PS 4708-2012 (4th Rev.)
ICS No. 43.080.99

PAKISTAN STANDARD SPECIFICATION FOR THREE WHEELER AUTO VEHICLES

PSS: 4708-2012(R)

PAKISTAN STANDARDS AND QUALITY CONTROL AUTHORITY

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PAKISTAN STANDARD SPECIFICATIONS FOR THREE WHEELER AUTO VEHICLES

PS: 4708-2012(R)

0. FOREWORD:

0.1 This Pakistan Standard was adopted by the authority of the Board of Directors for Pakistan Standards & Quality Control Authority after the draft prepared and finalised by the Technical Committee; Prime Movers for Road Transport (MTC-13) and was approved and endorsed by the 138th National Standards Committee on 30 - 03 - 2012.

0.2 This Pakistan Standard is prepared after taking into consideration the views and suggestions of manufacturers, specialists and utilizing agencies.

0.3 This Pakistan Standard has been revised after taking assistance, from PSQCA Officials, the Environmental Protection Agency (EPA) and stake holders which are acknowledged with thanks; i.e., EPA –SRO No. 742(1)/93. (Emission Standard) as amended in 2009 [SRO No. 72(KE)/2009].

0.4 This Pakistan Standard was first prepared in 2001 and then revised in 2005, 2008 and 2009. Now keeping in view, the latest developments for accommodating the amended EPA SRO and the necessary amendments have been made in this standard.

0.5 This standard is subject to periodical review in order to keep pace with developments in technologies. Any suggestion for improvement will be recorded and placed before the concerned committee in due course.

1. SCOPE

1.1 This Standard specifies the requirements for Three-Wheeler Auto Vehicles *which have either separate closed rear area or an open platform normally used for the transport of goods and passengers.*

1.2 This standard specifies marking, labelling, sampling requirements and distribution criteria for conformity.

1.3 This standard covers safety requirements and limitation of emission of gaseous pollutants & sounds.

1.4 This standard does not cover competition vehicles and special purpose vehicles.

2. DEFINITIONS

2.1 Vehicle: A Three-wheeler auto vehicle that is ready to use on road and comprising of the following;

2.1.1 single/coupled chassis frame

2.1.2 complete body, built with hood frame, hood cover and driver seat

2.1.3 passenger seats in accordance with the applicable specifications (Tables 3-7)

2.1.4 A wind screen
2.1.5 At least one head lamp, turn signals, reflectors for vehicle broad configurations (specified in Table 1)
2.1.6 Power-train comprising of a single engine / electric motor(s) having suitable power to weight ratio, an efficient and safe transmission and safe braking system
2.1.7 An efficient and safe steering system.
2.1.8 Speedo meter, Neutral indicator and Temperature gauge(for water cooled engines only).

2.2 ***Structure/Construction:*** *Any structure built above the vehicle's cargo bed or cargo itself. It can be container for storing goods or carrying passengers or canopy.*

2.3 Braking system and components:

Braking System: Combination of parts (other than the engine) the function of which is progressively to reduce the speed of a moving vehicle, bring it to a halt and keep it stationary if it is already halted, consisting of :

- The control.
- The transmission (mechanism)
- The brake(s).

Control: Part operated directly by the rider to supply to the transmission the energy required for braking or controlling the vehicle.

Transmission (Mechanism): Combination of components which provide the functional link between the control and brake.

Brake: Parts of the braking system in which the forces opposing the movement of the vehicle are developed.

2.4 ***Curb Weight:*** *The weight of an unloaded vehicle.*
2.4.1 ***Crew Weight:*** *The weight of passengers as per seating capacity permissible in a cabin.*
2.4.2 ***Payload:*** *Actual weight of useful cargo carried by vehicle.*
2.4.3 ***GVW (Gross Vehicle Weight):*** *It is the total weight carried by a vehicle including its own weight. [GVW=Curb Weight + Crew Weight + Pay Load]*
2.4.4 ***Power to weight ratio:*** *It's the power, the engine generates, divided by the Gross Vehicle Weight (GVW).*

2.5 Attainable speed test: Max. Speed multiplied by 0.95 that a vehicle can attain when tested on a vehicle test bench without any air resistance simulation mechanism.

2.6 Emission from Engine: The Smoke, Carbon-monoxide, Hydrocarbons and Oxides of Nitrogen (HC + NOx) in addition to the sound emitted from vehicle during idling [as per SRO 742(1)/93] and load condition. [Smoke valid and HC + NOx optional; till implementation of Ministry of Environment's S.R.O. 72(KE)/2009].

Hydrocarbons: Hydrocarbon compounds derived from non-combustion or incomplete combustion of fuel in the engine emitted during idling and load condition. (To be measured and added to NOx).

Oxides of Nitrogen: Compounds of nitrogen and oxygen resulting from combustion in the engine. (To be measured and added to HC).

Carbon-monoxide: Carbon-monoxide resulting from incomplete combustion in the engine.

Smoke: The particulate matter emitted through the vehicle exhaust as measured with some suitable equipment (i.e. smoke gun / smoke meter or pump using ringleman chart).

2.7 Sound Level:

Noise: It means the root-mean-square of the values measured in dBA that are recorded at 7.5 meters from source. "dBA" means the A-weighted sound level in decibels, measured using a sound level meter.

Horn sound: It means the root-mean-square of the values measured in dBC that are recorded during testing of the vehicle as emitted from vehicle horn. "dBC" means the C-weighted sound level in decibels, measured using a sound level meter.

2.8 Decibel (dB): It means 20 times the logarithm to the base 10 of the ratio of the measured sound pressure relative to a reference sound pressure of 20 mPa.

2.9 Engine Leak Prevention Test:
Any suitable system to assure leak prevention of engine or its parts.

2.10 Engine Idling RPM Test:
The rotational speed of an engine in rotations per minute (RPM) at which the engine is in idling condition to ensure uniform engine tune-up of vehicle as tested by any suitable RPM meter.

2.11 ***Chassis:*** *The chassis is the main structure of the vehicle suitably designed in such a way that passengers and goods could reach the destination safely. The chassis or frame of a vehicle is commonly constructed mainly of two beams and several cross members. The critical components are Leaf Spring, U-Bolts, Shock Absorbers which are to be checked as per OEM Standard Specifications.*

2.12 Road Worthiness

2.12.1 Initial Confirmation
Government Authority shall issue a road worthiness certificate to the new Vehicle.

2.12.2 ***Periodic Conformation***
The Operator/Transporter shall obtain the Road Worthiness Certificate from Authorities/Approved Workshops every year.

2.12 Ground Clearance:
The ground clearance is the amount of space between the base of an automobile tire and the underside of the chassis; or, more properly, to the shortest distance between a flat level surface and any part of a vehicle other than those parts designed to contact the ground (such as tires, tracks, skis, etc.). Ground Clearance is measured with standard vehicle equipment and is usually given with no cargo or passengers.

2.13 Road Clearance:

The road clearance for the purpose of this Pakistan Standard shall be defined as the height of any part of a vehicle that would touch first if the height of a conventional speed breaker (a continuous heaped surface on road perpendicular to the traffic flow direction) is gradually increased. The road clearance is to be measured using laden vehicle with standard vehicle equipment. Road Clearance may not be affected by the differential or any such part of the vehicle that does not create any hindrance in crossing a conventional speed breaker due to the height provided by tires while crossing such surfaces.

3. REQUIREMENTS FOR EMISSION:

The requirements for emission shall be met in accordance with EPA standards for vehicular exhaust & noise, as well as the level of sound emitted from the vehicle horn as mentioned in Table-1.

4. MARKING AND LABELLING:

4.1 At least there shall be affixed; legibly, clearly and permanently; to any part of the engine and chassis of every vehicle; number, letter or mark representing the model of the vehicle corresponding to the engine and chassis.

4.2 Any unit that manufacture(s) products complying with this standard shall use the PS Mark in connection with its products only after having received a license from the Pakistan Standard and Quality Control Authority. Sale of production without PS Mark is prohibited.

4.3 ***REGISTRATION:*** *The vehicle must be registered with the motor vehicle department in conformity to form F issued by the OEM.*

4.3.1 *Strict Annual Motor Vehicle Inspection should be carried out to ensure compliances with PSQCA Standards*

4.4 **MANUFACTURER'S CERTIFICATE:** Fallowing data to be mentioned and provided by manufacturer with the vehicle at the time of delivery along with Form 'F'.

4.4.1 Chassis Number
4.4.2 Engine Number
4.4.3 Color
4.4.4 Model (Proper Description)
4.4.5 Loader or Passenger
4.4.6 Dealer's Name
4.4.7 Customer Name
4.4.8 Warranty Book (including Battery etc)

5. CRITERIA FOR LOT AND SAMPLING FOR CONFORMITY TESTING:

5.1 Lot:

5.1.1 Vehicles of the same type as those previously deemed to comply with this standard, which are manufactured or delivered or purchased at the same time.

5.1.2 A lot shall not exceed 500 in number for the purpose of QA/QC.

5.1.3 A minimum number of 10 units must be offered for sampling of 03 units (to be picked up at random) for inspection / surveillance by PSQCA.

6. TESTING & RECORDS:

In-house testing of samples and test records (as defined at 8.7) shall be maintained for at least six months.

6.1 General Requirements for Testing:

Calibration:

All critical analytical equipments shall have an accuracy of measurement to within $\pm$ 5 %. (Instruments such as metre tapes, foot scales and beakers are not to be considered mandatory).

Exhaust Gas Analyzer (Emission Test):

The emission analyzer for CO, HC+NOx determination shall be capable of using ECER 40 method with effect from July 01, 2012 and its availability with the assembly unit shall not be mandatory while NDIR or any other technique based equipment is acceptable till June 30, 2012 for CO.

6.2 The vehicle(s) tested must be approximately horizontal during the test so as to avoid any abnormal distribution of the fuel.

6.3 Test Records:

In-house testing of samples and records of test shall be maintained for a minimum period of six months.

7. VEHICLE SPECIFICATIONS:

7.1 The specifications for Three Wheeler Auto Vehicles shall be in compliance with the tables to follow:

TABLE-1

Mandatory Requirements for All Categories of 3-Wheeler Auto Vehicles			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
1.	Exhaust gas emissions (CO)	4.5 % (NDIR) max.	As per prevalent NEQS.
2.	Exhaust gas emissions (Smoke)	40% or 2 on Ringlemann Chart	
3.	Vehicle noise emission (Scale A noise)	85 dbA (max.)	
4.	Vehicle's horn sound emission (Scale C)	105 dbC (max.)	
5.	Parking brake	Mandatory	To keep a fully laden vehicle stationary when parked at a slope of 15^0
6.	Available seat size per passenger	38cm x 38cm (min.)	Seat width for driver seat of motorcycle rickshaw may be 22 cm (min.)
7.	Available seat backrest per passenger	40cm x 38cm (min.)	Optional for driver seat.
8.	Seating height for each passenger	30 cm (min.)	May be reduced to 22 cm (min.) in case bucket seats are used.
9.	Leg room for each passenger	33 cm (min.)	May be reduced to 30 cm (min.) in case bucket seats are used and for third row of seats.
10.	Entrance level for passenger (in case of un-laden vehicle)	30cm – 55cm	
11.	Drive mechanism	4 Stroke Reciprocating Internal Combustion Engine / Rotary Internal Combustion Engine / Electric Motor	Shall have suitable power to weight ratio.
12.	Braking System	Mechanical for Motorcycle Rickshaw & Hydraulic for all others.	Mandatory for rear wheels only.
13.	Transmission	Direct / Through Shaft or Chain	There shall be a reverse gear. (Optional for Motorcycle Rickshaw)
14.	Head Lamp	Low beam at 0mm16500 lux(min.) 75mm12500 lux(min.) and shall be adjustable to give a view of the road at 7.5 meter	To be verified by PSQCA (Measuring instruments not mandatory for Unit)

TABLE-1(contd.)

Mandatory Requirements for All Categories of 3-Wheeler Auto Vehicles			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
15.	Front Side Lamp Units	Emitting white light visible from a distance of 7.5 meters in dark. Amber yellow turn signals visible at 45^0 angle from a distance of 15 meters in day light.	To be verified by PSQCA (Measuring instruments not mandatory for Unit) White light emitting lamps shall be optional for Motorcycle rickshaws.
16.	Rear Lamp Units	Tail lamps emitting red light visible from a distance of 15 meters in dark operational when front beam is switched on. Brake indicator lamps emitting red light visible at a distance of 20 meters when operated in day light. Amber yellow turn signals visible at a distance of 15 meters in day light. Reverse gear indicator lamp emitting white light visible at a distance of 20 meters and giving a reasonable view to driver for reversing the vehicle.	To be verified by PSQCA (Measuring instruments not mandatory for Unit) Reverse gear indicator lamps shall be optional.
17.	Reflectors	To mark not less than 10cm from the extreme boundaries of vehicle	The size of each reflector must be $400mm^2$ at each side.
18.	Battery (for all devices except power storage in case of electrically driven vehicles)	12 Volts 26 Ah (min.)	In case of Motorcycle rickshaw 2.5 Ah shall be allowed.
19.	Roof height for each passenger	96 cm (min.)	To be measured from highest point of seat(s) vertically upwards.
20.	Roof	Water resistant	Shall cover all area from wind screen to extreme rear and sides.
21.	Wind screen	Glass / Transparent plastic	Clear enough that would not cause distortion of vision.
22.	Wipers	Electric / Manual	Shall be provided to clear at least 30% of screen area
23.	Electrical connections	Safely insulated.	Shall have proper colour coding.
24.	Speedometer / Odometer	With speed indicator and counter with units	Shall be tested and certified by supplier.

TABLE-1 (contd.)

Mandatory Requirements for All Categories of 3-Wheeler Auto Vehicles			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
25.	Turn signal indicator, high beam indicator, neutral / gear indicator	Shall be provided	With proper lighting colour scheme
26.	Spare wheel	Shall be provided	Jack and wheel spanner shall be provided
27.	Rear view mirrors	Shall be provided at both sides	Shall provide a clear view of rear in total
28.	Body construction	Shall be well fitted / assembled.	Shall provide protection from dusts through floor and abnormal vibration with suitable strengths.
29.	Partitions	Safety bars	Shall be provided between each seating row / compartment.
30.	Attainable speed	40 km/hr (min.)	Shall be measured using a laden vehicle. [May be 25km/hr for electric vehicles].
31.	CNG / LPG cylinders & kits	OGRA approved	As per valid S.R.O.
32.	Exhaust muffler	Extended beyond rear seat back	Not to extend beyond extreme rear end of body and shall be nearly horizontal.

7.2 The three-wheeler auto vehicles shall be categorized in accordance with following criteria:

TABLE-2

Single-seat three-wheeler auto vehicle (loader / pick-up) 150 cc minimum			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
1.	Over all vehicle length	350 cm (max.)	To be measured using extreme ends.
2.	Over all vehicle width with folded mirrors	115 cm – 150 cm	To be measured using extreme ends.
3.	Wheel track	100 cm – 145 cm	
4.	Wheel base	165 cm – 250 cm	
5.	Turning circle diameter	700 cm (max.)	To be measured for both sides.
6.	Overhang	95 cm (max.)	
7.	Ground clearance	10 cm (min.)	
8.	Fuel efficiency (Min.)	15 km/ltr for gasoline 20 km/kg for CNG 25 km/kg for LPG 3 km/kWh for Electric vehicles	Verification shall be done on horizontal metalled road having no obstructions and fully laden during no ambient winds. [One fuel system as selected by O.E.M. shall be used to verify]

TABLE-3

Three-seat three-wheeler auto vehicle (Passenger) 150 cc minimum			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
1.	Over all vehicle length	350 cm (max.)	To be measured using extreme ends.
2.	Over all vehicle width with folded mirrors	105 cm – 150 cm	To be measured using extreme ends.
3.	Wheel track	95 cm – 145 cm	
4.	Wheel base	140 cm – 250 cm	
5.	Turning circle diameter	700 cm (max.)	To be measured for both sides.
6.	Overhang	95 cm (max.)	
7.	Ground clearance	10 cm (min.)	
8.	Fuel efficiency (Min.)	18 km/ltr for gasoline 24 km/kg for CNG 30 km/kg for LPG 5 km/kWh for Electric vehicles	Verification shall be done on horizontal metalled road having no obstructions and fully laden during no ambient winds. [One fuel system as selected by O.E.M. shall be used to verify]

TABLE-4

Four-seat three-wheeler auto vehicle (Passenger) 175 cc minimum			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
1.	Over all vehicle length	350 cm (max.)	To be measured using extreme ends.
2.	Over all vehicle width with folded mirrors	120 cm – 150 cm	To be measured using extreme ends.
3.	Wheel track	110 cm – 145 cm	
4.	Wheel base	140 cm – 250 cm	
5.	Turning circle diameter	700 cm (max.)	To be measured for both sides.
6.	Overhang	95 cm (max.)	
7.	Ground clearance	10 cm (min.)	
8.	Fuel efficiency (Min.)	18 km/ltr for gasoline 24 km/kg for CNG 30 km/kg for LPG 5 km/kWh for Electric vehicles	Verification shall be done on horizontal metalled road having no obstructions and fully laden during no ambient winds. [One fuel system as selected by O.E.M. shall be used to verify]

TABLE-5

Five-seat three-wheeler auto vehicle (Passenger) 200 cc minimum			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
1.	Over all vehicle length	350 cm (max.)	To be measured using extreme ends.
2.	Over all vehicle width with folded mirrors	105 cm – 150 cm	To be measured using extreme ends.
3.	Wheel track	95 cm – 145 cm	
4.	Wheel base	140 cm – 250 cm	
5.	Turning circle diameter	700 cm (max.)	To be measured for both sides.
6.	Overhang	95 cm (max.)	
7.	Ground clearance	10 cm (min.)	
8.	Fuel efficiency (Min.)	16 km/ltr for gasoline 22 km/kg for CNG 28 km/kg for LPG 4.5 km/kWh for Electric vehicles	Verification shall be done on horizontal metalled road having no obstructions and fully laden during no ambient winds. [One fuel system as selected by O.E.M. shall be used to verify]

TABLE-6

Six-seat three-wheeler auto vehicle (Motorcycle Driven) 100 cc minimum			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
1.	Over all vehicle length	325cm (max.)	To be measured using extreme ends.
2.	Over all vehicle width with folded mirrors	115 cm – 140 cm	To be measured using extreme ends.
3.	Wheel track	100 cm – 135 cm	
4.	Wheel base	140 cm – 200 cm	
5.	Turning circle diameter	600 cm (max.)	To be measured for both sides.
6.	Overhang	105 cm (max.)	
7.	Ground clearance	9.5 cm (min.)	
8.	Fuel efficiency (Min.)	16 km/ltr for gasoline 22 km/kg for CNG 28 km/kg for LPG 4 km/kWh for Electric vehicles	Verification shall be done on horizontal metalled road having no obstructions and fully laden during no ambient winds. [One fuel system as selected by O.E.M. shall be used to verify]

TABLE-7

Seven-seat three-wheeler auto vehicle (Passenger) 200 cc minimum			
Sr. No.	**Details of Standards**	**Limits (with units)**	**Criteria**
1.	Over all vehicle length	350 cm (max.)	To be measured using extreme ends.
2.	Over all vehicle width with folded mirrors	115 cm – 150 cm	To be measured using extreme ends.
3.	Wheel track	100 cm – 145 cm	
4.	Wheel base	165 cm – 250 cm	
5.	Turning circle diameter	700 cm (max.)	To be measured for both sides.
6.	Overhang	95 cm (max.)	
7.	Ground clearance	10 cm (min.)	
8.	Fuel efficiency (Min.)	15 km/ltr for gasoline 20 km/kg for CNG 25 km/kg for LPG 3 km/kWh for Electric vehicles	Verification shall be done on horizontal metalled road having no obstructions and fully laden during no ambient winds. [One fuel system as selected by O.E.M. shall be used to verify]

8. Others (Distribution Standard of Vehicle):

8.1 Assemblers shall assure warranty of vehicle for at least three (03) months or 5000km which ever comes earlier, in case of defects the assembler shall offer free service / spare parts.

8.2 The assembler / manufacturer shall offer availability after sales service and parts / maintenance through authorized service dealer workshop in the area of sales.

8.3 The assembler / manufacturer shall be responsible for informing the public on change of model.

8.4 The assembler / manufacturer shall establish sales dealerships and service cum spare parts facilitation through warranty centres in major cities of the country and publicize their address in a way that the public should be aware of these facilities.

8.5 The assembler / manufacturer shall not sell any vehicle without sales tax invoice and is bound to submit quarterly production reports; in accordance of applicable S.R.O. of Ministry of Science and Technology; to PSQCA.

8.6 Check list of documentation to be shown at the time of inspection as evidence of QA/QC for Assembly units defined by PSQCA is annexed (Annex-A).

8.7 QA/QC Check List: (See Annexure – A).

#	**Description or record (Ref.)**	**Availability of record**		**Remarks**
1	**QA/QC records of critical parts**	**Yes**	**No**	
a	Frame			
b	Wheel hub(s)			
c	Axle(s)			
d	Rim(s)			
e	Fuel tank			
f	Handle			
g	Speedometer unit			
h	Head light unit			
i	Tail light unit			
j	Winker(s)			
k	Painted parts			
l	Ni, Cr Plated parts			
m	Seats and other body parts			
n	Exhaust muffler			
o	Break system units			
p	Gear units			
q	Engine components (QA/QC Certificate in case of import			
r	Engine testing (RMP, Noise etc.)			
2	**Main Assembly QA/QC records**			
a	Torques			
b	Fitment			
c	Harness			
d	Aeshetics			
3	**PDIQA / QC record**			
a	Critical torques			
b	Electric systems			
c	Fitments			
d	Exhaust gas emissions			
e	Noise emissions			
f	Horn sound emission			
g	Test bench / Road test setup			
4	**Critical Testing Facilities**			
a	Exhaust gas emission analyser			
b	Sound level meter			
c	Engine test stand			
d	Vehicle test bench			
e	Torque wrench(es)			
f	Vernier calipers / measuring tapes / measuring scales			
g	Depth gauges / thread gauges / micro meter			
h	Measuring cylinders / beaker			
i	Coating thickness meter / Cross hatch test set-up			