

# DETERMINATION OF TECHNICAL AND OPERATIONAL INDICATORS OF ROAD TRAFFIC LIGHTS AND REQUIREMENTS FOR THEIR USE IN THE CONDITIONS OF UZBEKISTAN

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**Abstract.** *This article provides information on the main changes and additions to the state standard “Uz SS 3485 Road traffic lights. Types and basic parameters. General technical requirements. Test methods.” developed in Uzbekistan. When developing a new state standard, the standards of developed countries were studied, including MUTCD (USA), RILSA (Germany), Manual R310E (Norway), GSPMSLI Section 3.2 (Israel), SS R 52282 (Russia) were studied and harmonized with international standards of “Commonwealth of Independent States” SS 33386, SS 33385.*

**Keywords:** *traffic light, technical requirements, operational requirements, electrical requirements, photometric and colorimetric requirements, screen, light power, combined traffic light, working conditions, tactile and sound gestures, test methods.*

## INTRODUCTION

Today, in the conditions of Uzbekistan, if we give exact numbers of road safety at the level of the Republic scale, in 2021, 10,225 road traffic accidents occurred, of which 2,423 people died, and 9,227 were injured [1]. To compare, the number of people died in Uzbekistan due to COVID-19 is 1637 from March 2020 to the present day. It is a severe situation that the number of people killed due to road traffic accident is high in one year. For this reason, a number of practical works are being carried out in order to improve this situation. In particular, state standards related to road traffic safety are being studied and revised in order to achieve good results in the safe organization of road traffic. In this article provided information about the main changes and additions made by the authors to the state standard Uz SS 3485 “Road traffic lights. Types and basic parameters. General technical requirements. Test methods.”.

## OBJECTS AND METHODS OF RESEARCH

Studying the experience of foreign countries and making changes to Uz SS 3485 “Road traffic lights. Types and basic parameters. General technical requirements. Test methods.” state standard in accordance with the requirements of Uz SS 1.10, the structures before and after making changes are presented in table 1 below [2, 3, 4, 5, 6, 7].

From Table 1, we can see that in the structure of the state standard after the changes and additions, the names of the existing sections have been changed in accordance with the requirements of Uz SS 1.10 and some new clauses have been introduced [7].

Detailed information on the changes and additions to the state standard is provided below.

The section on the scope of application of the standard was fully explained and general information was given on the requirements set by this standard.

2 clause with references to regulatory documents have been updated for 2022 year and references to newly applied regulatory documents have been added.



**Table 2**

**Operating conditions**

Climate performance	Placement category	Air temperature during operation, °C			
		Working temperature		Limit working temperature	
		high	lower	high	lower
KT	1	+65*	-10	+70*	-20
M		+45*	-45	+50*	-45

\* Air temperatures are determined taking into account the climatic conditions of Uzbekistan.

The following changes and additions were made in clause 5.2, which contains structural requirements for traffic lights:

- traffic lights intended for bicycle traffic should be distinguished from other types of traffic lights and the color of the body should be yellow in order to be recognized from a distance;
- high-contrast screens should make the traffic light signs stand out better against the background of the surrounding environment, especially in cases where there is a bright background, should also be used for other types of traffic lights in addition to additional sign traffic lights (Figure 2) [3];

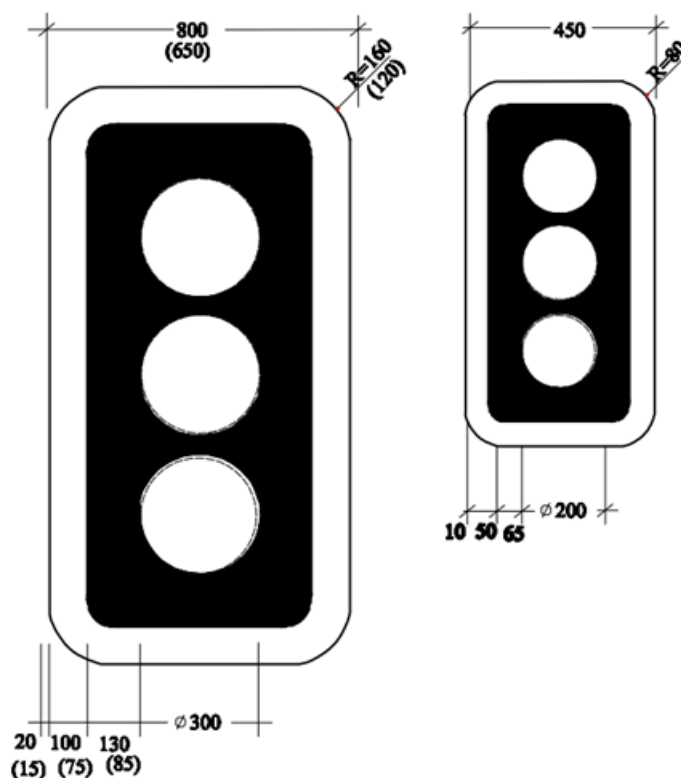


Fig. 2. Traffic lights with high-contrast screens

The following changes and additions have been made in clause 5.3, which lists electrical requirements for traffic lights:

- For connection to the public network, the standard nominal voltage is 220±20 V and the frequency of alternating current should be taken as 50 Hz. [4];
- The use of light-emitting diodes as a source of light in traffic lights is specified;

The following changes and additions were made to clause 5.4, which contains requirements for colorimetric and photometric descriptions of traffic lights:

- Light intensity of traffic lights on axis [2]

The following changes and additions were made in clause 5.5, which lists the requirements for the descriptions of operational characteristics of traffic lights:

At the time of using traffic lights, the defects listed in Table 4, which negatively affect traffic safety, are not allowed to appear. [6].

**Table 3**

**Light power of traffic lights on axis**

Luminous intensity in Candela

Sign color	Light intensity on the axis of the signal, at least						Pedestrian traffic lights
	Type of traffic lights						
	1, 2, 6-8		3	5	9	10	
	Aperture diameter						
200mm	300 mm						
Red	200	300	100(15)	-	200(50)	-	100(50)
Yellow	250	400	125(20)		250(70)	-	-
Green	200	300	100(15)		200(50)	-	100(50)
White-shadow	-	-	-	100(50)	-	200	-
<p>Note:                      The luminous intensity of any signal of a traffic light should not exceed 2500 Cd.                      In parentheses, the values of the light intensity indicator before making changes are given</p>							

**Table 4**

**Defects of traffic lights and signs and their elimination periods**

Defect type	Defect elimination period, (in days) *
Failure of one light source or LED module	1
Damage to the electrical in the traffic light housing or wiring in the electrical cable	2
Damage to the diffuser, separation of more than 25% of the area of the sign applied to it from the surface of the diffuser, failure (absence) of the canopy(soyabon), contamination of more than 20% of the surface of the diffuser for any reason	5
Failure of more than 20% of the light-emitting diodes of one traffic light signal module, more than 30% decrease in light intensity on the axis. Non-compliance of traffic signals with the established requirements for visibility at night .	7
Deactivation of the traffic light object, emergency transition to "yellow flashing" mode, non-standard combination of traffic light signals.	1

Simultaneous operation of traffic lights that allows movement in opposite directions as a result of failure of the traffic light control device. Turn off one-way (primary and duplicate) red signals regulating vehicular or pedestrian traffic	1
Failure of the pedestrian tactile signaling device	3

*\*Note: The period of elimination of defects should not exceed the periods specified in this table.*

In order to ensure that traffic lights are delivered in a complete set by the manufacturer, a new item of requirements for completeness has been introduced and the following requirements have been specified in it [5]:

- a passport with the main characteristics of the traffic light materials (with reference to the regulatory document under which the product is manufactured);
- instruction reflecting the rules of work on the technology of using and installing traffic lights;
- safety rules of equipment, rules of transportation and storage of materials;
- use of traffic lights, maintenance and cleaning instructions;
- traffic lights must be provided with all components that ensure assembly and installation of the product in accordance with the requirements of this standard and the manufacturer's documentation.

The following changes and additions have been made in clause 5.7, which lists the requirements for marking and packaging of traffic lights:

The traffic light marking must contain the following information:

- product name;
- name of the country of origin;
- manufacturer name, legal address, trademark;
- weight, brutto and netto, kg;
- dimensions of gabarite;
- production date;
- рўп number;
- determination of the regulatory document placed on the product (this state standard);
- number of the certificate of conformity.

Marking must be done with a typographical seal or another method that ensures its preservation during the product's shelf life and performance warranty period.

The following changes and additions have been made in the 5.8 clause stating the requirements for additional technical means for people with limited vision and hearing of traffic lights:

Sound and tactile signals for traffic lights and their requirements are given in Appendix E according to ISO 23600 [7].

Test methods for determining compliance with the requirements for the main indicators of traffic lights are presented in clause 6, test methods for the following indicators were introduced, and the existing test methods were updated:

- Methods of testing compliance with constructive requirements;
- Methods of testing resistance to external environmental influences;
- Determination of electrotechnical indicators;
- Methods of testing colorimetric and photometric descriptions;

- Methods of testing performance indicators.

The following changes and additions were made in clause 7, which contains the requirements for transportation and storage of traffic lights in transport [5]:

- The requirements for transportation, storage and packaging must be in accordance with GOST 15150;

- Traffic lights must meet the requirements of their transport by any mode of transport in accordance with the rules of carriage applicable to each mode of transport;

- When transporting and storing the traffic light, it is necessary to comply with the requirements specified in the documents and mark-ing attached by the manufacturer.

The following changes and additions have been made in clause 8, which lists the requirements for the warranty period provided by the manufacturer of traffic lights. [2, 6].

The manufacturer guarantees compliance with the requirements of this standard when the conditions set by the rules for transportation, storage and packaging of traffic lights are met by the consumer.

The parameters of the traffic lights should not change for a period of not less than five years after being put into operation when the environmental impact is in accordance with clause 5.1.

The warranty period should be as follows, subject to the conditions of storage, transportation and operation:

Storage period - not less than 3 years from the date of manufacture;

Service period - at least 5 years from the date of commission-ing.

Additional technical means for persons with impaired visual functions and impaired visual and hearing functions, sound and tactile signals of road traffic lights, presented in clause 6 of the old form of the standard, are presented in the mandatory appendix E of the newly developed standard in an updated state based on the experience of the current countries [4]

### **RESULTS AND THEIR DISCUSSION**

Based on the study of the standards of developed foreign countries, definitions of the main terms in the text of the standard were given and new changes were made to the classification of traffic lights.

Indicators of operational conditions in the production of traffic lights were determined taking into account the climatic conditions of Uzbekistan.

Traffic lights designed for bicycle traffic should be yellow in order to distinguish them from other types of traffic lights and be recognized from a distance, and black contrast screens should be used to make traffic lights stand out against the background of the surrounding environment.

In order to ensure that the traffic lights are delivered in a complete set by the manufacturer, a requirement for its completeness has been included.

The use of light-emitting diodes as a light source in traffic lights, as well as the defects of traffic lights and signs and the deadlines for their elimination were determined.

Changes and additions have been made to the clause stating the requirements for additional technical means for persons with limited vision and/or hearing of traffic lights.

Test methods for structural, environmental resistance, electrotechnical, colorimetric and operational indicators are presented to determine compliance with the requirements for the main indicators of traffic lights.

## **CONCLUSION**

Changes and additions were made to the requirements for transportation and storage of traffic lights in transport, as well as to the requirements for the warranty period provided by the manufacturer of traffic lights.

In the development of the national standard Uz SS 3485, the standards of the developed countries of the USA, Germany, Norway, Israel, and Russia were studied and brought into line with international standards.

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