

# ECE No. 46.04: Indirect Vision Devices (Rear-View Mirrors ) Technical requirement

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JAPAN AUTOMOBILE STANDARDS INTERNATIONALIZATION CENTER

## ECE No. 46.04: Rear-View Mirrors



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1. The main purpose of this regulation
  - a. To ensure the driver's field of "non-direct vision" by mirror or camera-monitor systems, without look back (= facing forward).
  - b. To define the minimum area as the driver's field.
2. Scope: M, N, L (Note: Basically, the explanation is for M, N.)



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### 3. Summary

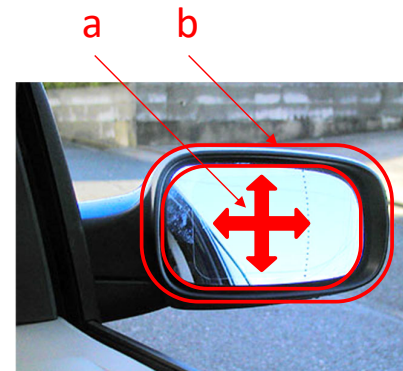
	Requirement		Regulation text
For devices	General	Adjustment, Interior/Exterior projection	6.1.1
	Dimension	Mirror size, Radius of curvature	6.1.2.1
	Reflection	Coefficient of reflection	6.1.2.2
	Strength	Impact, Bending	6.3.2
For vehicles	Installation	No vibration	15.1
	Visible area		15.2
	Class I	Interior rear-view mirror	-
	Class II	Exterior rear-view mirror(M1/N1)	-
	Class III	Exterior rear-view mirror(except M1/N1)	-
	Class IV	Exterior rear-view mirror(Wide angle)	-
	Class V	Close-proximity exterior mirror	-
	Class VI	Front mirror	-

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## 4. Overview of requirement for Devices (1/6)

General - adjustable, Interior/Exterior projection

- a. All mirror shall be a adjustable.
- b. The edge of the reflecting surface must be enclosed in a protective housing which must have a value "c" greater than or equal to 2.5 mm.



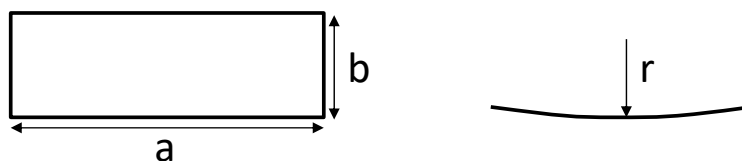
- c. The When the mirror is mounted on a plane surface which are static contact with a sphere either  
     165 mm in diameter (interior mirror)  
     100 mm in diameter (exterior mirror)  
     must have a radius of curvature 'c' of not less than 2.5 mm.

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## 4. Overview of requirement for Devices (2/6)

Dimension - Mirror size, Radius of curvature

Minimum mirror size and radius of curvature for Class I/II/III is below.



	a (mm)	Min. r (mm)	b (mm)
Class I	$150 + \frac{1}{1 + \frac{1000}{r}}$	1200 (a=150.5)	40
Class II	$\frac{170}{1 + \frac{1000}{r}}$	1200 (a=92.7)	200
Class III		1200 (a=92.7)	70
Class IV	-	300	-
Class V	-	300	-
Class VI	-	200	-
Class VII	-	1000 or 1500	-

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## 4. Overview of requirement for Devices (3/6)

Reflection - Coefficient of reflection

The value of the normal coefficient of reflection (see Annex6) must be not less than 40 per cent. In the case of reflecting surfaces with a changeable degree of reflection, must be not less than 4 per cent in the "night" position.



Adjusting lever  
(Day <-> Night)

(Annex 6)

Figure 1: Generalised reflectometer showing experimental set-ups for the two calibration methods

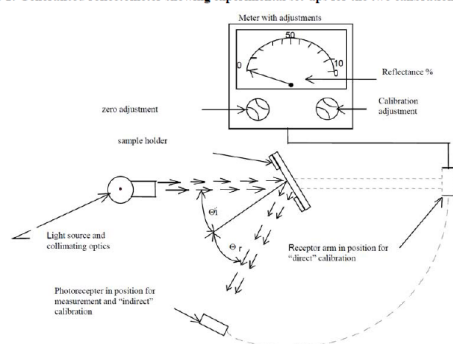
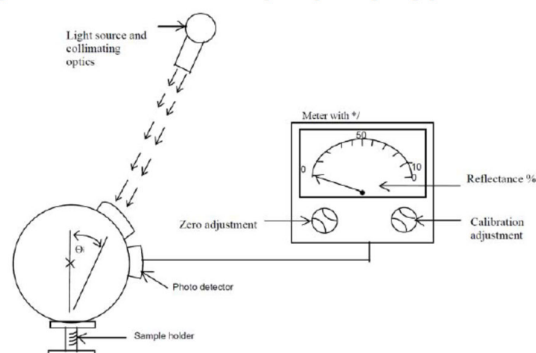


Figure 2: Generalised reflectometer, incorporating an integrating sphere in the receiver



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## 4. Overview of requirement for Devices (4/6)

Strength – Impact test (1/2)

<Scope(exemption)>

Impact test is not to be carried out for

- ✓ devices integrated in the bodywork of the vehicle and providing a frontal deflecting area of an angle not more than 45 deg. measured in relation to the longitudinal median plane of the vehicle, or
- ✓ devices not protruding more than 100 mm measured beyond the circumscribing bodywork of the vehicle according to Regulation No. 26.

#### 4. Overview of requirement for Devices (5/6) Strength – Impact test (2/2)

The criteria of impact test.

- ✓ The pendulum must continue to swing after impact at least 20 deg. With the vertical.
- ✓ The reflecting surface must not break during the tests.

Please refer to the regulation text in detail of the test rig.

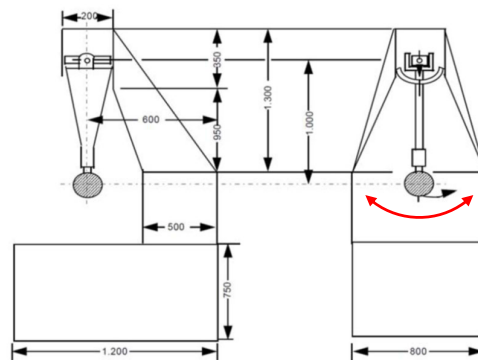


Figure 1

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#### 4. Overview of requirement for Devices (6/6) Strength – Bending test (Only Class VII)

The criteria of Bending test.

- ✓ The reflecting surface must not break during the tests.

Please refer to Figure 2 in the regulation in detail of the test rig.

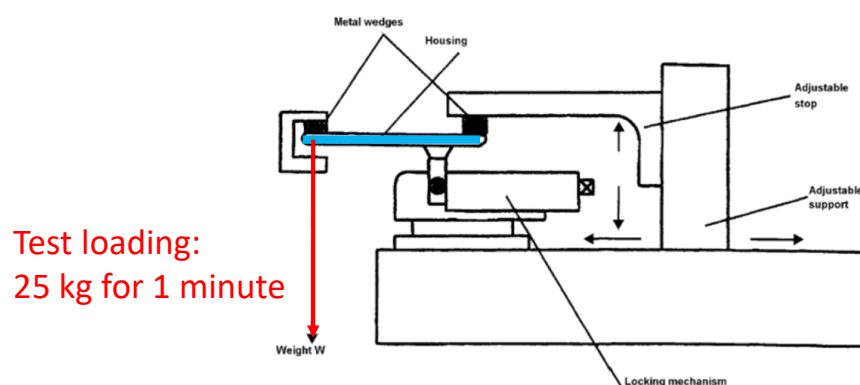


Figure 2: Example of rear-view mirror bending-test rig

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## 5. Overview of requirement for vehicles (1/11)

Installation – No vibration

Devices shall be fitted in such a way that the devices do not move so as significantly to change the field of vision as measured or vibrate to an extent which would cause the driver to misinterpret the nature of the image perceived.

The conditions shall be maintained when the vehicle is moving at speeds of up to 80 per cent of its maximum design speed, but not exceeding 150 km/h.

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## 5. Overview of requirement for vehicles (2/11)

Visible area – Mirror class (Reference)

Class I; Interior mirror

Class II; Main exterior mirror (for big truck and bus)

Class III; Main exterior mirror (for Passenger vehicle )

Class IV; Wide-angle mirror (for big truck)

Class V; Close proximity exterior mirror (for big truck)

Class VI; Front mirror (for big truck)

Class VII; Front mirror (for motorcycle etc.)



Class  
II & IV

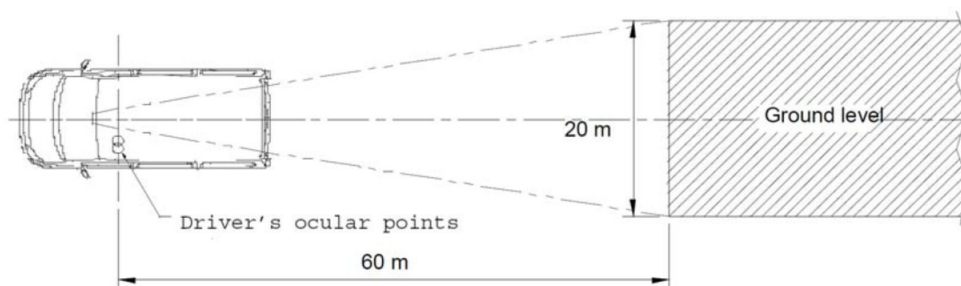


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## 5. Overview of requirement for vehicles (3/11)

Visible area – Class I

The driver can see at least a 20 m wide, flat, horizontal portion of the road centred on the vertical longitudinal median plane of the vehicle and extending from 60 m behind the driver's ocular points to the horizon.



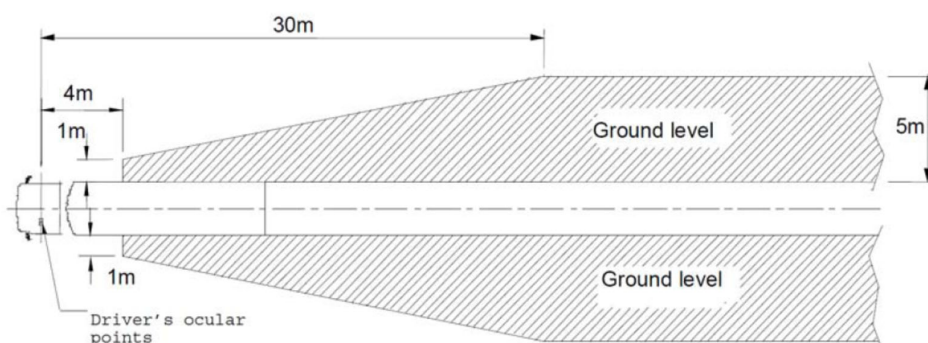
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## 5. Overview of requirement for vehicles (4/11)

Visible area – Class II

The driver can see at least a 5 m wide, flat, horizontal portion of the road, which is bounded by a plane which is parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle and extends from 30 m behind the driver's ocular points to the horizon.

In addition, the road must be visible to the driver over a width of 1 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 4 m behind the vertical plane passing through the driver's ocular points.



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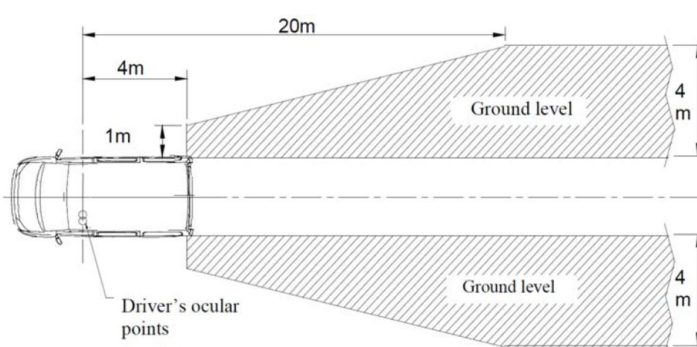


## 5. Overview of requirement for vehicles (5/11)

Visible area – Class III

The driver can see at least a 4 m wide, flat, horizontal portion of the road, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle and extends from 20 m behind the driver's ocular points to the horizon.

In addition, the road shall be visible to the driver over a width of 1 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 4 m behind the vertical plane passing through the driver's ocular points.



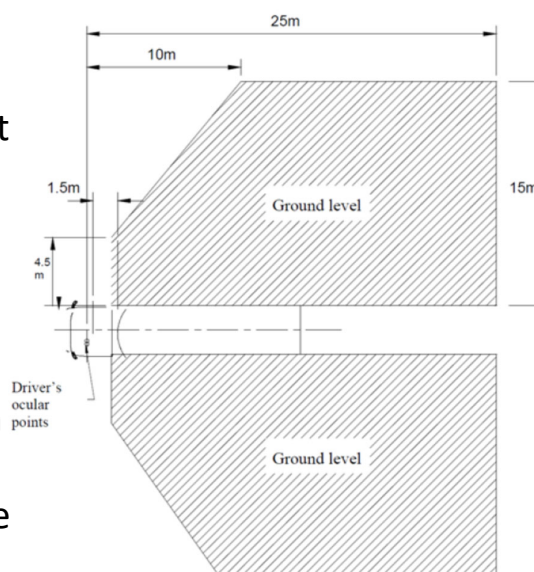
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## 5. Overview of requirement for vehicles (6/11)

Visible area – Class IV

The driver can see at least a 15 m wide, flat, horizontal portion of the road, which is bounded by a plane parallel to the median longitudinal vertical plane of the vehicle and passing through the outermost point of the vehicle and which extends from at least 10 m to 25 m behind the driver's ocular points.

In addition, the road shall be visible to the driver over a width of 4.5 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 1.5 m behind the vertical plane passing through the driver's ocular points.



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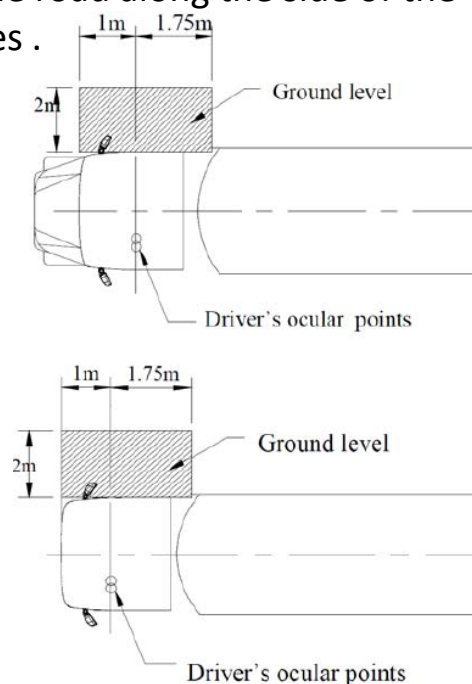
## 5. Overview of requirement for vehicles (7/11)

Visible area – Class V

The driver can see a flat horizontal portion of the road along the side of the vehicle, bounded by the following vertical planes .

The plane parallel to the median longitudinal vertical plane of the vehicle which passes through the outermost point of the vehicle cab on the passenger's side; in the transverse direction, the parallel plane passing at a distance of 2 m.

To the rear, the plane parallel to the vertical plane passing through the driver's ocular points and situated at a distance of 1.75 m behind that plane; To the front, the plane parallel to the vertical plane passing through the driver's ocular points and situated at a distance of 1 m in front of that plane.



**Must be fitted 2m above ground**

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## 5. Overview of requirement for vehicles (8/11)

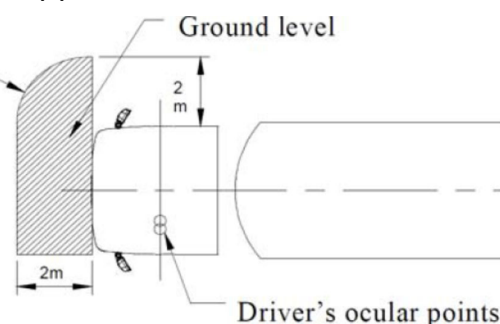
Visible area – Class VI

The driver can see at least a flat horizontal portion of the road, which is bounded by:

- a transverse vertical plane through the outermost point of the front of the vehicle;
- a transverse vertical plane 2,000 mm in front of the plane defined in (a),
- a longitudinal vertical plane parallel to the longitudinal vertical median plane going through the outermost side of the vehicle at the driver's side and;
- a longitudinal vertical plane parallel to the longitudinal vertical median plane 2000 mm outside the outermost side of the vehicle opposite to the driver's side.

The provisions for front mirror are compulsory for **forward controlled vehicles of N2 > 7.5 t and N3.**

If vehicles of these categories cannot fulfil the requirements by using a front mirror, a **vision support system shall be used.** In the case of a vision support system this device shall be able to detect an object of 50 cm height and with a diameter of 30 cm within the field defined in Figure.



**Must be fitted 2m above ground**

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## 5. Overview of requirement for vehicles (9/11)

Minimum number (M1,M2,M3,N1)

	Class I	Class II	Class III	Class IV	Class V	Class VII
M1	Compulsory	Optional	Compulsory 2(L/R)	Optional	Optional	Optional
M2	Optional	Compulsory 2(L/R)	Not permitted	Optional	Optional	Optional
M3	Optional	Compulsory 2(L/R)	Not permitted	Optional	Optional	Optional
N1	Compulsory	Optional	Compulsory 2(L/R) Class II may be fitted as an alternative.	Optional	Optional	Optional

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## 5. Overview of requirement for vehicles (10/11)

Minimum number (N2)

	Class I	Class II	Class III	Class IV	Class V	Class VII
N2 < 7.5 t	Optional	Compulsory 2(L/R)	Not permitted	Compulsory 2(L/R) if a Class V mirror can be fitted  Optional 2(L/R) if not	Compulsory 1: Passenger side  Optional 1: Driver side	Optional
N2 > 7.5 t	Optional	Compulsory 2(L/R)	Not permitted	Compulsory 2(L/R)	Compulsory 1: Passenger side  Optional 1: Driver side	Compulsory

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## 5. Overview of requirement for vehicles (11/11)

Minimum number (N3)

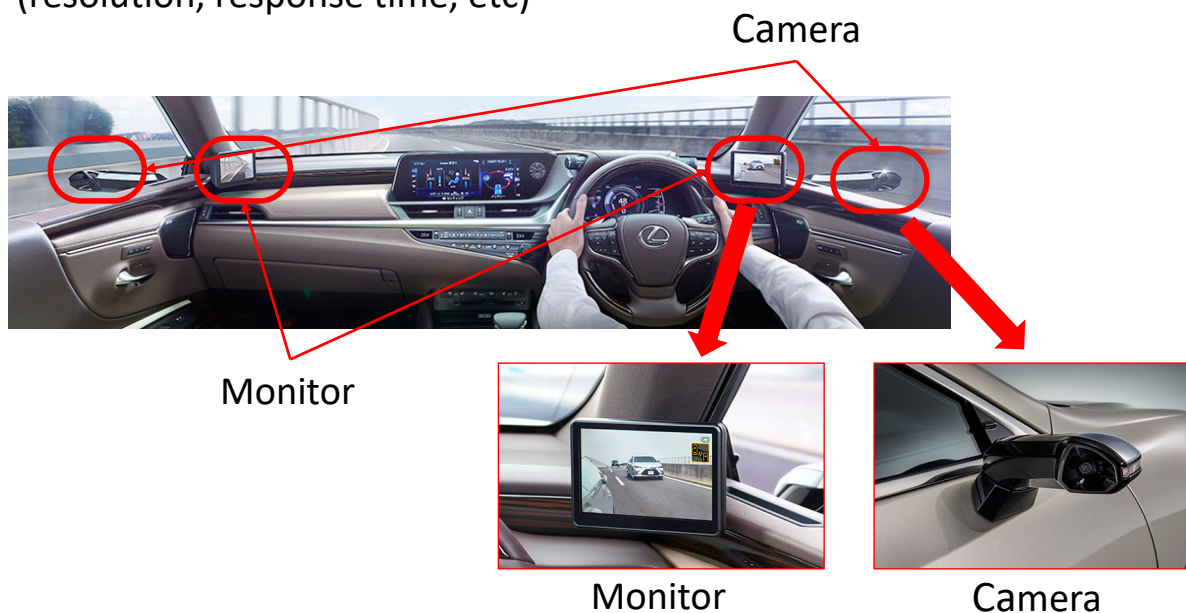
	Class I	Class II	Class III	Class IV	Class V	Class VII
N3	Optional	Compulsory 2(L/R)	Not permitted	Compulsory 2(L/R)	Compulsory 1: Passenger side  Optional 1: Driver side	Compulsory

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## 6. Camera Monitor System(CMS)

Now, CMS is allowed for Class I - VI.

The areas which CMS should be displayed are same as conventional mirrors. But, in addition, the requirements of camera/display are defined separately. (resolution, response time, etc)



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Thank you!