SAFETY STANDARDS No. 33.1

[Central Motor Vehicle Rules, 1989, Notification S. O. No. 873 (E) dtd. 15.12.1997, item No. 22, of Ministry of Surface Transport].

The Towing Devices used on Motor Vehicles, Trailer and Transport Tractors from 2 Tonne to 35 Tonne Gross Mass

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I N T R O D U C T I O N

(1986)

The question of prescribing Safety and Pollution Standards for automotive vehicles has been engaging the attention of the Government of India, Automotive Industry and Consumers. On pursuance of this objective Ministry of industry, formed a committee to frame the safety standards and pollution standards. The Committee during its tenure formulated 36 safety standards.

On the completion of the tenure of the Committee, the work of framing of safety standards has been entrusted to Automotive Research Association of India, under a project entitled 'Formulation of Safety Standards for Automotives'.

These safety standards, exclusively, have drawn material from Federal Motor Vehicle Safety Standards, Australian Design rules, EEC regulations and Indian Standards.

These Standards are now under wide circulation as a preliminary to be converted into Indian Standards and will then be identified by an IS Number.

These Standards are likely to become mandatory and take effect after the Government's regulation.

(1993)

This safety standard is modified based on the discussion held till date with various organisations concerned in executing and implementing the same to bring in line with the current trends and requirements.

This standard has become mandatory under Rule No. 124 of CMV (A) R 1993 and takes effect from the Government's notification No. S. O. No. 201 (E) dtd. 26.3.93 by the Ministry of Surface Transport, Government of India.

(1998)

This safety standard is amended to include the amendments as recommended in part I of the recommendations of technical subcommittee set up to identify the changes in CMVR which have a technical bearing. This revised standard described as safety standard 33.1 supersedes all previous versions and is published by the Automotive Research Association of India. This standard takes effect from the Government of India notification S.O. No. 873 (E) dtd. 15.12.1997 issued by Ministry of Surface Transport (MOST).

ARAI desires to call attention to the fact that this safety standard does not purport to include all the necessary provisions of a contract.

The Towing Devices Used on Motor Vehicles, Trailers and Transport Tractors from 2 Tonne to 35 Tonne Gross Mass

1.0 Scope

This standard establishes requirements of capacity, dimensions for interchangeability, strength and deformation of various towing devices for motor vehicles and trailers.

2.0 Purpose

The purpose of this standard is to provide safety to vehicles and trailers, minimise the failures of towing devices by proper design strength and also provide for interchangeability.

3.0 Application

This standard applies to motor vehicles trailers and transport tractors from 2 tonnes upto 35 tonnes gross mass fitted with towing devices.

The standard covers the following devices:

(1) Fifth wheel King Pin of 50.8 mm and 89 mm diameters for trailers.
(2) Draw bar eyes and fore-carriage pins for connection between trailers of gross mass above 2 tonnes and upto 35 tonnes and transport tractor.
(3) Towing hooks for use between trailers of gross mass above 2 tonnes and upto 35 tonnes and transport tractor.
(4) Towing jaws for use between trailers of gross mass above 2 tonnes and upto 35 tonnes and transport tractor.

4.0 Definition

4.1 Fifth Wheel - A device used to connect a truck tractor to a semitrailer and to permit articulation between the units. It is generally composed of a lower half, mounted on the tractor, consisting of a trunnion, plate and latching mechanism, for connection with a King Pin mounted on the semi-trailer.

4.2 King Pin - The trailer part of the mechanical coupling of a transport tractor-trailer normally attached to fifth wheel of the tractor.

4.3 Drawbar Eye - The trailer part of the mechanical coupling of an independent trailer, normally attached to the towing hook of the tractor.

4.4 Towing Hook - The tractor part of the mechanical coupling of an independent trailer normally attached to the drawbar eye of the trailer. The towing hook is used when towing jaw is not used.

4.5 Towing Jaw - The tractor part of the mechanical coupling of an independent trailer normally attached to the drawbar eye of the trailer. The towing jaw is used when towing hook is not used.

5.0 Requirements

5.1 Requirements for Fifth Wheel King Pins

5.1.1 Dimensions

Dimensions given under various clauses are for the purpose of guidance only and are preferable.

5.1.1.1 Dimensions of 50.8 mm Diameter Fifth Wheel King Pin

The dimensions and tolerances of fifth wheel King Pin of 50.8 mm diameter shall be preferably as given in Fig. 1. The dimensions of gauge, detail of load applications and fixture for applying load C are given in fig. 1 a, 1 b and 1 c respectively.

5.1.1.2 Dimensions of 89 mm Diameter Fifth Wheel king Pin

The dimensions and tolerances of fifth wheel King Pin of 89 mm diameter shall be preferably as given in Fig. 1.

5.1.2 Drawbar Pull

5.1.2.1 Drawbar Pull for 50.8 mm Diameter Fifth Wheel King Pin

5.1.2.1.1 The King Pin shall be designed to withstand a drawbar pull of load A in fore and aft direction of 27,200 kg.

5.1.2.1.2 The King Pin shall also be designed to withstand in fore and aft direction a dynamic (cyclic) load B of 11340 kg for 500,000 cycles and a torque load C of 1440 mkg. for 100,000 cycles (see Fig. 1 b).

5.1.2.2 Drawbar Pull for 89 mm Diameter Fifth Wheel King Pin

5.1.2.2.1 The King Pin shall be designed to withstand a drawbar pull of 56,600 kg load applied at any point of the 89 mm diameter surface, without residual deformation to King Pin or structure.

5.2 Drawbar Eye And Fore-Carriage Pin

5.2.1 Dimensions

The dimensions of the drawbar eyes and fore carriage pins shall be preferably as given in fig. 2.

5.2.2 Design

5.2.2.1 Effective means shall be provided to prevent endwise movement of the fore carriage pin.

5.2.2.2 If the drawbar eye is arranged to swivel, stops shall be provided limiting the angular movement to 150 on either side in the horizontal plane (see Fig. 2).

5.2.3 Marking

The following wording shall be suitably marked on the drawbar in clear lettering 10 mm high, raised or stamped :

To Tow 'X' TONNES GROSS
In place of 'X' the value 5, 16 or 35 to be marked as the case may be.

5.3 Requirements of Towing Hook for use between trailers from 5 tonnes upto 35 tonnes gross mass and Transport Tractor

5.3.1 Dimensions

The dimensions of the towing hook shall be preferably as shown in Fig.3.

Note : The dimensions specified are based upon a forged hook, and have been calculated on the basis of the total yield strength being equal to two thirds the gross mass being towed. It is necessary that any other part not covered by this standard, connecting the coupling to the towing tractor shall have a similar strength.

5.3.2 Design

5.3.2.1 An efficient safety catch, preferably of the automatic or semiautomatic type, shall be provided as indicated in Fig. 3 to prevent accidental detachment of the drawbar from the hook.

5.3.2.2 The hook shall be so designed that a bar of diameter as specified in fig. 3, when held vertically, may be passed freely between the inside faces of the hook with the catch held back to clear.

5.3.3 Mounting

5.3.3.1 Suitable mounting shall be designed to mount the hook. An example with a four bolt design is shown in Fig. 3.

5.3.3.2 The nuts shall be secured either by peening the end of the bolt or by fitting a positive locking device such as a safe locking nut or a slotted nut and split pin.

5.3.4 Marking

The following wording in clear lettering 10 mm high, raised or stamped, shall be marked on each towing hook as under:

(a) TO TOW 'X' TONNES GROSS on one side

(b) SS No. XXXX on the other side.

Where in place of 'X' the value 5, 16 or 35 to be marked as the case may be.

5.4 Requirements for Towing Jaw for use between Trailers from 5 tonnes upto 35 tonnes Gross Mass and Transport Tractor

5.4.1 Dimensions

The dimensions shall be preferably as shown in Fig, 4. The dimensions marked with asterisk (*) are essential for interchangeability, other dimensions apply to the forged Jaw and are for guidance only.

Note : The dimensions specified for the forged jaws have been calculated on the basis of the total yield strength being not less than two-thirds the gross mass being towed. It is necessary that any other part not covered by this standard, connecting the coupling to the towing vehicle shall have a similar strength.

5.4.2 Design

5.4.2.1 An efficient safety locking device shall be provided as indicated in Fig. 4 to prevent accidental extraction of the pin from the jaw.

5.4.2.2 The jaw shall be so designed that a bar of diameter specified in Fig. 4 shall pass freely between the pin and the inside face of the jaw.

5.4.3 Mounting

5.4.3.1 The jaw shall be mounted with four bolts of diameter and at the centres shown in Fig. 4. This renders it interchangeable in mounting with hooks specified in Cl.5.3.

5.4.3.2 The nuts shall be secured either by peening the end of the bolt or by fitting a positive locking device such as a safe locking nut or a slotted nut and split pin.

5.4.4 Marking

The following wording in clear lettering 10 mm high, raised or stamped, shall be marked on each towing jaw :

(a) 'TO TOW 'X' TONNES GROSS' on one side

(b) SS No. XXXX on the other side.

Where In place of 'X' the value 5, 16 or 35 to be marked as the case may be.

6.0 Test Conditions

For the towing devices mentioned in clauses 5.2, 5.3 and 5.4 the connection and mounting structure must withstand a towbar pull equivalent to 50% of the gross mass of the towed trailer without residual deformation to the mounting or the trailer structure.

FIGURE 1

Dimension	50.8 mm King Pin	89 mm Dia. King Pin

Ø A	50.8 ± 0.10	89.0 ± 0.10
Ø B	73 ± 0.10	114.0 ± 0.10
Ø C	71.5 ± 0.40	111.1 ± 0.40
D	35 + 0.00 - 3.00	21 + 0.00 - 3.00
E	70 + 1.50 - 0.00	58.5 + 1.50 - 0.00
F	84 + 0.00 - 1.50	73 + 0.00 - 1.50
R	3 + 0.50 - 0.00	3 + 0.50 - 0.00
Ø G	-	38

FIGURE 2

Trailers Gross mass (t) Maximum	Drawbar Eye		Fore carriage pin dia, P mm, (in double shear) Minimum
	Inside dia. A mm	Dia. at section B mm	
2 to 5	50.8	28	25.5
16	51	40	25
16	76	40	25
35	76	40	38

FIGURE 3

Material	2 - 5 Tonnes	Upto 16	Upto 35 Tonnes

Dimensions	En5 (normalised)	Tonnes C 30	35Mn 2 Mo 28
A	85.8	100	100
B	44.5	100	100
Mx Boltsize	M 12	M 16	M 20
D	31.8	44.5	44.5
E	38	41.5	41.5
F	76	100	100
G	62	81	81
J	14.5	20.5	20.5
K	8	10	10
L	12.5	19	21
M	8	13	13
R_1	9.5	13	22.5
R_2	48	51	48
R_3	9.5	13	13
R_4	70	83	152.5
R_5	11	16	16
R_6	47.5	58	76.5
R_7	8	12.5	12.5
R_8	-	106	80
R_9	19	19	19
Ro	3	3	3
<a	45^o	45^o	45^o
<ß	30^o	30^o	-
< θ	-	15^o 30'	70^o
< ϒ	7^o	7^o	7^o
ØS	31	44	44
SECTION SIZE :			
a	44.5	51	60.5
b	47.5	60.5	60.5
c	44.5	51	-
d	41	52.5	60.5
e	38	49	-
f	44.5	49.5	-
g	31.75	44.5	-
h	44.5	-	60.5

FIGURE 4

Dimension	Upto 5 Tonnes	Upto 16 Tonnes	Upto 35 Tonnes
A	86	100	100
B	45	100	100
ØC	35.5	45	58
D	71.5	98	124
E	57.5	81	91
ØF	32	41.2	54
ØG	35	44.5	57.5
H	48	66	72
J	57.5	85	88
K	35	41	41
L	13	19	21
M	-	13	13
Mx	M12	M16	M20
< *a*	25^o	25^o	25^o
< ß	7^o	7^o	7^o
< θ	7^o	7^o	7^o
R_1	6.5	13	8
R_2	16	19	21
R_3	8	10	8
R_4	3	3	3
R_5	6.5	8	10
R_6	5	4	4
R_7	6.5	13	12.5
ØP	32	44	44
S	-	68.5	88
ØT	32.5	41.7	54.5
ØU	-	65	84.5
V	25.5	32	44.5
W	25.5	40	44.5

FIGURE 2

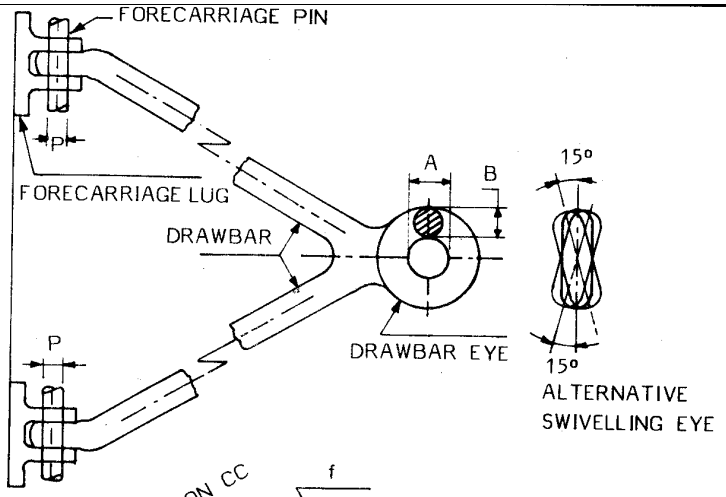
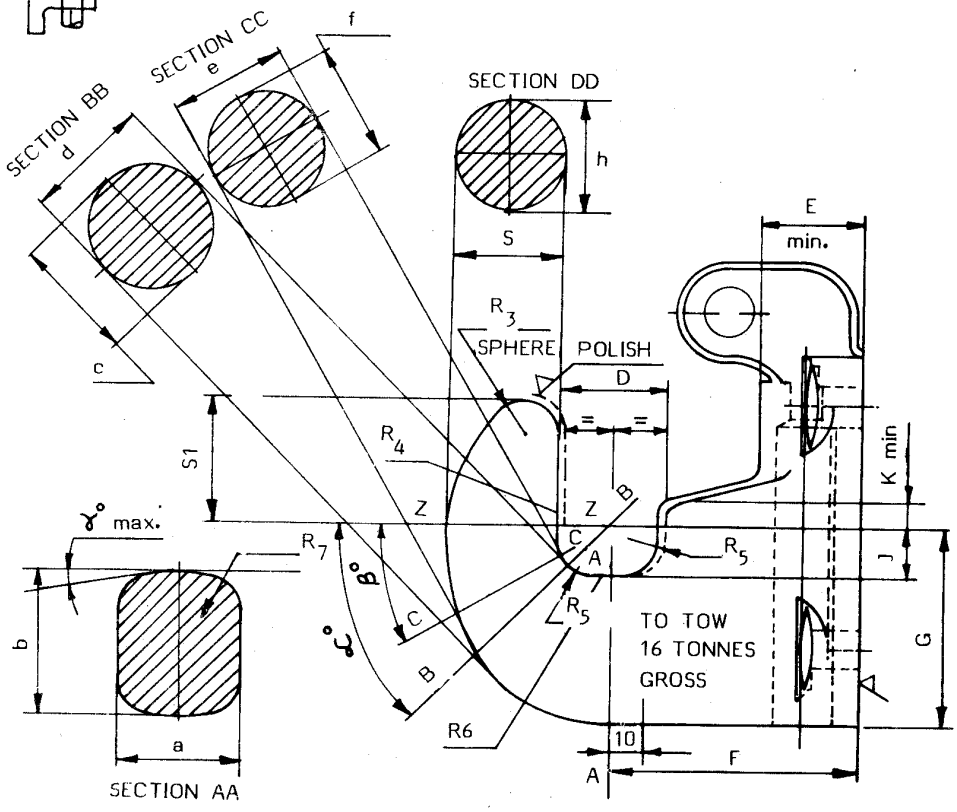
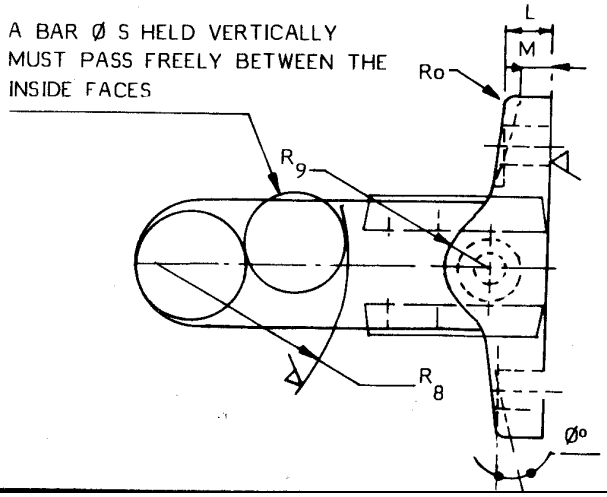


FIGURE 3





ALL DIEMENSIONS IN MM.