CES 713

Compulsory Ethiopian Standard

First Edition

Road saftey Camra-requirement

ICS: 43.200
Published by Institute of Ethiopian Standards

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Road saftey Camra-requirement

1. Scope

This standard specifies requirements for the supply and installation of RSC systems.

This specification covers the following RSC system types:

i. Speed cameras monitor vehicles within the detection zone and capture evidence of vehicles travelling above the posted speed limit. Both spot speed cameras and mobile spot speed cameras are covered.
ii. Red-light cameras monitor vehicles within the detection zone and capture evidence of vehicles during the red-light phase.
iii. Average speed/point-to-point (P2P) cameras monitor vehicles at the detection zone of entry and exit point and capture evidence of vehicles travelling at an average speed above the posted speed limit.

The following are not covered in this specification:

i. camera management server hardware
ii. back-office equipment for offence file processing
iii. mobile phone and seatbelt detection.

2. Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ES IEC 62368-1, Audio/video, information and communication technology equipment — Part 1: Safety requirements

ES IEC 61000-2 , Electromagnetic compatibility (EMC)

ES IEC 60068-2-1, Environmental testing — Part 2-1: Tests — Test A: Cold

ES IEC 60068-2-2, Environmental testing — Part 2-2: Tests — Test B: Dry heat

ES IEC 60068-2-31, Environmental testing — Part 2-31: Tests — Test Ec: Rough handling shocks, primarily for equipment-type specimens

ES IEC 60068-2-64, Environmental testing — Part 2-64: Tests — Test Fh: Vibration, broadband random and guidance

3. Terms and Definitions

For the purposes of this document, the following terms and definitions shall apply.

3.1

ANPR (Automatic Number Plate Recognition)

System that isolates a vehicle number plate within an image, performs optical character recognition, and produces a machine-readable enumerated data field of the number plate.

3.2

Average speed / Point-to-point (P2P) cameras

Cameras that monitor vehicles at the detection zone of entry and exit points and capture evidence of vehicles travelling at an average speed above the posted speed limit.

3.3

Detection rate

Percentage of vehicles passing through the detection zone that are successfully detected by the ANPR system.

3.4

Capture rate

Percentage of all detected vehicles that are successfully captured (imaged) by the ANPR system.

3.5

Accuracy rate

Percentage of captured images in which the ANPR system correctly reads and matches all numbers and/or letters on the number plate.

3.6

Data bar

Overlay information on a captured image that includes detection date and time, site location, lane number, vehicle speed, and (for red-light detection) elapsed time.

3.7

EIRP (Equivalent Isotropically Radiated Power)

Output power level of a transmitted microwave beam expressed in dBW relative to an isotropic radiator.

3.8

Infrared illuminator

Light source used by RSC systems to illuminate the detection zone under low-light conditions without using visible light.

3.9

Mobile spot speed cameras

Speed monitoring cameras that are not permanently fixed and can be relocated to different enforcement sites.

3.10

Spot speed cameras

Camera that monitor vehicles within a detection zone and capture evidence of vehicles travelling above the posted speed limit at a single point.

3.11

Principal

Entity (e.g., road authority or contracting body) that owns or operates the RSC system and performs administration and monitoring functions.

3.12

Red-light camera

Camera that monitors vehicles within a detection zone and captures evidence of vehicles crossing the stop line during the red-light phase.

3.14

Road Safety Camera(RSC) system

An integrated network of roadside hardware, sensor arrays, and software solutions designed to automatically detect, track, and document traffic violations or to monitor general traffic flow.

3.16

Vehicle classification detection

Ability to classify vehicle type based on configurable length thresholds.

4. Functional requirements

4.1. Vehicle detection

4.1.1. Speed detection

The RSC systems shall have the ability to detect and calculate the speed and direction of all types of moving vehicles.

4.1.2. Speed accuracy

The speed detection accuracy shall be within a tolerance of ±3km/h from 30km/h to 250km/h across all vehicle types in both approaching and receding directions.

4.1.3. Red-light detection

The RSC systems shall have the ability to detect vehicles that cross the stop line during a red-light phase.

4.1.4. Lane detection

The RSC systems shall be able to identify the lane on which the vehicle is detected in a multi-lane (minimum of two lanes) road. This applies to vehicles travelling into two streams of traffic that flow in opposite directions.

4.1.5. P2P

The RSC systems shall be able to detect the travelling vehicle in a consistent position within the designated entry and exit zone.

4.1.6. Vehicle classification detection

The RSC systems shall be able to classify vehicle type based on the length of the vehicle, and the threshold must be configurable.

4.2. Camera

4.2.1. Static image

The camera shall be able to capture an image within the detection range of the sensor and transmit data to the back-end system. The captured image shall show:

i. a detected vehicle
ii. the lane of the detected vehicle
iii. the number plate of the detected vehicle
iv. the roadway and, if a red-light camera, the traffic signal lights.

4.2.2. Resolution

The camera shall provide a minimum resolution of 5MP or higher.

4.2.3. Images (P2P)

The camera shall capture an image of the detected vehicle passing the entry and exit points of the enforcement zone.

4.2.4. Automatic exposure control

The camera shall have automatic exposure control to maintain the light level as it changes throughout the day.

4.2.5. Frame rate

The camera shall provide a minimum of 1ms shutter speed and be able to capture multiple images of vehicles with a minimum of two images per enforcement record.

4.2.6. Data bar

The captured image shall have a data bar with the following information:

(1) date and time of the detection
(2) site location
(3) lane of the detected vehicle
(4) speed of the detected vehicle
(5) elapsed time (redlight detection).

4.3. Automatic number plate recognition (ANPR)

If the RSC systems have ANPR capability, then it shall meet the following requirements.

4.3.1. Number plate detection

The ANPR system shall be able to read the number plate, which means isolating the number plate within the image, carrying out optical character recognition, and producing a machine-readable enumerated data field of the number plate.

4.3.2. Detection rate

The ANPR system shall detect a minimum of 95% of vehicles passing through the detection zone.

4.3.3. Capture rate

The ANPR system shall capture a minimum of 95% of all detected vehicles.

4.3.4. Accuracy rate

The ANPR system shall be able to read and match all numbers and/or letters on the number plate with a minimum of 95% accuracy of the captured images.

4.3.5. Illuminator

The RSC systems shall use an infrared illuminator and shall be able to apply correction to any infrared illumination colour shift under low light conditions. Visible light illuminators are not allowed to be used.

4.3.6. Video

The camera shall be able to produce videos to track the movement of vehicles or verify if emergency services vehicles have beacons.

4.3.7. Frame rate

The video shall provide a minimum frame rate of 25fps.

4.3.8. Resolution

The video shall provide a minimum resolution of 1920 × 1080 pixels.

4.3.9. Duration

The video shall provide a minimum of 10 seconds duration in total, comprising 5 seconds before and after the offences.

4.4. Log records

The RSC systems shall be able to produce a record of the logs shown in

Table 1. Types of log records

Types of logs	Description
Incident logs	To record the information about a detected incident
System logs	To record the operating status of the system
Radar logs	To record raw data from the sensor
Event logs	To record a system event such as system settings change, system alarm, etc.
Deployment logs	To record information about vehicle events

4.4.1. Data storage

The RSC systems shall be able to store system files, incident records and log records. The following requirements shall apply for storage capacity:

i. a minimum of 7 days of data or 70,000 incident-related data for speed, red-light and dual cameras.

ii. a minimum of 1 day of data or 200,000 detection-related data for average speed/P2P cameras.

4.4.2. Monitoring

The RSC systems shall allow remote monitoring of system alarms within the Principal's network.

4.4.3. Administration

The RSC systems shall allow the Principal to perform administration tasks remotely within the Principal's network such as, but not limited to:

I. updating the software remotely and not relying on updates by physical means (eg the use of a flash drive or direct laptop connection)

II. rolling back to the last previous version (n−1) as a minimum.

4.4.4. Configuration

The RSC systems shall allow remote access within the Principal's network to modify configurable settings of systems.

4.4.5. Time synchronization

The RSC systems shall allow frequent time synchronization through the Network Time Protocol (NTP) to an accurate time source.

4.4.6. Security functions

Security functions shall comply with the Ethiopian security Regulation requirements.

5. **Compliance with protocols and other control interfaces**

5.1 The RSC systems shall be configured to comply with the Principal's prevailing protocols and other control interfaces.

6. Performance requirements

6.1 Operational life

The RSC systems shall have a minimum operational life of not less than 10 years without degradation of performance quality.

6.2 Resistance to the effects of external conditions

6.2.1 The RSC systems shall be capable of continuous, normal operation and maintaining performance criteria in the conditions described below:

i. installed and operated in direct sunlight

ii. ambient temperature range between −10°C and +50°C

iii. humidity between +5% and +95% non-condensing

iv. lighting (dawn, dusk, day and night)

v. weather (heavy rain, brilliant sunshine, overcast skies, snow and thick fog)

vi. conditions, both permanent and temporary, that are unique to the specified location

vii. vibrations expected in the installed location

viii. pollution effects such as surface corrosion.

6.3 Protection from dust and moisture

6.3.1 The sensor housing and the enclosure shall provide a minimum Ingress Protection (IP) rating of IP65 based on IEC 60529:1989+AMD1:1999+AMD2:2013 Degrees of protection provided by enclosures (IP code).

6.4 Microwave beam

6.4.1 Radio spectrum

6.4.1.1 The microwave beam transmitted from the radar shall operate within Ethiopia's general user radio licence spectrum of 24GHz to 24.25GHz.

6.5 Frequency tolerance

6.5.1 The transmitted microwave beam frequency of the radar should be within ±125MHz of the centre frequency.

6.6 Beam coverage

6.6.1 For fixed RSC systems, the radar beam angle shall cover a minimum of three traffic lanes.

6.6.2 Beam power

6.6.2.1 The output power level of the transmitted microwave beam should be −10dBW equivalent isotropic radiated power (EIRP) and shall not exceed 0dBW EIRP.

6.6.3 Maintainability

6.6.3.1 The RSC systems shall have a design:

i. so all the components can be easily replaced in the field

ii. to be easily cleaned (including graffiti).

7 Technical requirements

7.1 Electrical safety

The RSC equipment shall comply with and be installed in accordance with ES IEC 62368-1 and ES IEC 62471.

7.2 Electrical

The RSC systems shall be able to be powered from a 220V AC power supply and 12 DC power supply.

7.3 Radio standards

7.3.1 The RSC systems shall comply with the **Radio communications Regulations** and conform to the technical and measurement requirements of **EN 302 288-1 V1.61** for 24 GHz short-range radar equipment.

7.3.2 Electromagnetic compatibility

The RSC systems shall comply with the ES IEC 61000 series.

7.3.3 **Electrical surge protection**

All equipment shall be internally protected against damage resulting from:

i. lightning strikes near the RSC systems

ii. electrical transients on power cabling

iii. electrical transients on internal and external wiring

iv. electromagnetic interference

v. static electrical discharge.

7.4 Mechanical

7.4.1 **Vibration and shock resistance**

The RSC systems shall be capable of withstanding vibration and shock and shall conform to:

i. ES IEC 60068-2-31 Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens

ii. ES IEC 60068-2-64 Environmental testing – Part 2-64: Tests – Test Fh: Vibration, broadband random and guidance.

7.5 **Environment**

7.5.1 **Environmental conditions**

The RSC systems shall be capable of withstanding Ethiopian environmental conditions and shall conform to:

i. ES IEC 60068-2-1 Environmental testing – Part 2-1: Tests – Test A: Cold
ii. ES IEC 60068-2-2 Environmental testing – Part 2-2: Tests – Test B: Dry heat
iii. IEC 60068-2-78 Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state.

7.6 System integration

The RSC systems shall support the communication interface.

7.7 Documentation, software and licensing

7.7.1 Documentation

The RSC shall be accompanied by original equipment manufacturer maintenance, service and operations guidelines and manuals, which will include maintenance schedules and procedures, handling and storage instructions, and a spares list. The documents shall be written in English.

7.8 Software and licensing

7.8.1 Up-to-date and patched software including any specialist software required to administer or monitor the equipment shall be provided

7.8.2 Any licensing requirements for use, including associated terms, conditions and licensing costs shall be provided.

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INSTITUTE OF ETHIOPIAN STANDARDS

Organization and Objectives

The Institute of Ethiopian Standards (IES) is the national standards body of Ethiopia. IES is re-named by the proclamation number 1263/2021, from Ethiopian Standards Agency (ESA) to Institute of Ethiopian standards, with the mandate given by the regulation Number, 193/2010 and proclamation number, 1263/2021.

IES's objectives are:

- Develop Ethiopian standards and establish a system that enable to check whether goods and service are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.
- Conduct standards related research and provide training and technical support.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational and research institutes, governmental organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/ or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.

Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices). A catalogue of Ethiopian Standards is also available freely and can be accessed from our website.

 International Involvement IES, representing Ethiopia, is a member of the International Organization for Standardization (ISO), International Electro-technical Commission (IEC) and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the American Society for Testing and Materials (ASTM). It is a founding member of the African Regional Organization for standardization (ARSO).

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