COLORADO
Bureau of Investigation
Department of Public Safety

Collecting Known Tire Exemplars

The following procedures were determined through laboratory testing at the Colorado Bureau of Investigation Forensic Services (CBIFS) to be suitable methods for the collection of known tire exemplars.

The preparation and submission of a set of known tire exemplars is critical for comparative examinations of questioned tire impressions. The exemplars will be directly compared to a questioned tire impression found at a crime scene.

A full set of known tire exemplars for a passenger vehicle with 4 mounted tires plus one spare includes the impression of the entire 6- to 8-foot circumference of all five tires.

Once known impression collection is complete, it is best practice to remove the tires from the vehicle and also submit the tires for comparison. An identification (the highest level of association) of a known tire to a questioned impression rarely can be made without submitting the physical tire.

This is an involved process that typically requires a minimum of three people: one individual to push the vehicle across the film or board when recording impressions, one individual to steer the vehicle from the driver's seat, and one individual to apply the recording medium to the tire and mark the recorded impressions as tire wear bars (see below) come into contact with the film or board. Having 5 people is ideal.

If you have questions please reach out to: cdps_cbi_laboratory_foot_tire_analysts@state.co.us

Preparation for the collection of known tire exemplars

- It is important that the tires are mounted on the suspect vehicle for this process in order to produce a comparable known impression under a similar weight load.
    - For large trucks and commercial vehicles with dual tire mounts, ensure the tires are not taken off the rim prior to creating the known impression, as the way they are mounted in relation to one another is critical in the examination step. The known impression for both tires on the same mount should be recorded at the same time.
    - If the tires have already been removed from the vehicle prior to apprehension, they should be placed back on the vehicle for collection (if available), or another vehicle of similar size if the suspect vehicle is damaged or unavailable.
    - If the original tire locations on the vehicle are unknown, make note of this and the location each tire was mounted on the vehicle for the known impression collection.
- Ensure the vehicle has been taken to a garage with an untextured smooth flat surface for this collection process.

    - The texture of blacktop or porous concrete will transfer to the known impression limiting the comparative value.
- Prior to collection for each tire, use a dry cloth to gently remove the loose dirt/dust from the tire surface.
    - DO NOT remove embedded rocks, nails or other debris from the tread or tire surface.
- Find the tread wear indicator bars in the grooves of each tire and mark them on the sidewall using chalk or a wax pencil with consecutive alphabetical letters.
    - Most tires have four to six tread wear indicator bars and thus would be marked A-F. Tread Wear Indicator bars are marked by small symbols on the tire side wall near the tread. Example symbols are shown below. Other symbols may exist.

Fingerprint Powder method

Required Materials:

- Latex or nitrile gloves
- Arm covers, such as a disposable Tyvek suit
- Approximately 40 feet of clear adhesive film, such as a roll of clear shelf liner
- Chalk or a wax pencil to mark the tread wear indicator bars on the sidewall of the tire
- Markers
- Black fingerprint powder
- An unused chalkboard or dry erase board eraser
- A can of fast-drying clear acrylic aerosol spray.

Procedure:

1. Position the vehicle so that it can be pushed forward in a straight line with no obstructions.

2. Choose a single tire to begin with. Each tire impression will be collected separately.

3. Measure the circumference of the tire. Tire circumferences for most cars will range between 6 to 8 feet depending on the size of the tire. You need to know this measurement so you can prepare the proper length of impression film in order to assure you have a long enough surface for a full circumference impression. Make sure this film is about 6 inches longer than your measurement.

4. Roll out a few feet of the impression film and place it adhesive-side up just in front of the tire so that when the vehicle is pushed forward, the tire rolls onto the film and moves in line along the film. If you are working with a rear tire on the vehicle, you may have to roll up the far end of the film behind the front tire so that the front tire does not roll over it. As the vehicle moves forward, the far end of the impression film can be unrolled behind the front tire.

    a. The outer edges of the film will need to be taped down, as otherwise it will adhere to the tire and pull up off the ground.

5. Apply fingerprint powder to the chalkboard or dry erase board eraser. CBI has found this is easiest by pouring some powder into a plastic container and dipping the eraser into the container.

6. With gloves and arm covers, use the eraser to spread a consistent layer of powder over the entire tread of the tire. Make sure there is powder on the tread closest to the interior side of the tire as well. You will have to advance the vehicle forward a few inches to cover the entire tread surface.

7. With the vehicle placed in neutral, one person will push the vehicle forward *slowly*, while another person in the driver's seat steers the vehicle to make sure that the tire stays on the film. The tire will leave a powder impression on the adhesive film as it moves forward.

8. As the vehicle moves forward, the third person will mark letters on the film that correspond to the location where the lettered tread wear bars come into contact with the film while also adding powder to the area previously unreachable due to being on the ground. If you are working with a rear tire, this person may also need to unroll the film behind the front tire. Having additional people to help with these tasks is ideal.

9. After the tire has left its full circumferential impression on the film and reaches the end of it, you may want to have the tire roll over a length of butcher paper to remove any excess powder.

10. After each impression is made, but before removing that impression, label the impression with (1) the tire brand and model, (2) the tire's position on the vehicle, i.e. left rear, right front, etc., (3) direction relative to the front of the vehicle, (4) the pressure of the tire, especially if abnormal, (5) other information such as the date, your initials, case number, vehicle information, etc.

11. In a well-ventilated area, apply the clear acrylic spray over the entire adhesive side of the film and impression. This will secure the powder to the surface and dull the adhesive so that the film does not stick to itself.

12. Repeat the entire process for the other tires on the vehicle. Do not forget the spare, which should be mounted on the vehicle for this process.

13. The impressions can be rolled up and packaged for submission. All known impressions from the same vehicle can be packaged together if desired.

Ink method

Required Materials:

- Latex or nitrile gloves
- Arm covers, such as a disposable Tyvek suit
- Approximately 40 feet of clear plastic film (preferred), white paper, or white chart board (Do not use foam core board)
    - Tape can be used on the bottom side to tape shorter pieces of paper or board together.
- Chalk or a wax pencil to mark the tread wear indicator bars on the sidewall of the tire
- Markers
- Printer's ink – should be good, hard drying, highly toned glossy black ink that sets up in 2 to 6 hours. An excellent ink option is Speed Ball oil-based block printing ink.
    - Fingerprint ink may not be suitable for this method, as it dries too fast.
    - Water-based inks should not be used.

Procedure:

1. Position the vehicle so that it can be pushed forward in a straight line with no obstructions.

2. Choose a single tire to begin with. Each tire impression will be collected separately.

3. Measure the circumference of the tire. Tire circumferences for most cars will range between 6 to 8 feet depending on the size of the tire. You need to know this measurement so you can prepare the proper length of impression film, paper, or board in order to assure you have a long enough surface for a full circumference impression. Make this film, paper, or board about 6 inches longer than necessary.

4. Roll out a few feet of the impression film, paper, or board and place it just in front of the tire so that when the vehicle is pushed forward, the tire rolls onto the impression surface and moves in line along the surface. If you are working with a rear tire on the vehicle, you may have to roll up the far end of the impression film, paper, or board behind the front tire so that the front tire does not roll over the surface. As the vehicle moves forward, the far end of the impression surface can be unrolled behind the front tire.

5. With gloves and arm covers, use your hands to spread a consistent layer of ink over the entire tread of the tire. Make sure there is ink on the tread closest to the interior side of the tire as well. You will have to advance the vehicle forward a few inches to cover the entire tread surface.

6. With the vehicle placed in neutral, one person will push the vehicle forward *slowly*, while another person in the driver's seat steers the vehicle to make sure that the tire stays on the impression surface. The tire will leave an inked impression on the surface as it moves forward.

7. As the vehicle moves forward, the third person will mark letters on the impression surface that correspond to the location where the lettered tread wear bars come into contact with the surface. If you are working with a rear tire, this person may also need to unroll the impression surface behind the front tire. Having additional people to help with these tasks is ideal.

8. After the tire has left its full circumferential impression on the surface and reaches the end of the surface, you may want to have the tire roll over a length of butcher paper to remove any excess ink.

9. After each impression is made, but before removing that impression, label the impression with (1) the tire brand and model, (2) the tire's position on the vehicle, i.e. left rear, right front, etc., (3) direction relative to the front of the vehicle, (4) the pressure of the tire, especially if abnormal, (5) other information such as the date, your initials, case number, vehicle information, etc.

10. Repeat the entire process for the other tires on the vehicle. Do not forget the spare, which should be mounted on the vehicle for this process.

11. The inked impressions should be laid flat and secured until thoroughly dry. This may take anywhere from 2-6 hours, but to be safe and assure that the ink is totally dry, overnight drying is recommended.

12. Once dried, the impressions can be rolled up and packaged for submission. All known impressions from the same vehicle can be packaged together if desired.

Vaseline method

Required Materials:

- Latex or nitrile gloves
- Arm covers, such as a disposable Tyvek suit
- Approximately 40 feet of white chart board
    - Tape can be used to tape shorter pieces of board together.
- Chalk or a wax pencil to mark the tread wear indicator bars on the sidewall of the tire
- Markers
- Vaseline
- Black magnetic fingerprint powder and an applicator
- A can of fast-drying clear acrylic spray

Procedure:

1. Position the vehicle so that it can be pushed forward in a straight line with no obstructions.

2. Choose a single tire to begin with. Each tire impression will be collected separately.

3. Measure the circumference of the tire. Tire circumferences for most cars will range between 6 to 8 feet depending on the size of the tire. You need to know this measurement so you can prepare the proper length of impression board in order to assure you have a long enough surface for a full circumference impression. Make sure this board is about 6 inches longer than your measurement.

4. Roll out a few feet of the impression board and place it just in front of the tire so that when the vehicle is pushed forward, the tire rolls onto the board and moves in line along it. If you are working with a rear tire on the vehicle, you may have to roll up the far end of the board behind the front tire so that the front tire does not roll over it. As the vehicle moves forward, the far end of the impression board can be unrolled behind the front tire.

5. With gloves and arm covers, use your hands to spread a consistent layer of Vaseline over the entire tread of the tire. Make sure there is Vaseline on the tread closest to the interior side of the tire as well. You will have to advance the vehicle forward a few inches before you can cover the entire tread surface.

6. With the vehicle in neutral, one person will push the vehicle forward *slowly*, while another person in the driver's seat steers the vehicle to make sure that the tire stays on the chart board. The tire will leave a clear Vaseline impression on the board as it moves forward.

7. As the vehicle moves forward, the third person will mark letters on the board that correspond to the location where the lettered tread wear bars come into contact with the board while also adding Vaseline to the area previously unreachable due to being on the ground. If you are working with a rear tire, this person may also need to unroll the board behind the front tire. Having additional people to help with these tasks is ideal.

8. After the tire has left its full circumferential impression on the board and reaches the end of it, you may want to have the tire roll over a length of butcher paper to remove any excess Vaseline.

9. After each impression is made, but before removing that impression, label the impression with (1) the tire brand and model, (2) the tire's position on the vehicle, i.e. left rear, right front, etc., (3) direction relative to the front of the vehicle, (4) the pressure of the tire, especially if abnormal, (5) other information such as the date, your initials, case number, vehicle information, etc.

10. Use a magnetic applicator, apply magnetic fingerprint powder to the chart board. The powder will stick to the Vaseline and develop a visible black impression.

11. In a well-ventilated area, spray a couple layers of hair spray or acrylic spray over the entire chart board and impression. This will secure the powder to the surface and dull the stickiness of the Vaseline and prevent it from smearing.

12. Repeat the entire process for the other tires on the vehicle. Do not forget the spare, which should be mounted on the vehicle for this process.

13. The impressions can be rolled up and packaged for submission. All known impressions from the same vehicle can be packaged together if desired.

Call to set up an appointment for evidence drop off at the CBI laboratory closest to you:

Denver Office ● 6000 W 54th Ave, Arvada, CO 80002 ● 303-463-7000
Pueblo Office ● 79 North Silicon Drive, Pueblo, CO 81007 ● 719-647-5999
Grand Junction Office ● 2797 Justice Drive, Grand Junction, CO 81506 ● 970-248-7500
Northern Colorado Regional Lab ● 2329 115th Ave, Greeley, CO 80634 ● 970-400-3638