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STANDARD**

**DRS  
236**

Second edition

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Reaffirmed yyyy)

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**Acoustics — Noise Pollution — Tolerance  
limit**

ICS 13.140

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Reference number

DRS 236: 2020

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In order to match with technological development and to keep continuous progress in industries, standards are subject to periodic review. Users shall ascertain that they are in possession of the latest edition

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## Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

RS 236 was prepared by Technical Committee RSB/TC 41, *Environment Protection*.

In the preparation of this standard, reference was made to the following standard (s):

- 1) MS 175: *Burnt Clay bricks – Code of practice for moulding and firing*
- 2) RS 117:2014. *Mining and quarrying – Code of practice*
- 3) MS 173: *Acoustics— Noise Pollution — Tolerance limits*

The assistance derived from the above source is hereby acknowledged with thanks.

This second edition cancels and replaces the first (RS 236:2014) been technically revised.

## Committee membership

The following organizations were represented on the Technical Committee on *Environment Protection* (RSB/TC 41) in the preparation of this standard.

Appropriate Community Sanitation & Energy Service international (ACSE-1)

Biofuel Rwanda

Compagnie pour l'environnement et le Développement ( COPED)

Energy Water and Sanitation Authority ( EWASA)

Kanombe Military Hospital

Kinazi cassava plant

King Faisal Hospital

Peat Energy Group

Resources efficient and cleaner Production Center (RECP)

Rwanda Environment Management Company (RWEMACO)

Rwanda Environment Management Authority (REMA)

Rwanda Utility Regulatory Authority

Sulfo Industries

UMUTARA Polytechnic

University of Rwanda- College of Arts and Social Sciences (UR-CASS)

University of Rwanda- College of Science and Technology (UR-CST)

Rwanda Transport and Development Agency (RTDA) - co-secretariat

Rwanda Standards Board (RSB) – Secretariat

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## Introduction

Acoustics are fundamentally important to learning environment. It is intrinsically linked with communication and aural communication.

The source of outdoor noise worldwide is mainly caused by machines, transport, and propagation systems. Some of the main sources of noise in residential areas include loud music, transportation (traffic, rail, airplanes, etc), lawn care maintenance, construction, electrical generators, explosions, and people.

To be practical use any method of description, measurement, and assessment of environmental noise is intended to be related in some way to what is known about human response to noise. Many adverse consequences of environmental noise increase with increasing noise but the precise dose-response relationships involved continue to be the subject of scientific debate.

Noise pollution affects both health and behaviour. Unwanted sound (noise) can damage physiological health. Noise pollution can cause hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances and other harmful and disturbing effects. High noise levels can contribute to cardiovascular effects in humans and an increased incidence of coronary artery disease.

There is a need to or mitigate the noise to reduce noise pollution or to reduce the impact of that noise, whether outdoors or indoors. Multiple techniques have been developed to address interior sound levels, many of which are encouraged by local building codes.

This standard aims at guiding concerned engineers, companies or individual on how to control or mitigate the noise pollution among residential, commercial, industrial, silent zone areas and other public buildings.

# Acoustics — Noise Pollution — Tolerance limits

## 1 Scope

This Draft Rwanda Standard prescribes maximum allowable noise limits in industrial, commercial, residential and silence zone areas in respect to human beings. It also lay down sound level requirements for indoors of non-industrial buildings.

## 2 Normative references

There are no normative references in this document

## 3 Terms and definitions

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

### 3.1

#### **decibel (dB) one tenth of a bel**

decibel is the fundamental division of a logarithmic scale used to express the ratio of two specified or implied quantities, the number of bels denoting such a ratio being the logarithm to the base of 10 of this ration.

### 3.2

#### **acoustics**

the science concerned the production, control, transmission, reception of sounds effects.

### 3.3

#### **day time**

6 a.m. to 9 p.m.

### 3.3

#### **night time**

9 p.m. to 6 a.m.

### 3.4

#### **silence zone**

areas up to 100 m around such premises as hospitals, educational, institution, libraries and courts

**3.5**

**threshold of audibility**

zero decibel

**3.5**

**Noise pollution**

is a regularly exposure to **elevated sound levels** that may lead to adverse effects in humans or other living organisms.

**3.6**

**Environment noise**

is an accumulation of noise pollution that occurs outside

**4 Criteria for noise**

**4.1** In selecting criteria to evaluate a situation, it is important to recognize various problems that may be caused by the noise. Criterion for environmental noise is the best development basing on problems faced by human beings, physical damage to structure and reduces utility of property.

**4.2** Noise has effects on health as specified in 4.2.1 - 4.2.4.

**4.2.1** Physical injury; exposure to sound pressure levels exceeding 140 dB, even for short period involves a risk of morphological damage to the ear;

**4.2.2** Hearing loss; long term occupational exposure to high level noise greater than 70 dB can result in a gradual loss of hearing;

**4.2.3** Non-specific health effects; noise also results into physiological reactions such as; changes in heartrate, blood pressure and peripheral reactions and vestibular reactions. Many of these noise-induced reactions are non-specific and are usually referred to as stress reactions; and

**4.2.4** Interference effects; these include; sleep interference, communication interference, and task performance.

**5 Tolerance limits for noise**

**5.1** The categorization and tolerance limits for noise as specified in table 1 and table 2 is recommended.

**Table 1—Noise level**

| S/N | Area code | Category of area | Limit in dB, Max |            |
|-----|-----------|------------------|------------------|------------|
|     |           |                  | Day time         | Night time |
|     |           |                  |                  |            |

|   |   |                  |    |    |
|---|---|------------------|----|----|
| 1 | A | Industrial area  | 75 | 70 |
| 2 | B | Commercial area  | 65 | 55 |
| 3 | C | Residential area | 55 | 45 |
| 4 | D | Silence zone     | 50 | 40 |

**Table 2—Maximum acceptable noise levels inside buildings**

| S/No | Type of building            | Maximum acceptable noise levels (dB ) |
|------|-----------------------------|---------------------------------------|
| 1    | Offices                     | 50-60                                 |
| 2    | Dwellings ( houses & flats) | 45-55                                 |
| 3    | Schools ( class rooms       | 45-50                                 |
| 4    | Hospitals                   | 40-50                                 |
| 5    | Churches or mosques         | 40-50                                 |

**5.2** The silence zones should be declared by a competent authority. Use of vehicle horns, and speakers and bursting or cracking shall be banned in these zones.

**5.3** The maximum recommended noise dose and exposure levels as specified in table 3 should be observed.

**Table 3—Allowable exposure duration**

| 1  | sound level (dBA) | Maximum exposure duration per day |
|----|-------------------|-----------------------------------|
| 2  | 85                | 8h                                |
| 3  | 88                | 4h                                |
| 4  | 91                | 2h                                |
| 5  | 94                | 1h                                |
| 6  | 97                | 30 min                            |
| 7  | 100               | 15 min                            |
| 8  | 103               | 7.5 min                           |
| 9  | 106               | 3.7 min                           |
| 10 | 109               | 118 sec                           |
| 11 | 112               | 94 sec                            |
| 12 | 115               | 28 sec                            |
| 13 | 118               | 14 sec                            |
| 14 | 121               | 7 sec                             |
| 15 | 124               | 3 sec                             |
| 16 | 127               | 1 sec                             |
| 17 | 130-140           | Less than 1 sec                   |

|    |     |             |
|----|-----|-------------|
| 18 | 140 | No exposure |
|----|-----|-------------|

## 6 Occupational health and safety

6.1 No person shall be exposed to sound levels exceeding:

- a) 70 dB of continuous levels in any one way
- b) 85 dB of reasonably constant level for 8 h continuously in any one day;
- c) 135 dB as measured with an instrument set as 'fast' in any one day; and
- d) 150 dB in case of impulse as measured with an instrument set at 'fast' in any day

6.2 If exposure is for periods longer than eight hours, or if the sound level is fluctuating, an equivalent sound level shall be calculated, and this resultant noise shall not exceed the equivalent 85 dB..

6.3 All areas where people may be exposed to sound levels exceeding the limits specified in Table 3 shall be identified as ear protection areas and shall be suitably condoned off.

## 7 Noise and town planning

7.1 residential areas shall be set off from various roads according to average noise level that may emanate from them at any time. It is difficult to reduce outdoor noises coming into building. Therefore, it is advisable that during town layout planning (even planning of a suburb) the location of residential buildings, in particular be so arranged that they are far away from traffic, industrial, noisy surroundings.

7.2 Residential buildings situated on roads carrying heavy traffic should need similarly to be off from the road adequately and suitably oriented to attenuate the noise to required degree.

## 8 Industrial noise

Attention should be given to them during zoning to protect people from unnecessary noise

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