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Land Vehicle Tire Qualification

Feb 26, 2008

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LAND VEHICLE TIRE QUALIFICATION



- Qualification for Land Vehicle Tires for Tire Privatization Initiative (TPI) Contract
- Classifications
 - SAE J2014 / Manufacturer's Approved Part No.
 - Cooperative Approved Tire List (CATL)
 - Product Description (ZZ-T-391, ZZ-T-410, ZZ-T-1619)
- Qualification Process Dependent upon Classification
- Vehicle qualification testing inherently qualifies OEM tire for that vehicle system
- Replacement tires qualified via testing requirements per classification

SAE J2014 / Manufacturer's Approved Part No. Tire Qualification Process

- Need or interest established for additional tire source for vehicle system*
- Testing criteria defined based on vehicle performance requirements (Vehicle Mission Profile, Military Requirements, etc.)*
- Testing funded by tire manufacturer unless Govt. determines critical need for second source*
- SAE J2014 test costs prohibitive (est. \$1M -\$2M)*
- Upon successful completion of testing/PM approval, tire P/N added to specific NSN*

SAE J2014:

- Society of Automotive Engineers' specification
- Pneumatic Tires for Military Tactical Wheeled Vehicles
- Developed by SAE Military/Industry Tire Technology Subcommittee
- Describes test and test methodology to evaluate tire and tire/vehicle related performance
- Tests required based on vehicle system and mission profile
- Used as basis for procurement for military vehicles

SAE J2014:

- Tire Traction 4.6
- Vehicle Evasive Maneuver 4.7
- Bead Unseating 4.8
- Rolling Resistance 4.9
- Dimensional Criteria 4.10
- Ride Handling and Stability 4.11
- Mechanical Reliability 4.13
- Tire Treadlife Durability 4.14
- Comparative Stopping Distance 4.15
- Tire Single Wheel, Skid-Resistance 4.16

SAE J2014 4.6 Tire Traction

- Traction performance of candidate tire relative to reference tire.*
- Mud / Sand /Snow*
- No less than 95% of reference tire.*

SAE J2014 4.7 Vehicle Evasive Maneuver

- NATO Lane Change*
- Wet /Dry Pavement*
- Comparison to reference tire*
- Mixed Fitment (reference tire & candidate tire on same vehicle)*

SAE J2014 4.8 Bead Unseating

- Determine tire/rim slip, air loss or bead unseating at minimum recommended inflation pressure*
- Figure 8 course*
- Sand (moisture content less than 2.0%, cone index 100 @ 3 in)*
- Candidate tires not lower than 1 psi air loss (same as reference)*

SAE J2014 4.9 Rolling Resistance

- In Accordance with SAE J1269*
- Rolling Resistance Coefficient of candidate tire not exceed reference tire by more than 5%*

SAE J2014 4.10 Dimensional Criteria

- Measurements of Candidate Tire compared to Reference*
- Overall diameter, section width, weight, revolutions per mile, bead width
- Additional: deflection, spring rate, footprint at various loads/inflations
- Comply with T&RA or ETRTO
- Meet requirements for compatibility with reference tire

SAE J2014 Ride Handling and Stability 4.11

- Candidate tire must provide acceptable ride, handling and stability characteristics*
- Various course profiles specific to mission profile*
- Jury Ride evaluation equal or above reference tire rating (may be supplemented by instrumented data)*

SAE J2014 4.13 Mechanical Reliability

- Tire durability in off-road conditions
- Durability course: washboard (1 in to 4 in amplitude)
 - rock terrain (3 in to 6 in, protruding 1 in to 6 in)
 - cross-country (hills/curves with embedded stones)
- 2400 miles duration (Inspection every 600 miles)
- Criteria:
 - Candidate tire must exceed 95% of reference tire mileage
 - Candidate tire: less than two like failures or less than reference tire
 - Candidate tire equal to better than reference tire in Performance (*heel/toe wear, chunking, cutting ,stone retention, physical appearance*)

Failure Criteria:

- Broken or displaced belts or breakers*
- Tread separation exposing casing
- Ply separation
- Bead damage / separation
- Severe open splices and/or liner separations
- Tire induced loss of air
- Exposed or broken casing
- Bulges in tread or sidewall

SAE J2014 4.14 Tire Treadlife Durability

- 10000 miles duration
- Evaluate tread wear performance of candidate tire*
- Measurements after 100 mile break-in, each 1250 miles*
 - Tread depth at centerline & shoulder*
 - Diameter, section width, tread arc width*
- Conducted on courses required for mission profile*

Criteria:

- Candidate tire exceeds 95% of reference tire mileage*
- Candidate tire less than two like failures or less than reference tire*
- Candidate tire equal or better than reference in Performance (heel/toe wear, chunking, cutting, stone retention, physical appearance)*

SAE J2014 4.15 Comparative Stopping Distance

- Comparison of stopping distance of candidate with reference tire.*
- Wet / Dry Surface
- Candidate tire stopping distance no more than 5% greater than reference tire
- Mixed Fitment

SAE J2014 4.16 Tire Single Wheel, Skid-Resistance

- Candidate tire on test rig vehicle*
- ASTM E274
- Candidate tire peak and slide performance no less than 95% of reference tire*

Other tests may be required in conjunction with SAE J2014 or specific to the vehicle system

Run flat test

- Performance of tire as part of tire/wheel/run flat system

Steady State Handling SAE J2181

- 200 ft diameter course
- Understeer gradient

Thermal Profiling

- Temperature measurements at centerline / belt edge

Backward Stability ANSI B30.5c

- Crane Application

- CATL offers a list of approved tires qualified through limited testing
- CATL 1922 – Highway Tires
- CATL 1923 – Off Road Tires
- Grouped by Application (passenger, truck, etc.)
- Approved Manufacturers with tire brands listed

- Historically, CATL used by government agencies when purchasing tires and retreads
 - Department of Defense (Land Vehicle Contract)
 - U.S. Postal Service
 - Department of the Interior
 - State, city and local governments
- Competitive within the approved sources
- DOD Land Vehicle Contract (138 NSNs)
- More cost effective than to test every NSN

Key Roles and Responsibilities

- The DLA Defense Supply Center Columbus (DSCC) has overall management responsibility.
- TARDEC has technical responsibilities which include:
 - test site and test plan approval
 - review and approval of test results
 - notification to DLA of qualifications/changes.

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Address: TARDEC Team Tactical Vehicles & Tires

AMSRD-TAR-E/TACT MS: 267

Warren, MI 48397-5000

Standards Used

- ASTM F-1922, Standard, Test Method for Highway Tires
- CTQP-AM-1922 Administrators Manual for Highway Tire Tests

Test Requirements

- 20,000 miles - highway with limited gravel for certain applications
- Reference tires run on the same vehicle at the same time as candidate tires
- Tread Depth measurement of reference and candidate tires taken at specified intervals
- Candidate tires must complete the test and tread wear projections must be at least 95% of that of the reference tire

CATL 1922 Tires

Groups

- Group 1, passenger car tires
- Group 2, light truck tires
- Group 3, medium and heavy truck/bus tires, and Special Application tires

CATL-1922, April 2007

GROUP 1, PASSENGER CAR: NEW TIRES

BRIDGESTONE/FIRESTONE (U.S.A.) INCORPORATED BRANDS

- TEST QUALIFICATION REFERENCE: ACTS-CATL-T1-1/98-051
- QUALIFICATION EXPIRATION DATE: 28 OCTOBER, 2010
- QUALIFIED PRODUCTION POINTS: ALL BRIDGESTONE/FIRESTONE CORP. TIRE MANUFACTURING FACILITIES

GOVERNMENT ITEM NO.	MODEL/BRAND DESIGNATION	CLASS	CODES
BRIDGESTONE BRANDS:			
X1.2.2	"S402"	a/s	AP, PS
X1.2.3	"BLIZZAK WS-15"	s/t	AP, PS
X1.2.5	"S375"	r/t	AP/ PS
X1 .2.6	"POTENZA RE900"	a/s	AP, PS
X1 .2.7	"POTENZA S-02"	r/t	AP, PS
X1.2.8	"POTENZA RE71"	r/t	AP, PS
X1 .2.9	"POTENZA RE940"	a/s	AP, PS
X1.2.10	"POTENZA RE930"	a/s	AP, PS
X1.2.11	"POTENZA RE 92"	a/s	AP, PS
X1 .2.12	"POTENZA HP 41"	a/s	AP, PS
X1.2.13	"EAGER"	a/s	AP, PS
X1 .2.14	"TURANZA Z"	a/s	AP, PS
X1.2.15	"TURANZA V"	a/s	AP, PS
X1.2.16	"TURANZA H"	a/s	AP, PS
X1.2.17	"TURANZA T"	a/s	AP, PS
X1 .2.18	"TURANZA ER30"	r/t	AP, PS
X1 .2.19	"TURANZA EL40"	a/s	AP, PS
X1 .2.20	"TURANZA EL41"	r/t	AP, PS
X1 .2.21	"TURANZA EL42"	r/t	AP, PS
X1.2.22	"401V"	r/t	AP, PS

Standards Used

- ASTM F-1923 Standard Test Method for Off Road and Low Speed Tire
- CTQP-AM-1923 Administrator Manual for Off Road and Low Speed Tire Tests

Test Requirements:

- Off-road, low-speed tires measured and tested in the laboratory.
- Plunger Energy, tread depth, tensile strength, and ultimate elongation, must fall within specified limits.

CATL 1923 Tires

Groups

- Group 1, Off the road tires used in intermittent highway service,
- Group 2, earthmoving, mining and logging tires used for short hauls, fork-lift truck, mobile crane, shovels, mining car, front end loader and dozers,
- Group 3, road grader tires

GROUP 1, OFF ROAD TIRES, INTERMITTENT HIGHWAY SERVICE

BRIDGESTONE/FIRESTONE (U.S.A) INCORPORATED

- QUALIFICATION PRODUCTION POINTS: ALL BRIDGESTONE/FIRESTONE INC. OTR TIRE MANUFACTURING FACILITIES.
- QUALIFICATION TEST REFERENCE: GSA QPL-1083-3
- QUALIFICATION EXPIRATION DATE: 30 JULY, 2012
- *NOTE: THIS VERSION OF THE CATL WAS PUBLISHED BEFORE RE-QUALIFICATION TESTING WAS COMPLETED. TO VERIFY QUALIFICATIONS AFTER 30 JUL 05, ASK MANUFACTURER TO PROVIDED A COPY OF QUALIFICATION TEST CERTIFICATION.

GOVERNMENT ITEM NO.	MODEL/BRAND DESIGNATION	CLASS
BRIDGESTONE RADIAL BRANDS:		
X1.1.1RA/RB	VKT	E
X1.1.2RA	VFT	E
X1.1.3RA/RB	VSJ	E
X1.1.4RA/RB	VHB	E/ML
X1.1.5RA	VGJ	E
X1.1.6RA	VMTS	ML
X1.1.7RA/RB	VRLS	ML
X1.1.13RA	VUT	E/L
X.1.1.14RA/RB	VHS	E/ML
BRIDGESTONE BIAS BRANDS:		
X1.1.8BA/BB	VEB	E
X1.1.9BA	VEB2	E
X1.1.10BB	AL	C
X1.1.11BA/BB	AL2	C
X1.1.12BB	RR	C

Cooperative Approved Tire List (CATL) Qualification Process

1. Tire Manufacturer expresses interest in becoming qualified to specific group of tires within CATL (passenger, light truck, truck/bus, off-road)
2. Tire manufacturer prepares and submits a detailed test plan conforming to ASTM F1922 or ASTM F1923 to TARDEC for review and approval.
3. Tire manufacturer selects a TARDEC approved independent test facility or proposes an independent test facility for TARDEC review and approval.
4. TARDEC selects the control tire.
5. Tire manufacturer contacts with the test facility to perform testing and notifies TARDEC of the test schedule at least 30 days in advance.
6. Test results are certified by the independent test facility and a copy of the test results/final report are sent directly to TARDEC.
7. TARDEC reviews test results/report and notifies the tire manufacturer of the approval or disapproval decision within 30 days.
8. If approved, TARDEC notifies DLA and Michelin. Within 10 days of notification, Michelin publishes the updated CATL via the internet.

(Test cost paid by tire manufacturer)



Procedure for choosing candidate & control tire for CATL 1922

20K Treadwear Test

- For the Candidate tire the prospective suppliers shall submit a list of their sizes, brands/models, types, codes and classes and fabric materials of the body plies and belts or breakers of each group the manufacturer intends to furnish under this specification. The Administrator shall select the tires for laboratory, (when specified), and road qualification tests.
- Control tires shall be used to establish the tread wear qualification point. Control tires are selected by the Administrator utilizing the results from the previous qualification testing.

Test Evaluation Criteria

- CATL 1922 (20K Treadwear Test)
 - With control tires performing at 100% level for tread wear, the candidate tire must meet 95% projected mileage
- CATL 1923
 - Dimensional Criteria
 - Plunger Energy
 - Tensile Strength
 - Tread (1700 PSI)
 - Sidewall (900 PSI)
 - Ultimate Elongation
 - Tread (400% minimum)
 - Sidewall (300% minimum)

PURSUIT AND EMERGENCY HIGH SPEED TESTING

- PASSENGER CAR - SAE J 1561 OR ECE 30
- LIGHT TRUCK - SAE J 1633

High Speed Tire Testing:

- Tires are tested for 60 minutes in the laboratory by running against either a 1.7 m or 2.0 m diameter wheel at specified load and speed.
- "The tire manufacturer shall supply to the Administrator the test results, by tire model and size, and certification that the particular tire model and size successfully met the requirements of the subject tests."
- "Govt may grant waiver for additional sizes in same design if contractor provides sufficient evidence (construction information, internal testing, etc.) that these additional sizes meet speed rating."
- TEST FACILITIES
 - STANDARDS TESTING LABS
 - AKRON RUBBER DEVELOPMENT LABORATORY
 - SMITHERS SCIENTIFIC SERVICES, INC.

Termination of test (P&EHS Testing)

The test may be considered terminated by one of the following.

- completion of predetermined final step
- tire failure

Upon visual inspection of the dismounted tire, any visible evidence of the following constitutes tire failure:

- tread separation
- cord separation
- ply separation
- bead separation
- sidewall separation
- chunking
- innerliner separation
- cracking

Light Truck Off Road Severe Application (ORSA)

- 2400 Miles of operation for all tires.
- X-ray Examination Bead-to-Bead 360° around test tires at the beginning and conclusion of the test

Pass/Fail Criteria

- Two Like Failures occur within the prescribed test mileage
- Anomalies experience by the control tire due to testing will be acceptable anomalies experienced by the test candidate tire(s)

Pass/Fail Criteria (cont'd)

The following anomalies will be considered for pass/fail criteria in comparison to the control tire:

- Severe heel/toe wear
- Broken belts
- Broken cords
- Severe tread chunking
- Tread separation
- Ply separation
- Bead damage separation
- Open splices
- Loss of air from cavity
- Exposed casing structure cord
- Bulges in tread or sidewall
- Out of Round condition

RETREADING ISSUES

- For testing, all tire casings furnished shall meet applicable requirements of Federal Motor Vehicle Standards 109, 110, 117, 119 and 120 part 574; part 575.104; as well as state and local regulations, as applicable.
- Casings furnished for Style Y tires shall be from a tire purchased new in the United States which the original tread rubber has been worn off while in service in the United States.
- The retread facility's identification code shall be located on the same sidewall and as close as possible to the original casing manufacturer's DOT code.
- Any speed category codes and M&S designations that were placed on the casing sidewall by the new tire manufacturer shall also be removed.

REQUALIFICATION

- Once a tire manufacturers particular model/retreading process of tire has been qualified, it shall remain qualified and be listed on the Administrator's Cooperative Approved Tire List (CATL) for a period of four years for Group 1, five years for Group 2, and six years for Group 3.
- At the end of the appropriate time period, the manufacturer shall requalify the original tire model/retreading process which was submitted for qualification or any other tire model for Style X to which qualification was extended based on the qualification of the original tire model.

QUALIFICATION EXTENSION

- Qualification of a particular retreaders process for which the retreaders quality is clearly established will be extended to other tire tread classes retreaded by the same process, of the same tire group and tire type having equal or better compound and treadwear as certified by the retreader

Tires defined by Product Description (ZZ-T-391, ZZ-T-410, ZZ-T-1619)

- Tire must meet product description and requirements by referenced specification*
- Commercial item (agricultural, mining, skid steer, solid tires)*
- Dimensional requirements (tire diameter, width, tread depth) must be in accordance with industry standards (T&RA, ETRTO)*
- Tire must address additional requirements as defined in specification (ozone resistance, identification, carcass strength, etc)*

QUESTIONS?

