

MILITARY TIRE GLOSSARY

Foreword—This Document has not changed other than to put it into the new SAE Technical standards Board format.

- 1. Scope**—This glossary of tire military/industry terminology is a direct result of many months of planned and coordinated work by the SAE Military/Industry Tire Technology Nomenclature Task Force. This effort was put forth with the hope of leading the military and industry towards standardization of terminology. This glossary represents the latest state-of-the-art terms and definitions for military use.

This SAE Recommended Practice shall remain open for comments from the reader and shall also be reviewed and updated periodically. Many similar terms and definitions were reviewed from which the ones best applied to military use were selected. It is the purpose of this task force to provide technical definitions in present day use. Please do not hesitate to inform the task force of any improvements which may be required.

- 2. References**

- 2.1 Applicable Publication**—The following publication forms a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

- 2.1.1 TIRE & RIM ASSOCIATION PUBLICATIONS**—Available from The Tire & Rim Association Inc., 175 Montrose West Avenue, Suite 150, Copley, OH 44321.

Tire & Rim Association Yearbook

- 3. Glossary of Terms—Alignment:** See Wheel Alignment.

All Terrain Tire: A tire with an aggressive lug pattern for use on vehicles where a substantial portion of the driving will be off-road on trails and cross country type terrain. It provides good off-road performance with respect to mud, sand, and snow traction.

Antiskid: The wiping or biting edges of a tread design offering resistance to skidding. (See also Tread Groove Depth.)

Aspect Ratio: The ratio of the section height to the section width of the tire.

Balancing: A process to correct for heavy or light areas of a tire.

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Bead/Bead Area: The bead is made of high tensile steel wires wrapped and reinforced by the plies. The bead area is the portion of tire attached to the rim flange. (See Figure 1.)

Bead Face/Sole: The portion of the bead between the bead heel and toe. (See Figure 1.)

Bead Face/Sole Width: The horizontal distance between the bead heel and bead toe.

Bead Heel: The rounded portion of the bead fitting at the junction of the rim flange and bead seat.

Bead Lock: A device mounted in the tire that fits between the beads to prevent bead unseating and tire rotation on the rim.

Bead Profile (Measurement): The horizontal widths of the bead area "cross-section" starting at the bead heel measured in five 1/4" (0.25) in increments. (See Figure 2.)

Bead Seat: Flat portion of the rim on which the bead rests.

Bead Separation: A breakdown of bond between components in the bead area.

Bead Spacer: A device mounted inside the tire that fits between the beads to prevent bead unseating, but does not prevent tire rotation on the rim.

Bead Toe: The pointed area of the bead. (See Figure 1.)

Bead Width: A horizontal measurement from the outside to inside of the bead through the bead wire centerline. (See Figure 1.)

Belt(s): A reinforcing and stabilizing member, usually consisting of two or more plies, located circumferentially around the tire and under the tread not extending into the bead or lower sidewall. (See Figure 3A.)

Belt Separation: A breakdown of bonding between the belts and/or plies or tread.

Bias Ply Tire (Diagonal): A pneumatic tire in which the ply cords extending to the beads are laid at alternate angles substantially less than 90 degrees to the centerline of the tread.

Blister: A separation within sidewall or liner stock or a separation between sidewall carcass or liner and carcass.

Bolt Together Divided Wheel: A wheel that has a removable wheel portion which is attached to the fixed wheel portion by wheel clamp bolts and nuts. (See Figure 4.)

Break: A rupture extending into or through the fabric. Example: An impact break is usually in the shape of an X, Y, or star and can be seen from the inside of the tire. A flex or circumferential break runs parallel to the beads.

Breaker (Bias/Diagonal Tire): A band or strip of rubber coated bias cut tire cord placed circumferentially around the tire usually between the last ply of fabric and tread. Sometimes called the impact or shock ply.

Buckle: Tire distortion caused by improper molding, evidenced by wrinkling on the inside of the casing.

Buckling: The wrinkling of the tire sidewall caused by applied torque.

Buff: The preparation of the surfaces of a tire during either the repairing or retreading process where the old rubber is removed and the casing is cleaned, profiled, and textured.

C: Compactor tire. See Section 4.

Carcass: The tire structure, except tread rubber.

Casing: The tire structure, except tread rubber.

Checking: Minute cracking in surface of rubber caused by aging and oxidation.

Chunking: The breaking away of pieces of the tread.

Circumferential Breaks: A tire injury running parallel to the bead.

Circumferential Tread Cracks: Cracks in the grooves of the tread running parallel to the beads.

Circumferential Rib: Rib extending around circumference of tire.

Cleated Tread: See Lug.

Combat Support Vehicle: A self-propelled, boosted, or towed conveyance for transporting a burden on land, sea, or through the air or space assigned to combat support elements to furnish operational assistance to combat elements.

Combat Vehicle: A vehicle, with or without armor, designed for a specific fighting function.

Combination Gross Vehicle Weight (CGVW): Total vehicle weight including tractor and trailer with full payload, driver, crew, and fuel. (See vehicle specification.)

Commercially Available Military Tires: Tires that may be used to meet military requirements in accordance with military specifications and are available as off-the-shelf purchase items.

Commercial Tires: Tires designed for the commercial (civilian) marketplace for passenger cars, light trucks, heavy trucks, construction, and material handling equipment, etc. These tires are suitable for military vehicles with a mission profile similar to that of their commercial counterpart.

Compactor Tire Codes: C or K. (See Section 4 .)

Cone Index (CI): An index of the shearing resistance of a medium obtained with a cone penetrometer.

Conicity Force: See Lateral Force Offset.

Contact Area (Footprint): The total area of the tire tread in contact with a flat surface, including the area of grooves or other depressions (load and inflation dependent).

Cords: The strands forming the reinforcement structure in a tire.

Cord Separation: Cords parting away from adjacent rubber compounds.

Cracking: Any parting within the tread, sidewall, or innerliner of the tire extending to cord material.

Cross Country: See Section 5.

Cross Rib Tire: A deep tread drive wheel position tire with deep molded grooves that extend essentially radially into the shoulder.

Cross Section: See Section Width. (See Figure 1.)

Crown: See Tread.

Crown Radius: See Tread Radius. (See Figure 1.)

Crown Width: See Tread Width. (See Figure 1.)

Cure: The process of vulcanization of rubber by applying heat and pressure over a period of time.

Cured-On-Solid Tires: Tires that are cured directly onto operating wheels.

Cut Growth: The enlargement of tire cuts as a result of flexing action. Usually found in the grooves of the tread.

Deflection (Static): The difference between the unloaded and the loaded section heights. (See Figure 5).

Design Rim Width: The specific rim width assigned to each tire size designation to determine basic tire dimensions.

Directional Tread: Tread design in which performance is dependent on direction of rotation (rear farm tractor tires are an example).

D.O.T. Number: Department of Transportation number that must be used by all tire manufacturers on all over-the-highway tires. Numbers molded in the tire sidewall identify the manufacturer, the manufacturing plant, the tire size and type, and the week of manufacture. Example: DOT MA L9 ABC 038. DOT means the tire meets or exceeds Department of Transportation Federal Motor Vehicle Safety Standards 109 or 119. MA is the code number assigned by DOT to the manufacturing plant. L9 is the tire size, in this case G78-14. ABC is a group of up to four symbols, optional with the manufacturer, to identify the brand or other significant characteristics of the tire. The 038 means the tire was made during the third week of 1988. The first two numbers designate the week, the last number indicates the year.

Durometer: A device to measure the hardness of rubber. The term is also applied to the readings obtained with this device; for example, a tire tread may be defined as 60 durometer, which means that it shows this degree of hardness when measured with the durometer.

Dynamic Radius: Vertical distance from the axle horizontal centerline to the road under any given condition of load, speed, and inflation.

Dynamic Resistance: Dynamic resistance of the free-rolling tire is the scalar sum of all contact forces tangent to the test surface and parallel to the wheel plane of the tire.

Dynamometer: A revolving wheel device for measuring power.

E: Earthmover tire. (See Section 4).

Endurance (D.O.T. Test): An operational or laboratory measurement of the fatigue life of a tire carcass. Not related to tire wear or puncture resistance.

Erosion Wear: Tread wear that occurs along the edges of a rib due to rib spread during load cycle. Also known as channel wear or river wear.

ETRTO: The European Tyre and Rim Technical Organization

Fixed Wheel Portion: The portion of a bolt together divided wheel that fastens to the vehicle axle hub flange. (See Figure 4.)

Flange: The shaped portion of a rim that retains the outer edges of the beads.

Flange Height: Measurement from the base of the flange vertically to its top as standardized by TRA or ETRTO. (See Figure 5.)

Flap: Rubber strip that fits inside the tire to protect tube from pinching by the beads or rubbing on the rim. Normally used with tubeless tires.

Flash: Fin produced by excess rubber squeezed out between edges of mold during curing process.

Flotation: Ability of a tire to resist sinkage on soft, yielding terrain.

Footprint: Graphic display of tread contact area. (See Contact Area.)

G: Grader tire. (See Section 4).

Grader Tire Code: G (See Section 4).

Gouging: Chisel-like action of rocks or other foreign objects on tires.

Groove: The space between two adjacent ribs or lugs.

Groove Cracking: Crack(s) in the groove(s) of the tread.

Gross Vehicle Weight Rating (GVWR): The value specified by the manufacturer as the maximum permissible loaded weight of a single vehicle.

Grown Tire: A tire that has undergone expansion due to use in-service.

Guide Rib: Rib running around the lower sidewall of the tire just above the bead. This should appear evenly above flange when tire is properly mounted.

Gutter: A groove at one edge of a rim where the lock ring or side ring fits.

HC: See 4.1.

Heat Buildup (Tire): Increase in heat of tire while in use in excess of heat dissipated.

Heat Dissipation (Tire): Removal of heat from a tire by conduction, convection, and radiation from the surface.

Heel: The rounded portion of the bead fitting at the junction of the rim flange and the bead seat.

Heel and Toe Wear: A type of irregular treadware characterized by different wear rates at the leading and trailing edges of a tread element.

Highway: See Section 5.

Hop: The vertical oscillatory motion of a wheel between the road surface and the spring mass.

Hydroplaning: The lifting action on a tire when water pressure forces the tire upward.

Impact Break: Rupture in tire carcass due to sudden shock.

Impact Resistance: Ability of tire to withstand sudden shock.

Industrial Tire Codes: See Section 4.

Inflation: The internal pressure of the tire cavity.

Innerliner: The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire. (See Figure 3A).

Innerliner Separation: The parting of the innerliner from cord material in the carcass.

K: See 4.1.

Lateral Force Offset: The average lateral force of a free straight-rolling tire. The two components of this force are as follows:

- a. Conicity Force: The component of lateral force offset which does not change sign with a change in direction of rotation.
- b. Ply Steer Force: The component of lateral force offset which changes sign with a change in direction of rotation.

LT(Light Truck Tire): See 4.1.

Liner: See innerliner.

L: Loader and dozer tire. (See Section 4.)

Loader and Dozer Tire Codes: L (See Section 4.)

Load Range: The term "load range" with a letter (A, B, C, etc.) in tire identification is used to identify a given size tire with its load and inflation limits when used in a specific type of service, as defined in the heading of TRA tables.

Load Rating: The maximum load a tire is rated to carry for a given inflation pressure.

Locking Ring: Removable, split, rim locking ring that holds rim flange in place on a multipiece rim.

Low Profile Tire: A tire that has a section height that is less than 85% of its nominal section width. For example, a tire with an aspect ratio (H/W) of less than 0.85.

Lug: Tread bar running across the tire tread rather than circumferentially as with a rib. (Also known as cleated tread.)

Lug-Base Tires (Industrial): Tires with lugs on the rim-mating surface that correspond to indentation in the rim.

Lug Reinforcement: Supporting bar or buttress designed to reinforce tread lugs or cleats.

Lug Tearing: Ripping of the lug, sometimes resulting in removal, can result from violent operation or mechanical interference.

Maximum Load Rating: The load rating at the maximum permissible inflation pressure for that tire.

Maximum Loaded Vehicle Weight: The sum of:

- a. Curb weight including fuel/fluids
- b. Driver and crew weight
- c. Additional accessories/options
- d. Pay load
- e. Trailer tongue load. (See vehicle specifications.)

Maximum Permissible Inflation Pressure: The maximum cold inflation pressure of the tire or the maximum rated pressure of the wheel, whichever is lower.

Maximum Tire/Wheel Load Rating: The maximum load a tire is rated to carry at a specified maximum speed and operating condition. The maximum load rating of the wheel should also be considered when determining the maximum load rating of a tire and wheel system.

Misalignment: Maladjustment of one or more parts of steering or suspension mechanism, causing unsatisfactory operation of wheels and vehicle.

Mission Profile Descriptors: See Section 5.

ML (Mining and Logging Tire): See 4.1.

Mobility (Vehicle Mobility): The overall capability of a vehicle to move from place to place while retaining its ability to perform its primary mission.

Mold: The heated cavity in which tires and retreads are vulcanized. Includes the curing chamber, matrices, and adjusting devices.

Mud and Snow or Winter Service Tire (Passenger and Light-Truck Tires Only): A tire that has a relatively aggressive tread pattern and is designed primarily to provide additional starting, stopping, and driving traction in mud and snow. The tread has ribs, lugs, blocks, or buttons, is generally discontinuous and has the following marking and characteristics when inflated.

- a. A substantial portion of the lug, block, or rib edges in the tread design are at an angle greater than 30 degrees to the tire circumferential centerline.
- b. On at least one side of the tread design, the shoulder lugs protrude at least 1/2 inch in a direction generally perpendicular to the direction of travel.
- c. Permanently labeled on one sidewall with the words "MUD AND SNOW" or any contraction using the letters "M" and "S" (for example, MS, M/S, M-S, M&S, etc.).

NHS: See 4.1.

Nondirectional Tread: Tread design that is equally effective in either direction of rotation.

Nontactical Vehicle: Motor vehicles used in support of general transportation services and facility and equipment maintenance functions not directly connected with combat or tactical operations. The nontactical wheeled vehicle fleet contains passenger carrying, general purpose, and special purpose vehicles. The nontactical wheeled vehicle fleet is primarily of commercial design and is one of two categories of the wheeled vehicle fleet. The other category is the tactical wheeled vehicle fleet.

O.E.: Original equipment.

Off-The-Road Tires: Tires designed primarily for use over unpaved roads or where no roads exist. Built for ruggedness and traction rather than speed.

Off-Road/Off-Highway: See Section 5.

On-Road/On-Highway: See Section 5 .

Open Splice: Any parting at any junction of tread, sidewall, or innerliner.

Overall Diameter: The diameter of an inflated tire at the outermost surface of the tread, including 24 h inflation growth. (See Figure 5).

Overall Width: The width of a new tire, including 24 h inflation growth, and including protective side ribs, bars, and decorations. (See Figure 1.)

Overinflation: Tire inflation above the manufacturer's recommended pressure for the specific load, speed, and terrain conditions.

Overloading: Loads over and above the maximum load limits for speed, tire size, inflation pressure, and operating conditions. Tire overloading can be dangerous and is not recommended. However, note that tire load capacity can be increased in certain cases by increased inflation or control to lower speeds. (See information under Tire and Rim Association Yearbook.)

Oversizing: Mounting larger tires than size specified for a vehicle to support heavier loads or to provide increased flotation.

Ozone: A form of oxygen which accelerates aging and weathering in tires.

P: See 4.1.

Pass: One trip of a vehicle over a test course.

Percent Carcass Deflection: Deflection is the difference between the unloaded and the loaded section heights. This term must be used in U.S. Army (W.E.S.) VCI calculations. (See Figure 5.)

Percent Tire Deflection: Deflection is the difference between the unloaded and the loaded section heights. This is a TRA and commercial industry term and must not be used for U.S. Army (W.E.S.) VCI calculations. (See Figure 5.)

Ply: A layer of rubber-coated parallel cords. (See Figure 3A.)

Ply Adhesion: Strength of attraction between adjacent plies.

Ply Lock: Turn up of ply ends around bead so other plies lock them in place.

Ply Rating: The term is used to identify a given tire with its maximum recommended load when used in a specific type of service. It is an index of tire strength and does not necessarily represent the number of cord plies in the tire.

Ply Separation: A parting of rubber compound between adjacent plies.

Pneumatic Tires: Tires that are inflated to pressures higher than atmospheric pressure.

Pressed-On Solid Tires: Tires that are cured on circular metal bands which are then pressed onto mating wheels.

Pressure Buildup: Increase of air pressure in tire caused by temperature rise of the contained air.

Primary Road: See Section 5.

Pusher Axle: A nonpowered, load-carrying axle preceding in tandem with a powered axle.

Pyrometer: An instrument to measure temperature—usually by the generation of electric current by a thermocouple when acted on by direct heat. Commonly used to measure mold surface temperatures or (if a penetrating needle is used) tread rubber temperatures.

Radial Cracking: Surface openings, generally in shoulder or sidewall of tire, running perpendicular to the beads.

Radial Runout: In tires, a measure of out-of-roundness; tested by rotating the inflated tire and observing or measuring how far the surface of the tread varies from a true circle.

Radial (Ply) Tire: A pneumatic tire in which the ply cords which extend to the beads are laid substantially at 90 degrees to the centerline of the tread, the carcass being stabilized by an essentially inextensible circumferential belt. (See Figure 3A.)

Rating Cone Index (RCI): The product of the RI (remolding index) and the average of the measured insitu CI (cone index) for the same layer of soil.

Regroovable Tire: A tire with sufficient undertread so that grooves can be cut in the worn tire, thereby extending tire life.

Remolding Index (RI): A ratio that expresses the proportion of the original strength of a soil that will be retained after traffic of a moving vehicle.

Removable Wheel Portion: The portion of a bolt together divided wheel which can be removed from the fixed wheel portion in order to service the tire. (See Figure 4.)

Retreaded Tire: A casing to which tread rubber has been affixed to extend the usable life of the tire.

Retreading (Recapping): The process of renewing the tread on a tire by buffing the old surface and applying a new tread.

Revolution Per Mile (RPM): The number of revolutions that the mounted tire will make in 1 mile at a specified load and inflation.

Ribs: Tread sections running circumferentially around tire.

Rim: A support, usually metal, for a tire or a tire and tube assembly on which the tire beads are seated.

Rim Diameter (Nominal): The diameter of the rim corresponding to the tire bead heel as defined by TRA or ETRTO.

Rim Flange: The part of the rim that supports the bead heel and resists lateral internal inflation pressure.

RMA: See Rubber Manufacturers Association.

Rock Drilling: A condition in which the tread of a tire is penetrated by a rock (object). During use of the tire, the embedded rock continues to be forced down through the tread rubber or casing of the tire.

Rolling Circumference: The distance that the (axle) center of the tire moves in one revolution of the tire.

Rolling Radius: Vertical distance from the axle horizontal centerline to the road under any given condition of load, speed, and inflation.

Rolling Resistance: The scalar sum of all contact forces tangent to the test surface and parallel to the wheel plane of the tire.

Rubber (Natural): Substance derived from latex of rubber trees and certain shrubs.

Rubber Manufacturers Association: RMA is the national trade association representing approximately 200 companies engaged in the production of various types of rubber goods, including: tires and innertubes.

Runflat Device: A structural insert for a pneumatic tire designed to carry the load for a limited distance if the tire is deflated.

Runflat Tire: A pneumatic tire designed to carry the load for a limited distance if the tire is deflated.

Safety Cage (or Device): Safety devices designed to reduce the hazard of multipiece rims coming apart when tires are initially inflated.

Secondary Road: See Section 5.

Section Height: Half the difference between the overall diameter and the nominal rim diameter. (See Figure 1 and Figure 2.)

Section Width: The width of a new tire, including 24 h inflation growth and including normal sidewalls but not including protective side ribs, bars, or decorations. (See Figure 1.)

Self-Cleaning: The ability of a tire tread design to eject dirt and mud by natural flexing action of tire.

Self-Sealing Tire: A tubeless pneumatic tire lined from bead to bead with a self-sealing polyurethane polymer that will seal penetrations up to 0.30 inch in diameter.

Semipneumatic Tires: Hollow center tires that operate at atmospheric pressure.

Separation: Pulling apart (delamination) such as ply separation (from each other) or tread separation (from plies).

Serial Number: Numbers cured onto tire sidewall for identification. (See D.O.T. number.)

Shoulder Area: Outer edges of tread. (See Figure 1.)

Sidewall: That portion of a tire between the shoulder area and the bead area. (See Figure 1.)

Sidewall Separation: Sidewall separation means the parting of the rubber compound from the cord material in the sidewall.

Sipe: Relatively small straight, angular, or curved slots, other than grooves, molded in the tread surface of a tire.

Size Factor: The sum of the section width and overall diameter of an inflated tire.

Skid Depth: See Tread Depth.

Skid Resistance: Ability to maintain grip on road to resist slide or slip, either directionally or laterally.

Slip: The vector difference between total displacement and rolling displacement.

Slip Angle: The angular displacement of the tire centerline and direction of travel.

Smooth Floors and Runways: Paved or protected operating surfaces which are free of undulations, obstructions, or discontinuities.

Solid Tires On Pneumatic Type Rims: Solid tires that are designed to mount on multipiece pneumatic type rims.

Speed Rating: Maximum speed that the tire is rated by the manufacturer for a specific operation.

Split Rim: Rim divided circumferentially into two or more sections.

Spreader: Device for spreading beads of tire to examine or obtain access to inside.

Spud: Base portion of metal valve anchored inside tube or rim.

Squirm: The rubbing motion of the tread as the loaded tire rotates.

SS: See 4.1.

ST: See 4.1.

Stability: Ability of tires to maintain direction of vehicle on curve without causing excessive sway.

Static Loaded Radius: Vertical distance from the axle horizontal centerline to the road under any given condition of load and inflation while stationary. (See Figure 5.)

Steel Wire Cord: A tire cord made from many steel wires which are twisted together.

Tactical Vehicles: Motor vehicles used in direct support of combat or tactical operations including vehicles in combat, combat support, and combat service support table(s) of organization and equipment. The tactical vehicle fleet contains both military design and commercial vehicles. The tactical wheeled vehicle fleet is one of two categories of the wheeled vehicle fleet; the other category is the nontactical wheeled vehicle fleet.

Tag Axle: A nonpowered load carrying axle following in tandem with a powered axle.

Tandem Axles: Two or more sets of axles set one behind the other.

Tapered Bead: Tires with a taper on the base of the bead for compression on the rim to seal tubeless tires and to prevent tire to rim slip.

TG: See 4.1.

Tire and Rim Association (TRA): Industrial association of tire, rim, and valve manufacturers. Provides technical tire, rim, and valve standards. The Tire and Rim Association determines standard tire and rim dimensions and combinations of loads and inflations recommended for the best service. Information is available in TRA publications.

Tire/Wheel Assembly Balancing: Adding external weights to compensate for unequal distribution of tire and wheel weight.

Tire Overloading: Load applied to a tire which exceeds the maximum the tire is being operated.

Tire Size Markings: (See Figure 7.)

Tire Stud: A hard metal or plastic rivet that is inserted into a tire tread surface for the purpose of improving traction on ice or hard packed snow.

TL: Tubeless tire.

Toe-In: Alignment of wheels on an axle so that they are closer together at the front than at the rear.

Toe-Out: Alignment of wheels on an axle so that they are closer together at back than at front.

Ton Mile Per Hour (TMPH): A measure of work per unit time of tires as limited by the tire's internal operating temperature.

TR: Tires for service on trucks, buses, and other vehicles with rims having specified rim diameter of nominal plus 0.156 in or plus 0.250 in. This suffix is intended to differentiate among tires for passenger car, light truck, and other vehicles, or other service which use similar designations. Example: 7.00-15, 7.00-15LT, 7.00-15NHS and 7.00-15TR.

TR Number: Code number of tube valves and rim valves set by TRA.

TRA: See Tire and Rim Association.

Tracking: Tracking is when the rear wheels of a vehicle follow the same line as the front wheels.

Traction: The grip or friction, pull or bite between tire and ground.

Tractive Effort, Net: The total force output of the traction device acting parallel to the surface of the ground and in the direction of travel of a driving wheel.

Tread: That portion of a tire that comes in contact with the road.

Tread Depth: The distance in 32nds of an inch measured from the tread surface to the bottom of the grooves in a tire.

Tread Design: The pattern of the tread area.

Tread Elements: The parts of the tread design which are separated from each other and made distinct by the sipes and rib or lug design molded into the tire.

Tread Life: Length of service in miles before tread wears out.

Tread Radius: The measurement of curvature of a tire tread between the shoulders of the tire. (See Figure 1).

Tread Rib: A tread section running circumferentially around a tire.

Tread Separation: Tread pulling away from body of tire.

Tread Wear Indicators: Raised portion of the base of the tread groove which appears locally smooth when the tread is worn to a predetermined depth indicating time for removal of tire from service.

Tread Width: The distance from shoulder to shoulder of a tire. (See Figure 1.)

TT: Tube-type tire.

Tube (Inner): An airtight rubber device placed inside a tube-type tire casing that contains the inflating medium.

Underinflation: Tire having less than recommended air pressure for the specific load, speed, and terrain conditions.

Understeer: The tendency for the front tires of a vehicle to lose grip before the rear tire(s).

Undertread: Tread material between bottom of tread grooves and carcass.

Vehicle Cone Index (VCI): Minimum soil strength in the critical soil layer, in terms of rating cone index for fine grain soil (clay) or in cone index for coarse grain soils (sands), required for a specific number of passes of a vehicle, usually one pass (VCI₁) or 50 passes (VCI₅₀).

Vehicle Oversteer: A vehicle handling property in which the steer angle required to negotiate a given curve decreases with an increase in vehicle forward speed. This condition exists when the tire slip angles on the front tires are less than that of the rear tires.

Vehicle Understeer: A vehicle handling property in which the steer angle required to negotiate a given curve increases with vehicle speed. This condition exists when the slip angle of the front tire is greater than the slip angle of the rear tires.

Weather Checking: Fine hairline cracks caused by oxidation and other atmospheric (ozone) effects, generally observed in the sidewall surface of a tire.

Wheel Alignment: Adjustment of suspension and steering components to allow the tires to run in a precise manner.

Wheel Clamp Bolt: An externally threaded fastener which, when used with clamp nuts, serves to secure the removable wheel portion to the fixed wheel portion of a bolt together divided wheel. (See Figure 4.)

Wheel Clamp Nut: An internally threaded fastener which, when used with clamp bolts, serves to secure the removable wheel portion of a bolt together divided wheel. (See Figure 4)

4. **Off-The-Road Tire Code Nomenclature**

- C compactor tire
- E earthmoving tire
- G grader tire
- L loader and dozer tire

4.1 Prefix and Suffix Letters Used in Tire Size Designations—Prefix and suffix letters are included, when necessary, as part of tire size designations to differentiate between tires for service conditions which may require different loads and inflations and/or tires which must be used on different types of rims.

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- HC Identifies a heavy-duty tire designated for use on "HC" 15 degree tapered rims on trucks, buses, and other vehicles. This suffix is intended to differentiate among tires for light trucks and other vehicles or other services which use a similar designation. Example: 8R17.5LT, 8R17.5HC.
- K Compactor tire for use on 5 degree drop center or semidrop center rims having bead seats with nominal minus 0.032 in diameter.
- LT Light truck tires for service on trucks, busses, trailers and multipurpose vehicles used in normal highway service for a 5 degree tapered bead seat rim with a specified rim diameter of nominal minus 0.032 in diameter or with 15 degree tapered bead seat rim. This prefix or suffix is intended to differentiate among tires for passenger car, truck-bus and other vehicles or other services which use a similar designation. Example: P235/75R15, LT235/ 75R15 and 7.00-15LT, 7.00-15TR.
- ML Mining and logging tires used in intermittent highway service.
- NHS Not for highway service.
- P Identifies a tire primarily intended for service on passenger cars.
- SS Differentiates tires for off-highway vehicles such as mini and skid-steer loaders from other tires which use similar size designations such as 7.00-15TR and 7.00-15NHS, but may use different rim bead seat configurations.
- ST Special tires for trailers in highway service.
- TG Tractor-Grader tires, not for highway service.
- TR Tires for service on trucks, buses and other vehicles with rims having specified rim diameter of nominal plus 0.156 in or plus 0.250 in. This suffix is intended to differentiate among tires for passenger car, light truck, and other vehicles or other services which use similar designations. Example: 7.00-15, 7.00-15LT, 7.00-15NHS, and 7.00-15TR.

5. *Mission Profile Descriptors*—

Cross-Country: Vehicle operations over terrain not subject to repeated traffic and where no roads, routes, well-worn trails, or man-made improvements exist. (This definition does not apply to vehicle test courses which are used to simulate cross-country terrain.)

Highway: Four or more lanes, often divided, all-weather primary roads used for heavy and high density traffic usually with a limited access to/from other roads.

Off-Road/Off-Highway: These terms are synonymous, with off-road being preferred. Vehicle operation over trails or cross-country.

On-Road/On-Highway: These terms are synonymous, with on-road being preferred. Vehicle operation over prepared road surfaces, to include highways, primary roads, and secondary roads.

Primary Roads: Two or more lanes, all-weather, maintained, hard surfaced (paved) roads with good driving visibility used for heavy and high density traffic. These roads have lanes with a minimum width of 9 ft, and the legal maximum Gross Vehicle Weight/Gross Combined Weight (GVW/GCW) for the country or state is assured for all bridging.

Secondary Road: Two lanes, all-weather, occasionally maintained hard or loose surfaced (for example, large rock, paved, crushed rock, gravel) roads intended for medium weight, low-density traffic. These roads have

lanes with minimum width of 8 ft and no guarantee that the legal maximum GVW/GCW for the country or state is assured for all bridges.

6. *Retread and Repair Materials*

6.1 Glossary of Terms—

Abrasion: Wearing away by scraping or rubbing; the progressive wearing away of a tire in-service.

Accelerator: A chemical that affects the rate of vulcanization of the tread rubber compounds.

Aging: Deterioration of physical and chemical properties of rubber by oxidation and/or heat over a period of time.

Air Injection: An inspection method using a high pressure air probe to detect separation.

Air Pressure: Force exerted by air within tire, expressed in pounds per square inch, bars, or kilopascals.

Awl: A pointed or flat tool used to probe nail holes and injuries.

Backing: A removable protective material used on the application side of tread rubber and repair materials to preserve cleanliness and tackiness.

Balancing: A process to correct for heavy or light areas of a tire.

Banbury: An automatic machine for mixing rubber and compounds.

Band Lugging: A method of retreading earthmover design tires using hand buildup and kettle cure.

Band Ply: The inner cord ply of a tire.

Bead/Bead Area: The bead is made of high tensile steel wires wrapped and reinforced by the plies. The bead area is that anchoring part of the tire that is shaped to fit the rim. (See Figure 1).

Bead Centering Plate: An alignment device used to reduce tire diameter, and center the casing in the retread matrix.

Bead Heel: The rounded portion of the tire that contacts the rim flange. (See Figure 1.)

Bead to Bead Measurement: The method of measuring a tire before retreading to predetermine the correct buffing dimensions, tread rubber size, and curing matrix to be used in the processing from the heel of one bead straight up at 90 deg, to the bead over the crown and down the other side to a position on the heel of the other bead.

Bead Toe: The pointed area of the bead. (See Figure 1.)

Belt: A reinforcing member, usually consisting of two or more plies, located circumferentially around the tire and under the tread which is less extensible than the carcass. (See Figure 3A.)

Belt Separation: A tire failure in which the belts separate from the plies or tread. Usually occurs at the edge of the belts.

Bevel Cut: The angle cut used on tread and other splices and in the skiving of a tire for repair.

Bias Belted: A tire with a bias ply carcass and stiff reinforcing belts extending from shoulder to shoulder.

Bias Ply: A pneumatic tire in which the ply cords extending to the beads are laid at alternate angles substantially less than 90 degrees to the center of the tread.

Bladder Cure: A method of shaping and curing a tire using an expandable cylindrical rubber membrane.

Brand Number: A code branded into one or both sidewalls of a tire by the customer for identification purposes.

Break: A rupture extending into or through the fabric. An impact break is usually in the shape of an X, Y, or star and can be seen from the inside of the tire. A flex or circumferential break runs parallel to the beads.

Breaker (Bias/Diagonal Tire): A band or strip of rubber coated bias cut tire cord placed circumferentially around the tire between the last ply of casing fabric and tread. Sometimes called the impact or shock ply.

Buckle: Tire distortion evidenced by wrinkling on the inside of the casing.

Buff Contour: The specified shape of a buffed tire.

Buff Line: The dividing line in the cross section of a tire between the buffed surface of the original tire and the retread rubber.

Buffed Surface: The specially prepared surface of a tire casing to provide proper texture for the previously vulcanized casing to help promote adhesion to the new rubber.

Buffer: A machine used to rasp the old tread from the tire.

Buffing Template: A machined device of a specified shape used to obtain the required buffed contour.

Builder: A machine used to apply tread rubber to a casing.

Buildup: The application of retread or repair rubber.

Buzz Outs: See Skiving.

Calender: A machine used to coat one or both sides of cord fabric with rubber.

Casing: A used tire to which additional tread rubber may be attached for the purpose of retreading.

Cement: An adhesive rubber compound dissolved in solvent used to provide building tack and cured adhesion. May be brushed or sprayed on the buffed surface.

Centerline: A circumferential inked line or indentation applied during extrusion to the center of the tread rubber to aid in positioning the tread.

Chaffer: Reinforcing material around the bead in the rim flange area to prevent chafing of the tire by the rim parts.

Channeling: Voids in the shoulder area between the tread and the buffed surface.

Check Valve: A one-way valve used to prevent pressure loss.

Chemical Cleaning: A rapid drying rubber solvent for removing mold lubricant, dirt, and other foreign material before mechanical buffing.

Chemical Cure: Vulcanization at room temperature activated by chemical agents without application of heat from outside source.

Chemical Cure Repair Unit: Tube or innerliner repair unit applied without heat.

Chemical Leak Detector: A liquid capable of detecting air seepage not discernible by visual inspection.

Chemical Rubber Gum: A special compound repair gum which cures at room temperature by chemical reaction.

Chemical Rubber Compound: A two-part rubber putty, when mixed together thoroughly, begins curing at room temperature.

Chemical Vulcanizing Cement (Also Chemical Cure Cement): Cement which, when used with compatible materials, will produce a chemical cure.

Chipper: A narrow band of fabric or steel cord located in the bead area whose function is to reinforce the bead area and stabilize the lower sidewall.

Chunking: The breaking away of pieces of tread.

Circumferential Breaks: A tire injury running parallel to the bead.

Circumferential Cracks: Cracks in a tire running parallel to beads.

Cold Patch: Chemical cure repair unit.

Collapsible Rim: A rim used in retreading that can be folded and unfolded for insertion into the tire where it holds the curing tube in place and exerts pressure on the tire sidewalls.

Compound: A thorough mixture of natural and/or synthetic rubbers with various ingredients necessary for each tire part.

Cords: The strands forming the reinforcement structure in a tire.

Corrosion: Degradation of steel reinforcing cords.

Cracking: Any parting within the tread, sidewall, or innerliner of the tire extending to cord material.

Cross Section: See section width.

Crown: See tread.

Crown Width: See tread width.

Cure: The process of vulcanization of rubber by applying heat and pressure over a period of time.

Cure Rate: The speed at which a compound cures and develops its physical properties.

Cure Time: The length of time an article is cured. (See Optimum Cure.)

Curing Rim: The rim used to support the tire and keep the curing tube in place while curing.

Curing Tube: Special, heavy-duty tube placed within the tire while curing the retread or repair. This tube, when inflated, forces the tread rubber into the matrix, forming the tread design.

Cushion Gum: A fast curing tacky rubber compound used for adhesion of tread rubber for undertread repair, and buildup of other repairs. (Also see Precured Tread Cushion Gum.)

Cutoff Rib: An indentation molded into a retreaded tire to produce a sharp ending at the edge of the new retread rubber. (See Flow Stop, Stop Ring.)

Debagger: A machine for inserting and removing curing tubes from a tire.

Delugger: A machine to cut the lugs from tires prior to buffing.

Detreader: A machine that delugs and buffs a used tire.

Die Size: A coded description of the dimensions of tread rubber for retreading. (Example 40-80-14.) The first number gives the width of the crown in 8ths of an inch. The second number gives the width of the base in 8ths of an inch. The third number gives the gauge of the stock in 32nds of an inch.

Dryer—Drying Room: Equipment or an enclosed space used to remove moisture from casings prior to inspection and processing.

Durometer: A device to measure the hardness of rubber. The term is also applied to the readings obtained with this device; for example, a tire tread may be defined as 60 durometer, which means that it shows this degree of hardness when tested with the durometer.

Envelope: A flexible covering used to encompass a precured tread during the bonding process.

Extruder: A machine that heats and shapes a rubber compound, by the process of extruding, into a usable form (that is, strip or die size).

Fabric Fatigue: Fabric degradation and resultant tire cord loss of strength due to repeated flexing. Accentuated by overloading and/or underinflation.

Factory-Built Repairs: Factory-assembled repair units made of layers of cord, fabric, and cushion gum, which are cured or semicured and used to reinforce damaged areas. (Also see Hand-Built Repairs.)

Filler Strip: A free-flowing rubber compound used under the tread when added thickness is required in retreading.

Filler Gum (Filling Stock): A soft-rubber compound (usually fast curing) used to fill in low spots on a casing before applying retread compound during retreading.

Flap: Rubber strip that fits inside tire to protect tube from pinching by beads or rubbing on rim. Not used with drop center rims.

Flash: Fin produced by excess rubber squeezed out between edges of mold during curing process.

Flipper: Reinforcing fabric around the bead wire for strength and to attach the bead to the tire body.

Flow Crack: A surface crack caused by excessive stock movement when tire is shaped into curing mold.

Flow Stop: See Cutoff Rib.

Footprint: Graphic display of tread contact area.

Full Cap/Treads: Application of new tread rubber to include not only the tread area but also the shoulder area.

Gauge: The thickness of tread rubber measured in 32nds of an inch.

Groove: Space between two adjacent ribs, lugs, or buttons.

Groove Cracking: Crack(s) in the groove(s) of the tread.

Hand Built Repairs: Repair units built using uncured cord fabric, and cushion gum, usually assembled for a specific tire.

Heat Booster/Pad: An electric heating unit which, when placed between the air bag or curing tube and the carcass of the tire, provides internal heat and aids in the curing of repairs and retreads.

Hot Patch: Repair units vulcanized with heat.

Innerliner: The layer(s) forming the inside surface of a tubeless tire that contains the inflating medium within the tire.

Innerliner Repair Material: A special repair material for repair of inner liners.

Inside Curing Rim: A metal support for a curing tube, fitting inside the tire, not intended for vehicle use.

Kettle Cure: Cure method employing steam and air for the heat and pressure required in vulcanizing.

Liner: See innerliner.

Load Range: The term "load range" with a letter (A, B, C, etc.) in tire identification is used to identify a given size tire with its load and inflation limits when used in a specific type of service, as defined in the heading of TRA tables.

Low Profile Tire: A tire that has a section height that is less than 85% of its nominal section width. For example, a tire with an aspect ratio (H/W) of less than 0.85.

Low Temperature Gum: A rubber compound that cures at a lower than standard temperature.

Lug Tearing: Rupture of the lug, sometimes resulting in removal, resulting from violent operation or mechanical interference.

Mandrel: A curved support inserted in a tire to prevent the casing from collapsing while curing a repair.

Matrix: Aluminum or steel rings or segments that form the cavity in which the tire is actually cured and from which the tread design is formed.

Matrix Skirt: The sidewall flange of the matrix. In a short skirt matrix, the flange extends from the shoulder to the flow stop and in a long skirt matrix, it extends below the flow stop.

Mill: Machine composed of two large iron or steel, counter-rotating rolls, used to warm, mix, and blend rubber and plastic stocks.

Moisture Blows: Ply separations caused by the presence of moisture in the casing which, when subject to heat, becomes steam and expands.

Mold: Equipment in which the new tread is cured to the worn tire. Mold includes the steam chamber, matrix, and adjusting devices.

Mold Lubricant: Material used as a mold release to facilitate removal of the tire from the mold after curing.

Nonfill: Failure of the tread rubber to properly fill the matrix during cure, resulting in imperfectly formed tread elements and rounded lug edges.

Nonskid: See Tread Depth.

Open Splice: A retreaded tire defect caused by failure of the rubber to knit together properly at the tread splice during cure.

Optimum Cure: That state of cure at which the rubber compound exhibits the most satisfactory physical properties. Usually expressed in minutes curing time at a reference temperature.

Overall Diameter (O.D.) Buffered: A measurement used to size a buffed tire, on an inflated tire using calipers or a diameter tape rule.

Overcure: Curing in excess of optimum cure.

Overflow: Spew-out of tread compound at the mold parting line or at the edge of the matrix skirt during curing, which should be trimmed or buffed off the finished product.

Ozone Checking: Formation of fine cracks in surface of rubber due to ozone in air.

Padding Gum: Heat resistant rubber used under tread rubber to build up its size for mold fit. (Also see Filler Gum.)

Plasticizer: A chemical added to rubber compounds to impart softness, flexibility, or resiliency.

Ply: A layer of rubber-coated parallel cords.

Ply Rating: The term is used to identify a given tire with its maximum recommended load when used in a specific type of service. It is an index of tire strength and does not necessarily represent the number of cord plies in the tire.

Ply Separation: A parting of rubber compound between adjacent plies.

Potentiometer: A voltmeter that reads the extremely low voltage developed at the thermocouple junction and, thus, shows the temperature. Usually they read directly in degrees of temperature.

Precured Tread: Tread which is vulcanized with the tread configuration molded into it prior to being placed on the buffed casing.

Precured Tread Cushion Gum: A fast-curing tacky rubber compound used to bond the precured tread to the buffed surface; may be used for repairs.

Press (Loading): A machine designed to open and close a matrix, load and eject retreaded tires.

Press Plate: Ring-shaped plates in molds that may be adjusted to alter the cross section of tires.

Puncture: A penetration through a tire, made by a nail or other similar small object.

Puncture Repair: See Repaired Tire.

Pyrometer: An instrument to measure temperatures—usually by the generation of electric current by a thermocouple when acted on by direct heat. Commonly used to measure surface mold temperatures or (if a penetrating needle is used) tread rubber temperatures.

Rasp: A tool with raised points forming the cutting prominences, used for roughening rubber surfaces.

Radial Cracking: Surface openings, generally in shoulder or sidewall of tire, running parallel to tire radius.

Radial Runout: In tires, a measure of out-of-roundness; tested by rotating the inflated tire and observing or measuring how far the surface of the tread varies from a true circle.

Reducing Valve: Pressure regulating device used for controlling steam or air pressure at desired level.

Regrooving (Recutting): The cutting of a tread design into tread rubber where a design does not already exist or the cutting into an existing tread design to a depth greater than that provided by the new tire manufacturer or retreader.

Reinforcement: Any material, usually rubber and fabric, vulcanized to the tire to add strength to the cord body at an injury.

Reinforcement Repair: See repaired tire.

Relugging: A method of retreading large off-the-road tires using handle buildup and kettle cure.

Repair Gum: Material used for filling voids or covering reinforcing material in a tire repair.

Repair Plug: Rubber compound used to fill the cavity of an injury in a tire. Should be applied from inside the tire.

Repaired Tire: Any tire with punctures, cuts, or other types of injuries that have been reconditioned as required to provide additional service life. Common repair types are:

- a. Puncture Repairs: tread punctures, nail holes, or cuts in the tread and shoulder area, repaired from inside the tire which seal the innerliner and fill the injury. Injury limits are up to and including 1/4 in diameter for automobile and light truck tires and 3/8 in for truck tires. Larger punctures must be referred to a full service repair facility.
- b. Spot Repairs: repairs made by vulcanizing rubber to a tire without replacing cord.
- c. Reinforcement Repairs: repairs made to the casing when an injury has extended through more than 25% but less than 75% of the tire body requiring both hole-filling material and reinforcing patches.
- d. Section Repairs: repairs, other than nail-hole type, made to the casing when an injury has extended through 75% or more of the actual plies, or completely through the casing in the tread or sidewall areas. The damaged cord is removed and new cord is replaced in the form of a repair unit.

Repair Unit (Patch): The material used to seal and/or reinforce the injury in a tire or tube.

Resilience: Capacity of rubber to recover its original size and shape after deformation.

Retread Separation: Tread pulling away from the tire at interface of new tread and buffed surface.

Retreaded Tire: A casing to which tread rubber has been affixed to extend the usable life of the tire.

Reversion: Excessive heating of a cured rubber compound leading to deterioration of its physical properties.

Rim: A support, usually metal, for a tire or a tire and tube assembly on which the tire beads are seated.

Rubber Cement: An adhesive composed chiefly of rubber dissolved in a suitable solvent.

Rust: See Corrosion.

Scorching Of Rubber: Premature vulcanization of rubber caused by heat during processing.

Section Repair: See Repaired Tire.

Section Bag (Air-Stream): A rubberized fabric bag made in 1/4, 1/5, or 1/6 of a circle with valves at both ends. When inflated inside a tire in a sectional mold, it applies pressure in the vicinity of the injury.

Section Width: The width of a tire, including normal sidewalls but not including protective side ribs, bars, or decorations. (See Figure 1.)

Self-Vulcanization: See Chemical Cure.

Separation: Pulling apart (delamination), such as ply separation (from each other) or tread separation (from plies).

Setup: Premature vulcanization of a rubber compound during processing or storage.

Shaping: Buffing the casing to shape it to properly fit the size and contour of the matrix cavity.

Shelf Life: Refers to the accepted length of time that a perishable product may remain in stock.

Shoulder Area: Outer edges of tread. (See Figure 1).

Shoulder Radius: Small radius (generally) that joins the primary tread radius to the shoulder contour.

Sidewall: That portion of a tire between the shoulder area and the bead area. (See Figure 1).

Sipe: Relatively small straight, angular, or curved slots, other than grooves, molded in the tread surface of a tire.

Size Factor: The sum of the section width and overall diameter of an inflated tire.

Sizing: Measuring the tire casing to determine proper matrix fit. Usually a combination of bead to bead or cross section and tire circumference is used.

Skid Depth: See Tread Depth.

Skim Coat: Coat of rubber applied to ply fabric by heat and pressure. (See Calendar).

Skiving: The removal of damaged material prior to making a repair.

Slab Stock: Rubber compound cut and taken from a mill in wide, thick strips.

Soapstone: A soft talc-like powder used as a lubricant on the inside of a casing to prevent the tube from sticking.

Spacer Ring: A ring inserted between two halves of a matrix, which enables the matrix to handle tires of the same diameter, but with greater tread widths and larger cross sections.

Splice Bevel: An angled cut across the tread crown and through the gauge which permits full matching of the tread ends when they meet.

Splice Butt: A 90 degree angle cut across the tread crown and through the gauge which permits full matching of the tread ends when they meet.

Spot Repair: See Repaired Tire.

Spotter (Spot Press): A heat vulcanizing unit used in spot repairs, with a metal curing plate for either (or both) outside or inside tire surface.

Spreader: A multiarm device that spreads the tire bead without inverting the tread area.

Standard Rim: A rim that meets the dimensions specified by Tire and Rim Association, Inc., the European Tyre and Rim Technical Organization, or other recognized standardizing bodies.

Stitching: The process of rolling tread rubber or repair material in order to remove trapped air and also to obtain adhesion.

Stop Ring: See Cutoff Rib.

Strip Rubber: Tread rubber in strip form most commonly used in cold feed extruders.

Stripping Stock: A rubber stock used to make or extend the tapered edge of the tread rubber.

Tack: Surface adhesiveness of a rubber compound before cure.

Talc: Powder lubricant to prevent sticking between tube and tire.

Template (Buffing Template): A pattern, or gauge, used as a guide in repairing and retreading tires. In repairing, it is used to outline the area to be buffed inside the carcass. In retreading, it is used to determine correct contour of the buffed tire for perfect fit in the mold.

Thermocouple Test: A heat study which uses special wire probes. Temperature is measured by a potentiometer or pyrometer. By following the heat developed, time and temperature to cure a specific tire in a given cure system are determined.

Tire Paint: A paint compatible to tire bodies used to enhance the appearance of a tire.

Top Cap (Top Treading): A retread that covers the crown or top of a tire.

Tread: That portion of a tire that comes in contact with the road.

Tread Depth: The distance measured from the tread surface to the bottom of the grooves in a tire.

Tread Design: The pattern of the tread area.

Tread Gum: A rubber compound, usually 1/16 inch in gauge, used to repair spots in the tread carcass or to replace that rubber removed from the carcass when making a sectional repair.

Tread Radius: The measurement of curvature of a tire tread between the shoulders of the tire. (See Figure 1).

Tread Rib: A tread section running circumferentially around a tire.

Tread Roller: A roller, either manual or power, used to help apply the tread rubber, remove trapped air, and obtain adhesion.

Tread Rubber (Tread Stock): Rubber material that will replace the worn off tread portion of a tire.

Tread Separation: Tread pulling away from body of a tire.

Tread Tearing: A tearing away of a portion of the tread design.

Tread Width: The distance from shoulder-to-shoulder of a tire. (See Figure 1).

Tube Plate: A heated metal plate with a smooth surface used in making tube repairs.

Tuber (Extruder or Tubing Machine): Device to extrude or force uncured rubber through die of any size or shape by use of heat and pressure. The rubber stock is fed into the tuber and extruded through a die that shapes it to the size needed for the tires on which it will be applied.

Undercure: A condition that describes less than acceptable vulcanization or curing.

Undertread: Tread material between bottom of tread grooves and carcass.

Vent Hole: Small holes in the tread area of the matrix allows the rubber to flow and fill out the tread design.

Venting (Awling): The act of partially perforating a tire above the beads which allows trapped gas or moisture to escape safely and without loss of tire air retention ability.

Void(s): A condition whereby the tread rubber flow fills the tread design but does not completely fill the space between the tire casing and matrix, thereby leaving portions of the base in an unfilled condition.

Vulcanization: A chemical reaction that takes place under appropriate curing time, temperature, and pressure and develops usable (tire) characteristics.

Vulcanizing Cement: See Cement.

Weather Checking: Fine hairline cracks caused by oxidation and other atmospheric (ozone) effects, generally observed in the sidewall surface of a tire.

Wicking Material: Cord used to allow gas or moisture to escape from the tire casing.

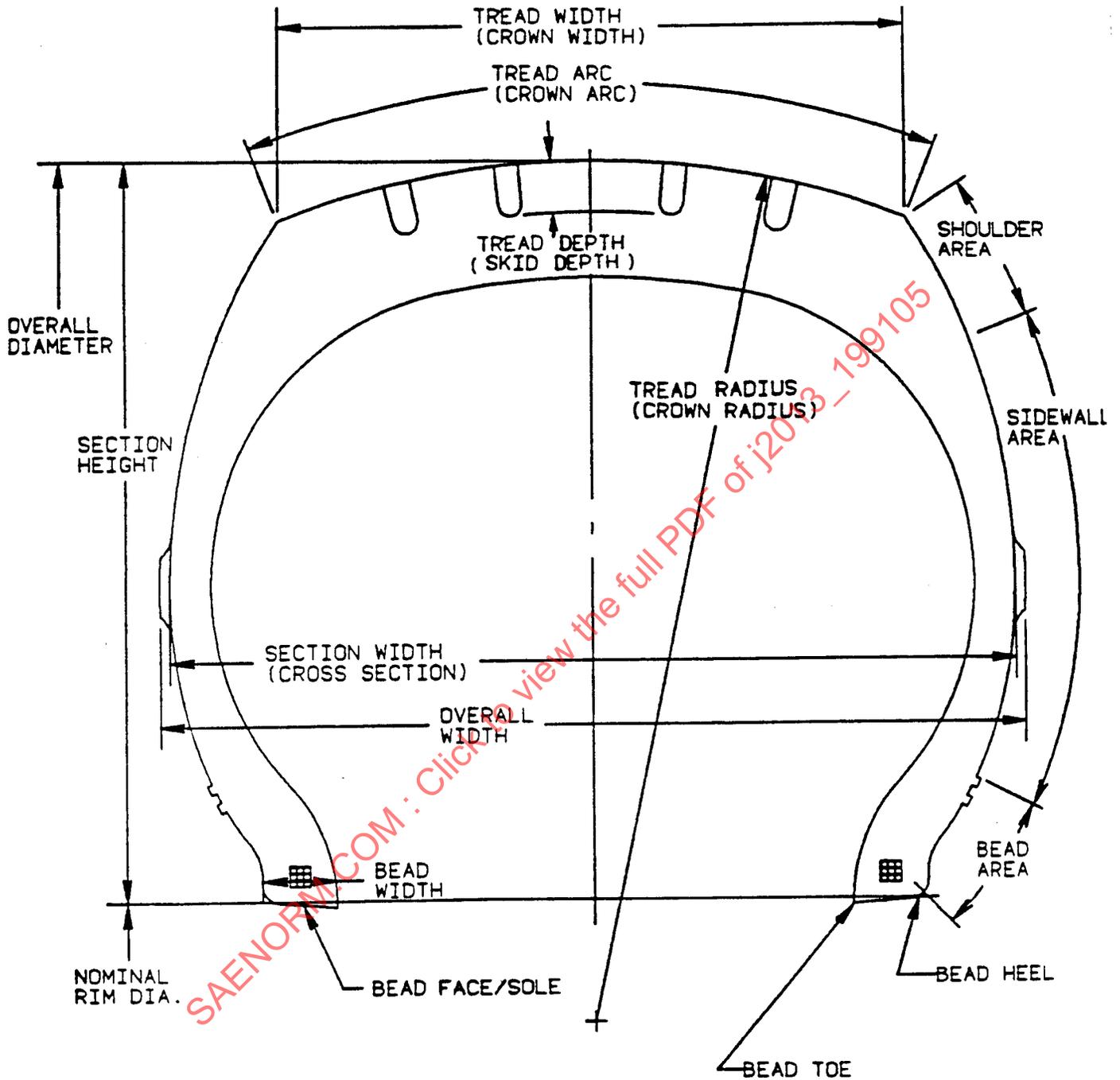


FIGURE 1—TIRE TERMINOLOGY

BEAD DIMENSIONS



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FIGURE 2—BEAD DIMENSIONS

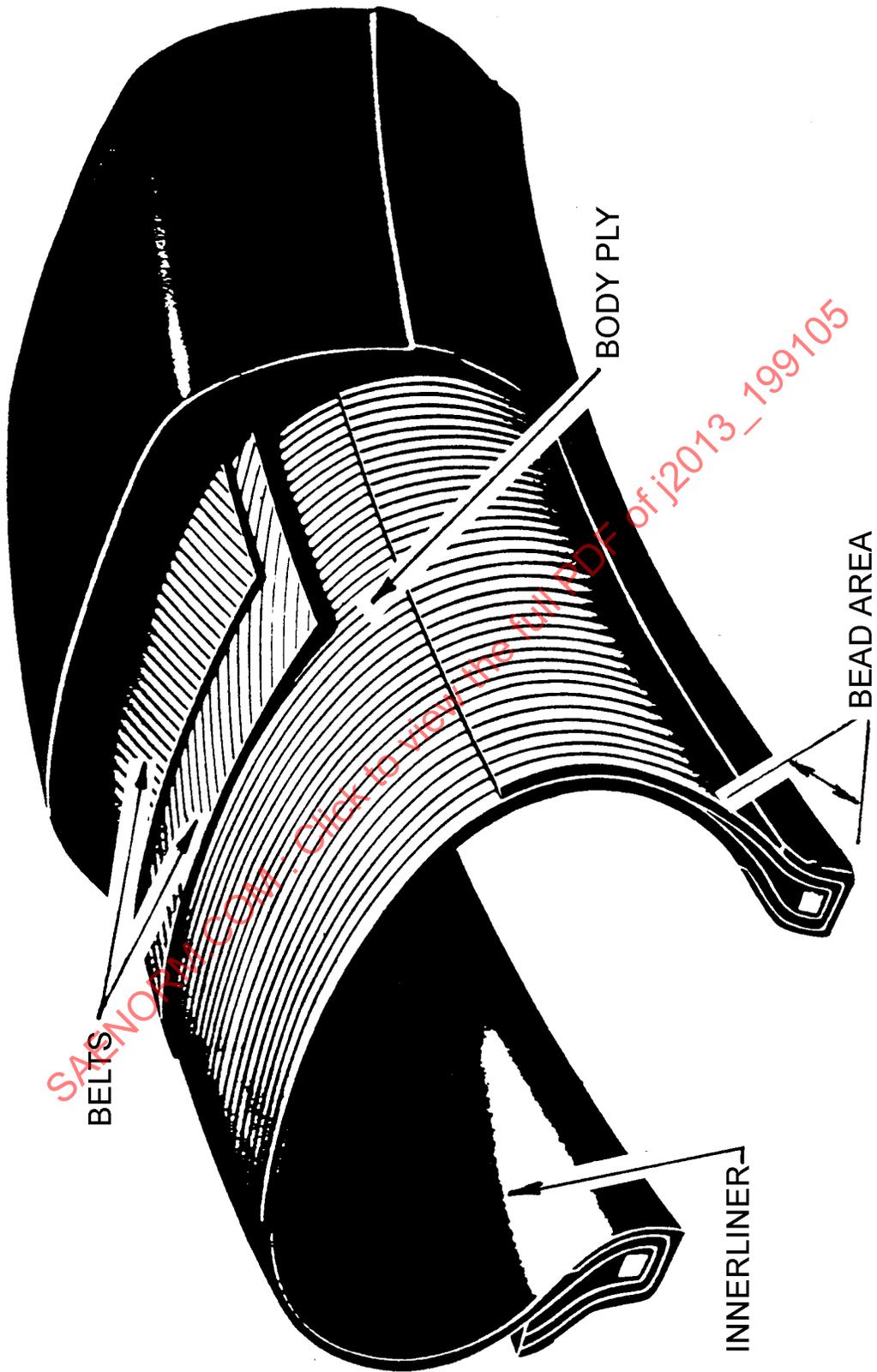


FIGURE 3A—RADIAL PLY TIRE