ruined because painters have little or no idea how to care for them, or they are too lazy to clean them.

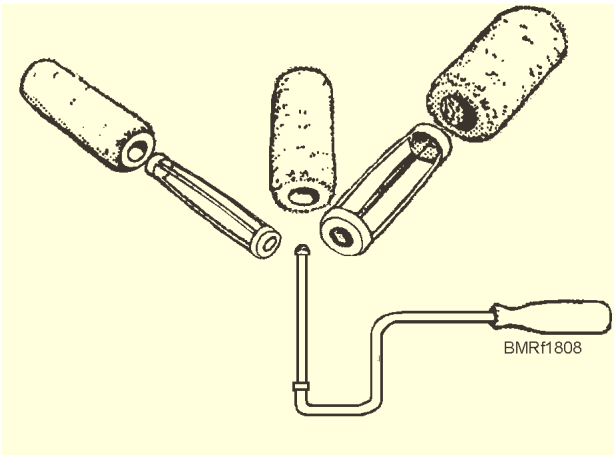


**Figure 18-8.—Parts of a paint roller.**

To avoid ruining paintbrushes and rollers, pay attention to the following hints. Treat applicators as though you paid for them yourself, and replace them when they no longer are usable.

- **Do not let a brush stand on its bristles in a pot of paint for more than a few minutes**. The weight of the brush bends the bristles, making it almost impossible to do a good job.

- **Never allow paint to dry on a brush**. If you intend to leave a paint-filled brush for long periods, as over the noon hour, fold wax paper or other heavy paper around the bristles and ferrule in such a way that air is kept away from the bristles. Twist the paper around the handle and secure it with rope yarn or sail twine. Cover your pot of paint, and place both it and the brush in a safe place. Before starting to paint again, stir the paint thoroughly with a paddle—not the brush.

- **At the end of the day, clean as much paint from the brush as possible by wiping it across the edge of the paint pot or mixing paddle**. Then turn in your paint and brush to the paint locker.

Ordinarily, the person or persons working in the paint locker will clean and stow the brushes turned in. Occasionally, though, they require help; and you may be detailed to the job. If so, follow instructions carefully; and do a thorough job of cleaning the brushes.

***Student Notes:***

Paint lockers usually have containers with divided compartments for stowing different types of brushes (that is, paint, varnish, shellac, and so on) for short periods of time. These containers normally have tight covers and are equipped for hanging brushes so that the entire length of the bristles and the lower part of the ferrule are covered by the solvent or cleaner oil kept in the container. Brushes are suspended so that the bristles don't touch the bottom, preventing them from becoming permanently misshapen.

Brushes to be used the following day should be cleaned in the proper cleaner and placed in the proper compartment of the container. Those not to be used again soon should be cleaned, washed in soap or detergent and water, and hung to dry. After drying, they should be wrapped in heavy paper and stowed flat. Do not leave a brush soaking in water. Water causes the bristles to separate into bunches, flare, and become bushy.

The proper cleaners for paint applicators are shown below:

| PAINT/FINISH | SOLVENT/CLEANER |
|---|---|
| Natural and synthetic oil-base paints and varnishes; chlorinated alkyd paints | Turpentine or mineral spirits |
| Latex emulsion paints | Water |
| Chlorinated rubber paints | Synthetic enamel thinner xylene |
| Shellac | Alcohol (denatured) |
| Lacquer | Lacquer thinner |

Paint rollers are cleaned in a different fashion. After use, the fabric cylinder is stripped from the frame, washed in the cleaner recommended for the paint used, washed in soap and water, rinsed thoroughly in fresh water, and replaced on the frame to dry. Combing the pile of the fabric while it is damp prevents matting.

### REVIEW 4 QUESTIONS

Q1.What is the first sign of aluminum corrosion?

Q2. True or False. Old paint in good condition makes an excellent base for repainting.

Q3. For painting small areas and cutting into corners, what type of paintbrush is best?

Q4. What method of painting does the Navy use to completely and evenly cover an area?

### SUMMARY

We live close together aboard ship. The daily routine of cleaning the berthing compartment and head areas is not only beneficial for our own welfare but for our shipmates as well. It also makes those long cruises easier if we take the time to make our living spaces as pleasant as possible. The occasional zone inspection will help in keeping all our spaces up to speed. Looking for problems that exist, or ones that could arise in the future, will benefit us all.

We also discussed some of the more important aspects of surface preservation. Most of our ships serve for over 20 years, and in the case of carriers, over 30 years. That is testimony to how well the Navy cares for its ships. This care would not be possible without personnel having the proper equipment and materials, being properly trained in the correct application of these materials, and taking pride in doing a good job. Anyone can paint, but taking that extra step to ensure the assigned job is completed with the best possible results is the difference in a job that really looks sharp and one that just gets by.

### REVIEW 1 ANSWERS

A1. To find the responsibilities for cleaning and maintaining spaces, you should refer to the **Cleaning, Preservation, and Maintenance Bill**.

A2. Th**e compartment cleaner** is responsible for cleaning living and berthing spaces

***Student Notes:***

A3. You should pick up and stow gear that has been left adrift. This **reduces tripping and fire hazards and keeps dewatering equipment from clogging.**

A4. **False**. You should not sweep dirt and debris over the side.

A5. The three steps used in most detergent cleaning are

a. **Wetting**

b. **Scrubbing**

c. **Rinsing**

A6. The two types of deck covers are—

a. **Resilient**

b. **Nonslip**

## REVIEW 2 ANSWERS

A1. When working with solvents, the term *ventilation* means **fresh air moving in and through the space with proper exhaust.**

A2. When handling acid or caustic cleaners, you should wear the following protective equipment:

a. **Acid-resistant apron**

b. **Face shield with goggles**

c. **Gloves**

d. **Boots**

A3. Treat material and rags used to clean up a solvent spill as **HAZMAT material**.

A4. The two types of respirators used by Sailors when handling solvents—

a. **Air-purifying**

b. **Air-supplied**

A5. Most fires in paint and solvent storage areas are caused by **vapor buildup**.

A6. Personnel who work in a compartment having bad air might have one or all of the following symptoms.

a. **Dizziness**

b. **Headache**

c. **Labored breathing**

d. **Excessive fatigue**

## REVIEW 3 ANSWERS

A1. The most common hand tools used to remove paint and rust from small areas are—

a. **Sandpaper**

b. **Wire brush**

c. **Hand scraper**

A2. To prepare chipped edges of paint for painting, you should **feather the edge of chipped paint with sandpaper**.

A3. The two main reasons for a bad paint job are—

a. **Improper surface preparation**

b. I**mproper paint application**

A4. The four main essential ingredients in paint are—

a. **Pigment**

b. **Vehicle**

c. **Drier**

d. T**hinner**

A5. **At a minimum, two coats of primer** should be applied to bare metal.

## REVIEW 4 ANSWERS

A1. The first sign of aluminum corrosion is a **white, powdery residue**.

A2. **True,** old paint in good condition makes an excellent base for repainting.

A3. When painting small areas and cutting into corners, you should use the **sash tool brush**.

A4. To completely and evenly cover an area, you should use the Navy **laying on and the laying off method**.