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**Compressed earth blocks —
Part 3: Test methods**

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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 514-1 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:

ARS 670-3: 2014, *Compressed earth blocks - Part 3: Test methods*

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

DRS 514 consists of the following parts, under the general title *Compressed earth blocks*:

- *Part 1: Definitions, classifications, specifications*
- *Part 2 Earth mortars*
- *Part 3: Test methods*
- *Part 4: Code of practice for production and construction*

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

Mass Design Group

NP Construction Construction Company (NPCC) Ltd

Road Transport Development Agency (RTDA)

Rwanda Housing Authority (RHA)

Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA)

Rwanda Quarries Association (RQA)

SKAT Consult

St Joseph Engineering Company (SJEC) Ltd

Standards for Sustainability (SfS)

Stonecraft Industries Ltd

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Introduction

There are two kinds of identification tests for raw materials, and more specifically for earth: quantitative and qualitative.

In the case of the former, tests are carried out using laboratory equipment and the operating modes are those habitually used. In the case of the latter, these are so-called field tests, the use of which certainly figures in the technical literature, but which nevertheless requires a sure level of skill and knowledge on the part of the operator. In all cases, professional experience will be vital.

With regard to mechanical tests, these should be suited to the intrinsic characteristics of earth, which differ widely from those of most other mineral building materials.

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Compressed earth blocks — Part 3: Test methods

1 Scope

This Draft Rwanda Standard specifies test methods for verification of the characteristics of compressed earth blocks intended for house construction.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 546, Clay products for buildings — Vocabulary

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in DRS 546 apply.

4 Tables of tests

Table 1 — Earth tests

Characteristics	Symb	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Lab	Opt	Recom	
GRANULARITY									
Texture		Wet sieving	N			x		x	1,4
		Hydrometer test	N			x		x	1,4
		Simplified sedimentation	L		x			x	1,3,4
		Sand equivalent	L		x			x	1,4
		Visual examination	L	x	x		x		1,3,4
		Hand-washing test	L	x	x		x		1,3,4
		Pellet test	L	x	x		x		1,3,4
		Cigar test	L	x	x			x	1,3,4
Pulverisation ratio		Visual examination	L		x			x	1,3,4

Characteristics	Symb	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Lab	Opt	Recom	
		Sieving	N		x			x	1,3,4
PLASTICITY									
Liquid limit	LL	Casagrande test	N		x	x		x	1,3,4
Plastic limit	PL	Atterberg thread test	N		x	x		x	1,3,4
		Cone	N		x	x	x		
Plasticity index	IP	Calculation	N		x	x		x	1,3,4
CLASS									
Class of soil		Determined in table	L			x	x		3
SHRINKAGE									
Linear shrinkage		Alcock test	N		x			x	2,3
		Pellet test	L		x		x		1,3,4
CHEMICAL COMPOSITION									
pH		pH test	N		x	x		x	1,3,4
Soluble salts		Chemical analysis	N			x		x	1,4
Acid salts		Chemical analysis	N			x		x	1,4
Alkaline salts		Chemical analysis	N			x		x	1,4
Organic matter or humus		Chemical analysis	N		x	x		x	1,4
		Smell test	L	x	x			x	3,4
Carbonates		Chemical analysis	N			x		x	1,4
Sulphates		Chemical analysis	N			x		x	1,4
Chlorides		Chemical analysis	N			x		x	1,4
MINERALOGY									
Methylene blue value of the O/d fraction of the soil	VBS (O/d)	Methylene blue test	N			x		x	1,4

Characteristics	Symb	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Lab	Opt	Recom	
Methylene blue value of the entire soil	VBS Total	Methylene blue test	N			x		x	1,4
Nature of colloids		X-ray test	N			x	x		1
COMPACTIBILITY									
Optimal water content	Wopt	Static Proctor	N			x		x	4
		Dropping ball test	L		x			x	2,4

L = qualitative N = quantitative

Table 2 — Water tests

Characteristics	Symb	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Lab	Opt	Recom	
QUALITY									
Transparency		Visual examination	L		x			x	2,3,4
Salinity		Taste examination	L		x			x	2,3,4
		Evaporation	L		x			x	2,3,4

L = qualitative N = quantitative

Table 3 — Cement tests

Characteristics	Symbols	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Lab	Opt	Recom	
QUALITY									
Class		Rod test	N			x		x	1
		Bending rod	L		x			x	2
Going off		Visual and tactile examination	L		x			x	4

L = qualitative N = quantitative

Table 4 — Line tests

Characteristics	Symbols	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Laboratory	Optional	Recom	
COMPOSITION									
Active lime		Chemical analysis	N			x	x		1
QUALITY									
Going off		Visual and tactile examination	L		x			x	4

L = qualitative N = quantitative

Table 5 — CEB tests

Characteristics	Symbols	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Lab	Opt	Recom	
CONFIGURATION									
Sections		Metric measurement	N		x			x	4
DIMENSIONS									
Work dimensions		Metric measurement	N		x			x	4
GEOMETRY									
Parallelism		Metric measurement	N		x			x	4
Surface smoothness		Metric measurement	N		x			x	4
Edge smoothness		Metric measurement	N		x			x	4
Surface obliquity		Metric measurement	N		x			x	4
APPEARANCE									
Pitting		Metric examination	N		x			x	4
Roughness		Visual examination	L		x			x	4
Chips		Metric measurement	N		x			x	4

Flaking, etc.		Visual examination	L		x			x	4
Splits, etc.		Metric measurement	N		x			x	4
Colour		Visual examination	L		x			x	4
Structure		Visual examination	L		x			x	4
Texture		Visual examination	L		x			x	4
PHYSICOCHEMICAL									
Pitting		Visual examination	L		x			x	4
Efflorescence		Visual examination	L		x			x	4
MECHANICAL, PHYSICAL AND HYDRIC									
Dry compressive strength	f_b dry	Crushing strength test	N				x		1,4
Wet compressive strength	f_b wet	Crushing strength test	N				x		1,4
Dry tensile strength	f_b^t dry	Tensile strength test	N				x		1,4
Wet tensile strength	f_b^t wet	Tensile strength test	N				x		1,4
Bending strength		Block breaking test	N		x			x	2,3,4
Dry density	γ_d	Metric measurement + weight measurement	N		x			x	1,2,3,4
Erosion		Erosion	N				x	x	4
Abrasion - loss of material		Abrasion	N				x	x	4
Shrinkage		Shrinkage	N		x		x	x	4
Water absorption		Weight measurement	N				x	x	4
Water absorption by the exposed face		Weight measurement	N				x	x	4
Specific heat	C	Specific heat	N				x	x	1
Thermal conduction coefficient	λ	Thermal conduction	N				x	x	1

L = qualitative N = quantitative

Table 6 — Mortar tests

Characteristics	Symb	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Laboratory	Optional	Recom	
MECHANICAL, PHYSICAL, HYDRIC									
Dry compressive strength	f_m dry	Crushing strength test	N			x			4
Dry tensile strength	f_m^t dry	Tensile strength test	N			x			4

L = qualitative N = quantitative

Table 7 — Masonry tests

Characteristics	Symbols	Tests	Nature of tests	Place of testing			Character of test		Ref.
				Quarry	Workshop /Site	Lab	Opt	Recom	
CONFIGURATION									
Bonding pattern		Visual examination	L		x			x	2,4
Horizontality of courses		Metric measurement	N		x			x	4
DIMENSIONS									
Execution dimensions		Metric measurement	N		x			x	4
GEOMETRY									
Sweep		Metric measurement	N		x			x	4
Plumb		Metric measurement	N		x			x	4
APPEARANCE									
Oozing		Visual examination	L		x		x		4
Macro-cracks		Visual examination	L		x		x		4
Chips		Visual examination	L		x		x		4

		and metric measurement								
Colour		Visual examination	L		x		x		4	
Texture		Visual examination	L		x		x		4	
PHYSICOCHEMICAL										
Pitting		- Visual examination	L		x		x		4	
Efflorescence		- Visual examination	L		x		x		4	
MECHANICAL, PHYSICAL AND HYDRIC										
Dry characteristic compressive strength	f_k	Calculated	N				x		4	
Thermal heat loss coefficient		Calculated	N				x	x	1	
Thermal coefficient lag	δ	Calculated	N				x	x	1	
Acoustic absorption coefficient	l	Calculated	N				x	x	1	
Fire resistance		Fire resistance	N				x	x	1	
Shrinkage		Metric measurement	N				x		x	1,4

L = qualitative N = quantitative

Bibliography

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