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**Recommendations for dimensions and  
workmanship of natural building stones  
for masonry work**

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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.

DRS 518 was prepared by Technical Committee RSB/TC 9, *Civil engineering and building materials*.

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

IS 1127: 1970 (Reaffirmed 2003): *Recommendations for dimensions and workmanship of natural building stones for masonry work*

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

### **Committee membership**

The following organizations were represented on the Technical Committee on *Civil engineering and building materials* (RSB/TC 9) in the preparation of this standard.

A+ Construction Group Ltd

Africeramics Ltd

Consultants Engineers Group (CEG) Ltd

D&D Resources Ltd

Dutureheza Ltd

Enabel Rwanda

Greenpack Africa Ltd

Integrated Polytechnic Regional Centre (IPRC) - Musanze

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NP Construction Construction Company (NPCC) Ltd

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

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# Recommendations for dimensions and workmanship of natural building stones for masonry work

## 1 Scope

This Draft Rwanda Standard provides recommendations for the dimensions and workmanship of natural building stones used for various types of stone masonry.

## 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.

DRS 515, Natural stone — Terminology and classifications

## 3 Terms and definitions

For the purpose of this standard, DRS 515 and the following definitions shall apply.

### 3.1

#### **ashlar**

stone masonry using dressed square stone blocks to given dimension and laid in courses

### 3.2

#### **Arris**

sharp edge formed by two planes

### 3.4

#### **bed joint**

joint where one stone presses on another, for example, a horizontal joint in a wall or a radiating joint between the voussoirs of an arch

### 3.5

#### **bond**

interlocking arrangement of structural units in a wall to ensure stability

### 3.6

#### **bond stone (through stone)**

selected long stones used to hold a wall together transversally

### 3.7

#### **natural stone**

includes various types of stones used in building

### 3.8

#### **corbel**

stone bonded well into the wall with part of it projecting out of the face of wall to form a bearing surface

### 3.9

#### **cornice**

horizontal moulded projection which crowns or finishes either a wall, any horizontal division of wall, or any architectural

### 3.10

#### **course**

layer of stones in a wall including the bed mortar

### 3.11

#### **cramp**

small piece of metal or the hardest or toughest stone procurable, sunk in mortices and fixed across joints as additional ties. The ends of metal cramps are bent at right angles and stone cramps are dovetailed

### 3.12

#### **Damp-Proof Course**

impervious layer which prevents movement of moisture

### 3.13

#### **dowels**

small sections of metal, stone or pebbles bedded with mortar in corresponding mortice in bed or side joints or adjacent stones

**3.14**

**efflorescence**

powered encrustment of salt left by evaporation. This may be visible on the surface or may be below surface

**3.15**

**flashing**

sheet of impervious material fixed to a structure so as to cover an intersection or joint where water will otherwise leak through

**3.16**

**Apron Flashing**

one piece combined cover and apron used to obtain a waterproof joint

**3.17**

**Cover Flashing**

flashing dresses down as a cover only over a separate upstand

**3.18**

**hammer dressing**

rough surfacing to a stone by means of a spall hammer

**3.19**

**Hearting**

infilling which forms the core of a rubble wall

**3.20**

**Jamb**

part of the wall at the side of an opening

**3.21**

**Joggle**

key between the stones by providing groove in one stone to take a corresponding concealed projection in the edges on the other stone

## 4 Dimensions and tolerances

4.1 The recommended dimensions of natural building stones measured at edges shall be as given in Table 1.

4.1.1 The recommended dimensions given in Table 1 have been worked out on the basis that the thickness of the mortar joints are 3 mm for ashlar masonry, 6 mm for block in course and 10 mm for square rubble.

4.2 **Tolerances** -The following tolerances shall be allowed on the dimensions:

a) for stones required in ashlar masonry:

1) length and width  $\pm 5$  mm; and

2) height  $\pm 3$  mm.

b) for stones required for other than ashlar masonry:

1) length and breadth  $\left. \begin{array}{l} \pm 5 \text{ mm} \\ -10 \text{ mm} \end{array} \right\}$ ; and

2) height  $\pm 5$  mm.

## 5 Workmanship

5.1 In case of stratified rocks, stones for building purposes shall be so quarried and dressed that when set in the building, the stones are laid along the plane of stratification.

**TABLE 1 DIMENSIONS OF NATURAL BUILDING STONES***( Clause 3.1 )*

Sl. No.	TYPE OF MASONRY	LENGTH mm	BREADTH mm	HEIGHT mm
i)	Stones for ashlar	597 697 797	297 347 397	297 347 397
ii)	Stones for block in course	394 494	194 244	194 244
iii)	Stones for square rubble	90 140 190 240 290 390 440 490 590	90 90, 140 90, 140, 190 90, 140, 190 90, 140, 190, 240 90, 140, 190, 240, 290 90, 140, 190, 240, 290 90, 140, 190, 240, 290 90, 140, 190, 240, 290	90 90, 140 90, 140, 190 90, 140, 190 90, 140, 190, 240, 290 90, 140, 190, 240, 290 90, 140, 190, 240, 290 90, 140, 190, 240, 290 90, 140, 190, 240, 290
iv)	Stones for random rubble	May be of any size and shape but not less than 150 mm in any direction		
v)	Stones for sills and lintels	a) 890, 990, 1 090, 1 190, 1 290	90, 190, 290, 390, 490	90, 140, 190
		b) 1 390, 1 490, 1 590, 1 690, 1 790	190, 290, 390, 490, 590	140, 190, 240, 290
vi)	Stones for arches, domes and circular moulded work	The dimensions depend on the particulars of the curve		
vii)	Coping stones	190, 290, 390, 490, 590, 690, 790	200, 300, 400, 500, 600	100, 150, 200
viii)	Kerb stones	390, 490, 590, 690, 790	100, 200, 300	300, 400, 500

5.2 No sharp protrusions, pinnings or depressions shall be allowed on any side of building stones, appropriate to each type of masonry described in 5.3.

### 5.1 5.3 Dressing of stones

#### 5.1.1 Ashlar masonry

5.3.1.1 Plain ashlar -Every stone shall be cut to the required size and shape, chisel dressed on all beds and joints so as to be free from bushings; dressed surface shall not show a depth of gap of more than, 3 mm from straight edge placed on it. The exposed faces and joints, 6 mm from the face shall be fine tooled so that a straight edge can be laid along the face of the stone in contact with every point. All visible angles and edges shall be true and square and free from chippings. The corner stones (quoins) shall be dressed square and the corners shall be straight and perpendicular.

5.3.1.2 Ashlar sunk or moulded-dressing shall be done in the same manner as in plain ashlar (see 5.3.1.1).

The faces shall then be gauged, cut, grooved, rebated, sunk or plain moulded as required for the work. For this purpose, a full size layout of the moulding shall be prepared on platforms for which sheet templates shall be cut

and the stone dressed to the templates to a uniform and fine finish. The dressed surface shall not be more than 3 mm from straight edge placed on it. All visible angles and edges shall be true and free from chippings. The faces of joints, 6 mm from the face shall also be fine tooled so that a straight edge placed on it, is in contact with every point. It shall be finest surface that can be given to a stone with the chisel and with rubbing.

**5.3.1.3** Ashlar rough tooled-The dressing of stone blocks shall be similar to plain ashlar (see 5.3.1.1) except that face exposed in view shall have a fine chisel draft 2.5 mm wide round the edges and shall be rough tooled between the draft such that the dressed surface shall not deviate more than 3 mm from the straight edge placed over it.

**5.3.1.4** Ashlar block in course-The stones are dressed all squared, and the faces are usually hammer-dressed.

**5.3.2** Random Rubble Masonry-Stones shall be hammer-dressed on the face, the sides and the beds to enable these to come in proximity with the neighbouring stone. The bushing on the face shall not be more than 40 mm on an exposed face.

### **5.3.3 Coursed rubble masonry**

**5.3.3.1** Coursed rubble (first sort) -Face stone shall be hammer-dressed on all Heeds and joints so as to give them approximately rectangular shape. These shall be square on all joints and bed faces. The bed joints faces shall be chisel drafted for at least 80 mm back from the face and for the side joints faces at least 40 mm. No portion of the dressed surface shall show a gap more than 6 mm from straight edge placed on it. The remaining unexposed surface portion of the stone shall not project beyond the surface of bed and side joints. The requirements regarding bushing shall be same as for random rubble masonry (see 5.3.2).

**5.3.3.2** Coursed rubble (second sort) -All requirements are the same as for coursed rubble ( first sort ) ( see 5.3.3.1) except that no portion of dressed surface of joints shall show a depth of gap more than 10 mm from a straight edge placed on it.

**5.3.4** Stones for Arches, Dopes or Circular Moulded Work-The dressing shall be done in the same manner as for ashlar sunk or moulded (see 5.3.1.2) except that for arch or dome work, the stones shall be dressed to the required shape so that the surface of joints shall be truly radial.

**5.3.5** Stones for Moulded and Carved Columns-The dressing shall be done in the same manner as for plain ashlar (see 5.3.1.1). The surface of joints with the adjoining stones shall be truly vertical, horizontal, radial and circular as the case may be. The face may be dressed to uniform curves of planes as required for the work.

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