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Standard Terminology Relating to the Characteristics and Performance of Tires[1]

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1. Scope

1.1 This terminology primarily covers definitions for technical terms that occur in ASTM Committee F09 standards on the characteristics and performance of tires.

1.2 Definitions for terms that may also be used in other technologies, such as vehicle behavior, are worded to cover both areas.

1.3 When any definition in this terminology (that does not have the limiting phrase) is quoted out of context, editorially insert the limiting phrase *in a tire* after the dash following the term. This will properly limit the field of application of the term and definition.

2. Terminology

2.1 *Definitions:*

accelerometer, *n*—an instrument that senses inertial reaction to measure linear or angular acceleration. **F811**

accuracy, *n*—a measurement concept that describes the degree of correspondence between an average measured value and an accepted reference or standard value for the object, material or phenomenon under test. **F1082**

age, *v*—to apply conditions so as to promote change of material properties. **F2838**

aging, accelerated laboratory (also: aging, laboratory), *n*—increased rate of tire material property changes under specified conditions, including temperature, inflation pressure, oxygen concentration in the filling gas, and time. **F2838**

aging, in-service, *n*—material property changes within tires due to consumer usage. **F2838**

aging, oven, *n*—accelerated laboratory aging in an elevated temperature environment. **F2838**

aging, thermal oxidative, *n*—the process whereby chemical and physical material properties of a tire change with exposure to heat and oxygen. **F2838**

aligning stiffness [*FL/γ*]**,** *n—of a tire*, the rate of change of tire aligning torque with respect to change in tire slip angle, usually evaluated at zero slip angle.

aligning stiffness coefficient, *n—of a tire*, the ratio of tire aligning stiffness to the tire normal force.

aligning torque [*FL*]**,** *n—of a tire*, the component of a tire moment vector tending to rotate a tire about the *Z*′-axis, positive clockwise when looking in the positive direction of the *Z*′-axis. **F403, F424**

alignment, *n*—the adjustment of various parts of the vehicle's suspension system to ensure proper handling stability and to minimize abnormal tire treadwear. **F1922**

all-season tread, *n*—tread design providing dry, wet, and snow traction performance for an optimized balance for year-round performance and which may meet the Rubber Manufacturers Association (RMA) definition for an M&S, M+S, M/S, MS, etc. marked tire (see RMA "Snow Tire Definitions for Passenger and Light Truck (LT) Tires"). **E1136, F2493**

analysis, *n*—an act of inspecting the S/H image and associating this image with a known calibration reference. **F1364**

anomaly, *n*—a change in the strain pattern of the rubber surface of a straining block as a result of applied stress brought about through a change in atmospheric pressure on the rubber surface. **F1364**

anti-lock braking system (ABS), *n*—a collection of sensing and control hardware installed on a vehicle to prevent wheel lock-up during brake application. **F1649**

average tire tread depth [*L*]**,** *n*—the average of all tire groove (void) depth measurements. **F1016**

axle efficiency [*nd*]**,** *n—in a vehicle*, the ratio of the sum of the wheel torques at the driven wheels to the product of driveshaft torque and axle ratio.

balancing, *n*—a process to correct for heavy or light areas of a tire and wheel assembly. **F1922**

bandwidth [1/ *T*]**,** *n*—the range of frequencies within which certain performance characteristics occur; specific limits normally apply. **F811**

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bead, *n—of a tire*, the part of a tire that comes in contact with the rim and is shaped to secure the tire to the rim. **F1922, F1923, F2663**

bead separation, *n*—a breakdown of bond between tire components in the bead area. **F1922**

bead unseating block, *n*—machined block of cast aluminum (also known as "shoe") used on the bead unseating fixture to press against the tire sidewall. **F2663**

belt, *n—in a tire*, a breaker that substantially restricts the carcass in a circumferential direction. **F1922, F1923**

belt edge (BE) temperature, *n*—in the cross section of a radial tire, the temperature at the edge of the stabilizer plies or belts, for example, in the rubber region of the two belt edges. **F2779, F2869**

belt separation, *n*—a breakdown of bonding between the belts or plies or tread, or combination thereof. **F1922**

bias, *n*—the difference between the average measured test result and the accepted reference value; it measures in an inverse manner the accuracy of a test. **F1082**

black sidewall, *n*—a sidewall on which only black compounds comprise the outer visible surface of the tire. **F724**

block, *n*—synonym for *element*. **F1426**

bottom out, *v*—to deform a tire by radial load on the tread until radial movement of the inside surface is stopped by the rim or other tire inside surface. **F414**

braking coefficient [*nd*]**,** *n*—the ratio of the braking force to the normal force on a tire.

braking force [*F*]**,** *n—of a tire*, the negative longitudinal force resulting from braking torque application. **F403, F408**

braking force coefficient, *n—of a tire*, the ratio of braking force to normal force. **F403, F408**

braking force coefficient, peak, *n—of a tire*, the maximum value of tire braking force coefficient that occurs prior to wheel lockup as the braking torque is progressively increased. **F403, F408**

braking force coefficient, slide, *n—of a tire*, the value of braking force coefficient obtained on a locked wheel. **F 403, F408**

braking torque [ML^2/T^2] **,** *n—of a vehicle*, the negative wheel torque. **F403, F408**

brand, *n—of a tire*, the name under which one or more tire lines are marketed.

brand, tire, private, *n*—a brand name used by a tire seller or group of sellers who are not manufacturers.

break, *n*—a crack or tear extending into or through the reinforcing material. **F1922**

breaker, *n—in a tire*, one or more plies under the tread region of a tire that are additional to those which extend from bead to bead.

break-in [*L*] **,** *n*—one or more periods of initial standardized tire operation during which tire is brought to the state which will lead to more consistent test results. **F762, F1016**

calibration tire, *n*—a witness tire designed to provide a fixed or known test value for selected properties. **F1806**

candidate tire, *n*—a test tire that is part of a test program. **F1572, F1649, F1650, F1805, F1806, F1922**

candidate tire set, *n*—a set of candidate tires. **F1572, F1649, F1805, F1806**

caravan, *n—for purposes of a tire test*, two or more vehicles running in the same time frame, over the same test course(s), under similar but independent conditions. **F1922**

carcass, *n—of a tire*, the part of a tire structure that does not include the tread and sidewall rubber.

casing, *n—of a tire*, a used or treadless tire to which additional tread rubber may be attached for the purpose of retreading. **F1922**

center of tire contact, *n*—the intersection of the wheel plane and the vertical projection of the spin axis of a wheel onto the road plane.

center rib, *n*—a rib at or near the circumferential centerline of the tread band. **F1426**

center row, *n*—a row located at or near the circumferential centerline. **F1426**

center wear, *n*—a type of irregular wear characterized by a wear rate continuously increasing from shoulder to center of the tread band. **F1426**

centripetal acceleration [ML^2/T^2] **,** *n—of a vehicle*, the component of the vector acceleration (of a point in a vehicle) perpendicular to the tangent of the path of the point and parallel to the road plane.

chip and tear, *n*—a special type of irregular wear characterized by a rough tread surface which may contain cracks, abrasion pits or surface ruptures. **F1426**

circumferential line, *n—on a tire*, any real or imaginary circle on the surface of a tire, lying in a plane that is perpendicular to the spin axis. **F421, F870**

clinch strip, *n*—high-modulus or high-hardness compound applied between the carcass and the sidewall in the bead area to reinforce the bead. **F724**

cold inflation pressure, *n*—the gauge pressure of a tire, measured after equilibration at ambient temperature. **F2838**

connection point, *n*—any point on the wheel or metal loading plate where the resistance measuring instrument's leads are connected. **F1971**

contained air temperature, *n*—the temperature of the air contained within the tire cavity when the tire is mounted and inflated on the proper rim. **F2779, F2869**

control tire, *n*—a reference tire, used in a specified manner throughout a test program **F1572, F1649, F1805, F1806, F1922**

convoy, *n*—*in tire testing*, two or more vehicles running at the same time, over the same test course, under the same interdependent conditions. **F1922**

cord, *n*—*in a tire*, filament(s) or plied yarns used in making a tire ply. **F1922**

cornering force [ML^2/T^2] **,** *n*—*of a tire*, the horizontal force acting perpendicularly to the instantaneous motion vector of the center of contact for a tire operating at a slip angle.

cornering force coefficient [*nd*]**,** *n*—the ratio of cornering force to the normal force on a tire.

cornering stiffness [F/γ]**,** *n*—*of a tire*, the negative of the rate of change of tire lateral force with respect to change in tire slip angle, usually evaluated at zero slip angle.

cornering stiffness coefficient, *n*—*of a tire*, the ratio of tire cornering stiffness to tire normal force.

cornering traction coefficient, *n*—the ratio of the cornering tractive force vector and normal force.

cornering traction vector angle, *n*—the angle between the resultant cornering traction force vector and the *X*' axis.

cornering tractive force, (*F*), *n*—the vectorial sum of lateral and longitudinal tractive force components.

coverstrip, *n*—a thin layer of black compound which covers the unexposed white sidewall portion of a finished tire. **F724**

crazing, *n*—minute, closely grouped, generally superficial cracks that usually results from light activated oxidation. **F724**

critical slip angle, (rad or degree)**,** *n*—the value of the slip angle at the peak lateral force coefficient.

cross-country track, *n*—surface not subject to repeated traffic in addition, no roads, routes, well-worn trails or man-made improvements; can consist of tank trails with crushed rock or having large exposed obstacles (rocks, boulders, etc.). **F1922**

cupping, *n*—a type of irregular wear characterized by a variation in wear rate that may be periodic (essentially cycloidally shaped) around the tread band circumference in one or more rows; the variation of loss is essentially independent of individual projections if the pattern contains these projections. **F1426**

curved equivalent test severity—*in tire testing,* the test conditions (load, rotational speed, tire inflation pressure) on the flat or highway surface that will provide equivalent internal tire temperatures, for example, at the belt edge, to a known set of curved 1.707-m roadwheel surface test conditions. **F2779, F2869**

determination, *n*—the application of the complete measurement procedure to one piece, specimen or object to produce *one* numerical measured value to be used to form an average or median. **F1082**

developed footprint length [*L*]**,** *n*—the maximum footprint dimension in the circumferential direction of the tire, under stated conditions of measurement. **F870**

developed footprint width [*L*]**,** *n*—the maximum lateral dimension of a tire footprint under stated conditions of measurement. **F870**

diagonal wear, *n*—a type of irregular wear characterized by an increased wear rate region or band oriented transversely (from shoulder to shoulder) at some non-90° angle with respect to the circumferential centerline of the tread band. **F1426**

driving coefficient [*nd*]**,** *n*—the ratio of the driving force to the normal force. **F424, F1572, F1805**

driving coefficient, peak[*nd*]**,** *n*—the maximum value of the driving coefficient. **F424**

driving force, [*F*]**,** *n*—*of a tire*, the positive longitudinal force resulting from the application of driving torque. **F424, F1572, F1805**

driving torque [ML^2/T^2] **,** *n*—*of a wheel*, the positive wheel torque. **F424**

effective rolling radius, *n*—the ratio of the linear velocity of the wheel center of the free rolling tire in the X' direction to the spin velocity. **F424**

element, *n*—an isolated (totally bounded by void) projection. **F421, F762, F870, F1426**

endurance, *n*—*of a tire,* the ability of a tire to perform as designed in its intended usage conditions such as load, inflation pressure, speed, time, and environmental conditions. **F2779, F2869**

fastest wearing groove [*L*]**,** *n*—the circumferential groove with the minimum life expectancy. **F1016**

fastest wearing location [*L*]**,** *n*—that location which exhibits the highest percent tread (depth) loss (as calculated in 6.1.1 of Practice F1016). **F1016**

feathering, *n*—a type of element irregular wear characterized by thin strips of rubber extending from the edge of the element. **F1426**

flange, *n*—that part of the rim which gives lateral support to the tire.

flex cracking, *n*—cracking primarily caused by application of mechanical stress-strain cycling. **F724**

footprint area [L^2]**,** *n*—the gross contact area of a tire that is loaded (under stated conditions) against a smooth flat surface. **F870**

free rolling tire, *n*—a loaded tire rolling without applied driving or braking torque. **F424**

front end breakaway, *n—in cornering vehicle*, the point in the curved trajectory of a vehicle when it can no longer be maintained on its intended path because of front wheel departure toward the outside of the curve.

***g*,** *n*—a unit of acceleration where 1 *g* is equal to the acceleration of gravity, 9.8 m/s^2 (32.2 ft/s^2). **F811**

global testing, *n*—testing conducted at two or more laboratories or test sites for the purpose of comparing candidate tire performance at each location for selected characteristic properties. **E1806**

gravel road, *n*—two lane, all-weather, occasionally maintained, hard or loose surface (for example, large rock, paved, crushed rock, gravel) intended for medium-weight, low-density traffic, in accordance with the U.S. Federal Highway Administration. **F1922**

grooming, *v—in tire testing*, mechanically reworking a snow test surface in order to obtain a surface with more consistent properties. **F1572, F1805**

groove, *n*—a void that is relatively narrow compared to its length. **F414, F421, F762, F870, F1046, F1426, F1922, F1923**

groove, average depth [*L*]**,** *n*—the average of all tire groove depth measurements in a single groove. **F421, F762, F1016, F1046**

groove (void) area [L^2]**,** *n*—that portion of tire footprint area which is not contacted by ribs or elements. **F762, F870**

groove (void) area fraction [*nd*]**,** *n*—the ratio of the groove (void) area to the footprint area of a tire. **F870**

groove (void) depth [*L*]**,** *n*—a measurement of the perpendicular distance from a real or calculated reference plane defined by edges of two adjacent ribs (lugs) to the lowest point of contact in the groove (void). **F421, F762, F1046, F1922, F1923**

gyro-stabilized accelerometer, *n*—a precision vertical gyroscope fitted with one to three accelerometers to provide orthogonal measurements referenced to the earth-fixed axis system. **F811**

heel-toe wear, *n*—a type of irregular wear characterized by different wear rates at the leading and trailing edges of a projection (element). **F1426**

high speed performance, *n—of a tire,* the rotational speed capability of a tire to perform as designed in its intended usage conditions such as load, inflation pressure, speed, time, and environmental conditions. **F2779, F2869**

highway equivalent test severity—*in tire testing,* the test conditions (load, rotational speed, tire inflation pressure) on the 1.707-m roadwheel that will provide equivalent internal tire temperatures, for example, at the belt edge, to a known set of highway or flat surface conditions. **F2779, F2869**

hot inflation pressure, *n*—the gauge pressure of a tire after equilibration in an oven, measured between 60 and 80 min after removal from oven. **F2838**

ice, dry, *n*—smooth ice without loose surface materials. **F1572, F1805**

inclination angle, *n—of a tire*, the angle between the *Z*′-axis and the wheel plane. **F424**

inflation gas, *n*—the specific filling medium used to pressurize the tire cavity and maintain a specified gauge pressure (for example, oxygen/nitrogen gas mixture, air). **F2838**

inflation pressure loss rate, *n*—rate of change of normalized inflation pressure, determined from the slope of the linear portion of the log pressure versus time curve. **F1112**

inner liner, *n— of a tire*, the innermost layer(s) of a tubeless tire that limit(s) diffusion of the inflation medium into the carcass.

intended trajectory, *n*—the intended or ideal path (rectilinear or curvilinear) to bring a vehicle to a stop, that is, under controlled angular orientation. **F1649**

intermediate rib, *n*—one or more rib(s) located between the centerline and the shoulder ribs of the tread band. **F1426**

intermediate row, *n*—a row located between the circumferential centerline and the shoulder ribs/rows of the tread band. **F1426**

inter-projection wear, *n*—a type of irregular treadwear characterized by different wear rates on one or more adjacent projections (either transverse or circumferential orientation); this results in a step-off in tread depth between the adjacent projections. **F1426**

intra-projection wear, *n*—a type of irregular wear characterized by a different wear rate at two or more locations within a given projection. **F1426**

inverse wear rate [*nd*]**,** *n*—the distance traveled by a tire, after break-in, per unit loss in tread depth. **F1016**

irregular wear, *n*—a type of treadwear characterized by substantial variations of tread loss both from projection to projection and frequently from point to point on a given projection. **F421, F762, F1426**

juncture, *n*—the interface between two different tire components or different compounds within the same component. **F724**

juncture cracking, *n*—a crack with opening originating at a juncture between two components. **F724**

juncture opening, *n*—a separation developing in a juncture. **F724**

kerf, *n*—synonym for *sipe*. **F870**

lateral force [*F*]**,** *n—of a tire*, the component of the tire force vector in the *Y*′ direction. **F403, F424**

lateral force coefficient, *n—of a tire*, the ratio of lateral force to normal force.

lateral groove, *n*—a groove that has its long dimension oriented at a direction non-parallel to the tire circumferential

centerline; it most frequently opens into a void at both ends. **F870, F1426**

light truck tire, *n*—a tire that has a "LT" prefix or suffix in the tire size description: this indicates that the tire was primarily intended for service on light trucks with gross vehicle weights (GVWR's) <4536 kg. **F2869**

line, *n—of a tire*, a group of similar tires of different sizes but common construction type (bias, belted bias or radial) all with a common tire name.

line, neutral, *n—of a tire*, a line of tires to which a brand name may be added after their manufacture.

load index, *n*—a numerical code associated with the maximum load a tire can carry at the speed indicated by its speed symbol under specified conditions. **F1923**

load range, *n*—a letter designation (A, B, C, D) or, for P-metric tires, standard load (SL) or extra load (XL), used to identify a given size tire with its load and inflation limits when used in a specific type of service. **F414, F1922**

load range, *n—of a light truck tire,* a letter designation (B, C, D, E) used to identify a given size tire with its load and inflation limits when used in a specific type of service. **F2869**

load range, *n—of a truck-bus tire,* a letter designation (F, G, H, J, L, M) used to identify a given size tire with its load and inflation limits when used in a specific type of service. **F2779**

load rating [*M*]**,** *n*—the maximum load a tire is rated to carry for a given usage at a specified cold inflation pressure. **F414, F1922**

loaded radius [*L*]**,** *n—of a tire*, the wheel plane distance from the center of tire contact in the footprint to the wheel center, specified as a static or dynamic (rolling) measurement.

load symbol, *n*—a code associated with the maximum load a tire can carry at the speed indicated by its speed symbol under specified conditions. **F1923**

local testing, *n*—testing conducted at one laboratory or test site for the purpose of comparing a number of candidate tires for selected characteristic properties. **F1806**

lockup, *n—of a wheel*, the condition of a wheel in which its rotational velocity about the wheel spin axis is zero and it is prevented from rotating in the presence of applied wheel torque. **F408**

longitudinal force [*F*]**,** *n—of a tire*, the component of the tire force vector in the *X*' direction. **F403, F408, F424, F1805**

longitudinal groove, *n*—an endless groove that has its major (long) dimension substantially parallel to the tire circumferential centerline; the walls of the groove may not be perfectly parallel planes, but may have short alternating sections of the wall at angles to the tire circumferential centerline. **F1426**

longitudinal slip velocity [*L/T*]**,** *n*—the effective rolling radius multiplied by the difference between the spin velocity (in rad/unit time) of a driven or braked tire and that of a free rolling tire when each is traveling in a straight line. **F424, F1572, F1805**

manufacturer, *n— of a tire*, the name of a company or wholly owned subsidiary making the tire.

master set, *n*—a selected group of witness tires, each with different test response characteristics to provide a range of values for the measured property or properties. **F1806**

maximum load rating [*M*]**,** *n—of a passenger tire* the load rating at the maximum permissible cold inflation pressure for that tire. **F414**

maximum plunger travel, [*L*]**,** *n—in tire testing*, the relative displacement of tread surface by a plunger, measured from the point of initial contact of the plunger with the tread surface to the point of maximum force at rupture or at the bottom-out point. **F414**

maximum rated load, *n*—the load corresponding to the maximum tire load capacity at the rated inflation pressure in accordance with the publications of tire and rim standards current at the time of manufacture. **F2779, F2869**

measured inflation pressure, *n*—gage pressure of a tire measured at a given time under ambient temperature and barometric pressure. **F1112**

measurement interval, *n*—the distance travelled, in kilometres (miles), between two successive groove (void) depth measurements. **F762**

measuring rim, *n*—any 'rim' with a width as specified for the design or measuring rim for a particular tire size designation, and with the 'bead' seat and flange dimensions in accordance with publications of tire and rim standards organizations current at the time of manufacture. **F2663**

nominal plunger energy $\frac{1}{2}$ **[ML^2/T^2],** *n—in tire testing*, one half of the product of a peak force (required to rupture the tire structure in tread area) and maximum plunger travel into a tire at the time of rupture. **F414, F1923**

normal force [*F*]**,** *n—of a tire*, the component of a tire force vector in the *Z*' direction. **F403, F408, F424**

normalized inflation pressure, *n*—measured pressure of a tire adjusted, according to the ideal gas law, to the nominal test temperature and one atmosphere barometric pressure. **F1112**

notch, *n*—a groove smaller in both width and length than a lateral groove that contains one closed end. **F870, F1426**

orthogonal trajectory deviation, *n*—the perpendicular deviation or distance from the center of the vehicle to the TGL at the end of a stopping test. **F1649**

outside diameter, *n*—the maximum diameter of a tire when it is mounted and inflated. **F1502, F1922, F1923**

overall width, *n*—the maximum cross-sectional width of a tire, including protective or decorative ribs. **F1502, F1922, F1923**

overturning moment [*FL*], *n—of a tire*, the component of a tire moment vector tending to rotate a tire about the *X*'-axis, positive clockwise when looking in the positive direction of the *X*'-axis. **F403, F424**

paved road, *n*—two or more lanes, all-weather, maintained, hard surface roads with good driving visibility used for heavy and high-density traffic, in accordance with the U.S. Federal Highway Administration. **F1922**

peak braking coefficient [*nd*], *n—of a tire,* the maximum value of the braking coefficient that occurs prior to wheel lockup as the braking torque is progressively increased; this measure is influenced by operating conditions.

pie disk, *n—in tire X-ray testing*, a circular disk of a specified diameter having six pie-shaped sections, each containing cords of different materials; it is used for demonstrating the discernment capability of an X-ray imaging system. **F1035**

pitch, *n*—a unit of tread pattern elements used in various combinations to obtain optimum noise levels. **E1136, F2493**

pitch angle, (rad or degree), *n—in a vehicle*, the angle between its *X*-axis and the ground plane.

ply rating, *n*—the term is used to identify a given tire with its maximum recommended load when used in a specific type of service, giving an index of tire strength, not necessarily representing the number of cord plies in the tire. **F1923**

plowing, *n—in tire testing*, a type of uncontrollability defined by a loss of steering control with no substantial vehicle yaw; the vehicle moves on a trajectory that is dictated by vehicle dynamics as determined by velocity, mass, and the available traction at each tire. **F1649**

plunger, *n—in tire testing*, a cylindrical rod with a hemispherical end. **F414**

ply, *n—in a tire*, a layer of rubber-coated parallel cords. **F1923**

ply ending (PE) temperature, *n*—in the cross section of a radial tire, the temperature at the higher turn-up end of the body ply, for example, in the apex component region of the ending. **F2779**

precision, *n*—a measurement concept that expresses the ability to generate test results that agree with each other in absolute magnitude. **D4483, E691**

projected treadlife [*L*], *n*—the test distance that gives *h* as the average tread depth; where *h* is the height of treadwear indicator above groove (or void) base. **F1016**

projection, *n*—a pavement contacting area of the tread band, bounded by void. **F421, F762, F870, F1426**

rated inflation pressure, *n*—the minimum cold inflation pressure specified at the maximum rated load of a tire in accordance with the publications of tire and rim standards current at the time of manufacture. **F2779, F2869**

reference tire, *n*—a special tire included in a test program; the test results for this tire have significance as a base value or internal benchmark. **F1572, F1649, F1805, F1806**

regular wear, *n*—synonym for *uniform wear*. **F1426**

repeatability, *r*, *n*—an established value, below which the absolute difference between two" within-laboratory" or "within test-site" test results may be expected to lie, with a specified probability. **D4483, E691**

repeatability, relative (*r*), *n*—a repeatability estimate expressed as percentage of the average of the property for which the estimate was obtained. **D4483, E691**

replicate, *n*—either (1) an individual test object from a sample of *n* objects or (2) one of *m* individual test values for a test object. **F1806**

replication, *v*—the act of selecting and testing a number of replicates. **F1806**

reproducibility, R, *n*—an established value, below which the absolute difference between two "between-laboratory" or "between test-site" test results may be expected to lie, with a specified probability. **F1082**

reproducibility, relative (*R*), *n*—a reproducibility estimate expressed as percentage of the average of the property for which the estimate was obtained. **F1082**

resultant traction force [ML/T^2], *n*—the vector sum of lateral and longitudinal traction forces.

rib, *n*—a continuous circumferential projection. **F421, F762, F870, F1426, F1923**

rib or element area [L^2], *n*—that area within the outer periphery of a tire footprint that is contacted by ribs or elements. **F870**

rim, *n*—the specially shaped circular periphery to which a tire may be mounted with appropriate bead fitment. **F1971**

rim strip, *n*—a layer of compound, with or without fabric reinforcement, that is applied at the bead to protect the carcass plies against damage from mounting tools and from rim chafing during service. **F724**

rim, test, *n*—a rim having the configuration and dimensions suitable for use with a test tire in accordance with publications of a tire and rim standards organization current at the time of tire manufacture.

roll, *v—in a vehicle*, the angular motion of a vehicle about its longitudinal axis through the center of gravity.

roll angle, (rad or degree), *n—in a vehicle*, the angle between the vehicle y-axis and the ground plane.

rolling resistance moment, [*FL*], *n—of a tire*, the component of a tire moment vector tending to rotate a tire about the *Y*'-axis, positive clockwise when looking in the positive direction of the *Y*'-axis. **F403, F424**

rotation plan, *n—in tire testing*, the scheduled change of wheel positions for all tires on a vehicle, and between vehicles in a convoy, and scheduled change of vehicle position in a convoy during a road test as appropriate. **F762**

row, *n*—a rib or a continuous collection of elements that lie on a circumferential line parallel to the circumferential centerline of the tread band. **F1426**

row/rib wear, *n*—a type of irregular wear characterized by a greater wear rate in one or more rows/ribs; the increased wear rate may occur at one or more circumferential locations in (on) a given row/rib and is independent of (ie. occurs across) individual projections resulting in a step-off in tread depth between adjacent rows/ribs. **F1426**

sample, *n*—a selected number of *n* test objects that accurately represent the lot or population of interest. **F1806**

sampling, *v*—the act of selecting samples. **F1806**

secondary road, *n*—two lane, occasionally maintained, hard or loose surface (for example, large rock, paved crush rock, gravel, soil aggregate) intended for medium-weight, low-density traffic, in accordance with the U.S. Federal Highway Administration. **F1922**

section height [*L*]**,** *n*—the radial height of a tire section, expressed as one half the difference between the outside diameter of the unloaded tire and the nominal rim diameter; the outside diameter is measured on a tire-wheel assembly with the tire inflated to rated inflation pressure.

section width, *n*—the width of a new tire, including 24-h inflation growth and including normal sidewalls, but not including protective side ribs, bars, or decorations. **F1922**

servo accelerometer, *n*—an accelerometer containing servo mechanisms, electronics, and a seismic element to sense inertial reaction. **F811**

set, *n—in tire testing*, a selected number of test or control tires having nominally identical properties.

shearogram/hologram, *n*—the common term for an interferometric image provided by S/H systems. **F1364**

shearographic or holographic (S/H) systems, *n*—a shearographic or holographic system using interferometric laser imaging to nondestructively inspect tires. **F1364**

shoulder, *n—of a tire*, that region of a tire formed by the conjunction of the tread and sidewall.

shoulder rib, *n*—a rib at or near the outer edge or shoulder of the tread band. **F1426**

shoulder row, *n*—a row located at or near the shoulder of the tread band. **F1426**

shoulder wear, *n*—a type of irregular wear characterized by an increased wear rate in the outer edge of the shoulder rib or row compared to the inner shoulder edge. **F1426**

sideslip angle, (rad or degree)**,** *n—in a vehicle*, the angle between the projection of a test vehicle's longitudinal axis on the road plane and the velocity vector at some specified point in the test vehicle.

sidewall, *n—of a tire*, that portion of a tire between the tread and the bead. **F724, F1922, F1923**

sidewall component, *n*—an individual part of the sidewall construction, either a separate compound or a separately assembled piece. **F724**

sidewall rubber, *n*—the exterior rubber layer of a tire that extends over the sidewall part of the carcass. **F724**

sipe, *n*—a molded or cut rectangular void which is substantially narrower than the major grooves or voids. **F870, F1426**

skid number (*SN*)**,** *n*—slide braking coefficient multiplied by 100. **F408**

sliding braking coefficient, *n—of a tire*, the braking coefficient for a non-rotating tire that occurs after wheel lock-up.

slip angle, *n—of a tire*, the angle between the *X*'-axis and direction of travel of the center of tire contact. **F424**

slip angle, critical, *n*—the value of the slip angle at the maximum of lateral force coefficient.

snow, hard pack, *n—in tire testing*, packed base without loose snow. **F1572, F1805**

snow, medium hard pack, *n*—in tire testing, packed base with some loose snow **F1572, F1805**

snow, medium pack, *n—in tire testing*, groomed packed base with 2.5 to 5.0 cm (1 to 2 in.) loose snow. **F1572, F1805**

snow, soft pack, *n—in tire testing*, freshly fallen or deeply groomed base snow with 5.0 to 7.5 cm (2 to 3 in.) loose snow. **F1572, F1805**

specified design section width, *n*—the width specified in the publications of tire and rim standards organizations current at the time of manufacture for a new tire of that size designation and type when inflated on its "measuring rim." **F2663**

spin axis, *n—of a wheel*, the axis of rotation of a wheel. **F424**

spin velocity, *n*—the angular velocity of the wheel about its spin axis. **F424, F1572, F1805**

spinout, *n—in tire testing*, a type of uncontrollability defined by a loss of steering control due to rapid or substantial yaw, or both. **F1649**

splice, *n*—the joint formed either by overlapping or butting the ends of a given tire component in the course of assembling the tire. **F724**

splice crack, *n*—a crack originating at a splice. **F724**

splice opening, *n*—a parting of a splice along the interface of the assembled ends of a given component. **F724**

split-μ test , *n*—a wet traction or stopping distance test conducted on a test course with substantially different wet friction levels for the left and right tire test lanes. **F1649**

standard reference test tire, (SRTT), *n*—a tire that is used as a control tire or surface monitoring tire (for example, Specification, E1136, F1572, F1649, F1650, F1805, F1806,

F2493, F2870, F2871, and F2872 tires). **E1136, F1572, F1649, F1650, F1805, F1806, F2493, F2870, F2871, F2872**

steering wheel angle, (rad or degree), *n—in a vehicle*, the angular displacement of the steering wheel, measured from its orientation in the vehicle's straight-ahead position.

step wear, *n*—a synonym for *row/rib wear*. **F1426**

stopping distance, *n*—the path distance (rectilinear or curved) needed to bring a vehicle to a stop from some selected initial brake application speed. **F1649**

strain gage accelerometer, *n*—an accelerometer using strain gages to sense the motion of the seismic element. **F811**

straining block, *n*—a test block containing a number of anomalies that is capable of simulating an anomaly in a tire. **F1364**

straining block holding fixture, *n*—a device for holding one or more straining blocks in the S/H system during the calibration process. **F1364**

surface monitoring tire, *n*—a reference tire used to evaluate changes in a test surface over a selected time period. **F1572, F1649, F1805, F1806**

test (or testing), *n*—a procedure performed on an object (or set of nominally identical objects) using specified equipment that produces data unique to the object (or set). **F1572, F1649, F1805, F1806**

test cycle, *n—in tire testing*, one complete circuit of the specified test course. **F762**

test distance, *n*—distance traveled by a vehicle after tire break-in. **F1016**

test inflation pressure, *n*—specified gage pressure of a tire mounted on a rim, measured at a given time under ambient temperature and barometric pressure for evaluation purposes. **F2779, F2869**

test load, *n*—the force applied to a tire through the rim; it is normal to the metal loading plate onto which the tire is loaded. **F1971**

test matrix, *n*—a group of candidate tires usually with specified reference tires; all tests are normally conducted in one test program. **F1572, F1806**

test program, *n*—an ordered series of tests grouped together using a predefined plane. **F1806**

test result, *n*—the average or median of a specified number of determinations; it is the reported value for a test. **F1082**

test run, *n*—a single pass of a loaded tire over a given test surface. **F403, F408, F424, F1649, F1805, F1860**

test tire, *n*—a tire used in a test. **F1572, F1649, F1650, F1805, F1806**

test tire set, *n*—one or more test tires as required by the test equipment or procedure, to perform a test thereby producing a single test result. **F1572, F1649, F1805, F1806**

tire, *n*—a load-bearing ground-contacting circumferential attachment to a vehicle wheel. **F1922, F1923**

tire axis system, *n*—the origin of the tire axis system is the center of the tire contact where the *X*'-axis is the intersection of the wheel plane and the road plane with a positive direction forward, the *Z*'-axis is perpendicular to the road plane with a positive direction downward, and the *Y*'-axis is in the road plane, its direction being chosen to make the axis system orthogonal and right-hand. (See Fig. 1.) **F403, F408, F424**

tire, belted bias, *n*—a bias tire containing a belt.

tire, bias, *n*—a pneumatic tire in which the ply cords that extend to the beads are laid at angles substantially less than 90° to the center line of the tread. **F1922**

tire electrical resistance, *n*—the electrical resistance (in ohms) measured between the wheel of a mounted and inflated tire-wheel assembly and a metallic plate onto which the tire is loaded at a specified load. **F1971**

tire forces [*F*], *n*—the external forces acting on a tire by the road. **F403, F408, F424**

tire moments [*FL*], *n*—the external moments acting on the tire by the road. **F403, F424**

tire, oven-aged, *n*—a tire that has been subjected to accelerated laboratory aging in an elevated temperature environment. **F2838**

tire, pneumatic, *n*—a hollow tire that becomes load-bearing upon inflation with air, or other gas, to a pressure above atmospheric. **F414**

tire, radial, *n*—a pneumatic tire in which the ply cords that extend to the beads are laid substantially at 90° to the center line of the tread, the tire being stabilized by a belt. **F1922**

tire, snow (also mud and snow tire), *n*—a pneumatic tire designed for, or shown to have, good traction on roads covered with mud or snow.

tire speed rating, *n*—the maximum speed for which the use of the tire is rated under certain conditions as designated by the speed symbol marked on the tire sidewall or maximum speed rating as determined by the manufacturer. **F2779, F2869**

tire test speed, *n*—the tangential speed at the point of contact with the road or curved surface of a rotating tire for evaluation purposes. **F2869**

tire weight, *n*—the weight of an unmounted tire without tube or flap. **F1502**

torque [*FL*], *n—of a wheel*, the external torque applied to a tire from a vehicle about the wheel spin axis. **F403, F408, F424**

total or gross-contact area [L^2], *n*—that area encompassed by the outer periphery of a tire footprint. **F870**

traction test, *n*—in tire testing, a series of *n* test runs at a selected operational condition; a traction test is characterized

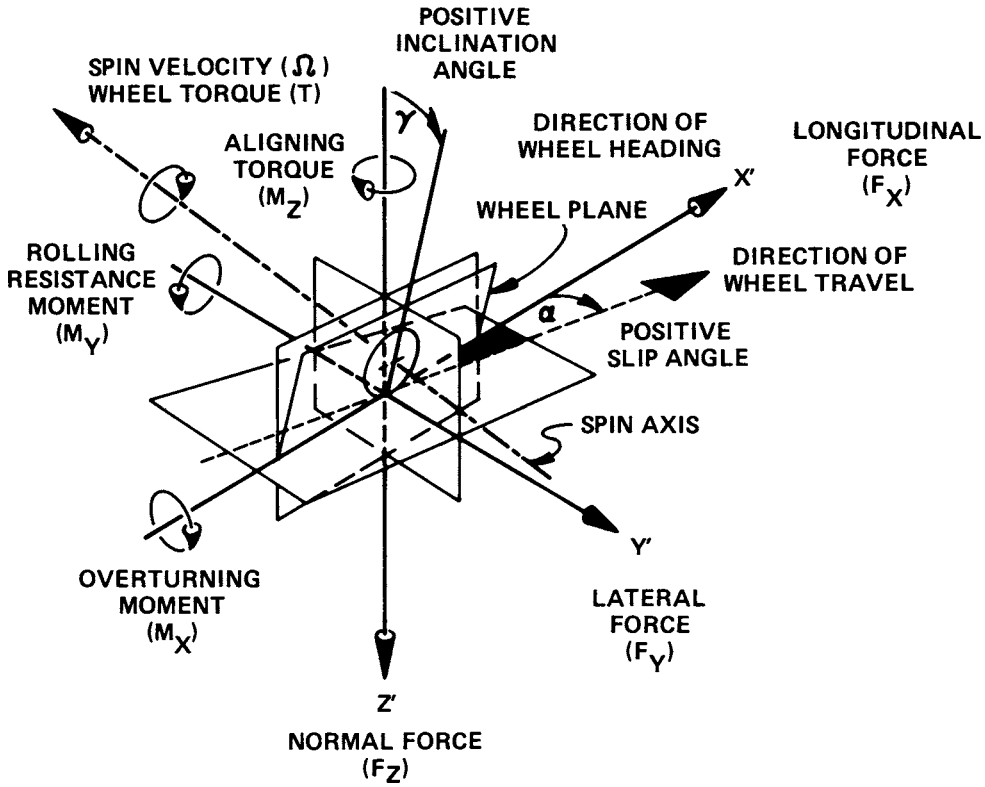

FIG. 1 Tire Axis System

by an average value for the measured performance parameter. **F1649, F1650, F1805**

traction vector angle, (rad or degree), *n*—the angle between the resultant traction force vector and the *X*'-axis.

tractive force coefficient, *n—of a tire*, the ratio of tractive force to normal force on a tire footprint.

trajectory, *n*—the rectilinear or curvilinear path of a vehicle during a stopping maneuver; it is defined by the center of gravity and the transient angular orientation of the vehicle. **F1649**

trajectory guide line (TGL), *n*—the centerline marked on the test course pavement that constitutes the intended trajectory; it is used by the driver to guide or steer the vehicle on its intended path. **F1649**

tread, *n—of a tire*, the part of a tire that comes in contact with the ground. **F414, F1922, F1923**

tread arc width, *n*—the length of the arc measured from one extreme of tread design proper to the opposite extreme; that is, from shoulder to shoulder perpendicular to the circumferential center line. **F1502, F1922**

tread band, *n*—an annular volume of rubber that encompasses the outer pavement contacting periphery of a tire; the width is normally much greater than the thickness, and both of these dimensions vary with tire size. **F1426**

tread centerline (CL) temperature, *n*—in the cross section of a radial tire, the temperature under the center of the tread region, for example, at the bottom region of the tread rubber component. **F2779**

tread depth [*L*], *n*—synonym for *groove (void) depth.* **F421, F762, F1046, F1923**

tread depth average, *n— in a single tire*, the average of all tire groove (void) depth measurements. **F762**

tread hardness, *n*—the hardness of an element in the tread design as measured by a designated standard gage. **F1502**

treadlife, *n*—the distance required to produce wear-out.

tread radius, *n*—the radius of a circle whose arc best fits the tread surface when radius template used is held perpendicular to the circumferential center line of an inflated tire. **F1502, F1922**

treadwear indicator, *n*—a raised portion of a groove bottom or a void bottom that is molded in a tire at fairly regular intervals around the circumference to provide a visual indication that most of a tread has been worn away. **F421, F1046**

truck-bus tire, *n*—a tire that is intended for service on commercial truck-bus vehicles. **F2779**

uncontrollability, *n*—any deviation of the vehicle from the intended trajectory (TGL) during or at the end of a test, or both. **F1649**

uniform wear, *n*—a type of treadwear characterized by equal tread loss both from projection to projection and from point

to point on a given projection, resulting in a smooth appearance of all parts of the tread pattern. **F421, F1426**

unseating, *v*—the dislodgment of the bead area of a tire from the portion of the rim designed to hold the bead in place resulting in loss of inflation pressure. **F2663**

veneer, *n*—a thin layer of rubber covering the surface of the tire sidewall. **F724**

vertical load, *n*—the normal reaction of the tire on the road which is equal to the negative of normal force. **F403, F408, F424, F1572, F1805**

void, *n*—a volume (in the tread band) defined by the lack of rubber; the depth dimension of this volume may vary from point to point in (on) the tread band. **F414, F421, F762, F870, F1046, F1572, F1426**

wear-out, *n*—a tire condition where any point on the tread is reduced to a depth equal to the height of treadwear indicator.

wear performance index, *n*—a calculated value that relates the wear performance of a candidate tire to that of a control tire tested in the same test; it may be calculated on the basis of either percent loss or rate of tread wear.

weather cracking, *n*—distinct surface cracks induced by action of ozone in those areas of sidewall that are under tension; the cracks usually form perpendicularly to the direction of stress. **F724**

wheel, *n*—a rigid structure consisting of a rim connected to a central disk that permits rotationally centered attachment to an axle. **F1971**

wheel center, *n*—the point at which the spin axis of a wheel intersects the wheel plane.

wheel plane, *n*—the central plane of a tire that is mounted on the wheel, normal to the spin axis. **F403, F424**

wheel torque, *n*—the external torque acting about the spin axis. **F424**

white sidewall, *n*—a sidewall which contains a white (or light colored) compound as a part of the total sidewall. **F724**

witness tire, *n*—a reference tire with an extended period of stability for specified characteristic properties. **F1806**

X-ray image plane, *n—in tire testing*, a surface located at a specified distance from the X-ray tube "focal spot." **F1035**

X-ray imaging system, *n—in tire testing*, a collection of the components and subsystems needed to produce a fluoroscopic or radiographic image of the tire. **F1035**

X-ray radiograph, *n*—an X-ray film, plate, or paper that is placed at the image plane and is used for recording an X-ray image of the object being examined. **F1035**

X-ray screen, *n*—a fluorescent screen, placed at the image plane, that produces an X-ray image of the object being examined. **F1035**

yaw, *n—in a vehicle*, the angular motion of a vehicle about its vertical axis through the center of gravity. **F1649**

yaw velocity, *n*—the magnitude of the yaw (rotation or angular displacement); it may be measured by fore and aft, vehicle versus pavement, velocity sensors. **F1649**