Form for Automobile Performance Diagram

1. Scope

This standard specifies the items, terms, and the forms to be designated in the automobile performance diagram (hereinafter referred as Performance diagram).

Remark: In this standard, units and numerical values are based on SI (International System of Units), while units and numerical values given in { } are customary units system, and are given for reference.

2. Purpose

This standard aims to standardize the forms of performance diagrams so as to be conveniently utilized by the users.

3. Described Items and Terms

In the performance diagram, diagrams and their explanatory items shall be separately described from the supplementary items, and the supplementary items shall be described in prescribed filling columns. (Refer to **Attached Fig.**)

3.1 Diagrams to be Described

3.2 Items and Terms to be described in Diagram

3.3 Items and Terms to be described in Prescribed Filling Columns as Supplementation

3.1 Diagrams to be Described

No.	Name of diagram	Description content
(1)	Vehicle speed diagram	This indicates the relationship between the vehicle speed and the engine speed by each speed change step. In the case of stepless transmission, this shall be indicated at its maximum speed change characteristic.
(2)	Driving force curve	This indicates the relationship between the vehicle speed and the driving force of engine under its maximum loaded condition by each speed change step. In case of stepless transmission, this shall be indicated corresponding to its maximum speed change characteristics.
(3)	Running resistance curve	This indicates the relationship between the vehicle speed and the running resistance by each grade.

3.2 Items and Terms to be Described in Diagram

No.	Item and term	Unit	Description content
(4)	Vehicle speed	km/h	
(5)	Engine speed	rpm	
(6)	Driving force	kN {kgf}	
(7)	Running resistance	kN {kgf}	
(8)	Grade resistance	kN {kgf}	Grade shall be indicated by "tangent" value.

Applicable Standards: **JIS D 1001** Engine Power Test Code for Road Vehicles
JIS D 4202 Dimension of Tires for Automobiles

Reference Standard: **JIS D 0102** Glossary of Terms Relating to Automobiles-Dimensions, Masses, Weights and Performances of Automobiles

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3.3 Items and Terms to be Described in Prescribed Filling Columns as Supplementation

No.	Item and term	Unit	Description content
(9)	Engine maximum output	kW {PS}	The engine speed at the maximum output shall be also described. kW/rpm {PS/rpm}
(10)	Engine maximum torque	N·m {kgf·m}	The engine speed at the maximum engine torque shall be also described N·m/rpm {kgf·m/rpm}
(11)	Gross vehicle mass	kg	When a trailer is coupled, the hauled mass may be also described in ( ).
(12)	Gross vehicle load	kN {kgf}	When a trailer is coupled, the hauled load may be also described in ( ).
(13)	Rolling resistance coefficient		The unit is not specified.
(14)	Air resistance coefficient	[$N \cdot h^2/Mm^4$] [{$kgf \cdot h^2/(m^2 \cdot km^2)$}]	
(15)	Projected area of front side	m^2	
(16)	Tire size		Describe the nominal size of tire according to **JIS D 4202** "Dimensions of Tires for Automobiles", etc.
(17)	Effective radius of tire	m	Describe the tire radius under kinetic load according to **JIS D4202**, etc.
(18)	Transmission ratio 1st speed 2nd speed 3rd speed . . . Reverse Forward Reverse		Describe the ratio according to the number of speed change steps of transmission in the filling column, and the unnecessary column may be neglected. As for stepless transmission, describe the maximum and minimum values.
(19)	Auxiliary transmission ratio High (H) Low (L)		Describe the values if necessary when used.
(20)	Reduction gear ratio High (H) Low (L)		The total reduction gear ratio shall be described including the reduction gear ratio of power take off and of speed reducer installed between the engine and transmission in addition to the final speed reducer. In case there are two or more reduction gear ratios, they may be described by the form as (primary) x (secondary) x (tertiary). Describe the reduction gear ratio according to the numbers of reduction stages only when two steps' speed reducer, etc. is used.
(21)	Power transmission efficiency		Describe the total power transmission efficiency. However, when torque converter of fluid coupling is installed, describe the transmission efficiency excluding above. As for a stepless transmission, describe the transmission efficiency corresponding to an applicable transmission ratio.
(22)	Stall torque ratio		Describe only when torque converter is installed.
(23)	Correction coefficient for loss due to exhaust silencer, etc.		Describe if necessary only when gross shaft output is used which is obtained by the test method specified in **JIS D1001** "Engine Power Test Code for Road Vehicles", etc. Describe the value when the engine output is at maximum, and also describe the engine speed at that time.

Remarks: 1. Either item of (11) Gross Vehicle Mass or (12) Gross Vehicle Load can be omitted when actually used.
2. The effective number of digits for described items shall follow the examples of **Attached Figs.**

4. Description Form

Examples of description form are shown in **Attached Figs.**

Attached Fig. 1 **Case where mechanical (manual) type transmission is used** (Example of using net shaft output).

Attached Fig. 2 **Case where automatic transmission with lockup clutch is used** (Example of using gross shaft output).

Attached Fig. 3 **Case of trailer-tractor where two steps' speed reducer is used** (Example of using gross shaft output).

Attached Fig. 4 **Case where stepless transmission is used** (Example of using net shaft output).

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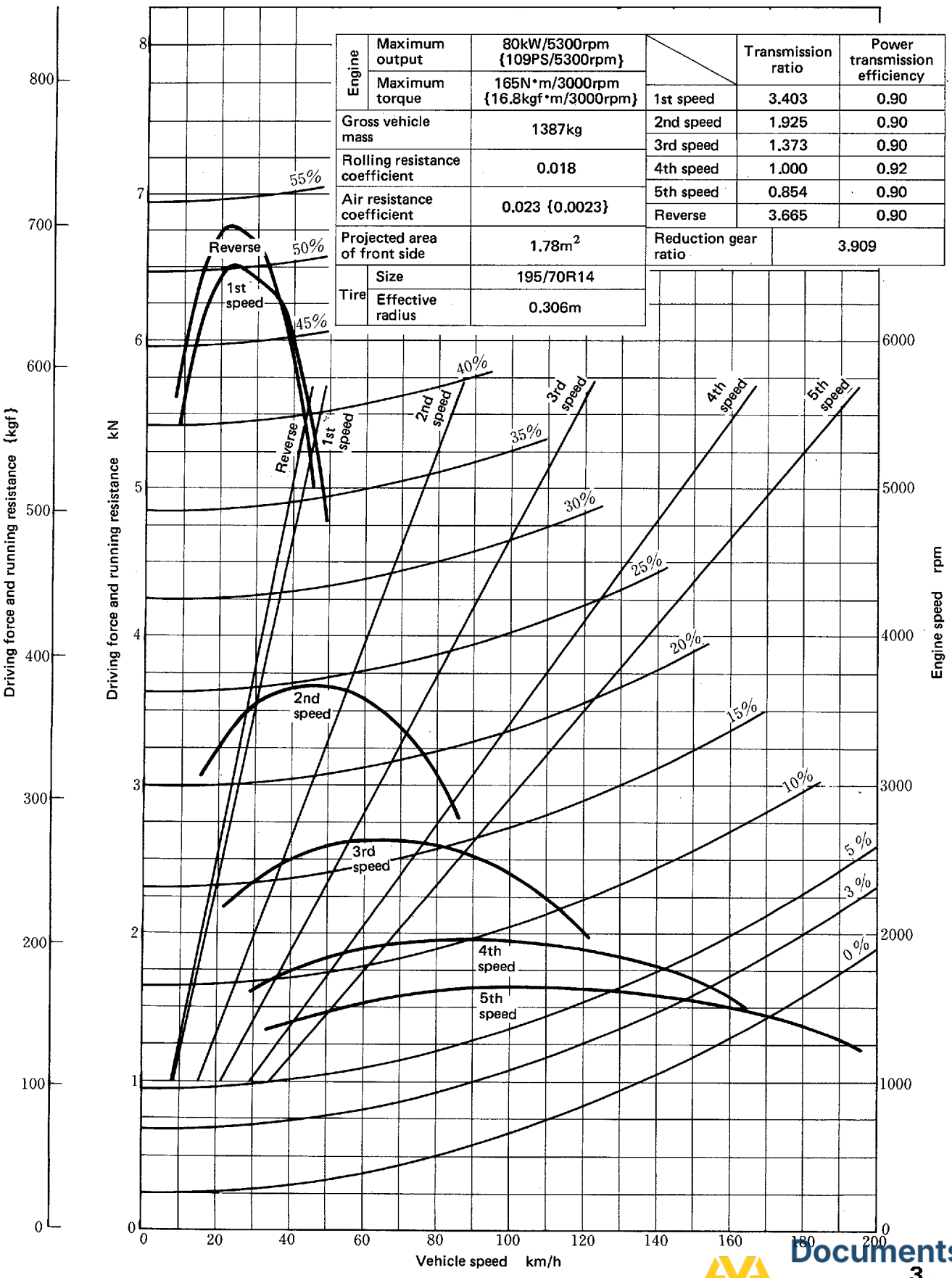
Attached Fig. 1 Case where Mechanical (Manual) Type Transmission is Used (Example of using net shaft output)

Performance Diagram for Model

Engine	Maximum output	80kW/5300rpm {109PS/5300rpm}
	Maximum torque	165N·m/3000rpm {16.8kgf·m/3000rpm}
Gross vehicle mass		1387kg
Rolling resistance coefficient		0.018
Air resistance coefficient		0.023 {0.0023}
Projected area of front side		1.78m^2
Tire	Size	195/70R14
	Effective radius	0.306m

	Transmission ratio	Power transmission efficiency
1st speed	3.403	0.90
2nd speed	1.925	0.90
3rd speed	1.373	0.90
4th speed	1.000	0.92
5th speed	0.854	0.90
Reverse	3.665	0.90
Reduction gear ratio	3.909	



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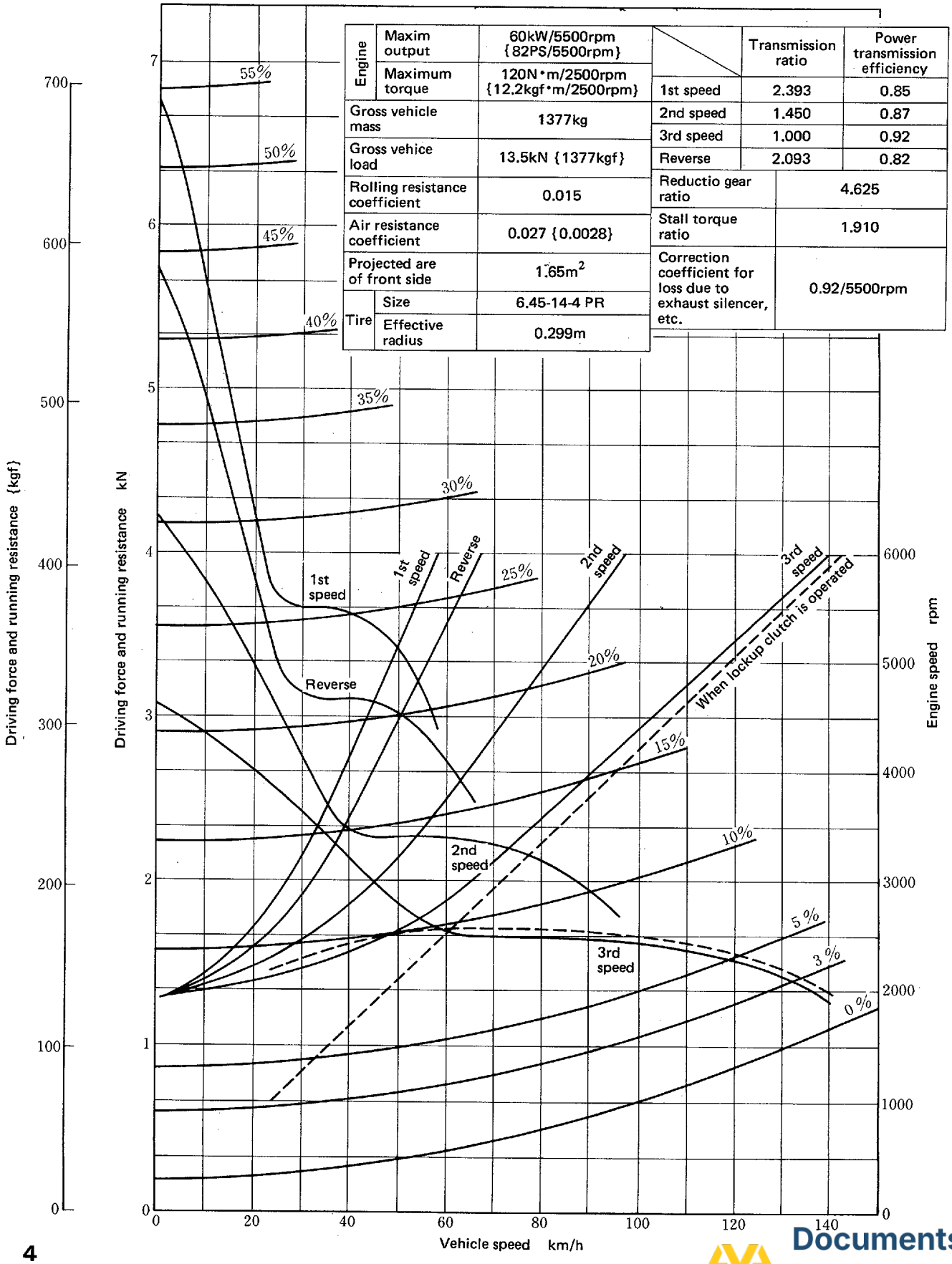
Attached Fig. 2 Case where Automatic Transmission with Lockup Clutch is Used (Example of using gross shaft output)

Performance Diagram for Model

Engine	Maxim output	60kW/5500rpm {82PS/5500rpm}
	Maximum torque	120N·m/2500rpm {12.2kgf·m/2500rpm}
Gross vehicle mass		1377kg
Gross vehice load		13.5kN {1377kgf}
Rolling resistance coefficient		0.015
Air resistance coefficient		0.027 {0.0028}
Projected are of front side		1.65m^2
Tire	Size	6.45-14-4 PR
	Effective radius	0.299m

	Transmission ratio	Power transmission efficiency
1st speed	2.393	0.85
2nd speed	1.450	0.87
3rd speed	1.000	0.92
Reverse	2.093	0.82
Reductio gear ratio	4.625	
Stall torque ratio	1.910	
Correction coefficient for loss due to exhaust silencer, etc.	0.92/5500rpm	



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