

SOLVENT-BASED CEMENTS USED FOR TIRE RETREADING AND REPAIRING

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I. PURPOSE

The purpose of this Recommended Practice (RP) is to review the types of solvent-based cements available and to explain their application. Cements reviewed include Black Vulcanizing and Chemical Vulcanizing.

The “Warnings” and “Cautions” stated throughout this RP should not be ignored. This RP is not intended to be all-inclusive or to eliminate or replace hands-on training. Personnel that perform tire repairing or retreading must be professionally trained. Questions pertaining to a specific product or piece of service equipment should be addressed to the manufacturer of that product.

II. BLACK VULCANIZING CEMENTS

A. Definitions and Use

Black vulcanizing cements are used in retreading and repairing to provide green (uncured) tack and cured adhesion. These cements are made by mixing special formulations and uncured rubber compounds in solvents that require heat and pressure to cure. These cements may contain highly flammable solvents and should only be used in ventilated areas.

1. Spray-Type Cements - Viscosity and percentage of rubber solids in spray-type cements are lower than brush-type or concentrated cements to facilitate use in spray-type applicator equipment. Spray-type cement is used primarily in precure tread, strip, and die-size tread applications.

WARNING

Serious bodily injury may result from not wearing adequate **personal protective equipment (PPE)** including eye protection (i.e., goggles or face shields), ear protection, respiratory protection, and gloves while retreading or repairing tires. Always wear appropriate PPE for your safety.

CAUTION

Cements must be dry and used in accordance with the manufacturer’s recommendations before being placed into a curing chamber. Using wet cements poses risks because they could ignite and cause a fire inside the chamber which may result in serious personal injury, death, and/or equipment damage.

WARNING

Only use cements in a well-ventilated area. **DO NOT** use flammable cements near fire, flame, or any other source of ignition (e.g., electric powered tools, lighters, matches, etc.). Explosive force and/or fire from ignition of cement could cause serious injury or death.

IMPORTANT

Follow all OSHA requirements and safety precautions. Contact the individual materials manufacturer for a copy of the Material Safety Data Sheets (MSDS) needed. Also refer to federal, state, and local regulations, especially as related to Volatile Organic Compound (VOC) emissions.

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2. Splice Cements - Generally, these cements have lower viscosity and rubber solids than spray-type cements.
3. Brush-Type Cements - These cements contain a higher percentage of rubber solids and have higher viscosity (for maximum green tack) than spray-type cements. These cements are used primarily for repairing and for application of tread rubber where maximum green tack is required.

TYPE OF CEMENT	TYPICAL RANGE OF SOLIDS*
Spray	5-12%
Splice	4-10%
Brush	10-15%
<i>*Solids-percentage of uncured rubber compound</i>	

B. Application of Black Spray-Type Vulcanizing Cement

1. The areas in which black vulcanizing cements are to be applied should:
 - a. be well ventilated;
 - b. be free from excessive dust;
 - c. not be located near molds, boilers, furnaces, any excessively hot and/or moist areas, or open flame or electrical sparks;
 - d. be in a non-smoking area; and,
 - e. have all equipment and storage cabinets properly grounded

Cemented casings should not be stored in direct sunlight.

The use of spray booths is recommended. These not only provide protection against fire by ventilation and overhead sprinklers, but also make possible a clean and neat working area. All equipment and lighting in the spray booth should be equipped with explosion proof switches, motors, and fixtures.

Tires to be spray-cemented must be rotated by a powered machine that does not touch the buffed area. Equipment for spraying cements should be cleaned and used for this purpose only. Refer to federal, state, and local regulations.

2. Mix contents of the cements well before use to thoroughly disperse solids and ensure a uniform material. Continuous agitation of the cement in the tank is recommended. Cement should be used in accordance with the supplier's instructions (e.g., drying time, shelf life, storage conditions, etc.).
3. Keep cement containers closed when not in use. Any solvents used to correct the cement viscosity must be those specified by the cement manufacturer and manufacturer's instructions must be followed. Any oil and/or moisture in the solvent will cause severe loss of adhesion. If viscosity is too high, "webbing" may occur. When excess cement is applied to the casing, additional drying time will be required.
4. The air supply to the spray equipment must be free from moisture, grease, oil or other contaminating materials. It is recommended that moisture traps be installed in the air supply line. Water traps and filters should be checked for satisfactory operation at the start of every shift. All manually operated traps and filters should be drained at the start of every shift, or as necessary.

There are many "airless" spray systems on the market. These systems use air or electricity to operate a pump to force the cement out of the tank and produce a spray of cement only — not a mixture of air and cement. Thus, there is no air pressure in the tank. These systems produce less overspray and eliminate the possibility of contaminated air in the system.

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CAUTION

Air systems can occasionally malfunction and create excess air pressure in the cement tank, which could result in an explosion and possibly cause serious injury. Checking the pressure relief safety valve located in the air line, before the line enters the cement tank, is a wise precaution.

5. For spray systems using air, follow manufacturer's recommendations for correct air pressures.

For airless cementing equipment, follow manufacturer's recommendations for operation, flushing the system, and keeping the nozzle clean, so a proper spray pattern may be achieved.

All electric motors used with cement equipment should be explosion proof and installed according to federal, state, and local regulations.

6. Exposed tire cords must be cemented within 15 minutes after final cleaning, and have complete cement coverage. Brush-type cement (higher solids) should be brushed onto exposed cords or wires, prior to spraying the casing.
7. Tires that are to be cemented must be rotated by equipment that does not touch the buffed area.

Start rotating the tires before spraying. Adjust the spray gun to cover about a 4" (102 mm) width or pattern. Follow the equipment and cement manufacturer's recommendation on the proper distance to hold the nozzle from the surface - generally, about 6" (152 mm). Apply a uniform coat of cement from one edge of the buffed area to the other edge, ensuring that the entire prepared area is covered. Do not apply excess cement because this could affect drying time and cured adhesion. Avoid "puddling" and "webbing" on the surface.

ALLOW ADEQUATE DRYING TIME OF CEMENT BEFORE RUBBER APPLICATION.

Follow manufacturer's recommendations for drying time. Drying time will depend on atmospheric conditions, such as ambient temperature and humidity. Increased temperatures increase cure rate. Decreased temperatures decrease cure rate. Testing for cement dryness may be done with cushion gum; if the gum sticks, the cement should be dry. Cushion gum does not stick when cement is wet and it shows wetness if visually inspected.

Cemented casings left hanging for more than two hours should be covered and protected from airborne contamination. If tack is lost due to contamination it is important to rework and/or recement before building due to contamination or loss of tack. (Reworking may include wire brushing, cleaning with solvent, or rebuffering.)

8. See manufacturer's recommendations to prevent plugging of the spray gun. If the nozzle of the gun is clogged, dip in rubber-grade solvent or dismantle and clear opening with rubber-grade solvent.

C. Application of Black Brush-Type Vulcanizing Cement

1. The areas in which brush-type vulcanizing cements are to be applied should:
 - a. be well ventilated;
 - b. be free from excessive dust;
 - c. not be located near molds, boilers, furnaces, open flame or electrical sparks, or any excessively hot and/or moist areas;
 - d. be in a non-smoking area; and
 - e. have all equipment properly grounded

Cemented casings should not be stored in direct sunlight.

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2. Mix contents of the cement thoroughly to disperse solids and ensure a uniform material. Cement should be used in accordance with supplier's instructions (drying time, shelf life, storage conditions, etc.).
3. Keep cement containers clean when not in use. Any solvents used to correct the cement viscosity must be those specified by the cement manufacturer and manufacturer's instructions must be followed. Any oil and/or moisture in the solvent will cause severe loss of adhesion. If excess solvent is added it may cause poor green tack and/or cured adhesion.
4. Tires to be cemented must be rotated by equipment that does not touch the buffed area.

Using a stipple brush, apply a uniform coat of brush-type vulcanizing cement.

ALLOW ADEQUATE DRYING TIME OF CEMENT BEFORE RUBBER APPLICATION.

Follow manufacturer's recommendations for drying time. Drying time will depend on atmospheric conditions, such as ambient temperature and humidity. Increased temperatures increase cure rate. Decreased temperatures decrease cure rate. Testing for cement dryness may be done with cushion gum; if the gum sticks, the cement should be dry. Cushion gum does not stick when cement is wet and it shows wetness if visually inspected.

5. Cemented casings left hanging for more than two hours should be covered and protected from airborne contamination. If tack is lost due to contamination it is important to rework and/or recement before building due to contamination or loss of tack. (Reworking may include wire brushing, cleaning with solvent, or rebuffering.)

III. CHEMICAL VULCANIZING CEMENTS

A. Definitions and Use

Chemical vulcanizing cements are made up of a combination of uncured rubber compounds and chemical accelerators in a solution of flammable or non-flammable solvents. (See IMPORTANT and WARNING boxes.)

When used in conjunction with a "chemical" type cushion gum or a "chemical" repair unit, this combination vulcanizes at room temperature. Adequate cure generally is obtained after 24 hours at room temperature (70°F/21°C or above). Higher temperatures decrease the cure time. Lower temperatures increase cure time.



WARNING

Only use cements in a well-ventilated area. **DO NOT** use flammable cements near fire, flame, or any other source of ignition (e.g. electric powered tools, lighters, matches, etc.). Explosive force and/or fire from ignition of cement could cause serious injury or death.



IMPORTANT

Tires with properly repaired punctures may be put into service immediately. Tires with properly repaired section repairs should be allowed to cure for at least 24 hours at ambient temperature (70°F / 21°C) before being placed into service.

B. Application of Chemical Vulcanizing Cement

1. The areas in which chemical vulcanizing cements are to be applied should:
 - a. be well ventilated;

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- b. be free from excessive dust;
- c. not be located near molds, boilers, furnaces, open flame or electrical sparks, or any excessively hot and/or moist areas;
- d. be in a non-smoking area; and
- e. have all equipment properly grounded

Cemented casings should not be stored in direct sunlight.

2. Be sure that the area to be cemented was prepared and cleaned with a product recommended by the repair material manufacturer. This cleaning removes contaminants.
3. Since chemical bonding takes place without the flow of rubber, texturize the surface to an TRMG BT1 or BT2 buffed texture (see RP 01/02-23 “BTS6 - Standard Buffing Textures for Tire Retreading and Repairing”). Clean the buffed surface with a soft wire brush, then remove buffing dust with a vacuum. Do not use compressed air to clean the buffed area as air lines may contain contaminants. Contaminants can spoil chemical vulcanizing cements, so it is important to remove prior to cementing.
4. Use chemical vulcanizing cement recommended by the repair material manufacturer. If required, mix cement thoroughly to disperse solids and ensure a uniform solution.
5. Cement should be used in accordance with supplier’s instructions (e.g., drying

time, shelf life, storage conditions, etc.). Using a clean brush, apply an even coat of chemical vulcanizing cement to the prepared surface. Avoid excessive application.

6. **IT IS IMPORTANT TO ALLOW CHEMICAL VULCANIZING CEMENT TO DRY THOROUGHLY BEFORE APPLYING A REPAIR UNIT.** Some manufacturers recommend cementing the back of the repair unit (see repair manufacturer’s instructions).



CAUTION

Cements must be dry and used in accordance with the manufacturer’s recommendations before being placed into a curing chamber. Using wet cements poses risks because they could ignite and cause a fire inside the chamber which may result in serious personal injury, death, and/or equipment damage.

Follow manufacturer’s recommendations for drying time. Drying time will depend on atmospheric conditions, such as ambient temperature and humidity. Testing for cement dryness may be done with cushion gum; if the gum sticks, the cement should be dry. Cushion gum does not stick when cement is wet and it shows wetness if visually inspected.

C. Disposal of Chemical and Solvent-Based Cements

Follow manufacturer’s recommendations and federal, state, and local requirements for disposal.

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