هيئة التقييس لدول مجلس التعاون لدول الخليج العربية
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إطارات المركبات التجارية الجزء الثاني: طرق الاختبار
Tyres for Commercial Vehicles Part 2: Methods of Test

ICS: 43.020

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هذه الوثيقة مشروع لمواصفة قياسية خليجية تم توزيعها لإبداء الرأي والملحوظات بشأنها ، لذلك فإنها عرضة للتغيير والتبديل ، ولا يجوز الرجوع إليها كمواصفة قياسية خليجية إلا بعد اعتمادها من الهيئة.

تقديم

هيئة التقييس لدول مجلس التعاون لدول الخليج العربية هيئة إقليمية تضم في عضويتها أجهزة التقييس الوطنية في الدول الأعضاء ، ومن مهام الهيئة إعداد المواصفات القياسية واللوائح الفنية الخليجية بواسطة لجان فنية متخصصة.

قرر المجلس الفني لهيئة التقييس لدول مجلس التعاون لدول الخليج العربية في اجتماعه رقم ( ) الذي عقد بتاريخ...../...../..... هـ ،الموافق ...../...../..... م اعتماد تحديث المواصفة القياسية الخليجية رقم GSO 646:2017 " إطارات المركبات التجارية الجزء الثاني: طرق الاختبار " التي تم دراستها و إعدادها ضمن برنامج عمل اللجنة الفنية الفرعية الخليجية رقم TC 02/SC01 " اللجنة الفنية الفرعية الخليجية لمواصفات المركبات والإطارات " المدرجة في خطة دولة الكويت .

على أن تلغي المواصفة القياسية الخليجية رقم GSO 646:1996 و تحل محلها .

Tyres for Commercial Vehicles Part 2: Methods of Test

1- SCOPE AND FIELD OF APPLICATION

This standard is concerned with methods of testing new tyres for commercial vehicles (Light Trucks, Heavy Trucks, Buses and trailers).This standard is not applicable for tyre types identified by speed category less than 80 km/h. It is also not applicable to motorcycle, road equipment or agricultural equipment tyres.

2- COMPLEMENTARY REFERENCES

2.1 GSO 645/2017 "Multi-purpose Vehicles, Trucks, Buses and Trailers, Part 1: "Nomenclature, Designation, Marking, Dimensions, Load Capacities and Inflation Pressures"

2.2 GSO 647/2017 "Tyres for Commercial Vehicles, Part 3: General Requirements".

3- VISUAL INSPECTION

3.1 Tyres shall be visually inspected to check for the absence of any cracks or cuts in the tread or on either sidewall. Check the tyre for any uneven shape between the sidewalls, by rotating the tyre on a flat surface

3.2 The tyre shall be visually inspected for all the required marking specified in GSO 645/2017 Regulation (see item 2.1).

4- DIMENSIONS MEASUREMENT

4.1 Tyre Width

4.1.1 The tyre shall be mounted on the measuring rim and inflated to the pressure specified by the manufacturer.

4.1.2 Prior to measuring, it shall be allowed to stand for 24 h. at room temperature.

4.1.3 The pressure shall be adjusted to the specified value mentioned in item 4.1.1.

4.1.4 The tyre width at its maximum point, excluding elevations due to labelling or decoration and other edges band by a caliper, shall then be calipered at six different points equally spaced around the circumference.

4.1.5 The highest measurements shall be taken as the tyre's width.

4.2 Overall Diameter
The maximum outer circumference shall be measured with a steel tape and then divided by 3.1416 in order to calculate the overall diameter.

5- STRENGTH TEST

5.1 Preparation of Tyre

5.1.1 The tyre shall be mounted on the testing rim and inflated to the pressure corresponding to the maximum load, or maximum dual load where there is both a single and dual load marked on the tyre. If the tyre is tubeless, a tube may be inserted to prevent loss of air during the test in the event of puncture.

5.1.2 The tyre shall be conditioned at room temperature of 21°C for 3 hours before the test is conducted.

5.1.3 The tyre pressure shall be readjusted to the value specified in 5.1.1.

5.1.4 The tread shall be cleaned and dried before the test.

~~5.2 Apparatus~~
~~A plunger with a compressor of a hemispheric steel end, moving vertically at a rate of 50 ± 2.5 mm/min., its diameter is chosen according to what is specified in Table (1).~~

5.2 Test Procedure

5.2.1 Use the cylindrical steel plunger, with a hemispherical end and of specified diameter as shown in Table 1(see below).

5.2.2 The plunger should be forced perpendicularly into a raised tread element as near as possible to the centerline of the tread, at a rate of 50 mm/minute, until the tyre breaks or the plunger is stopped by the rim.

5.2.3 Record the force and the distance of penetration just before the tyre breaks, or if it fails to break, just before the plunger is stopped by the rim.

5.2.4 Repeat the plunger application at 72° intervals around the circumference of the tyre, until five measurements are made. However, in the case of tyres of 12 inch rim diameter code or smaller, repeat the plunger application at 120° intervals around the circumference of the tyre, until three measurements are made.

5.3 Calculations

5.3.1 The breaking energy shall be calculated at each point by means of the following formula:

$$W = \frac{F \times P}{2} \times 10^{-3}$$

Where:
W = Energy absorbed at break, N.m
F = Force just before breaking, N
P = Penetration just before breaking, mm.

5.3.2 Compute the average breaking energy value for the tyre by calculating the average of the values obtained in accordance with paragraph 5.3.1.

5.3.3 The breaking energy of the tyre shall be as the mean value of readings except in case the plunger bottoms the rim and the reading is below the minimum specified value at any of the measurement points.

5.3.4 If, at all of the measuring points, the plunger bottoms on the rim without breaking the tyre, the tyre shall be deemed to have passed the test.

TABLE 1A
Strength Test Plunger Diameter

Tyre type and its loading range*	Plunger diameter (mm)
Light truck	19.05
≤12 rim diameter code (except motorcycle)	19.05
Tubeless: ≤ 17.5 rim diameter code	19.05
>17.5 rim diameter code, load range F or less	31.75
> 17.5 rim diameter code, load range over F	38.1
Tube-type: Load range F or less	31.75
Load range over F	38.1

* TABLE 1B

Load Range and the Equivalent Rating

Load range	Ply rating
A	2
B	4
C	6
D	8
E	10
F	12
G	14
H	16
J	18
L	20
M	22
N	24

6- ENDURANCE TEST

6.1 Preparation of Tyre

6.1.1 Mount a new tyre on a model rim assembly and inflate it to the inflation pressure corresponding to the maximum load rating marked on the tyre. Use a single maximum load value when the tyre is marked with both single and dual maximum load.

6.1.2 The tyre shall be conditioned at a temperature of (35)°C for a period not less than 3 hours before the test is conducted.

6.1.3 The inflation pressure shall be readjusted to the value at which the tyre has been previously adjusted as in 6.1.1 immediately before mounting the tyre rim assembly.

~~6.2 Apparatus~~
~~The apparatus shall consist of the following:~~

~~6.2.1 A steel drum (1700 ± 1%) mm in diameter and of at least the same width as the tread of the tyre to be tested.~~

~~6.2.2 A spindle on which rim and tyre shall be mounted, provided with a means for loading the tyre against the test drum.~~

~~6.2.3 A means for rotating the spindle of the drum within the specified testing speeds.~~

~~6.2.4 A means for measuring the radial forces at the spindle of the rim and the tyre at different speeds during the test.~~

6.2 Test Procedure

6.2.1 Mount the tyre-rim assembly on the test axle and press it against a flat-faced steel test wheel that is 1.7 m ± (1%) in diameter and at least as wide as the tread of the tyre.

6.2.2 Apply to the test axle a series of test loads expressed in percent of the load indicated, in GSO Regulation No. 645/2017, opposite the load index engraved on the sidewall of the tyre, in accordance with the test programme shown in Table 2.

6.2.3 If the tyre has load-capacity indices for both single and twinned utilization, the reference load for single utilization shall be taken as the basis for the test loads.

6.2.4 During the test the temperature in the test-room must be maintained between (38-44)°C during all phases of testing.

6.2.5 The tyre pressure must not be corrected throughout the test and the test load must be kept constant throughout each of the three test stages.

6.2.6 The endurance-test programme shall be carried out without interruption.

6.2.7 Immediately after running the tyre the required time, measure the tyre inflation pressure. Remove the tyre from the model rim assembly, and inspect the tyre.

6.2.8 A tyre which, after undergoing the endurance test, does not exhibit any tread separation, ply separation, cord separation, chunking or broken cords shall be deemed to have passed the test.

6.2.9 In the case of tyres with a speed category symbol above P, test procedure is specified in Appendix A.

TABLE 2
Loads and Speeds for Endurance Test

Load index	Tyre speed category	Test-drum speed		Load placed on the wheel as a percentage of the load corresponding to the load index		
		Radial-ply km. h^{-1}	Diagonal (bias-ply) km. h^{-1}	7 h.	16 h.	24 h.
122 or more	F	32	32	66 %	84 %	101 %
	G	40	32			
	J	48	40			
	K	56	48			
	L	64	-			
	M	72	-			
121 or less	F	32	32			
	G	40	40			
	J	48	48			
	K	56	56			
	L	64	56	70 %	88 %	106 %
				4 h.	6 h.	24 h.
	M	80	64	75 %	97 %	114 %
	N	88	-	75 %	97 %	114 %
	P	96	-	75 %	97 %	114 %

Notes:

(1) "Special-use" tyres (see paragraph 3.6.3 of GSO 645/2017 Regulation) should be tested at a speed equal to 85% of the speed prescribed for equivalent normal tyres.

(2) Tyres with load index 122 or more, speed categories N or P and the additional marking "LT", or "C", referred to in 5.12 GSO 645/2017 Regulation, shall be tested with the same programme as specified in the above table for tyres with load index 121 or less.

7- HIGH SPEED PERFORMANCE TEST

7.1 Preparation of Tyre

7.1.1 Mount a new tyre on a model rim assembly and inflate it to the inflation pressure corresponding to the maximum load rating marked on the tyre. Use a single maximum load value when the tyre is marked with both single and dual maximum load.

7.1.2 The tyre shall be conditioned at a temperature of (35)°C for a period not less than 3 hours before the test is conducted.

7.1.3 The inflation pressure shall be readjusted to the value at which the tyre has been previously adjusted as in 7.1.1 immediately before mounting the tyre rim assembly.

7.2 Test Procedure

7.2.1 Mount the tyre-rim assembly on the test axle and press it against a flat-faced steel test wheel that is 1.7 m ± (1%) in diameter and at least as wide as the tread of the tyre.

7.2.2 Apply a force of 88 % of the maximum load rating marked on the tyre (use single maximum load value when the tyre is marked with both single and dual maximum loads), and rotate the test wheel at 250 rpm for 2 hours.

7.2.3 Remove the load, allow the tyre to cool to 35 °C, and then adjust the pressure to that marked on the tyre for single tyre use.

7.2.4 Reapply the same load, and without interruption or readjustment of inflation pressure, rotate the test wheel at 375 rpm for 30 minutes, then at 400 rpm for 30 minutes, and then at 425 rpm for 30 minutes.

7.2.5 During the test the temperature in the test-room must be maintained at 35 °C during all phases of testing.

7.2.6 Immediately after running the tyre the required time, measure the tyre inflation pressure. Remove the tyre from the model rim assembly, and inspect the tyre.

REFERENCES:

1. ECE No. 54 "Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers, Revision 3; *26th March 2013*.

2. ECE No. 54 "Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers, Revision 3/ Amendment 1: *3rd February 2015*.

3. ECE No. 54 "Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers, Revision 3/ Amendment 2; *5th February 2016*.

4. ECE No. 54 "Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers, Revision 3/ Amendment 3; *26th March 2013*.

5. ECE No. 54 "Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers, Revision 3/ Corrigendum 1;*18th December 2014*.

6. ECE No. 54 "Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers, Revision 3/ Corrigendum 2; *25th August 2014*.

7. FMVSS No. 119 "New pneumatic tires for motor vehicles with a GVWR of more than 4,536 kilograms (10,000 pounds) and motorcycle"; *2008*

8. GS 645 "Multi-Purpose Vehicles, Trucks, Buses and Trailers Tyres Part 1"; *2005 & 2009*

9. GS 646 "Multi-Purpose Vehicles, Trucks, Buses and Trailers Tyres Part 2"; *1996 & 2009*

10. GS 647 "Multi-Purpose Vehicles, Trucks, Buses and Trailers Tyres Part 3"; *1996 & 2009*

APPENDIX A:

1. Load/speed endurance test programme for tyre with speed category symbol Q and above

1.1 This programme applies to:

1.1.1 All tyres marked with load capacity index in single 121 or less.

1.1.2 Tyres marked with load capacity index in single 122 and above and with the additional marking "C", or "LT", referred to in paragraph 5.12 GSO 645/2017 Regulation.

1.2 Load placed on the wheel as a percentage of the load corresponding to the load index Table 3 of GSO 645/12017 Regulation:

1.2.1 90% when tested on a test drum 1.70 m ± 1% in diameter.

1.2.2 92% when tested on a test drum 2.0 m ± 1% in diameter.

1.3 Initial test speed: speed corresponding to the speed category symbol less 20 km/h:

- Time to reach the initial test speed 10 min.
- Duration of the first step = 10 min.

1.4 Second test speed: speed corresponding to the speed category symbol less 10 km/h:

- Duration of the second step = 10 min.

1.5 Final test speed: speed corresponding to the speed category symbol:

- Duration of the final step = 30 min.

1.6. Total test duration: 1 h.

2. Equivalent test methods

If a method other than that described in paragraph 5 above is used, its equivalence must be demonstrated.