

JIS

JAPANESE INDUSTRIAL STANDARD

Testing Methods of Off-Highway
Dump Trucks

JIS A 8803—1984

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Testing Methods of Off-Highway
Dump Trucks

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1. Scope

This Japanese Industrial Standard specifies testing methods of off-highway dump trucks⁽¹⁾ of rigid frame type having driving mechanism and the maximum loadage for authorized freight mass of 15000 kg or more, hereinafter referred to as the "off-highway dump trucks", designed to bear up sufficiently even under the severe working condition to run carrying rock, soil and sand, and the like on grade, ungraded land, etc.

Note (1) The off-highway dump trucks include the articulate type, but not the trailer type dump truck.

Remark: In this standard, the units and numerical values given in { } are in accordance with the International System of Units (SI), and are appended for informative reference.

2. Definitions

The definitions of the main terms used in this standard are in accordance with JIS D 0001 and JIS D 0102 and some of the others are as follows:

- (1) unladen condition The vehicle is curb, but fuel, cooling water, lubricating oil, etc. are fully filled and the equipment required for driving is prepared. However, the riding person, spare parts, tools and other hand luggage are excluded.
- (2) complete vehicle curb mass The mass of the dump truck in unladen condition.
- (3) maximum authorized freight mass The allowable maximum loading mass.
- (4) fully laden condition The laden condition where the unladen vehicle is laden with persons to the riding capacity and with goods of maximum authorized freight mass in mass distribution as described in the element table of Attached Table 1. However, the fully laden condition shall be in the range of $100 \pm 10\%$ in overall mass of vehicle and distributed mass.
- (5) overall mass of vehicle The mass in the fully laden condition, taking the mass of one riding person as 55 kg.
- (6) distributed mass The mass distributed to each wheel exle of vehicle in the fully laden condition. The sum is equal to the overall mass of vehicle.
- (7) 6-wheel vehicle The vehicle having each two wheels on three sets of wheel axles, totaling 6 wheels. However, the dual wheels shall be counted as one.
- (8) rear dump truck The off-highway dump truck of construction with the rear body inclined rearward to unladen the freigh sliding from the rear part of the rear body, hereinafter referred to as the "rear dump".

Applicable Standards: See page 64.

- (9) side dump truck The off-highway dump truck of construction with the rear body inclined left and right or in either one direction to unladen the freight sliding from the side of rear body, hereinafter referred to as the "side dump".
- (10) rising angle The angle in which the floor surface of rear body rotates. The angle at the maximum is defined as the maximum rising angle.
- (11) rigid frame The frame having sufficient strength and rigidity to endure twisting and impact caused by running with heavy load on ungraded land.

3. Test Items

The test items are shown in the Table.

Further, part of test items or test contents may be selected depending on the type, construction, etc. of off-highway dump trucks.

Table

Test item	Test contents
Engine performance tests	Load test or at working load test Maximum speed regulating performance test No load minimum number of rotation test
Torque converter actual performance tests	General performance test Stall performance test Accessory performance test
Stationary tests	Main dimension measurement Laden volume measurement Mass measurement Ground pressure measurement Steering device operating force measurement Operating seat visual range measurement
Running Tests	Maximum speed test Running resistance test Acceleration from standstill test Minimum turning radius test Examination of speed meter scale Fuel consumption test Hill climbing test

Table (Continued)

Test item	Test contents
Brake tests	Brake air filling and consumption test Brake performance test Grade descending test (retarder test)
Dumping performance tests	Maximum rising angle test Rising time test Descending time test Leakage test
Noise and vibration tests	Noise test Vibration test
Traction tests	Tractive force output test Maximum tractive force test
Falling test	Falling test
Driving performance test	Driving performance test

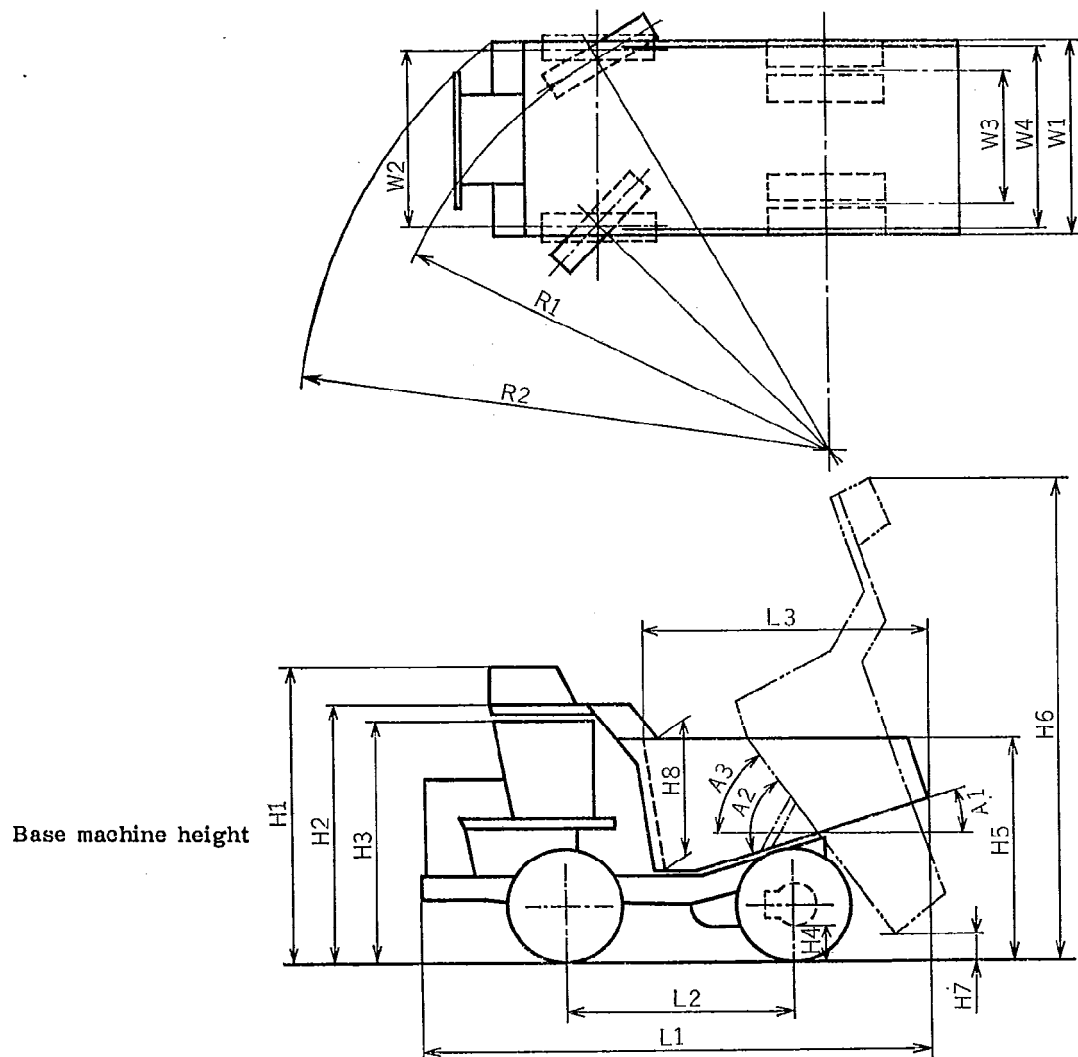
4. Preparation for Test

Concerning the off-highway dump truck to be tested the following preparation shall be carried out.

- (1) Specifications The manufacturer shall have prepared the specifications of test car carrying all of the following materials.
 - (a) Element table (It shall be in accordance with Attached Table 1. However, as required, items not specified in Attached Table 1 may be added.)
 - (b) Overall figure (in accordance with Fig. 1)
 - (c) Running performance curve (in accordance with Fig. 2)
 - (d) Retarder brake performance curve (in accordance with Fig. 3)
 - (e) Engine performance curve (in accordance with Fig. 4)
- (2) History The history from the manufacture to the start of the tests shall be recorded in Attached Table 2.
- (3) Servicing Prior to the tests, perform sufficient running-in to attain a perfect servicing condition.

- (4) Fuel and Lubricating Oil Fuel and lubricating oil specified by the manufacturer shall be used and their name and class be recorded.
- (5) Instruments for Measurement The instruments for measurement shall be inspected prior to test and be corrected as required.

Fig. 1 Overall Figure



L1	Overall length	A2	Maximum rising angle
W1	Overall width	A3	Rear body floor surface inclination angle
H3	Base machine height	A1	Rear body floor surface inclination angle
H2	Overall height	L3	Inside dimension of rear body (length)
H1	Overall height	W4	Rear body inside dimension (width)
L2	Wheel base	H8	Rear body inside dimension (maximum depth)
W2	Track (front wheels)	H6	Maximum ground clearance at dumping
W3	Track (rear wheels)	H7	Ground clearance of rear body rear edge at dumping
H4	Ground clearance of undercarriage	R1	Minimum turning radius
H5	Ground clearance of upper edge of rear body	R2	Minimum turning radius of body outside

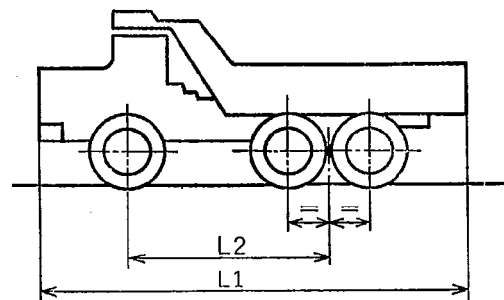


Fig. 2. Running Performance Curve (Example)

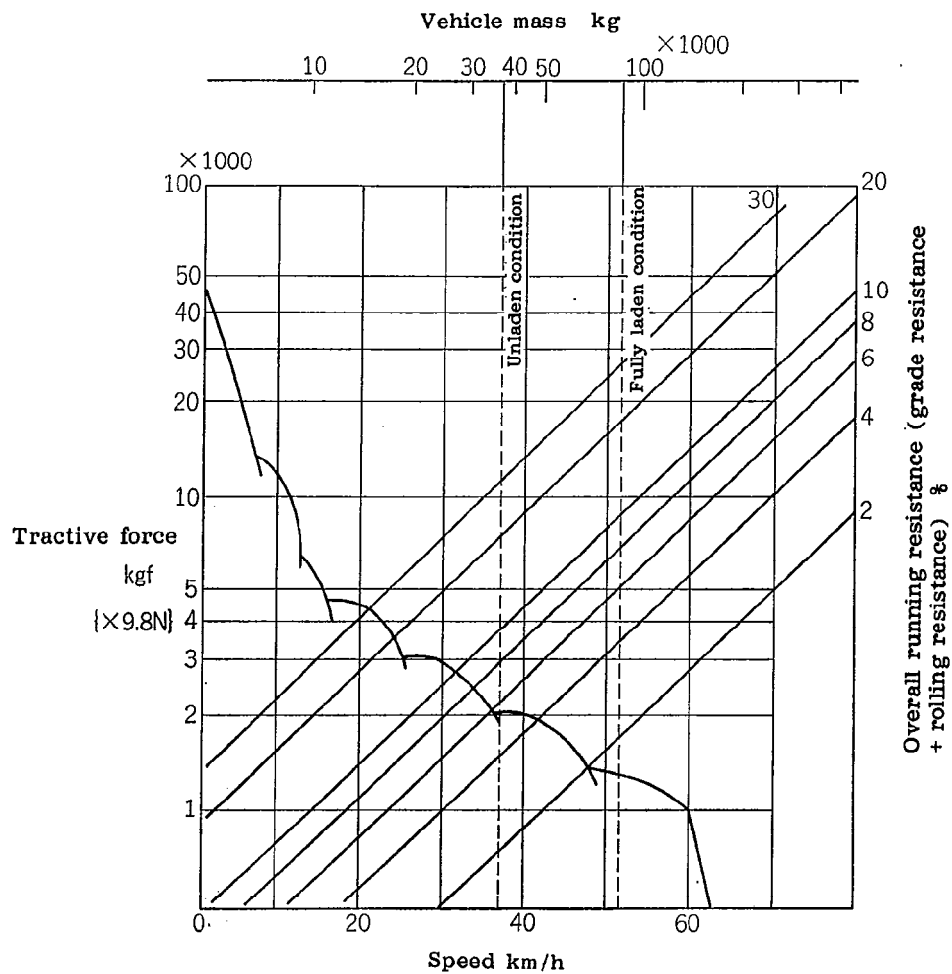


Fig. 3. Retarder Brake Performance Curve (Example)

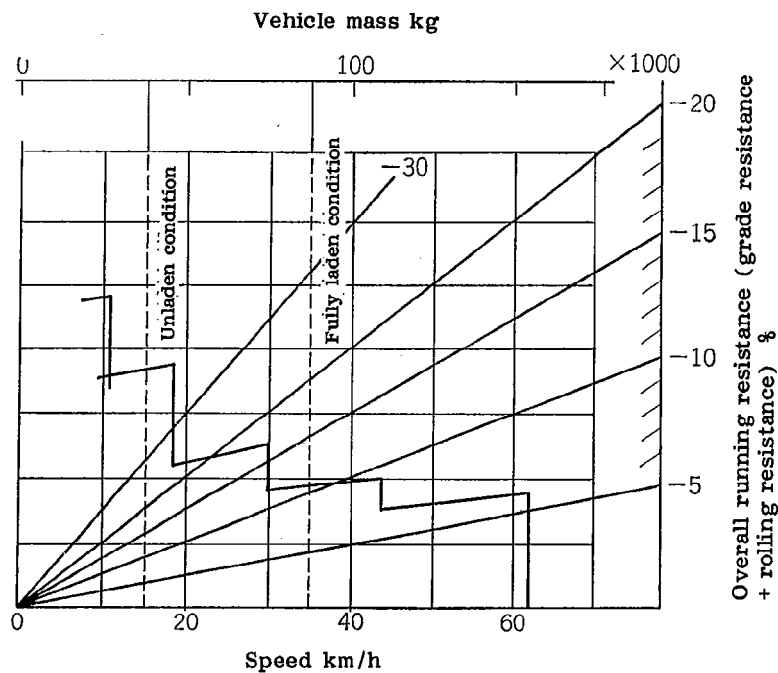
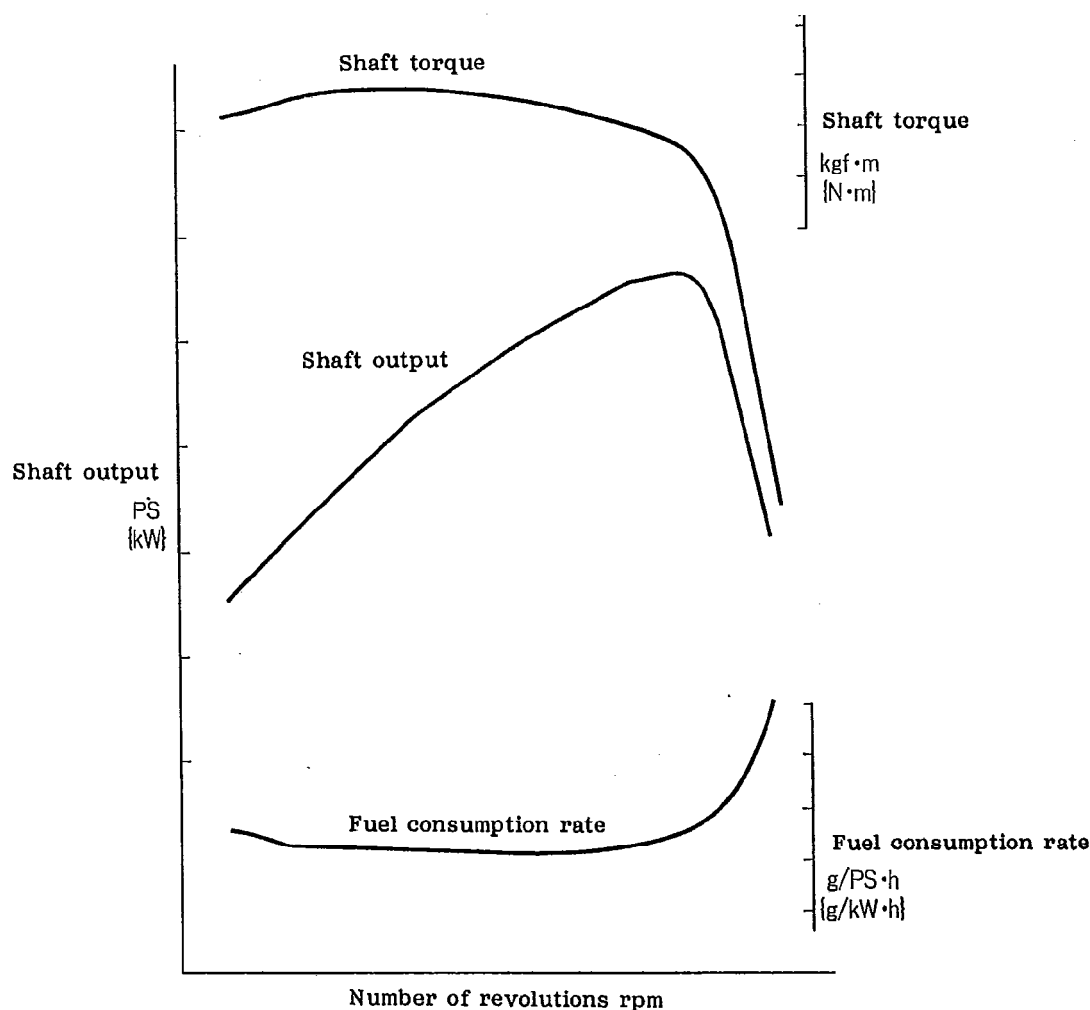


Fig. 4. Engine Performance Curve (Example)



5. Measuring Items and Measuring Methods

Measuring items and measuring methods of each test shall be in accordance with (1) to (14).

The precision of instrument to be used may be equal or superior to the precision specified in each item.

- (1) Engine Performance For the engine performance, the measuring devices specified in JIS D 1001 or JIS D 1005 shall be used.
- (2) Torque Converter Performance For the torque converter performance, the measuring devices specified in JIS D 1007 shall be used.

- (3) Dimensions The dimensions shall be measured by using tape measures specified in JIS B 7512, metal rules specified in JIS B 7516 and vernier callipers specified in JIS B 7507. The measuring precision shall be 0.2 % of measuring object or ± 1 mm, whichever is greater.
- (4) Mass The mass shall be measured by using a platform weighing machine, suspension balance, resistance wire strain gauge type load meter. The measuring precision shall be ± 1 % of the measuring object or ± 10 kg, whichever is greater.
- (5) Operating Force The operating force shall be measured by using a spring type suspension indicating balance, resistance wire strain gauge type operating force meter or the like. The measuring precision shall be ± 5 % of measuring object or 0.5 kgf {4.9 N}, whichever is larger.
- (6) Angle The angle shall be measured by using angle gauge with a level (or the level specified in JIS B 7511) and metal rules specified in JIS B 7516. The measuring precision shall be ± 3 % of the measuring object or ± 1 degree, whichever is larger.
- (7) Time The time shall be measured by using stopwatch or electron type counter. The measuring precision shall be ± 0.1 s.
- (8) Rotary Speed The rotary speed shall be measured by using a tachometer specified in JIS B 7521 or electron type counter. The measuring precision shall be ± 1 % of the measuring object.
- (9) Fuel Consumption Amount The volume (ml) of consumed fuel [or mass (g)] and the time (s) shall be measured. The measuring precision shall be ± 2 % of the measuring object.
- (10) Temperature The temperature shall be measured in accordance with JIS Z 8704 or JIS Z 8705. The minimum scale mark of the instrument shall be 1°C.
- (11) Oil Hydraulic Pressure The oil hydraulic pressure shall be measured by using a pressure gauge specified in JIS B 7505. The minimum scale mark of the instrument shall be 10 kgf/cm² {981 kPa}.
- (12) Pneumatic Pressure The pneumatic pressure shall be measured by using the tire gauge specified in JIS D 8201 or the pressure gauge specified in JIS B 7505. The minimum scale mark of the instrument shall be 0.5 kgf/cm² {49 kPa}.
- (13) Noise The noise shall be measured by using the sound level meter specified in JIS C 1505.
- (14) Vibration The vibration shall be measured by using the vibration level meter specified in JIS C 1510. The minimum scale mark of the instrument shall be 0.1 g {0.98 m/s²}.

6. Test Place

The place where the test is carried out shall be as given in the following:

- (1) Stationary Test Place The stationary test place shall be a flat and horizontal paved surface or a rigid surface where the tires do not sink, and where the dimensional measurement can be made accurately.

- (2) Running Test Places The running test places for running speed, running resistance, acceleration, and braking shall be the dry and flat linear paved road or rigid road.

Further, the hill climbing test place shall be of uniform grade and, as a rule, of inclined surface of 3 to 15 %. The minimum turning radius test place shall be a hard and flat broad place.

- (3) Traction Test Place The traction test place shall be a flat linear paved road the length of which is the measuring distance (m) of at least 10 times the car speed at test (m/s) plus the entrance region required for stabilization of running condition before beginning the test.

Furthermore, the average grade shall be within 1 %, the width, not less than twice the width of test vehicle and the across grade within 1.5 %.

7. Engine Performance Test

The engine performance test shall be carried out in accordance with either JIS D 1001 or JIS D 1005, which is employed shall be clearly shown, and the test results shall be inscribed according to their form.

- (1) Load Test or Load at Working Test In the case of test in accordance with JIS D 1001, the load test shall be carried out and in the case of test in accordance with JIS D 1005, the load at working test be carried out.
- (2) Maximum Speed Regulating Performance Test The MC-load maximum rotary speed shall be measured in accordance with JIS D 1001. Further, where the test is carried out in accordance with JIS D 1005, the test shall be carried out at the time of load at working test.
- (3) No Load Minimum Number of Revolution Test The test shall be carried out in accordance with JIS D 1001 or JIS D 1005.

8. Torque Converter Actual Performance Test

The test shall be carried out on the following items of 3. Actual Performance Test of JIS D 1007. The test results shall be inscribed in accordance with JIS D 1007.

- (1) General Performance Test
- (2) Stall Performance Test
- (3) Accessory Performance Test

9. Stationary Test

The stationary test shall be carried out with the engine stopped [however, except for 9. (5)] in the linearly advancing figure on following each items:

- (1) Main Dimension Measurement The measurement shall be carried out on each measuring item specified in Attached Table 3, and the results shall be inscribed in Attached Table 3.

- (2) Laden Volume Measurement The measurement of laden volume shall be carried out in accordance with the following:

- (a) Struck Capacity For the measurement of struck capacity, the space volume enclosed by rear body side plate upper edge surface and the inside surfaces of the rear body shall be calculated by using the measured values of rear body inside dimensions.

In the case of backward opening rear body such as scoop end type, the distance up to the opening sideward rear edge shall be taken as the side plate upper edge (see Fig. 5). However, in the case where the angle of opening sideward rear edge to the horizontal line is 45 degrees or more, it shall be volume enclosed by the plane passing the opening lower end and at 45 degrees relative to the horizontal line upward and inside and the side plate upper edge (See Fig. 6).

Fig. 5

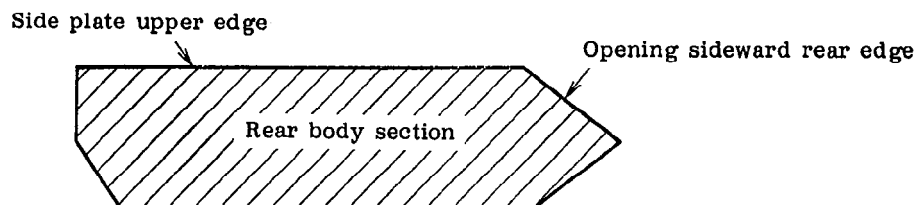
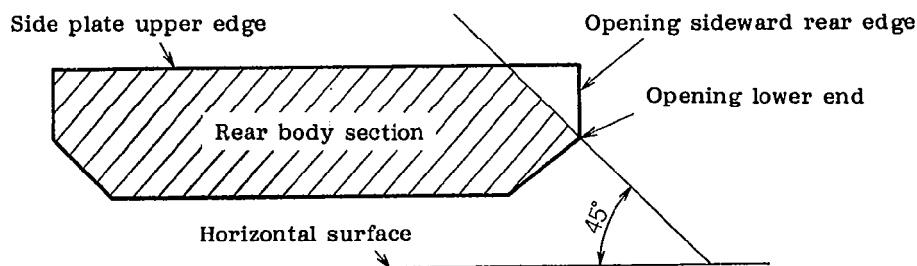


Fig. 6



In the case where the front plate and rear plate are higher than the side plate, the higher part shall not be included in the volume. In the case where the upper edge of side plate, front plate or rear plate is not linear, the average of their shapes shall be used and it shall be taken as the base of volume calculation. The minimum value of marking of struck capacity shall be 0.1 and the second place of decimal shall be rounded off by counting fractions of 0.05 and over as 0.1 and cutting away the rest.

- (b) Heaped Capacity Supporting the soil and sand are to be heaped to the height twice that of the four edges of the rear body, the overall capacity to be laden on the rear body shall be calculated.
- (c) Measurement record shall be inscribed in Attached Table 3.
- (3) Mass Measurement The measurement of mass shall be carried out as follows:
- (a) Complete Vehicle Curb Mass Measurement The mass of unladen condition shall be measured.
 - (b) Unladen Vehicle Distributed Mass Measurement The distributed mass on each wheel in unladen condition shall be measured.
 - (c) Maximum Authorized Total Mass Measurement The mass in fully laden condition shall be measured.
 - (d) Distribution Mass Measurement The distributed mass on each wheel in the condition of (c) shall be measured.
 - (e) Measurement record shall be inscribed in Attached Table 4.
- (4) Ground Pressure Measurement The ground pressure measurement shall be carried out as follows:
- (a) Measuring Method The tire grounding area of each wheel shall be measured and the ground pressure shall be calculated by using wheel load of (3) (d).

There are overall grounding area and effective grounding area in grounding area. The overall grounding area is defined as the overall area enclosed by outermost periphery of grounding surface, and the effective grounding area is defined as the areas of actually grounding parts, that is, the overall grounding area subtracted by the areas of grooved parts. Thereby, the apparent ground pressure and true ground pressure are calculated.
 - (b) The measurement record shall be inscribed in Attached Table 4.
- (5) Steering Device Operating Force Measurement The force required for operating main clutch, brakes, steering wheel, speed change lever, and pedals, and the total travel distance or angle shall be measured and inscribed together with their arrangement figure in Attached Table 5. In this case, the operating force shall be the maximum value of operating strokes, the operating force of pedals shall be the minimum value capable of stopping the truck body on the hill road of 20° or over in grade, and the grade shall be inscribed in Remark of Attached Table 5.

- (6) Driver's Seat Visual Range Measurement As for front visual range, the part of dead angle in the visual range of driver shall be indicated by drawing and, as for the rear visual range, the part off the bounds of the rearview mirror shall be drawn and inscribe in Attached Table 6.

Further, the structure of body of driver (measuring person) shall be a person of 91 ± 3 cm in sitting height, and in the case where the seat is adjustable, the seat shall be fixed at a most adequate position for driver to carry out the measurement.

10. Running Test

10.1 Maximum Speed Test The maximum speed test shall be carried out according to the following:

(1) Testing Methods

- (a) The conditions of test vehicle, test road and test appliances shall be in accordance with 4., 5., and 6.
- (b) The test shall be carried out in the unladen condition and the fully laden condition.
- (c) The test truck shall be travel accelerated in the entrance region and the maximum speed shall be retained until it reaches the measuring section.
- (d) The measuring section shall be 50 m, and the required time for both going and returning shall be measured and the maximum speed shall be determined.

Furthermore, the running speed shall be measured by using speedometer attached to the test truck for reference.

- (e) During the measurement of the maximum speed, the actuating condition, stability, etc. of each part of vehicle relating to high speed shall be observed.

- (2) The test results shall be inscribed in Attached Table 7.

10.2 Running Resistance Test The running resistance test shall be carried out according to the following:

(1) Testing Methods

- (a) The condition of test truck, test road and test appliances shall be in accordance with 4., 5., and 6.
- (b) The tractive force when the test truck is drawn by another car with a tractive force meter inserted in the intermediate at speeds of about 5 km/h, about 10 km/h and about 20 km/h shall be measured and the running resistance coefficient shall be obtained.

Further, the test shall be carried out in both going and returning directions of the test road with the speed change gear of the test truck kept neutral.

(c) At the time of traction, the engine shall be in idling condition.

(d) This test may be carried out in accordance with JIS D 1015.

(2) The test record shall be inscribed in Attached Table 8.

10.3 Accelerating from Standstill Test The accelerating from standstill test shall be carried out according to the following:

(1) Testing Methods

(1.1) The condition of test truck, test road and test appliances shall be in accordance with 4., 5., and 6.

(1.2) The test shall be carried out in the unladen condition and the maximum authorized freight condition on going road and returning road.

(1.3) Accelerating from standstill shall be carried out according to the following procedures:

(a) For the test truck prior to accelerating from standstill, the speed change gear shall be at neutral position, and the brakes be in working condition.

(b) Operating the speed change gear, put in the speed change step ⁽²⁾ and at the same time, relieve the brakes and treat in the acceleration pedal.

(c) Hereinafter gradually increase the speed.

Note ⁽²⁾ It shall be the lowest speed change step and the number of revolution of engine to be used for ordinary acceleration from standstill.

(1.4) The measuring distances shall be 5 m, 10 m, 20 m, 50 m, 100 m, 150 m and 200 m, and the time to reach the respective distances from the position of test truck accelerating from standstill shall be measured.

(2) The test record shall be incirbed in Attached Table 9 with the results of (1.4) and prepare the running distance - time diagram.

10.4 Minimum Turning Radius Test The minimum turning radius test shall be carried out according to the following:

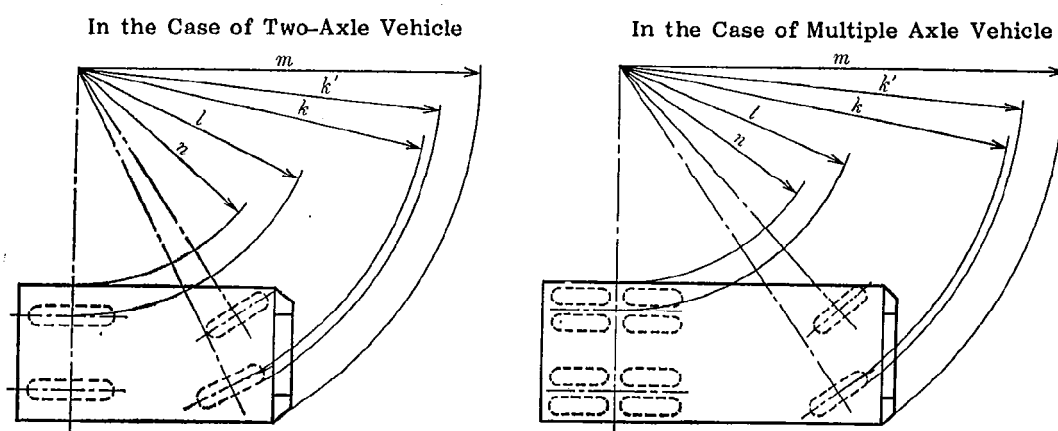
(1) Measuring Items The measuring items shall be as follows (See Fig. 7):

(a) Outside wheel Minimum Turning Radius The radius of trace (k) made by center of contact surface of the outermost side tire with the road surface at the time of test.

(b) Inside Wheel Minimum Turning Radius The radius of trace (l) made by center of contact surface of the innermost side tire with the road surface at the time of test.

- (c) Truck Body Outside Minimum Turning Radius The radius of trace (m) made by outermost part of truck body (excluding rear view mirror, under mirror, flexible antenna attached to the truck body outside) at the time of test.
- (d) Truck Body Inside Minimum Turning Radius The radius of trace (n) made by inner most part of truck body (excluding rear view mirror, under mirror, flexible antenna.) at the time of test.
- (e) Outside Wheel Outside Minimum Turning Radius The radius of trace (k') made by outside of contact surface of the outermost tire with the road surface at the time of test.

Fig. 7



(2) Testing Methods

- (a) The condition of test truck, test road and test appliances shall be in accordance with 4., 5., and 6. In addition thereto the retaining trace device (the device or tool to mark the running trace of test truck) and tape measure (the tape measure having the length capable of measuring the diameter of running trace circle of test truck) shall be prepared.
- (b) The standard condition of test truck shall be the unladen condition with one driver riding.
Further, as the tire of test truck, a standard article shall be used. The condition for this series of tests is that the check of (c) shall be carried out in unladen condition, and the tests of (d), (f) and thereafter shall be carried out in the standard condition specified in (b).
- (c) The front wheel alignment shall be checked and corrected if required.
- (d) After the maximum steering angle is checked and corrected to the value indicated in the specification of test truck, the maximum number of revolutions of steering wheel shall be measured.

- (e) Keeping the steering wheel in a position to maintain the maximum steering angle, make test running at least twice each turning left and turning right at extremely low speed.
 - (f) While drawing a remaining trace on the test road under the running condition of (e), after running without stopping until the remaining traces overlap, the test truck shall be stopped outside the running trace circle.
 - (g) The diameter of running trace circle shall be measured at two places in perpendicularly intersecting directions.
 - (h) The test shall be carried out in both directions of left hand turning and right hand turning.
- (3) The test record shall be inscribed in Attached Table 10.
- (4) The marking value of test results shall be inscribed according to the following:
- (a) The maximum number of revolutions of steering wheel shall be calculated to one place of decimals and the two places or fraction shall be discarded.
 - (b) The columns for rotary inside and outside wheels for the maximum steering angle shall be respectively divided into two sections so as to carry the cases up to four engaged wheels, and the inscribing value of the maximum steering angle shall be to one place of decimals and the places of decimals or its fraction shall be discarded.
 - (c) The turning diameter shall be measured for two values for each turning direction, and inscribed to two places of decimals and three places of decimals or its fraction shall be discarded.
 - (d) The measured values of turning diameters in various turning directions shall be averaged and the value divided by 2 shall be rounded by the method that counts fraction of .5 as a unit and cuts away the rest and inscribe to two places of decimals in the average turning radius column.
 - (e) The average value of average turning radius shall be rounded by the method that counts fraction of .5 as a unit and cuts away the rest and inscribe to two places of decimals in the minimum turning radius inscription column. However, where the average turning radii are different in left hand and right hand turnings by 0.1 m or more, the larger value shall be inscribed to two places of decimals.

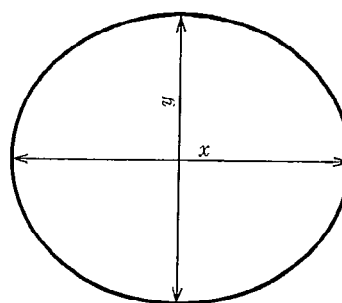
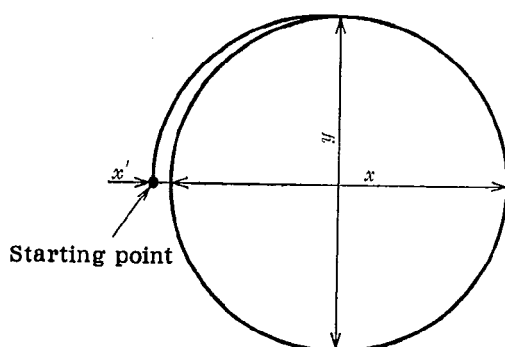
- (f) The measurement error caused by convex and concave road surfaces, runout from true circle of trace, remaining trace width, etc. shall be reduced by measuring the turning diameters in two perpendicularly intersecting directions of running trace circle and by obtaining the average of measured values.

In the case where the trace has run out from the true circle, the measurement shall be carried out in accordance with Fig. 8.

Fig. 8. Example of Trace Runout from True Circle

- (1) In the case where the trace does not return to the starting point

- (2) In the case where the trace is an ellipse



- (1) In the case where the trace does not return to the starting point, it shall be measured in x and y directions and the measured value of turning diameter in x direction shall be expressed by $x + \frac{x'}{2}$.
- (2) In the case where the trace is elliptic, the long diameter x and the short diameter y shall be measured.

10.5 Examination of Speedometer Scale The examination of speedometer scale shall be carried out according to the following:

(1) Testing Methods

- (a) The test truck shall be made the unladen condition and fully laden condition and the test road and test appliances shall be in accordance with 4., 5., and 6.
- (b) The driving wheel of speedometer shall be rotated several times at a low speed, the travel distance shall be measured and the effective diameter of the wheel shall be obtained according to the following formula:

$$D = \frac{l}{\pi N}$$

where D : wheel effective diameter (m)
 l : travel distance (m)
 N : number of revolutions of wheel

- (c) The correction coefficient of distance measuring device C_t shall be obtained according to the following formula:

$$C_t = \frac{\text{real speed (km/h)}}{\text{indication of distance measuring device (km/h)}} = \frac{\pi DK}{1000 K_1 K_2}$$

where K : constant of speedometer

$$= \frac{\text{speedometer axle number of revolutions}}{\text{distance measuring device indicating distance (km)}}$$

K_1 : speedometer driving gear ratio

$$= \frac{\text{speedometer axle number of revolutions}}{\text{propeller axle number of revolutions}}$$

K_2 : driving axle reduction gear ratio

$$= \frac{\text{propeller axle number of revolutions}}{\text{driving axle number of revolutions}}$$

- (d) The gauge mark distance L km adequate for the test road and the approach run distance before and after it shall be selected. The gauge mark distance shall be run at a constant speed V km/h by indication of test speedometer, the time t sec required for the running shall be measured by means of a stopwatch and the correction factor of speedometer C_v shall be obtained according to the following formula:

$$C_v = \frac{\text{actual speed (km/h)}}{\text{speedometer indicator (km/h)}} = \frac{3600L}{Vt}$$

- (2) The test record shall be inscribed in Attached Table 11.

10.6 Fuel Consumption Test The fuel consumption test shall be carried out according to the following:

(1) Testing Methods

- (a) The condition of test truck, test road and the test appliances shall be in accordance with 4., 5., and 6.
- (b) On the test road, the gauge mark point shall be provided for each required distance to make the measuring section.
- (c) The test truck shall be attached with a fuel consumption measuring device.
- (d) The test shall be carried out in the unladen condition and the fully laden condition.
- (e) For the test running speeds, integer multiplication of 10 km/h shall be chosen, and for the speed change gear the speed step most suitable to the corresponding truck speed shall, as a rule, be used.

- (f) For the test run, the approach run shall be carried out until the uniform speed is attained, and after the running speed has become uniform, and fuel consumption until reaching the nearest gauge mark point and at the same time required and the running distance shall be measured.
- (g) The fuel consumption rate shall be obtained from the measured value in (f) by using the following formulae:

$$F = \frac{L}{Q} \text{ (km/l)}$$

$$F = \frac{Q}{L} V \text{ (l/h)}$$

$$F = \frac{Q}{WL} \text{ (l/t·km)}$$

where F : fuel consumption rate (km/l, l/h or l/t·km)

L : actual distance of measuring section (km)

Q : fuel consumption amount (l)

V : actual speed (km/h)

W : total mass of vehicle at test (t)

- (2) The test record shall be inscribed in Attached Table 12.

10.7 Hill Climbing Test The test shall be carried out according to the following in order to confirm the running performance of vehicle corresponding to the grade of sloping road.

(1) Testing Methods

- (a) The condition of test truck and the test appliances shall be in accordance with 4., 5., and 6. The test shall be carried out in the unladen condition and the fully laden condition.
- (b) The test road shall be a paved sloping road or a rigid sloping road including the approach run section required for ordinary running and the measuring section of 20 m or more in length having a uniform grade.
- (c) The test shall be carried out in the hill climbing grade range of 3 to 15 % and as a rule be carried out under two conditions around 5 % and around 10 %.
- (d) The time required for passing the measuring section shall be measured.
- (e) The test shall be carried out on the required speed steps.
- (f) The average vehicle speed and the required hill climbing output shall be obtained from the measurement results according to the following formula:

$$V = \frac{L}{t} \times 3.6$$

$$P = \frac{WL (\sin \alpha + \mu \cos \alpha)}{75 t} \left\{ P = \frac{g WL (\sin \alpha + \mu \cos \alpha)}{1000 t} \right\}$$

where V : average vehicle speed (km/h)
 P : hill climbing required output [PS {kW}]
 W : total mass of vehicle at test (kg)
 L : hill climbing distance (m)
 t : hill climbing required time (s)
 α : grade (degrees)
 μ : rolling resistance coefficient
 g : gravimetric acceleration (to be 9.8 m/s^2)

(2) The test record shall be inscribed in Attached Table 13.

11. Brake Test

11.1 Brake Air Filling and Consumption Tests

(1) Filling Consumption Test

- (a) Raise the air pressure in the air tank to the upper limit of adjusting pressure range of pressure governor and successively maintain the engine at the maximum number of revolutions.
- (b) Tread in the brake pedal rapidly by whole stroke, after maintaining for 2 sec, return the brake pedal rapidly and keep the open condition for 8 sec (at intervals of 10 sec). Repeat this operation 15 times.
- (c) At each time, the air pressure of air tank for ordinary braking before and after treading in the brake pedal shall be measured by means of a pressure gauge and the results shall be inscribed in Attached Table 14.

(2) Filling Test

- (a) The air pressure of air tank shall be made 0 by using drain cock or the like.
- (b) The engine is started, quickly maintained at the rated maximum number of revolutions, the air pressure of main air tank shall be measured by using a pressure gauge every 15 sec or 30 sec until reaching the upper limit of regulating pressure range of pressure governor and the results shall be inscribed in Attached Table 15.
- (c) Prior to test for a test truck provided with appliances using compressed air other than the brakes, all the air tanks of the test truck are pressurized to the upper limit of regulating pressure range of pressure governor, the engine is stopped to make the air pressure of air tank for brake zero by using the drain cock and then the test of (b) shall be carried out.

(3) Consumption Test

- (a) After the air pressure in the air tank is raised to the upper limit of regulating pressure range of pressure governor, the engine shall be stopped.