RWANDA STANDARD

DRS 515

First edition

2022-mm-dd

Natural stone — Terminology and classification

ICS 01.040.91; 91.100.15

Reference number

DRS 515: 2022

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

Rwanda Standards Board

P.O Box 7099 Kigali-Rwanda

KK 15 Rd, 49

Tel: +250 788303492

Toll Free: 3250

E-mail: info@rsb.gov.rw

Website: www.rsb.gov.rw

ePortal: www.portal.rsb.gov.rw

Contents Page

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 515 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:

EN 12670:2019, *Natural stone - Terminology*

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

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

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

Rwanda Standards Board (RSB) – Secretariat

Introduction

The term Natural Stone groups several rock types with marked geological differences. The extraction, elaboration and commerce of Natural Stone have set a very particular vocabulary. Many of these terms have been taken from the popular or quarrymen language, which sometimes is far from scientific definitions. This document establishes the terminological bases for geological and petrologic definitions of natural stone and its classification. It also incorporates most of the popular or commercial terminology.

The terminology covers the fields of geology, mining, processing, marketing and products of Natural Stone. The included scientific classifications allow setting the scientific name of the stone varieties. If the stone variety is not included in this document, the rock should be classified using its three main mineralogical components.

Natural stone — Terminology and classification

1 Scope

This Draft Rwanda Standard defines the recommended terminology covering scientific and technical terms, test methods, products, and the classification of natural stones.

This document does not cover roofing slate.

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 definition apply.

3.1 Geological terms

3.1.1

accessory minerals

rock forming minerals that occur in such small amounts that they are not relevant in the classification or nomenclature of the rock

3.1.2

acid rock

igneous rock that contains more than 63 wt. % of silica

3.1.3

actinolite

Ca-Mg-Fe-amphibole (see amphibole formula)

3.1.4

agate

distinctly banded variety of chalcedony

3.1.5

age

fourth order geological time unit

3.1.6

agglomerate

pyroclastic rock in which bombs (with diameters greater than 64 mm) > 75 %

3.1.7

agglutinate

welded splatter, commonly of basaltic composition, deposited ballistically in strombolian or fire fountain volcanic eruptions

3.1.8

alabaster

fine grained, compact variety of gypsum, usually white or pale coloured and translucent

3.1.9

albite

sodium plagioclase, formula $Na(AlSi_3O_8)$ (see plagioclase)

3.1.10

alkali feldspar

alkali rich feldspars microcline, orthoclase, sanidine, albite, with less than 5 % vol. anorthite

Note 1 to entry: See feldspar and plagioclase.

3.1.11

allochems

coarser framework grains in most mechanically deposited limestones in the basin of sedimentation

Note 1 to entry: Allochems include: intraclasts, ooids, skeletal particles, pellets (including peloids).

3.1.12

allotriomorphic

anhedral

xenomorphic

mineral which shows in thin sections no characteristic or rational faces, suggested by its crystalline structure

3.1.13

alteration

post-formational change of the mineralogical and or chemical composition of a rock brought about by physical, chemical, or biological means, including actions of hydrothermal solutions and weathering

processes, excluding metasomatic and metamorphic changes

3.1.14

alumina Al2O3

chemical compound used in fine polishing

3.1.15

amorphous

phase that does not have a crystalline structure

3.1.16

amphibole

family of dark ferromagnesian silicate minerals, general formula A2-3B5(Si,Al)8O22(OH)2, where A = Mg, Fe^{2+}, Ca, Na; B = Mg, Fe^{2+}, Fe^{3+}, Al

3.1.17

amphibolite

gneissose or granofelsic metamorphic rock mainly consisting of green, brown, or black amphibole and plagioclase

Note 1 to entry: A gneissose/granofelsic mesostructure is typical of true amphibolites, in contrast with schistose, green amphibole-albite greenschists.

3.1.18

amygdaloidal

texture of volcanic rocks where almond-shaped vesicles are, fully or partially, filled with secondary minerals

3.1.19

analcime

mineral, Na ($AlSi_2O_6$)H_2O of the zeolite group

Note 1 to entry: See zeolite, secondary minerals.

3.1.20

andalusite

mineral, Al2SiO5 polymorphous with sillimanite and kyanite

3.1.21

andesite

volcanic rock of intermediate composition mainly composed of plagioclase (oligoclase - andesine) and

one or more of the mafic minerals' amphibole, pyroxene, and biotite

Note 1 to entry: See 4.2.1.5

3.1.22

anhydrite

mineral with $CaSO_4$ formula

3.1.23

anisotropy

vectorial behaviour of physical and mechanical properties in minerals and rocks, i.e. hardness in kyanite, thermal expansion in calcite, flexural resistance in slate

3.1.24

ankerite

mineral of dolomite group with calcium and iron

3.1.25

anorthite

calcic plagioclase, Ca (Al2Si2O8)

Note 1 to entry: see 3.1.384.

3.1.26

anorthoclase

sodium-rich mineral of the alkali feldspar group, formula $(Na,K)AlSi_3O_8$

Note 1 to entry: Its composition, in terms of the mole fraction of the orthoclase component (or) and the albite component (ab) is $or_{40}ab_{60}$ to $or_{10}ab_{90}$ (see feldspar, microcline, plagioclase, orthoclase).

3.1.27

anorthosite

plutonic rock mainly composed of anorthite – rich plagioclase and little or no mafic minerals

Note 1 to entry: See 4.2.1.2.

3.1.28

antiperthite

perthitic intergrowth of plagioclase host and subsidiary K-rich feldspar

3.1.29

apatite

group of minerals, of which the formula is $Ca_5(PO_4,CO_3)_3(F,OH,Cl)$

3.1.30

aphanitic

of or relating to an igneous rock in which the crystals are so fine that individual minerals cannot be distinguished with the naked eye

Note: Aphanitic rocks are extrusive rocks that cooled so quickly that crystal growth was inhibited.

3.1.31

aplite

fine grained igneous rock of granitic composition with allotriomorphic texture and, commonly, leucogranitic composition

3.1.32

aragonite

mineral, polymorphous with calcite, of which the formula is $CaCO_3$

3.1.33

Archaean

the older eon of the Precambrian ranging from the formation of the Earth at ~4 000 Ma to 2 500 Ma

Note: See Table 1.

3.1.35

arenite

loose soil or consolidated sedimentary rock, mainly composed of sand size detrital lithic fragments or mineral grains (between 1/16 mm and 2 mm)

Note 1 to entry: Usually the term is used with a prefix that refers to its composition or genesis, e.g. quartzarenite (see 4.2.2.5).

3.1.36

argillite

layered or not-layered consolidated sedimentary rock mainly composed of detrital clay size particles or clay minerals

3.1.37

arkose

sedimentary detrital rock with less than 75 % vol. quartz and a high content of feldspar grains

Note: See 4.2.2.5.

3.1.38

arkosic wacke

sandstone comprising >5 % vol. of sand grade particles, with the feldspar content exceeding that of rock fragments and >15 % vol. of mud matrix (material <30 µm in diameter)

3.1.39

ash

fine-grained volcanic material

3.1.40

augen fabric

fabric in some rocks, usually metamorphic, consisting of ellipsoidal or lens shaped porphyroblasts, crystals, or fragments, rounded and enveloped by the foliation, resembling eyes (augen) in a cross section

3.1.41

augen mylonite

mylonite containing distinctive large crystals or lithic fragments around which the foliated fine-grained matrix is wrapped, often forming symmetric or asymmetric trails

3.1.42

augite clinopyroxene

mineral of the pyroxene group (clinopyroxenes), the general formula of which is $(Ca,Na)(Mg,Fe^{2+},Al)(Si,Al)_2O_6$ with minor amounts of Na, Fe^{3+}, Al, Ti admitted, the colour of which is dark green to black, and which is an essential constituent in basic igneous rocks such as basalts and gabbros

3.1.43

bafflestone

autochthonous carbonate rock whose original components were bound organically during deposition,

the organisms forming baffles to trap finer matrix material

3.1.44

banded

rock having alternating nearly parallel layers that differ in colour, fabric or mineral composition, and because of that it shows alternating bands in a cross section

3.1.45

basalt

volcanic rock consisting essentially of plagioclase (labradorite-bytownite) and pyroxene with variable amount of phenocrysts set in a fine-grained matrix

Note 1 to entry: Commercially natural stone as per the scientific definition of basalt and other rocks such as, picrites, diabases, dolerites and microgabbros.

Note: See 4.2.1.5.

3.1.46

basanite

silica-undersaturated alkali olivine basalt containing olivine, clinopyroxene and plagioclase feldspar with >10 % vol. feldspathoids in the form of nepheline or leucite, which is found in association with other alkaline igneous rocks

3.1.47

basic

Mg,- Fe- and Ca-rich igneous rock with more than 45 % vol. and less than 52 % vol. of silica

3.1.48

bed of blocks

unweathered rock beneath unconsolidated material formed by blocks

3.1.49

bedding plane

a) planar or nearly planar surface that visibly separates the individual beds, layers or strata, in sedimentary rocks;

b) any surface, even when conspicuously bent or deformed by folding

3.1.50

benmoreite

alkali lava intermediate in composition between mugearite and trachyte

3.1.51

bindstone

autochthonous carbonate rock whose original components were bound organically during deposition, with the organisms binding finer matrix material together

3.1.52

bioclastic rock

sedimentary rock consisting of fragments and broken remains of organisms; e.g. limestone composed of shell fragments

3.1.53

biolithite

limestone essentially constituted of reef structures, animal or plant

3.1.54

biotite

mafic rock forming mineral of the mica group with general formula $K(Mg,Fe^{2+})_3(Al,Fe^{3+})\ Si_3O_{10}(OH)_2$

3.1.55

black granite

commercial term for black or dark coloured plutonic rocks

Note: See e.g. gabbro, diabase, basalt.

3.1.56

blasto-

prefix used to describe the metamorphic rock fabrics denoting the presence of primary crystals or pre-

existing fabric modified by metamorphism, but still recognized; e.g. blastogranular, blastomylonitic, blastopsephitic

3.1.57

blastomylonite

mylonite which displays a significant degree of grain growth related to or following deformation

3.1.58

block

angular fragment of rock with a diameter >256 mm

3.1.59

blue schist

schist whose bluish colour is due to the presence of sodic amphibole

3.1.60

omb

mass of liquid lava thrown through the air which rotates and takes on a characteristic shape and structure

3.1.61

boundstone

limestone, in which the grain were bound by an organism or organisms

3.1.62

breccia

a) coarse grained clastic sedimentary rock composed by angular rock fragments held together by a mineral cement or in a fine grained matrix;

b) clastic rock consisting of highly angular gravel-size fragments, of sedimentary, tectonic or volcanic origin

3.1.63

calc silicate marble

marble with calcium and silicate minerals

Note: See marble, ophicalcite.

3.1.64

calcarenite

limestone consisting predominantly of recycled detrital calcite grains of sand size (1/16 mm – 2 mm)

3.1.65

calcareous

containing calcium carbonate

3.1.66

calcilutite

limestone consisting predominantly of detrital calcite grains or fragments of silt or clay size (<1/16mm)

3.1.67

calciphyre

metacarbonate rock containing a conspicuous amount of calcium- and/or magnesium-silicate minerals

3.1.68

calcirudite

limestone consisting predominantly of detrital calcite grains or fragments larger than sand size

Note: See rudite.

3.1.69

calcisiltite

limestone consisting predominantly of detrital calcite grains or fragments of silt size

3.1.70

calcite

mineral, the formula of which is $CaCO_3$; trimorphous with aragonite and vaterite

Note: Very common in some sedimentary and metamorphic rocks.

3.1.71

calcitic dolomite

carbonate rock which 50 % vol. to 89 % vol. of the mineral dolomite

Note: See also 4.2.2.11.

3.1.72

calcitic marble

marble containing more than 50 % vol. of calcite

3.1.73

calc-schist

carbonate silicate-schist metamorphosed argillaceous limestone containing calcite as a substantial component and with a schistose structure produced by parallelism of platy minerals

Note: The term carbonate-silicate schist should be used when the non-carbonate mineral content is >50 % vol. See schist, 4.2.3.

3.1.74

Cambrian

oldest system and period into which the Palaeozoic is divided

Note: See Table 1.

3.1.75

carbonate

mineral containing $CO3^{2-}$; calcite, dolomite, magnesite, and siderite, etc. which are frequent rock forming carbonate minerals

3.1.76 carbonate rock

rock consisting chiefly of carbonate minerals, especially a sedimentary rock; limestone, dolomite, and carbonatite are examples of carbonate rocks

Note: See 4.2.2.8, 4.2.2.9, 4.2.2.10 and 4.2.2.11

3.1.77

carbonate-silicate rock

metamorphic rock mainly composed of silicate minerals (including calcium-silicate minerals) and containing between 5 % vol. vol and 50 % vol. vol of carbonate minerals

3.1.78

carboniferous

period and system of the Palaeozoic

Note: See Table 1.

3.1.79

cataclasite

fault rock which is cohesive with a poorly developed or absent schistosity, or which is incohesive, characterised by generally angular porphyroclasts and lithic fragments in a finer-grained matrix of

similar composition

Note: Generally, no preferred orientation of grains of individual fragments is present as a result of the deformation, but fractures may have a preferred orientation. A foliation is not generated unless the fragments are drawn out or new minerals grow during the deformation. Plastic deformation may be present but is always subordinate to some combination of fracturing, rotation and frictional sliding of particles. Cataclasite may be subdivided according to the relative proportion of finer-grained matrix into protocataclasite, mesocataclasite and ultracataclasite

3.1.80

cataclastic

pertaining to the structure and texture produced in a rock by severe mechanical stress during dynamic metamorphism; bending, breaking, and fragmentation of the mineral grains are characteristic features; also said of the rocks exhibiting such structure

Note: See breccia.

3.1.81

cement

mineral material, usually chemically precipitated during the rock compaction that occurs in the

interstitial spaces among the individual grains of a sedimentary rock, thereby binding the grains together as a rigid mass; silica, carbonates and iron oxides are common cements

3.1.82

Cenozoic

youngest era of geologic time

Note: See Table 1.

3.1.83

chalcedony

group name for the compact varieties of silica composed of minute crystals of quartz with sub microscopic pores

3.1.84

chalcopyrite

sulphide mineral, the formula of which is $CuFeS_2$

3.1.85

chalk

soft fine grained limestone, usually white consisting mostly of calcitic remains from microorganisms, and minor silt and clay

3.1.86

charnockite

orthopyroxene-bearing rock of granitoid composition

3.1.87

chert

fine-grained, hard, compact and dense sedimentary rock, consisting dominantly of the SiO2 minerals quartz, chalcedony and opal. cryptocrystalline and/or amorphous silica

Note: Flint is a variety of chert.

3.1.88

chlorite Group

group of phyllosilicates, some of them of green colour, with general formula $(Mg, Fe^{2+}, Fe^{3+})_6 AlSi_3O_{10}(OH)_8$

3.1.89

chloritoid

micaceous mineral, the formula of which is $Fe_2Al_4Si_2O_{10}(OH)_4$

3.1.90

chromite

mineral, the formula of which is $(Fe,Mg)(Cr,Al)_2O_4$

3.1.91

chronostratigraphic unit

stage or zone which, independent of facies, represents a layer of specific age

3.1.92

cipollino marble

impure marble with band coloured structure, consisting in layers of calcite or dolomite grains mixed with variable quantities of silicate minerals

3.1.93

clast

mineral or rock fragment composing clastic sedimentary rocks

3.1.94

cisuralian

oldest epoch of the Permian

Note : See Table 1.

3.1.95

clastic

pertaining to a rock or sediment composed principally of broken fragments that are derived from pre-existing minerals, rocks or organic structures and that have been transported some distance from its original place

3.1.96

clay minerals

group of minerals, essentially hydrous silicates of aluminium with a layered crystalline structure; iron, magnesium, potassium, and other cations are also present in their formula; the most common of which belong to illite, montmorillonite, and kaolinite mineral subgroups

3.1.97

clay slate shale

weakly metamorphosed clay stone with intermediate character between a clay stone and a true slate

3.1.98

clay

loose, extremely fine grained sediment or soft rock composed of particles with diameters less than 0,002 mm, mainly of clay minerals and other minerals, especially quartz, feldspars, and carbonates

3.1.99

clay stone

rock with more than 67 % vol. clay sized minerals

3.1.100

cleavage

a) property of a rock to split along closely spaced planar surfaces (see slaty cleavage, crenulation cleavage, schistosity, and rough cleavage);

b) splitting of a mineral along its crystallographic planes, thus reflecting crystal structure

3.1.101

clinopyroxene

monoclinic pyroxene exhibiting non-parallel extinction

3.1.102

columnar

structure of some volcanic rocks, such as basalt, consisting of parallel, prismatic columns, polygonal in cross section, nearly perpendicular to the top and the bottom of the flow unit

3.1.103

comb layering

fabric of igneous rocks consisting of bands of elongated crystals with nearly vertical mineral-elongation relative to the border of the bands

3.1.104

concretion

collective term applied loosely to various primary and secondary segregations of diverse origin, including irregular nodules, spherulites, crystalline aggregates, geodes, septarias and related bodies

3.1.105

conglomerate

coarse grained sedimentary rock composed of rounded to sub angular fragments (pebbles, cobbles, boulders), set in a fine grained matrix of sand or clay, and commonly cemented

3.1.106

consertal

fabric of rocks showing toothed border lines between adjoining crystals

3.1.107

contact (between grains)

mode of relation between grains of rock-forming minerals; i.e. by points, by lines, within the matrix

3.1.108

coral rock

coral reef limestone

3.1.109

cordierite

silicate mineral, common in some metamorphic and rare in magmatic rocks, the formula of which is $(Mg,Fe)_2Al_4Si_5O_{18}$

3.1.110

corona

fabric of igneous or metamorphic rocks where minerals are surrounded by a seam of one or more other minerals

Note: Particular examples are the rapakivi fabric and kelyphitic rims.

3.1.111

Cretaceous

youngest of the periods/ and systems included in the Mesozoic era/erathem

Note: See Table 1.

3.1.112

cross bedding

cross stratification with thick individual beds

3.1.113

crossed twinning

lamellae of mineral twins after two laws making in thin sections a grid as seen in microcline

3.1.114

cryptocrystalline

composed of crystals so fine that they cannot be recognized even under polarizing microscope

3.1.115

crystal zoning

texture of igneous crystals with concentric layers made by inclusions or variations in chemical composition e.g. in plagioclases

3.1.116

dacite

volcanic rock with quartz, plagioclase, alkali feldspar, and often mafic components

Note: See 4.2.1.5.

3.1.117

dark mineral

mafic mineral

Fe-Mg rock forming minerals, e.g. olivine, pyroxenes, amphiboles and biotite

3.1.118

decussate

metamorphic fabric of randomly oriented unequidimensional grains (e.g. pyroxenes, micas)

3.1.119

dedolomitization

partial or complete calcification of dolomite

3.1.120

deformation fabric

tectonic fabric

rock fabric resulting from deformation, as lineation, cleavages, schistosity, folds, preferred orientations of crystals etc.

Note: See fabric.

3.1.121

devitrification

process of nucleation and growth of crystals in glasses at sub solidus temperatures

3.1.122

Devonian

system of the Palaeozoic Erathem above the Silurian and below the Carboniferous

Note: See Table 1.

3.1.123

diabase

medium grained rock of basaltic composition used in two ways: altered basaltic rocks (British) andophitic texture (French, German and American)

3.1.124

diagenesis

process of mineralogical changes in sediments after deposition which result in a consolidated rock

3.1.125

diamictite

terrigenous sedimentary rock with particle sizes ranging from clay to boulder size

3.1.126

diatomite

fine-grained, hydrated rock silica formed by the accumulation of the tests of diatoms

3.1.127

diorite

plutonic rock mainly composed of plagioclase (-andesine), hornblende, and/or biotite

3.1.128

dip

inclination of a bed to the horizontal; the dip is at a right angle to the strike

3.1.129

dolerite

igneous rock with basaltic composition, commonly with ophitic fabric

Note : See3.1.123.

3.1.130

dolomite mineral

mineral, the formula of which is $CaMg(CO_3)_2$

3.1.131

dolomite rock

carbonate rock with high percentage (90 % to 100 % of the mineral dolomite

3.1.132

dolomitic limestone

carbonate rock with 10 % vol. to 49 vol % vol. of the mineral dolomite

Note: See Table 6.

3.1.133

dolomitic marble

magnesian marble

marble containing more than 90 vol % vol. dolomite

3.1.134

dolostone

sedimentary rock made up of dolomite

Note: See Figure 15.

3.1.135

dunite

peridotite

medium - to coarse - grained ultramafic rock comprising >90 % vol. olivine, often of mantle origin

3.1.136

dyke

dike

tabular or nearly tabular body of igneous rock that cuts across the geological structure of surrounding rocks

3.1.137

eclogite

plagioclase-free coarsed-grained metamorphic rocks composed of ≥75 % vol. of omphacite and garnet

3.1.138

elongate fabric

fabric of granoblastic metamorphic rocks in which the crystals tend to be elongated with preferred orientation

3.1.139

Eocene

epoch of Paleogene

Note: See Table 1.

3.1.140

eon

large division of geological time

Note : See Table 2.

3.1.141

eonothem

largest chronostratigraphic unit

Note: See Table 2.

3.1.142

epi-

upon, above

3.1.143

epiclastic

descriptive of sedimentary material redeposited from an existing sediment

3.1.144

epidote

mineral $Ca_2(Fe,Al)Al2[O(OH)(SiO4)(Si_2O_7)]$, which is an igneous accessory, common in some metamorphic rocks

3.1.145

epoch

third order geological time unit

Note: See Table 2.

3.1.146

equigranular fabric

rock made of crystals of a similar relative size

3.1.147

era

first order geological time unit

Note : See Table 2.

3.1.148

erathem

first order chronostratigraphic unit, which consists of several adjacent systems

Note: See Table 2

3.1.149

essential mineral

mineral that in a rock is used for its classification in main petrographic families or classes

Note: See quartz, alkali feldspar, plagioclase, feldspathoids, micas, amphiboles, pyroxenes, olivine, calcite, dolomite.

3.1.150

essexite

plutonic rock corresponding to nepheline monzogabbro or nepheline monzodiorite composed essentially of labradorite plagioclase, minor alkali feldspar, feldspathoids (e.g. nepheline), and dark mafic minerals as titanian augite, kaersutite, and / or biotite

3.1.151

euhedral idiomorphic

crystal with well-developed crystal faces

3.1.152

exfoliation

process by which concentric or parallel scales of rock are spalled out from the surface of a large rock mass

3.1.153

fabric element

rock component that acts as a unit in deformation

3.1.154

fabric, depositional

fabric resulting from deposition of sediments

3.1.155

fabric, (growth)

fabric grown without stress and movement

3.1.156

fabric

relative orientation of parts of a rock mass; hence mega-, meso-, microfabric depending on scale

3.1.157

facies

general appearance or nature of a rock mass, differentiating it from adjacent or associated ones

3.1.157.1

sedimentary facies

sum of lithological and paleontological characters exhibited by a sediment or sedimentary rock body and related to a given depositional environment

3.1.157.2

igneous facies

varieties of a single igneous body that differ in structure or composition from the normal rock type of the mass

3.1.157.3

metamorphic facies

set of metamorphic mineral assemblages repeatedly found in terranes of all ages around the world and showing a regular relationships between mineral composition and bulk chemical composition, so that different metamorphic facies can be related to different p-t conditions

3.1.158

fault gouge

incohesive, clay-rich fine- to ultrafine-grained cataclasite which may contain a schistosity

Note: Lithic clasts may be present.

3.1.159

fault rock

rock formed as a result of deformation in a fault zone

3.1.160

fault

fault zone

planar dislocation along which there has been displacement of the rocks on one side relative to those on the other side

Note: This includes fracture zones and shear zones or a fracture surface or zone along which rocks have moved relative to each other. A zone of sheared, crushed of foliated rock, in which numerous small dislocations have occurred, adding up to an appreciable total offset of the undeformed walls, is a fault zone

3.1.161

feldspar

group of silicate minerals with the chemical composition $KAlSi_3O_8$ (orthoclase, microcline), $NaAlSi_3O_8$ (albite), $CaAl_2Si_2O_8$ (anorthite) with certain miscibility of these components (see anorthite, microcline, orthoclase, sanidine, plagioclase)

3.1.162

feldspathic sandstone subarkose

sandstone rich in feldspar; intermediate in composition between arkosic sandstone and quartz sandstone

Note: See 4.2.2.5.

3.1.163

feldspathic

containing feldspar in a considerable amount

3.1.164

feldspathoids foid

group of alumino-silicate minerals with a variety of framework structures, similar to the feldspar but containing less silica, which is a characteristic of undersaturated alkaline igneous rock

3.1.165

felsic

containing feldspar, feldspathoids and other light-coloured silicates like quartz

3.1.166

ferruginous

containing iron or one of its components ferrous Fe^{2+} or ferric Fe^{3+}

3.1.167

fissile bedding

bedding with laminae less than 2 mm in thickness

3.1.168

fissility

property of splitting easily along closely spaced parallel planes

3.1.169

fissure

visible crack or fracture in the rocks

3.1.170

flint

nodular form of grey / black chert

Note: Term restricted to nodules of chert present in Cretaceous chalk.

3.1.171

flow fabric

alignment of inequidimensional mineral grains in an igneous rock in response to laminar flow

3.1.172

fluorite

mineral, the formula of which is CaF_2

3.1.173

foidite

feldspathoidite

general term for volcanic rocks containing more than 60 % vol. foids in total light – coloured constituents

3.1.174

foidolite

feldspatoidolite

general term for plutonic rocks containing more than 60 % vol. foids in total light – coloured constituents

3.1.175

fold

bend in formerly planar or tabular rock bodies

3.1.176

foliation

repetitively occurring or penetrative planar feature in a rock body (see cleavage)

3.1.177

formation

basic stratigraphic unit identified by lithological characteristics and fossils

3.1.178

fossil

remains or marks of animals or plants in sedimentary rocks

3.1.179

framestone

authochthonous organically bound limestone in which the organisms formed a framework during deposition

3.1.180

Furongian

youngest epoch of the Cambrian

Note: See Table 1.

3.1.181

gabbro

coarse grained plutonic rock consisting of plagioclase (labradorite-anorthite), and mafic minerals as clinopyroxene, orthopyroxene, hornblende and olivine

Note 1 to entry: See 4.2.1.2 and 4.2.1.3.

3.1.182

garnet

group of minerals of formula $X_3Y_2(SiO_4)_3$ where X = Ca,Mg,Fe^{2+},Mn^{2+} and Y = Al,Fe^{3+},Mn^{3+},V^{3+},Cr

3.1.183

geode

globular bodies in sediments or igneous rocks often containing fossils and crystals

3.1.184

geological structure

a) macroscopic feature of a rock mass or rock unit, e.g. columnar structure, blocky fracture, platy parting, bedding;

b) general disposition, attitude, arrangement or relative positions of the rock units of a region or area, resulting from such geological processes as sedimentation, faulting, folding, igneous intrusion, etc.

3.1.185

glass

congealed melt which failed to crystallize, but which is polymerized to some degree

3.1.186

glassy rock

rock consisting partly or wholly of glass, usually formed when magma is quenched too rapidly for crystallization to occur, but also forming in a fault rock by dynamic metamorphism (pseudotachylite) or by thermal metamorphism (buchite)

3.1.187

glauconite

green mineral of the phyllosilicates group originated in sedimentary rocks, formula $(K,Na)(Al,Fe^{3+},Mg)_2(Al,Si)_4O_{10}(OH)_2$

3.1.188

gneiss

metamorphic rock mainly consisting of quartz, feldspar and mica, in which bands rich in granular minerals such as feldspar and quartz, alternate with bands of planar minerals like mica

Note: Might derive from an igneous rock (Orthogneiss) or from a sedimentary rock (Paragneiss) (see Leptite and 4.2.3).

3.1.189

gneissose

gneissic fabric

a) structure characterized by a poorly or well developed schistosity through the rock, so that it splits on a scale of more than one centimetre

b) fabric in metamorphic rocks in which bands rich in granular minerals alternate with bands of planar minerals

3.1.190

goethite

“rust-like” hydrated oxide of iron produced by the weathering of iron metal, with formula α-FeO.OH

3.1.191

graded bedding

stratification in which each stratum shows a gradation in grain size from coarse to fine

3.1.192

grain size

predominant diameter of particles in a rock as observed

3.1.193

grain

particle of a rock e.g. the crystals in a granite

3.1.194

grainstone

carbonated sedimentary rock with joined grains without finely crystalline cement

3.1.195

granite

plutonic rock consisting essentially of quartz, alkali feldspar and sodic plagioclase in variable amounts, usually with biotite and/or hornblende

Note 1 to entry Commercially compact and polishable natural stone, used in decoration and building, mainly consisting of minerals with a hardness between 5 and 7 on the Mohs scale, such as quartz and feldspar, e.g. granite as per the scientific definition, other plutonic rocks, volcanic rocks with porphyritic structure, metamorphic rocks with mineralogical composition similar to granitoids such as gneiss, black granites (see 3.1.55)

Note: See 4.2.1.2

3.1.196

granitoid

term for any granitic rock

3.1.197

granoblastic

mosaic fabric of more or less equidimensional and even sized crystals

3.1.198

granodiorite

plutonic rock consisting essentially of quartz, sodic plagioclase, and less amounts of hornblende and biotite

3.1.189

granofels

granular metamorphic rock under any metamorphic grade

3.1.200

granofelsic structure

type of metamorphic structure resulting from the absence of schistosity such that the mineral grains and aggregates of mineral grains are equant, or if inequant have a random orientation

3.1.201

granophyric

intergrowth of quartz and K-Na-feldspar of intermediate composition

3.1.202

granular

rocks with all crystals approximately of equal size

3.1.203

granulite

high grade metamorphic rock with K-feldspar, quartz and garnet and/or different other mafic minerals and no primary muscovite

3.1.204

graphic

fabric of igneous rocks resulting from intergrowth quartz and either K-rich or Na-rich feldspar

3.1.205

graphite

mineral, one of the two naturally occurring forms of crystalline carbon, the other being diamond

3.1.206

greenschist

schistose metamorphic rock with albite chlorite, epidote, or actinolite

3.1.207

greenstone

old field term indicating an altered igneous rock with chlorite, hornblende, epidote

3.1.208

greywacke

detritic sedimentary rock with a fairly abundant cement rich in clay minerals

Note: See 4.2.2.6.

3.1.29

grit

sedimentary rock with coarse and angular grains

3.1.210

groundmass

fine-grained and/or glassy material surrounding the phenocrysts in a porphyritic volcanic rock

3.1.211

growth fabric

crystal arrangement determined by more or less free growth from a surface or an edge

3.1.212

Guadalupian

middle epoch of the Permian

Note: See Table 1.

3.1.213

gypsum

mineral $CaSO_4 \cdot 2H_2O$ also called selenite; the dense varieties are called alabaster

3.1.214

habit

characteristic crystal form or combination of forms of a mineral, including characteristic irregularities when idiomorphic

3.1.215

Hadean

era of the Precambrian

Note: See Table 1.

3.1.216

harzburgite

ultramafic/ultrabasic rock composed of >40 % vol. olivine, 5-60 % vol. orthopyroxene and <5 % vol. clinopyroxene. Forms the residue when basaltic magma is derived from mantle lherzolite, so it is found

in ultramafic xenoliths in alkali basalts and in the mantle part of ophiolites

3.1.217

hawaiite

alkaline volcanic rock containing andesine plagioclase (An_{30-50}), pyroxene, iron-titanium-oxide ± minor quartz or nepheline

3.1.218

heavy minerals

accessory minerals with a density greater than 2,9 g/cm^3

3.1.219

hematite

major ore mineral of iron, also found as an accessory mineral in many rocks, with formula Fe_2O_3

3.1.220

heteroblastic fabric

metamorphic rock composed of crystals with a range of sizes

3.1.221

Holocene

youngest epoch of the Quaternary

Note: See Table 1.

3.1.222

holocrystalline

rock consisting entirely of crystalline phases

3.1.223

holohyaline

rock consisting entirely of glass

3.1.224

homeoblastic

metamorphic rock composed of crystals of approximately equal size

3.1.225

hornblende

monoclinic Ca-amphibole with Al_2O_3 and Fe_2O_3

Note: See 3.1.17.

3.1.226

hornblendite

plutonic igneous rock composed almost completely of hornblende

3.1.227

hornfels

hard, compact contact-metamorphic rock of any grain size, dominantly composed of silicate + oxide minerals in varying proportions, with a horny aspect and a subconchoidal to jagged fracture.

Note: Traditionally hornfels carried qualifiers referring to the nature of the parent rock (e.g. basic hornfels, pelitic hornfels)

3.1.228

host

a) mineral containing an inclusion

b) rock body containing other small bodies

3.1.229

hydrothermal

adjective applied to processes, formations, and products, usually of magmatic origin, made by hot water or steam

3.1.230

hypidioblastic fabric

mineral constituent of a metamorphic rock which is bounded only in part by its own crystal faces

3.1.231

Hypidiomorphic

subhedral

mineral grain in an igneous rock which is bounded by only some of its crystal faces

3.1.232

idioblastic

mineral constituent of a metamorphic rock which is wholly bounded by its own crystal faces

3.1.233

igneous rock

rock formed by solidification from molten material (magma)

3.1.234

ignimbrite

pyroclastic volcanic rock either welded on deposition or subsequently lithified

3.1.235

illite

clay mineral of the phyllosilicate group

3.1.236

impactite

shock-metamorphosed rock, including breccias, finely crystalline or glassy material produced by a meteorite impact, e.g. suevite

3.1.237

inclusion

small crystal, fragment, gas, or liquid filled void within a larger crystal

3.1.238

intergranular fabric

typical of basalts, it consists of relatively equidimensional clinopyroxene and magnetite grains set amongst a framework of elongate feldspar microphenocrysts

3.1.239

Intergrowth

re-crystallization

term applied to the interlocking of different crystals due to simultaneous crystallisation

3.1.240

intermediate rock

rock with < 10 % vol. quartz plus either plagioclase in the range An_{10-50}, or an alkali feldspar or both alkali and plagioclase feldspars

3.1.241

intersertal fabric

fabric in volcanic rocks, where the spaces between a framework of elongate feldspar microphenocrysts are filled with glass (or its alteration products)

3.1.242

intraclast

fragment of typically weakly consolidated sediment reworked from within the area of deposition

3.1.243

intrusive rock

medium- to coarse-grained igneous rocks deriving from solidification of magma emplaced within a host rock

3.1.244

ironstone

clayey or compact rock consisting largely of iron minerals

3.1.245

jasper

granular, microcrystalline variety of quartz, usually coloured red by hematite

3.1.246

Jurassic

system of Mesozoic

Note: See Table 1.

3.1.247

K-feldspar

potassium feldspar

Note: See microcline, orthoclase, and sanidine.

3.1.248

kaolinite

common clay mineral formed by the weathering or hydrothermal alteration of feldspars and other aluminous silicate minerals, with general formula $Al_2(Si_2O_5)(OH)_4$

3.1.249

karst

landscape and structures developed in limestone, gypsum, and other soluble rocks by the effects of solution weathering

3.1.250

kelyphitic rims

corona structure composed of microcrystalline aggregates of fibrous pyroxene or amphibole developed around olivine or garnet

3.1.251

kyanite

disthene

mineral, polymorphous with andalusite and sillimanite, the formula of which is Al_2SiO_5

3.1.252

Labradorescence

schiller

optical phenomenon consisting of flashes or iridescence visible when the mineral or rock is moved in the light, as seen in some Ca-rich plagioclases

Note: See feldspar, plagioclase.

3.1.253

laccolith

concordant, flat-floored, dome like intrusion which arches the overlying host rocks

3.1.254

lamprophyre

dark igneous dyke rock characterised by abundant mafic phenocrysts, most commonly biotite, hornblende or augite

3.1.255

lapilli

pyroclast of any shape with a mean diameter between 2 and 64 mm

Note: See 4.2.1.6.

3.1.256

larvikite

augite syenite or monzonite characterised by the distinctive blue labradorescence of its rhomb shaped feldspars

3.1.257

latite

volanic rock with roughly equal proportions of plagioclase and alkali feldspar

Note: See Figure 6.

3.1.258

lava

magma which is extruded from a volcano or fissure in the earth's surface; also the volcanic rock that is solidified from it

3.1.259

layer

bed or stratum of rock

3.1.260

lepidoblastic fabric

textural term applied to the parallel alignment of sheet silicate minerals, such as micas and chlorites in metamorphic rocks

3.1.261

leptite

obsolete term for fine-grained, equigranular often banded rock of granitic composition, often resulting from metamorphism of a volcanic rock or by thermal metamorphism of other rocks; e.g. hälleflinta

3.1.262

leucite

feldspathoid mineral, $KAlSi_2O_6$, occurring in potassium rich volcanic rocks

3.1.263

leuco

prefix meaning white, weakly coloured, or colourless

3.1.264

leucocratic

igneous rock whose colour index (M') ranges from 10 to 35, where M' is M (mafic minerals) minus any muscovite, apatite and primary carbonates (i.e. colourless minerals in plane-polarized transmitted microscopy)

3.1.265

lherzolite

phaneritic rock similar to peridotite which contains 40-90 % vol. olivine, >5 % vol. orthopyroxene and >5 % vol. clinopyroxene with accessory plagioclase, spinel ± garnet, which yields basaltic magma on partial melting, so is taken as a model for the composition of the upper mantle, which occurs in some ophiolites and as xenoliths in alkali basalts, lamproites and kimberlites

3.1.266

light mineral

rock forming minerals with a density less than 2,9 g/cm^3, e.g. quartz, feldspar

3.1.267

limestone

sedimentary rock consisting chiefly of calcite, $CaCO_3$

Note : See 4.2.2.8 and 4.2.2.9.

3.1.268

limonite

hydrated iron oxide $FeO{\cdot}OH{\cdot}nH_2O$

3.1.269

lineation

general descriptive term for any kind of linear (one dimensional) feature in the fabric of a rock

3.1.270

lithic tuff

pyroclastic tuff composed predominantly of rock fragments

Note: See 4.2.1.5.

3.1.271

lithic

term applied to rock fragments

3.1.272

lithification

conversion of an incoherent sediment into a rock

3.1.273

lithographic limestone

extremely fine grained micritic limestone

3.1.274

lithographic structure

term used to describe grain size in calcareous sedimentary rocks, where it is homogeneous and very fine (clay size)

3.1.275

lithology

general character of a rock unit, particularly as seen in field-exposures and hand specimens; i.e., its mineral composition, fabric, primary structures, and the smaller-scale secondary structures

3.1.276

lithostratigraphy

stratigraphy based on the petrological characteristics of the rocks

3.1.277

lithotype

rock defined on the basis of certain selected petrological characteristics

3.1.278

llandovery

oldest epoch of the Silurian

Note: See Table 1.

3.1.279

longrain

preferred direction of cut in slates and other rocks

3.1.280

Lopingian

youngest epoch of the Permian

Note: See Table 1.

3.1.281

Ludlow

epoch of the Silurian

Note: See Table 1.

3.1.282

lumachella

limestone consisting of fossil mollusc shells like bivalves

3.1.283

macrostructure

structural feature of a rock which can be seen without magnification

3.1.284

mafic

term referring to ferromagnesian silicate minerals and rocks composed largely of these minerals

Note: See dark mineral.

3.1.285

magma

molten or partially molten rock material, from which igneous rocks are derived through solidification

3.1.286

magnesian limestone

dolomitic limestone

carbonate rock with 10 to 49 % vol. of the mineral dolomite

Note: See 4.2.2.11.

3.1.287

magnesite

carbonate mineral, source of magnesia, formula $MgCO_3$

3.1.288

magnetite

strongly magnetic mineral, formula $(Fe,Mg)Fe_2O_4$

3.1.289

main minerals

rock-forming minerals that occur in sufficient amount to be used in the classification of the rock

3.1.290

marble

metamorphic rock containing more than 50 % vol. of carbonates (calcite and/or aragonite and/ or dolomite) formed by metamorphic recrystallization of a carbonate rock

Note 1 to entry: Impure marbles contain between 50 and 95 % vol. carbonates, pure marbles contain > 95 % vol. carbonates.

Note 2 to entry: Commercially compact and polishable natural stone, used in decoration and building, mainly consisting of minerals with hardness between 3 and 4 on the Mohs scale (such as calcite, dolomite or serpentine), e.g. marbles as per the scientific definition and cipollino marbles, as well as the following natural stones, provided that they are capable of taking a mirror polish: limestone marbles, limestones, dolomites, calcareous breccias, travertines and serpentinites (see Mohs scale).

3.1.291

marl

sedimentary rock which is a mixture of calcite and clay (35-65 % vol. vol clay), with very occasionally dolomite

3.1.292

massive

of homogenous structure, without stratification, foliation, flow banding, schistosity, and the like, said of some rocks e.g. granites and limestones from reefs

3.1.293

matrix

finer-grained material between the larger grains or particles of a sediment or sedimentary rock

3.1.294

mela-

prefix attached to an igneous rock name signifying that it is of darker colour than usual

3.1.295

mesocataclasite

cataclasite where the finer-grained matrix forms more than 50 % vol. and less than 90 % vol. of the rock volume

Note: As cataclasite is the general term, to be consistent it is necessary to have a prefix for the more specific term intermediate between proto- and ultracataclasite.

3.1.296

mesomylonite

mylonite where more than 50 % vol. and less than 90 % vol. of the rock volume has undergone grain size reduction

Note: As mylonite is the general term, to be consistent it is necessary to have a prefix for the more specific term intermediate between proto- and ultramylonite.

3.1.297

Mesozoic

era comprising the Triassic, Jurassic and Cretaceous

Note: See Table 1.

3.1.298

meta-

prefix indicating that the parent rock has undergone a low grade metamorphic process (e.g. metasediments, metavolcanics)

3.1.299

metamorphic grade

relative condition of metamorphism; specifically refers to temperature and is expressed by variations in mineral assemblage, divided in very low, low, medium, high and very high grade of metamorphism

3.1.300

metamorphic rock

rock that has undergone metamorphism

Note: See 4.2.3.

3.1.301

metamorphism

process dominantly in the solid state, pressure and temperature driven, by which rocks are changed in their mineralogical content / composition, structure, and texture. Diagenesis is usually not considered as metamorphism

3.1.302

metasomatism

open-system process by which the chemical composition of a rock or rock portion is changed in a pervasive manner and which involves the introduction or removal of substances, moving in a fluid medium

3.1.303

miarolitic

fabric applied to small cavities in igneous rocks, especially common in granites, possibly filled by secondary minerals

3.1.304

mica

mineral group consisting of silicates characterized by very perfect basal cleavage, the general formula of the group is $(K,Na,Ca)(Mg,Fe,Li,Al)_{2-3}(Al,Si)_4O_{10}(OH,F)_2$ (see biotite, muscovite)

3.1.305

micacite

term for fissile rock, rich in phyllosilicates

3.1.306

micrite

fine grained crystalline matrix of limestones

3.1.307

micritic

microcrystalline calcite

very fine-grained (<4 µm) carbonate making up the matrix in limestones

3.1.308

microcline

member of the feldspar group, composition $KAlSi_3O_8$

Note: See feldspar.

3.1.309

microcrack

crack observable only under the microscope

3.1.310

microcrystalline

microgranular

applied to a rock whose crystals can only be seen under the microscope

3.1.311

microfabric

type of texture consisting of preferred orientation on the microscopic scale

3.1.312

migmatite

composite silicate metamorphic rock, pervasively heterogeneous on a meso- to megascopic scale, consisting of darker parts usually exhibiting features of metamorphic rocks, and lighter parts being of igneous appearance

3.1.313

mineral replacement

process of practically simultaneous disintegration and deposition by which a new mineral of partly or wholly differing chemical composition may grow in the body of an old mineral or mineral aggregate

3.1.314

mineral

homogeneous naturally occurring solid phase with a defined chemical composition and a highly ordered atomic composition

3.1.315

minor elements

components with concentrations less than 0,5 weight %.

3.1.316

Miocene

epoch of Neogene

Note: See Table 1.

3.1.317

Mississippian

oldest series of the Carboniferous

Note: See Table 1.

3.1.318

modal composition

mode

volumetric proportions, usually expressed on a percentage basis, of the minerals constituting rock, determined by polarizing microscope

3.1.319

Mohs scale

hardness scale

empirical scale developed by Mohs in which the relative hardness of a mineral is assessed, of which 1 is Talc; 2 is Gypsum; 3 is Calcite; 4 is Fluorite; 5 is Apatite; 6 is Orthoclase; 7 is Quartz; 8 is Topaz; 9 is Corundum; 10 is Diamond

3.1.320

monzonite

plutonic rock containing almost equal amounts of plagioclase and alkali feldspar with minor amphibole and / or pyroxene

Note: See 4.2.1.2.

3.1.321

mosaic fabric

texture of anhedral grains, whose grain boundaries developed by mutual interference during crystallization or recrystallization

3.1.322

mudstone

sedimentary rock of mud grade

3.1.323

mugearite

intermediate sodic basaltic trachyandesite

3.1.324

muscovite

member of the mica group, usually white, general formula $KAl_2(AlSi_3)O_{10}(OH,F)_2$

3.1.325

mylonite

fault rock which is cohesive and characterized by a well-developed schistosity resulting from tectonic reduction of grain size, and commonly containing rounded porphyroclasts and lithic fragments of similar composition to minerals in the matrix

Note1 to entry: Fine scale layering and an associated mineral or stretching lineation are commonly present. Brittle deformation of some minerals may be present, but deformation is commonly by crystal plasticity. Mylonites may be subdivided according to the relative proportion of finer-grained matrix into protomylonite, mesomylonite and ultramylonite.

Note 2 to entry: In the field it is often not possible to distinguish a foliated fault rock formed by brittle deformation (foliated cataclasite) from one formed by crystal plastic or grain boundary sliding processes, or a combination of different deformation mechanisms. Hence these are all defined in the field by the term mylonite.

3.1.326

myrmekitic fabric

microscopic intergrowth of vermicular (rod-like) quartz in plagioclase

3.1.327

Namurian

Carboniferous stage

Note: See Table 1.

3.1.328

natural stone

piece of naturally occurring rock

3.1.329

nematoblastic fabric

fabric of a recrystallized rock in which the shape of the grains is threadlike

3.1.330

Neogene

younger period of the Tertiary

Note: See Table 1.

3.1.331

nepheline syenite

plutonic rock, variety of foid syenite, in which nepheline is the most abundant foid

Note: See 4.2.1.2

3.1.332

nepheline

silicate mineral of the feldspathoids group, formula $(Na,K)AlSiO_4$

3.1.333

nephelinite

presently used to define modally a variety of foidite. If mode is not available, chemically as a rock with normative Ne>20 % vol.

Note: See foidite and 4.2.1.5.

3.1.334

nodule

small more or less rounded body within a host sediment or igneous rock (e.g. flint nodule, peridotite nodule)

3.1.335

norite

plutonic rock composed mainly of Ca-plagioclase and orthopyroxene

Note: See 4.2.1.3.

3.1.336

normative composition

assemblage of hypothetical water-free, standard normative minerals calculated from the chemical composition of a rock according to a prescribed sequence of rules (e.g. CIPW Norm)

3.1.337

nummulite limestone

formation made up chiefly of fossil shells of certain foraminifers (nummulites)

3.1.338

obsidian

dark rhyolitic volcanic glass

Note 1 to entry: See rhyolite.

3.1.339

ocellar

post-kinematic poikiloblastic growth of mineral phases or subspherical eye-shaped bodies in igneous rocks, that have been interpreted variously as vesicle infillings or immiscible magma globules

3.1.340

Oligocene

youngest epoch of Paleogene

Note 1 to entry: **See Table 1.**

3.1.341

olivine

silicate mineral with composition between forsterite, Mg_2SiO_4, and fayalite, Fe_2SiO_4

3.1.342

oncoid

type of carbonate coated grain coated by microbial mats in which the laminae are irregular in thickness, relief and continuity

3.1.343

onyx

variety of chalcedony consisting of alternating layers

Note 1 to entry: See chalcedony.

3.1.344

ooid

oolith

spherical to ellipsoidal body with concentric or radial structure or both, with or without a nucleus and usually calcareous, but also siliceous, hematitic, or other composition

3.1.345

opal

natural hydrous silica generically defined $SiO_2 \cdot nH_2O$

3.1.346

opaque minerals

minerals that are impervious to visible light, observed in thin section

3.1.347

ophicarbonate rock

ophicalcite

ophidolomite

ophimagnesite

rock consisting of serpentinite and carbonate; the serpentinite being commonly fragmented or brecciated, and veined and/or impregnated by the carbonate material; carbonatation of serpentine

being possible

3.1.349

ophiolite

sequence of oceanic crust including, from bottom to top, peridotite, gabbro, basaltic sheeted dikes and

pillow lavas, and marine sedimentary rocks; and also the metamorphic rocks derived from them

3.1.349

ophitic fabric

common texture in gabbroic and doleritic rocks in which euhedral plagioclase is enclosed poikilitically

in larger crystals of pyroxene

3.1.350

orbicular fabric

spheroidal fabric

ovoid bodies in an igneous rock, composed of concentric layers of radiating or tangentially arranged crystals

3.1.351

Ordovician

second of the periods comprised in the Paleozoic era

Note 1 to entry: See Table 1.

3.1.352

orthoclase

member of the feldspar group, composition $KAlSi_3O_8$

Note 1 to entry: See alkali feldspar and feldspar.

3.1.353

orthogneiss

gneiss derived from a granitic/acidic rock

3.1.354

orthopyroxene

pyroxenes crystallizing in the orthorhombic system, and usually calcium-poor

3.1.355

overgrowth

secondary material deposited in continuity with a crystal grain, common in sedimentary or metamorphic rocks

3.1.356

packstone

grain-supported, clastic limestone containing some lime mud

3.1.357

Paleocene

oldest epoch of Paleogene

Note 1 to entry: See Table 1.

3.1.358

Paleogene

older period of the Cenozoic

Note 1 to entry: See Table 1.

3.1.359

Paleozoic

first era in the earth's history with abundant fossil remains following the Precambrian time with very rare traces of fossils

Note 1 to entry: See Table 1.

3.1.360

paragneiss

gneiss derived from a sedimentary rock

Note 1 to entry: See gneiss.

3.1.361

paraschist

schist derived from a sedimentary rock

Note 1 to entry: See schist.

3.1.362

parting

tendency of crystals to separate along planes other than cleavage planes

3.1.363

pebbles

smooth rounded stones ranging in diameter from 4 mm to 63 mm

3.1.364

pegmatite

coarse grained facies of any type of igneous rock

3.1.365

pelite

aluminium-rich rock formed by the metamorphism of clay-rich sediments

3.1.366

Pellet

fecal ball.

Small aggregate rich in organic materials of largely fecal origin without any visible internal structures

3.1.367

peloid

sand-size grain of carbonate mud

3.1.368

pencil cleavage

property of splitting into large rod like fragments, seen in some foliated metamorphic rocks, due to the intersection of two cleavage sets

3.1.369

Pennsylvanian

youngest series of the Carboniferous

Note 1 to entry: See Table 1.

3.1.370

peridotite

collective name for ultramafic rocks consisting essentially of olivine (>40 % vol.) and pyroxene

Note 1 to entry: See 4.2.1.4.

3.1.371

period

second order geological time unit

Note 1 to entry: See Table 2.

3.1.372

Permian

last period of the Paleozoic era

Note 1 to entry: See Table 1.

3.1.373

perthite

intergrowth with K-rich alkali feldspar host and subsidiary lamellae of Na-rich plagioclase

3.1.374

petrography

description and classification of rocks by analysis of origin, fabric and mineral content, e.g. with polarizing microscope, X-ray diffraction, chemical analysis or other means

3.1.375

petrological family

petrological group

scientific name of the rock obtained by petrographic examination

Note 1 to entry: See specifically Annex A of this standard.

3.1.376

phaneritic

texture of igneous rocks in which all the crystals of the essential minerals are visible to the naked eye, in contrast with aphanitic, microcrystalline, and cryptocrystalline textures

3.1.377

Phanerozoic

current eon, post-Precambrian time

Note 1 to entry: See Table 1.

3.1.379

phenocrysts

relatively large crystals set in a finer matrix in igneous rocks and clearly visible to the naked eye

3.1.379

phlogopite

mineral of the mica group, formula $K(Mg,Fe)_3AlSi3O_{10}(OH)_2$

3.1.380

phonolite

volcanic rock consisting essentially of alkali feldspar and any foid

Note 1 to entry: See 4.2.1.5.

3.1.381

phyllite

schist mainly consisting of glittering layers of micas, chlorite, quartz, and other minor minerals

3.1.382

phyllonite

phyllosilicate-rich mylonite which has the lustrous sheen of a phyllite

3.1.383

picrite

mg-rich basalt, usually expressed by a large amount of olivine

3.1.384

plagioclase

minerals with composition between $NaAlSi_3O_8$ (Albite = Ab) and $CaAl2Si_2O_8$ (Anorthite = An); the series of which being commonly designated in terms of the mole fraction of the anorthite component (An) as follows: albite (An 0 % vol. to 10 % vol.), oligoclase (An 10 % vol. to 30 % vol.), andesine (An 30 % vol. to 50 % vol.), labradorite (An 50 % vol. to 70 % vol.), bytownite (An 70 % vol. to 90 % vol.), anorthite

(An 90 % vol. to 100 % vol.) (see feldspar)

3.1.385

Pleistocene

older of the two epochs comprising the quaternary period

Note 1 to entry: See Table 1.

3.1.386

pleochroism

anisotropy of light absorption in crystals, e.g. shown by biotite in polarizing microscope (brown: cleavage parallel colourless: cleavage vertical to vibration direction of light)

3.1.387

Pliocene

epoch of the Neogene

Note 1 to entry: See Table 1.

3.1.388

plutonic rock

igneous rock that has formed beneath the surface by consolidation from magma, and being usually coarse grained

Note 1 to entry: But not all coarse – grained rocks are plutonic.

3.1.389

pneumatolysis

alteration of rocks by gases and vapours from igneous rocks in a late stage of intrusion

3.1.390

poikilitic

inclusion of pre-existing mineral grains in one relatively large crystal in igneous rocks

3.1.391

poikiloblastic

inclusion of pre-existing mineral grains in one relatively large crystal in metamorphic rocks

3.1.392

polycrystalline

assemblage of crystal grains that together form a solid body

3.1.393

polygonal fabric

mosaic

fabric of granoblastic metamorphic rocks in which the general shape of the crystals are interlocking with moderately straight boundaries tending to meet in triple point

3.1.394

polymorphic minerals

polymorphous minerals

series of minerals with same chemical composition but different lattice structures, e.g. andalusite- kyanite-sillimanite series

3.1.395

porcellanite

archaeological term for a rock formed by the thermal metamorphism of a soil horizon in basalt

3.1.396

porphyritic fabric

igneous rock containing phenocrysts set in a fine-grained to aphanitic groundmass

3.1.397

porphyroblastic fabric

fabric characterized by large crystals formed during metamorphic crystallization

3.1.398

porphyroclasts

relict crystals surrounded by finer grains in a dynamically metamorphosed rock

3.1.399

Precambrian

time before the Cambrian, including the Proterozoic, the Archean and the Hadean

Note 1 to entry: See Table 1.

3.1.400

preferred orientation

rock in which the grains are more or less systematically oriented by growth, deposition, or deformation

3.1.401

Pridoli

youngest epoch of the Silurian

Note 1 to entry: See Table 1.

3.1.402

primary minerals

those minerals that crystallized or were deposited in the original rock forming process

3.1.403

Proterozoic

younger Eon of the Precambrian, 2,500 – 541 Ma., divided into three eras: Neo-Proterozoic, Meso-Proterozoic and Paleo- Proterozoic

Note 1 to entry: See Table 1.

3.1.404

protocataclasite

cataclasite where the finer-grained matrix, forms less than 50 % vol. of the rock volume

3.1.405

protomylonite

mylonite where less than 50 % vol. of the rock volume has undergone grain size reduction

3.1.406

psammite

sand or sandstone with grain diameters mainly between 0,0625 mm and 2 mm

Note 1 to entry: See arenite.

3.1.407

psephite

coarse grained fragmental rock composed of rounded pebbles with diameters mainly greater than 2 mm

Note 1 to entry: See rudite

3.1.408

pseudomorph

mineral, mineral intergrowth, or aggregate of grains resulting from replacement of a single pre-existing crystal, the shape of which is preserved

3.1.409

pseudotachylite

ultrafine-grained vitreous-looking material, usually black and flinty in appearance, occurring as thin planar veins, injection veins or as a matrix to pseudo conglomerates or breccias, which infills dilation fractures in the host rock

3.1.410

pumice

highly vesicular volcanic pyroclastic rock usually pale-coloured and rhyolitic

Note 1 to entry: See 4.2.1.6.

3.1.411

pyrite

mineral with formula FeS_2, dimorphous with marcasite

Note 1 to entry: If finely distributed in a rock unstable against weathering

3.1.412

pyroclastic rock

rock produced as the result of explosive volcanic eruption, made of >75 % vol. fragmental volcanic materials

Note 1 to entry: See 4.2.1.6.

3.1.413

pyrophyllite

silicate mineral, the formula of which is $AlSi_2O_5(OH)$

3.1.414

pyroxene

mineral family of silicates of the general formula $R_2Si_2O_6$ with R = Mg,Fe,Ca,Na,Al, and other elements

3.1.415

pyroxenite

collective term for ultramafic plutonic rock consisting mainly of pyroxenes, less than 40 % vol. olivine,

and other minerals

Note 1 to entry: See 4.2.1.4.

3.1.416

pyrrhotite

mineral with formula $Fe_{1-x}S$, unstable to the weathering like many other fine grained sulphides

3.1.417

quartz diorite

plutonic rock with plagioclase, quartz, and other mafic minerals

Note 1 to entry: See 4.2.1.2.

3.1.418

quartz porphyry

aphanitic rock of rhyolite composition containing phenocrysts of quartz and orthoclase in a glassy groundmass

3.1.419

quartz

very common mineral of the formula SiO_2

3.1.420

quartzarenite

sandstone cemented by silica or other silicates (feldspars, micas, clay minerals) which has grown around siliceous grains

Note 1 to entry: See 4.2.2.3 and 4.2.2.5

3.1.421

quartzite

metamorphic rock consisting essentially of quartz

Note 1 to entry: See 4.2.3.

Note 2 to entry: Commercially a quartzite is a natural stone as per the scientific definition of quartzite and quartzarenite.

3.1.422

Quaternary

younger of the two geological systems in the Cenozoic era

Note 1 to entry: See Table 1.

3.1.423

radiate intergrowth fabric

variety of skeletal fabric of igneous rocks with a skeletal intergrowth of two minerals where one of these is filling the gaps of the other in radiate manner

3.1.424

radiolarite

chert containing abundant radiolarian

3.1.425

rapakivi granite

granite with large rounded potassic feldspars mantled with sodic plagioclase

3.1.426

recrystallization

formation of new mineral grains in a rock or in its constituents

3.1.427

relic fabric

preservation of any original fabric when one or more minerals are replaced or recrystallized

3.1.428

relief

measure of the relative difference in refringence between a mineral grain and its surroundings in Petrography

3.1.429

rhyolite

silicic volcanic rock consisting of phenocrysts of quartz and alkali feldspar, often with minor plagioclase and biotite in a microcrystalline or glassy groundmass; rhyolite is sometimes completely glassy

Note 1 to entry: See obsidian and 4.2.1.5.

3.1.430

rock-forming minerals

50 to 100 principal silicates, oxides, carbonates and phosphates occurring in rocks, e.g. feldspar, quartz, pyroxene, amphibole, mica, calcite, dolomite, and clay minerals

3.1.431

rudaceous

with the appearance of a rudite

3.1.432

rudite

fragmental sedimentary rocks composed of fragments coarser than sand grains (>2 mm)

Note 1 to entry: See psephite.

3.1.433

rutile

mineral, formula TiO_2

3.1.434

saccharoidal fabric

granular or crystalline fabric resembling that of loaf sugar

3.1.435

sand

sediment of size range 0,0625 mm to 2 mm

3.1.436

sandstone

terrigeneous detritic sedimentary rock composed of grains of quartz, feldspar, mica, and lithic fragments from older rocks, and whose size ranges from 1/16 mm to 2 mm

Note 1 to entry: See 4.2.2.5.

Note 2 to entry: Commercially, a sandstone is a natural stone as per the scientific definition of sandstone and with silicates, calcite, clay minerals or iron oxides as cement.

3.1.437

sanidine

potassium feldspar in volcanic rocks

3.1.438

saussurite

commonly greenish mineral aggregate, produced in part by the alteration of feldspar, consisting chiefly of epidote and zoisite

3.1.439

scapolite

group of minerals, with general formula $(Na,Ca)_4(Al_3Si9O_{24})Cl$

3.1.440

schist

foliated metamorphic rock composed of nearly parallel arranged mica, chlorite, quartz, and other typical minerals

Note 1 to entry: See foliation, schistosity, calc-schist and 4.2.3.

Note 2 to entry: Commercially, a schist is a natural stone possessing a well-developed fissility that allows an easy split, i.e. some gneiss and phyllites, some limestones, quartzites, and fine grained pyroclastic rocks

3.1.441

schistosity

foliation or lineation in thoroughly crystallized and/or recrystallized metamorphic rock

3.1.442

schlieren

mineral concentrations (usually as streaks or layers) of cryptic origin in plutonic rocks, particularly granitoids

3.1.443

secondary minerals

minerals formed as a consequence of the alteration of pre-existing minerals

3.1.444

sedimentary rocks

rocks formed by the accumulation and diagenesis of sediment underwater or in subaerial environmen

Note 1 to entry: See 4.2.2.

3.1.445

seriate fabric

fabric in which the grain size of a mineral continuously decreases

3.1.446

sericite

fine grained variety of muscovite

Note 1 to entry: See muscovite.

3.1.447

series

third order chronostratigraphic unit

Note 1 to entry: See Table 2.

3.1.448

serpentine

mineral of the chemical formula $Mg_6Si_4O_{10}(OH)_8$, including the main varieties lizardite, antigorite and chrysotile

3.1.449

serpentinite

metamorphic rock consisting almost wholly of serpentine and relics of primary minerals

Note 1 to entry: See green marble.

3.1.450

shale

sedimentary rocks including the indurated, laminated, or fissile claystones and siltstones with cleavage parallel to bedding, consisting of phyllosilicate and quartz

3.1.451

shonkinite

coarse grained rock with abundant augite, some olivine, biotite or hornblende, and essential alkali feldspar and foids, usually nepheline

3.1.452

shoshonite

potassic, basaltic trachyandesite

3.1.453

siderite

carbonate mineral, $FeCO_3$

3.1.454

silica minerals

group of minerals with the formula SiO_2 of which Quartz is the most common

Note 1 to entry: Other varieties and polymorphs include agate, chalcedony, chert, coesite, cristobalite, flint, jasper, onyx, opal, stishovite and tridymite.

3.1.455

silicate

compound whose crystal lattice contains SiO_4 tetrahedra, either isolated or joined through one or more of the oxygen atoms to form groups, chains, sheets, or three dimensional structures

3.1.456

siliciclastic

clastic rock descriptor indicating a rock whose clasts are predominantly of silicate minerals

3.1.457

silicification

introduction of, or replacement by, silica, including all varieties of such processes, whether late magmatic, hydrothermal or diagenetic

3.1.458

sill

tabular igneous intrusion which has been emplaced parallel to the bedding or schistosity of the host rocks

3.1.459

sillimanite

mineral, Al_2SiO_5 polymorphous with kyanite and andalusite

3.1.460

silt

sediment of size range 0,0039 mm to 0,0625 mm

3.1.461

siltstone

fine grained consolidated sedimentary rock composed predominantly of particles of silt size

3.1.462

Silurian

geologic system between Ordovician and Devonian

Note 1 to entry: See Table 1.

3.1.463

sinter

porous, low density, light coloured siliceous rock deposited by waters of hot springs and geysers. e.g. siliceous sinter, consisting of silica; calcareous sinter, consisting of calcium carbonate, is also called tufa, travertine, and onyx marble

3.1.464

skeletal fabric

fabric of igneous rocks showing skeletal or dendritic crystallized minerals

3.1.465

slate

fine grained very low to low grade metamorphic rock possessing a well-developed fissility parallel to the planes of slaty cleavage

3.1.466

Soapstone

steatite

metamorphic rock composed 30 % vol. -70 % vol. talc., of which the carbonate content, if present, is up to 70 % vol., and of which any other single mineral species (chlorite, serpentine, olivine, amphibole, pyroxene etc.) is less than 50 % vol.

Note 1 to entry: Commercially, rocks consisting 30 % vol. –70 % vol. talc, carbonate, chlorite and serpentine. They have a soapy feel and are soft enough to be carved with a knife.

3.1.467

sodalite

feldspathoid mineral, $Na_8(AlSiO_4)_6Cl_2$

3.1.468

sparite

coarse grained (0,02-1 mm) calcite cement, major constituent of limestone

Note 1 to entry: See 4.2.2.9.

3.1.469

sparry-limestone

limestone with sparite cement

3.1.470

spheroidal structure

orbicular structure

ovoid body in an igneous rock composed of concentric layers of radiating or tangentially arranged crystals

Note 1 to entry: See orbicular fabric and 3.1.350.

3.1.471

spherulite

clusters of radiating crystals (usually feldspars, and possibly silica) formed by the radial growth of acicular crystals from a common centre or inclusion in volcanic rocks, especially rhyolite

3.1.472

spherulitic

radial fabric of minerals in rocks showing spherulites

3.1.473

spiculite

sediment or sedimentary rock composed of sponge spicules

3.1.474

spilite

low grade hydrothermally metamorphosed and metasomatized basaltic rock with albitized plagioclase set in a chlorite /Ca-silicate rich matrix

3.1.475

spotted slate

slate in which metamorphism has caused the growth of larger crystals in the fine-grained matrix

3.1.476

stage

fourth order chronostratigraphic unit

Note 1 to entry: See Table 2.

3.1.477

staurolite

silicate mineral, the formula of which is $(Fe,Mg)_2Al_9Si_4O_{23}(OH)$

3.1.478

Stephanian

carboniferous stage in North-West of Europe

Note 1 to entry: See Table 1.

3.1.479

stratification

texture produced by deposition of sediments in beds or layers (strata), laminae, lenses, wedges, and other units

3.1.480

structure

arrangement of the parts of a rock mass irrespective of scale, including spatial relationships between the parts, their relative size and shape and the internal features of the parts, hence microstrucure (at the microscopic scale), mesostructure (at the hand-specimen or outcrop scale), megastructure (at the regional or mappable scale)

3.1.481

stylolite

surface of interpenetrating or sutured contact originated in grain – to – grain pressure solution during diagenesis

3.1.482

syenite

plutonic rock consisting mainly of alkali feldspar, with subordinate sodic plagioclase, biotite, pyroxene, amphibole and occasionally fayalite; very minor amount of quartz or foid can be present

Note 1 to entry: See 4.2.1.2.

3.1.483

symplectite

microscopic intergrowth formed by coupled growth during secondary reaction and replacement

3.1.484

system

second order chronostratigraphic unit

Note 1 to entry: See Table 2.

3.1.485

talc

silicate mineral, the formula of which $Mg_3Si_4O_{10}(OH)_2$

3.1.486

tectonic or fault breccia

medium to coarse-grained cataclasite containing >30 % vol. visible fragments

3.1.487

tectonic

resulting from forces during the deformation of the earth's crust the rocks show features like cracks, faults, folds, flexures, striations, and brecciation

3.1.488

tectonite

rock whose minute structure has been produced by tectonic movement of its parts

3.1.489

tephrite

olivine-poor (<10% vol.) volcanic, alkaline volcanic rock comprising plagioclase, clinopyroxene and feldspathoids.

Note 1 to entry: The presence of olivine causes gradation into a basanite, and of alkali feldspar into a phonolite. Occurs in oceanic islands and continental setting

3.1.490

Terreneuvian

oldest epoch of the Cambrian

Note 1 to entry: See Table 1.

3.1.491

Tertiary

oldest geologic period/system comprised in the Cenozoic era

Note 1 to entry: See Table 1.

3.1.492

texture

term either defining the relative size, shape and spatial interrelationship between grains and internal

features of grains (i.e. microstructure), or denoting the presence of preferred orientation on the microscopic scale (i.e. microfabric)

3.1.493

thin section

embedded fragment of rock or mineral ground to a thickness of approximately 30 µm, polished, mounted on a glass as a microscopical slide and often covered with a thin glass

3.1.494

tholeiitic basalt

basalt containing plagioclase, augite, and orthopyroxene

3.1.495

titanite

sphene

silicate mineral, $CaTiSiO_5$

3.1.496

tonalite

plutonic rock consisting essentially of quartz, intermediate plagioclase, usually with biotite and amphibole

Note 1 to entry: See 4.2.1.2.

3.1.497

topaz

mineral, the formula of which is $Al_2SiO_4F_2$

3.1.498

tourmaline

complex silicate found in granite pegmatite and as an accessory mineral in igneous and metamorphic rocks, general formula $(Na,Ca)(Fe,Al,Li)_3Al_6(BO_3)3Si_6O_{18}(OH)_4$

3.1.499

trachyandesite

volcanic rock intermediate in composition between andesite and trachyte

3.1.500

trachybasalt

volcanic rock intermediate in composition between basalt and trachyte

3.1.501

trachydacite

volcanic rock with a lower Na_2O+K_2O content than trachyte and with no plagioclase phenocrysts

3.1.502

trachyte

volcanic rock consisting essentially of alkali feldspar

Note 1 to entry: See 4.2.1.5

Note 2 to entry: Commercially, a trachyte is a natural stone as per the scientific definition of trachyte and other rocks such as latites, quartz-trachytes, quartz-latites and trachyte tuffs.

3.1.503

travertine

fine-grained freshwater limestone formed by rapid precipitation of $CaCO_3$ from water

3.1.504

onyx marble

compact, banded variety of travertine, consisting of coloured and transparent layers of calcite and/or aragonite, and capable of taking a polish

3.1.505

tremolite

mineral of the calcic amphibole group, formula $Ca_2Mg_5Si_8O_{22}(OH)_2$

3.1.506

Triassic

oldest of the three geologic systems comprised in the Mesozoic era

Note 1 to entry: See Table 1.

3.1.507

troctolite

gabbro with olivine and no pyroxene

3.1.508

trondhjemite

leuco-tonalite

leucocratic variety of tonalite (sodic plagioclase, quartz and minor biotite)

Note 1 to entry: See 4.2.1.2.

3.1.509

tufa

porous, spongy variety of freshwater carbonate encrustation on plant remains

3.1.510

tuff

lithified pyroclastic deposit made of ash grains (<2 mm diameter) exceeding 75 % vol.

Note 1 to entry: See 4.2.1.6.

3.1.511

tuffite

pyroclastic rock consisting of a mixture of pyroclasts and epiclasts

3.1.512

twin

twinned crystal

twin crystal

nonparallel intergrowth of two or more individuals of the same crystalline phase having additional symmetry elements

3.1.513

ultrabasic

igneous rock containing less than 45 weight % of SiO_2

3.1.514

ultracataclasite

cataclasite where the finer-grained matrix forms more than 90 % vol. of the rock volume

3.1.515

ultramafic

describes rock containing less than 10 % vol. felsic minerals

3.1.516

ultramylonite

mylonite where more than 90 % vol. of the rock volume has undergone grain size reduction, which doesn't need to be 'ultra' fine grained

3.1.517

unequigranular

rock containing crystals of variable grain size

3.1.518

uralitization

replacement of pyroxene (augite) by (fibrous) hornblende

3.1.519

urtite

foidolite with more than 70 % vol. nepheline

Note 1 to entry: See 4.2.1.2.

3.1.520

variolitic fabric

fabric of igneous rocks with pock-marked appearance composed of radial aggregates of feldspar and pyroxene microliths in a microcrystalline or devitrified glassy base

3.1.521

vein

mineral body, thin in relation to its other dimensions, which cuts the older country rock

3.1.522

vesicle

spherical, ellipsoidal or more irregular holes in volcanic or hypabyssal rocks, formed by the collection of volatiles exsolved from magma during cooling or extrusion

3.1.523

vesicular fabric

fabric of volcanic rocks where vesicles are present

3.1.524

vitreous glassy

mineral material that does not have crystalline structure

3.1.525

volcanic agglomerate

pyroclastic rock in which bombs or rounded fragments with diameters greater than 64 mm are > 75 % vol.

Note 1 to entry: See 4.2.1.6.

3.1.526

volcanic glass

congealed melt of high viscosity which failed to crystallize, but which is polymerized to some degree

3.1.527

volcanic rock

extrusive rock

igneous rock deriving from the solidification of molten material (magma) at the Earth's surface

3.1.528

vug

cavity in a rock sometimes lined or filled with either crystalline or amorphous minerals

3.1.529

wacke

sandstone with 15% vol. - 75% vol. mud matrix by volume

3.1.530

wackestone

limestone comprising matrix-supported carbonate particles in mud

3.1.531

wall rock

country rock immediately adjacent to a vein, dyke or larger intrusive body

3.1.532

websterite

pyroxenite consisting of clinopyroxene and orthopyroxene and < 5 % vol. olivine, which occurs within ultramafic intrusions and as ultramafic xenoliths in basalt

3.1.533

wehrlite

peridotite with clinopyroxene and >40 % vol. olivine and <5 % vol. orthopyroxene, which occurs within ultramafic intrusions and as ultramafic xenoliths in basalt

3.1.534

Wenlock

epoch of the Silurian

Note 1 to entry: See Table 1.

3.1.535

wollastonite

silicate mineral, the formula of which is $CaSiO_3$

3.1.536

xenoblastic mineral

mineral constituent of a metamorphic rock which has grown without the development of its characteristic crystal faces

3.1.537

xenocryst

crystals “foreign” and unrelated to the host igneous rock

Note 1 to entry: They may represent crystals or disaggregated xenoliths plucked off the margins of the magma chamber or plumbing system.

3.1.538

xenolith

rock fragments incorporated in an igneous rock, plucked off the margins of the magma chamber or plumbing system

3.1.539

zeolite

group of minerals, aluminium silicate hydrates, with one or more of Na, K, Ca, Sr, Ba, and other elements

3.1.540

zircon

mineral, $ZrSiO_4$

3.1.541

zoisite

mineral $Ca_2Al_3(SiO_4)_3(OH)$

3.1.542

zoning

concentric bands, sectors, patches patterns of variable chemical composition, formed within a mineral

3.2 Quarrying terms

3.2.1

air bag

quarrying device, consisting of a thin-walled metal or rubber bag, which can be inserted in the vertical cut made in the bench and pumped up with air or water, causing the block to turn over

3.2.2

bedding plane

quarrymen's term for nearly horizontal rock mass discontinuities along which a rock tends to split or break readily

3.2.3

bit

drill tipped with diamond or carborundum, used as tool in a drilling machine

3.2.4

black powder

deflagrating explosive made up of a mixture containing about 2/3 potassium nitrate and 1/3 of equal parts of vegetal carbon and sulphur

3.2.5

block squaring

operation by which raw blocks are brought to a regular shape and average dimensions

3.2.6

boulder

a) fragment of rock, usually large (more than 256 mm) and rounded in shape;

b) massive body in granitoid rocks, which has remained unweathered in the disintegrated outcropping portion of a deposit

3.2.7

bulk stone

big pieces or blocks removed (separated) from the rock mass in natural stone quarries, before any other work such as regular shape cut, or sawn can be done

3.2.8

channelling flame jet

jet burner

cutting device used for flame channelling. It consists of a kerosene-fuelled torch, capable of developing a

2 500 °C temperature whereby rock is broken out

3.2.9

clay hole

hole, from 5 mm to 25 mm of diameter, filled with clay, occasionally found in marble, limestone and sandstone blocks, resulting from karstic processes

3.2.10

clot

group of dark minerals in igneous rocks, ranging in size from a few centimetres to one meter or more, that may be a segregation or a xenolith

3.2.11

core

cylinder of stone obtained by drilling with drilling devices

3.2.12

crack

fissure in stone, visible to the naked eye

3.2.13

defective block

block showing evident (or presumed internal) defects of various kinds (structural, textural, chromatic etc.)

3.2.14

deposit

gross volume of mineral reserve with variable extension and configuration, and potentially exploitable for the production of natural stone

3.2.15

detonating fuse

fuse with a detonating explosive core (generally pentrite) widely used in quarries both to detonate charges of different kinds of explosive and actual charge for explosives as such

3.2.16

derrick

guy derrick

crane consisting of a boom fastened to a pivoting mast, capable of operating in a 360° radius

3.2.17

diamond bead

electroplated or sintered diamond-coated cylinder, which is the cutting agent of a diamond wire

3.2.18

diamond wire

cutting tool consisting of a multi-strand steel cable onto which diamond beads and other elements (spacers, pressers, joints, etc.) are threade

Note 1 to entry: It may be entirely metallic or have a plastic or rubber sheath.

3.2.19

diamond wire saw

cutting device consisting of an engine section travelling on tracks and driving the diamond wire

3.2.20

dynamic splitting

quarrying technique consisting of a controlled use of linear explosive charges, inserted in co-planar and parallel holes at suitable distances, and fired simultaneously

3.2.21

down hole hammer drill

rotary-percussion drilling machine in which the hammer is positioned inside the hole, thus guaranteeing the mass of the piston to be in direct contact with the drill tip

3.2.22

drill rod

piece of steel of varying length with a cutting edge at one end and used for track drills and drilling machines

3.2.23

drill sharpener

equipment with an abrasive grindwheel used to restore the correct cutting profile of the drills

3.2.24

expansive mortar

chemical product, used as a separation system together with discontinuous drilling. Mixed with water, it is capable to develop expansion forces that suffice to break up any rock

3.2.25

flame-jet

technology for quarrying rocks (especially granitic) using the action of a concentrated flame at high temperature (> 2 000 °C)

3.2.26

fault

fracture with displacement of the sides

3.2.27

flagstone

stone paving, consisting of cubic/parallelepipedal, roughly processed, elements, generally laid on a bed

of sand, typically used for roads and traffic areas, hard thin bedded sandstone splitting into thin slabs

Note 1 to entry: In some countries is also used for some metamorphic rocks splitting into thin slabs.

3.2.28

freestone

stone that can be shaped and dressed with equal ease in any direction without splitting

3.2.29

grain

easy way

particular surface of many rocks characterized by a less pronounced split ability and cleavability than

"cross-cut" but better than *"vein-cut"*

Note 1 to entry: It often occurs at right angle both to *"cross-cut"* and *"vein-cut"*. The easiest cleavage direction in a stone. "With the grain" is the same as "natural bed." Also, the composition and texture of particles, crystals, sand, or rock.

3.2.30

hairline fissure

pelo

cutter

leptoclase

micro-fissure in a stone material, barely perceptible to the naked eye, and often detectable by wetting the surface

3.2.31

horizontal cut

cut performed at the base of the bench itself when isolating a bench, which may deviate significantly from a precise horizontal plane

3.2.32

joint lithoclase

surface of actual or potential parting within a rock along which there has been practically no displacement

3.2.33

key-way

opening in the bench made at a right angle to the bench to enable further cutting operations

3.2.34

loop (cutting)

configuration used when cutting with diamond wire in which the volume of the rock to be separated is enclosed within a permanently tensioned diamond wire loop, which may be rising (diamond wire

machine in upper position), or descending (diamond wire machine in lower position)

3.2.35

open cast quarry

quarry where operations are performed from the surface

3.2.36

overburden

loose soil, sand, gravel or similar material above a deposit that is stripped off when opening a quarry

3.2.37

percussion drilling

execution of holes with disaggregation of the rock only by means of impact (hammering)

3.2.38

piston jack

device used to turn over parts of the bench and consisting of a hydraulic pump unit and one or more jacks

3.2.39

plug and feathers

device for cleaving benches and blocks of stone, consisting of a wedge, with two toggle-bolts (counter- wedges) to be inserted into the holes of a discontinuous drilling line, and to be manually struck with a heavy hammer

3.2.40

quarry

basic productive unit where all operations involving the exploitation of a deposit are carried out, and

where the raw matter is extracted

3.2.41

quarry bench

step-like portion of rock in a quarry

3.2.42

quarry face

quarry front

part of the quarry where excavation takes place

3.2.43

quarry floor

part of the quarry onto which the cut bench is turned over and where operations such as block squaring

and hauling are carried out

3.2.44

rotary-percussion drilling

execution of holes with disaggregation of the rock by means of combined percussion and rotation

3.2.45

rough block

basis of the usable stone consisting of rocks obtained directly from quarries erratics with no processing whatsoever except extraction and shaping by cutting or splitting

3.2.46

rough-hewn

surface condition as quarried

3.2.47

sheeting

gently dipping joints that are essentially parallel to the ground surface

Note 1 to entry: See 3.1.152.

3.2.48

slickenside

striations, grooves and polish on joints and fault surfaces

3.2.49

static splitting

quarrying technique to section a rock involving the insertion of wedges/rock splitter into co-planar and parallel holes drilled along a pre-defined line

3.2.50

strike of a rock

intersection line of an inclined layer or plane with the horizontal plane; it is perpendicular to the direction of the dip

3.2.51

toe

lower edge of the quarry face

3.2.52

tracks drills

channelling drills

drilling machine travelling on tracks and used in quarrying to make a line of closely spaced holes into which bars are driven to break out the stone

3.2.53

undercut toe cut

horizontal cut in the face of a stone quarry

3.2.54

underground

method for exploitation of a quarry where activities are carried on inside the mass of rock, without contact with the external environment, except for access routes

3.2.55

vertical head cut

when isolating a bench, each of the two vertical cuts at a right angle to the quarry-face, defining the lateral limits of the bench itself

3.2.56

void

very thin blind hole in the surface of a natural stone

3.3 Processing terms

3.3.1

abrasive slurry

slurry consisting of water and abrasive, used for wire sawing

3.3.2

abrasiveness

intrinsic property of a stone to wear the tools used to process it (cutting, finishing, shaping etc.)

3.3.3

antique finishing machine

generic term indicating any machine used to perform processing for antique finishing

3.3.4

arm polisher

hand polisher

power driven machine for rubbing or polishing, consisting of a polisher mounted on a swivel arm, generally hand operated

3.3.5

axed finish

rough and rugged surface achieved by using a punch or axe

3.3.6

belt polisher

automatic machine consisting of a feed belt and a series of polishing heads with varying grit sizes

3.3.7

block cutter

sawing machine consisting of a horizontal diamond disk and a series of vertical diamond disks, used for the production of standard-sized dimensional stone

3.3.8

block saw

bridge saw fitted with a large diamond disk used for primary sawing

3.3.9

bossed

split surface finishing used to produce bosses and bossed surfaces

Note 1 to entry: It may be performed manually, with broad-blade chisels, or mechanically.

3.3.10

bridge saw

cutting machine for secondary cuts and cut-to-size operations, consisting of a mobile bridge driving a spindle with a diamond disc; the movements of the bridge and the spindle being combined in order to

work on the plane where the slab is placed

3.3.11

bush-hammering

impact surface finishing executed with a bush hammer, and producing dotted markings

Note 1 to entry: It can be performed manually or mechanically.

3.3.12

bush hammered finish

finish obtained by using a bush hammer or a bush hammering machine

Note 1 to entry: Bush hammer is a percussion tool for roughening a surface, with a square head and with few pyramidal percussion teeth or points.

Note 2 to entry: Bush hammering machine is a machine consisting of feed rolls and a overhanging beam supporting a pneumatic bush hammer.

3.3.13

brushing

surface finishing created by using particular flexible abrasives

3.3.14

calibrating

mechanical removal of material from the surface to ensure its planarity and the constancy of thickness within pre-defined tolerance limits

3.3.15

calibrating machine

machine used to perform calibrating operations

3.3.16

chain saw

machine for squaring blocks and/or cutting them into slabs/thick elements, whose cutting system

makes use of a chain installed on a mobile arm and fitted with abrasives tools

3.3.17

chamfer

oblique bevel on the visible edges of some stone products (tiles, steps) to eliminate the sharp edge and avoid chipping of the material

3.3.18

chamfering machine

machine used to produce bevels and chamfers in slab-like products.

Note 1 to entry: In tile lines, the section for the execution of lateral calibration and bevelling/chamfering on a tile

3.3.19

chiselling

dressing of a stone surface with a chisel

3.3.20

claw chisel

tooth chisel

percussion tool with a toothed edge

3.3.21

contouring machine

shaping machine

machine fitted with router bits or profile wheels for obtaining moulded edges

3.3.22

corrugated

reeded

surface finish formed by parallel semi-cylindrical grooves carved in the rock

3.3.23

cut-to-size

operation to cut semi-finished products to the required size and shape

3.3.24

diamond abrasive

abrasive tool consisting of diamond particles

3.3.25

diamond belt saw

machine for squaring blocks and/or cutting them into slabs/thick elements whose cutting system makes use of a sintered diamond-tipped belt stiffened by a metal bar, and sliding in a closed circuit

3.3.26

diamond gang saw

sawing device consisting of one or generally more metallic blades with diamond coated edges used for cutting stone rough blocks by the abrasion produced by the backwards and forwards movement of the blades

3.3.27

diamond saw finish

smooth finish resulting from sawing a block with diamond blades

3.3.28

diamond segment

diamond concretion welded on cutting tools such as blades, discs etc

3.3.29

diamond tool

cutting or finishing tool whose surface is coated with diamond powder amalgamated with a binder

3.3.30

dolly pointed finish

point finish

semi-rough finish achieved using a four pointed dolly point (bush hammer with four pyramidal percussion teeth or points)

3.3.31

dressing

shaping and squaring of stone units prior to fabrication

3.3.32

drilling machine

machine used to perform holes and seats for anchorages in cladding

3.3.33

edge

lateral surface of a slab-like element having dimensions defined by thickness and length

3.3.34

edge treatment

grinding or other treatment made to give a continuous and regular-shaped profile to the edges of the stone unit

3.3.35

edge polisher

machine fitted with grinding and polishing heads for edge-polishing, and sometimes also for edge-chamfering, and cutting drips

3.3.36

epoxy resin

resin characterised by excellent mechanical properties, high penetration and strong adhesive power

Note 1 to entry: Widely used in different operations such as restoration, reinforcement, reconstruction and consolidation of fragile stone elements.

3.3.37

filled finish

having natural voids in the surface of the stone filled with putty and resins or other materials

3.3.38

finish

final surface applied to the face of piece of rock during fabrication

3.3.39

flamed finish

surface texture obtained by thermal treatment the stone using a high temperature flame

3.3.40

flaming machine

machine consisting of feed rolls and a overhanging beam supporting a torch moving along the beam

3.3.41

gang saw

frame saw

cutting device consisting of one or generally more metallic blades mounted on a frame, used for cutting stone rough blocks by the abrasion produced by the backwards and forwards movement of the blades

adding a slurry of water and abrasive into the cut

3.3.42

grinding machine

automatic machine generally consisting of a feed belt and a series of head with varying grit sizes

3.3.43

abrasive finish

surface treatment (e.g. by means of a grinding disk bonded with silicon carbide) to produce a flat, uniform finish

3.3.44

groove

channel of rectangular or circular cross section cut into a slab

3.3.45

ground finish

surface treatment with coarse abrasive aimed to eliminate the main surface irregularities

3.3.46

guillotine

splitting machine

machine used for the fabrication of split faced pieces of stones

3.3.47

hard way

head

tough way

plane at right angle to the rift and the grain along which splitting is most difficult

3.3.48

heading machine

cutting machine normally included in a tile line for standard-sized products, performing performs the square cutting of the initial and final part of the strips leaving a block cutter

3.3.49

honed finish

surface finish having a dull polish or matt surface

Note 1 to entry: See also ground finish and matt finish.

3.3.50

jib milling cutter

simplest cutting machine, consisting of a mobile pallet with a column-jib-spindle unit on one side

3.3.51

kerf

continuous groove cut into the side of a stone unit for the inserting of anchoring devices

Note 1 to entry: See also 3.4.1.

3.3.52

matt finish

surface treatment (e.g. by means of a silicon carbide bonded polishing disk with grain size F.400) to produce a very flat, uniform, but not polished finish

Note 1 to entry: For silicon carbide bonded polishing disk with grain size F.400 see also FEPA 42-GB-1984.
Note 2 to entry: See 3.3.62.

3.3.53

monoblade gang saw

cross cut saw

crosscutter

frame saw fitted with just one blade and used for block squaring and primary sawing

3.3.54

multi-disc circular saw

machine for the elaboration of stone, consisting of a bridge saw fitted with a series of circular saw blades used for dimension sawing

3.3.55

natural stone product

worked piece of naturally occurring rock used in building and for monuments

3.3.56

natural cleft finish

rock faced finish

finish for rocks such as slate and quartzite, resulting from splitting or separating stone along the cleavage plane and showing the natural rock face

3.3.57

oil-repellent

resistance to impregnation with oily substances achieved on a stone surface by specific products

3.3.58

on-site finishing

execution of finishing *in situ* (e.g.: polishing flooring) after installation

3.3.59

oxalic acid

organic acid ($H_2C_2O_4$) used in the final stage of the traditional polishing of marbles, eventually in combination with other substances

3.3.60

pointed finish

semi-rough finish achieved by using a point chisel

3.3.61

polyester resin

class of synthetic heat-hardened resins characterised by good mechanical properties, high viscosity, high adhesive capacity and poor resistance to UV radiation. Widely used for fixing, repairs and joints

3.3.62

polished finish

surface treatment (e.g. by means of a polish disk or felt) to produce a high gloss finish

3.3.63

polishing line

automatic machine generally consisting of a feed belt and a series of heads with varying grit sizes

3.3.64

poté

conventional powder mixture consisting of metallic tin, sulphur and tin dioxide used as polishing agent with some stones, and as an additive for oxalic acid in traditional polishing of marbles

3.3.65

primary cut

sawing of blocks to produce a semi-finished product (slab, thickness piece, solid workpiece etc.)

3.3.66

ribbing

grooving

mechanical surface finishing producing linear markings, performed manually with chisels of various type and mechanically

3.3.67

riven cut finish

rugged surface produced by splitting a stone

3.3.68

rough slab

flat surface semi-finished product with unfinished edges obtained by sawing or splitting from a rough block

3.3.69

tumbling

rumbling

process to produce manufactured stone masonry units with randomly irregular arises, corners and surfaces, carried out with special vibrating machines (vibration tumblers or vibration finishers)

designed to mass treat surfaces

3.3.70

sand blasted finish

shot blasted finish

Commented [IU1]: Are they synonyms?

matt finishing resulting of impact of the sand or other abrasive grains expelled by a sand jet

3.3.71

sand-blasting machine

machine used for sand-blasting processes

3.3.72

sawn finish

finish resulting from the gang, block-cutter or diamond-wire sawing of the rock, without further treatment

3.3.73

semi-polishing

polishing finishing performed exclusively on the parts with higher relief of semi-finished, slab-like products that does not affect the more recessed parts; producing a true polishing only in the most prominent zones, and not to be confused with the final stage of honing, also known as semi-polishing

3.3.74

shaping machine

contouring machine

Commented [IU2]: Synonyms?

machine for the fabrication of specially designed stone units

3.3.75

shot-blasting

impact surface finishing involving blasting peens in cast iron-steel against the surface of the material, and producing dotted markings

3.3.76

shot-blasting machine

machine used in shot-blasting

3.3.77

silicon carbide

carborundum

Commented [IU3]: Synonyms?

artificial abrasive substance (CSi) with very high hardness (9,6, Mohs scale) and primary constituent of abrasives and tools

3.3.78

split

cutting the rock along one preferential splitting plane with a chisel or guillotine, usually by hand

3.3.79

splitting machine

hydraulic splitter

splitting device consisting of a hydraulic or air driven pump unit operated by an electrical or

combustion engine and one or more rock-splitting cylinders used for the fabrication of split faced curbing and cubic stone

3.3.80

stationary single diamond wire plant

machine for primary cuts equipped with a single diamond wire used for squaring off operations and the production of slabs/thickness pieces

3.3.81

stationary multiple diamond wire plant

unit for primary cuts equipped with several wire circuits of adjacent diamond wires used for the production of slabs/thickness pieces

3.3.82

steel shot

abrasive used in sawing granite blocks

3.3.83

template

pattern, usually of thin board or wood, used as a guide for cutting a stone unit

3.3.84

texture finish

dressed finish

texture finish, the modified appearance of a piece of rock resulting from one or several mechanical or thermal surface treatments

3.3.85

tooled finish

machine tooled finish

a) finish resulting from the mechanical surface treatment with tools;

b) fressed finish clearly showing tool marks

3.3.86

water jet

cutting device consisting of a nozzle projecting a pressurized thin jet of water, with or without abrasive

3.3.87

water-jet plant

equipment for both cutting and finishing rock, using water at high pressure, eventually combined with abrasive substances

3.3.88

water-repellent

impermeability to water achieved on a stone surface by applying specific products

3.3.8

water/sludge depuration and treatment plant

plant for treatment of waste water and sludges produced in a processing plant

3.3.90

waxed finish

chemical treatment applied to the surface of a stone and mainly intended for maintenance and care

3.3.91

widia

very hard alloy based on tungsten carbide and cobalt (or nickel), used in numerous tools

3.3.92

wire saw

sawing device consisting of a twisted three-strand wire cable, running over pulleys, cuting stone by abrasion, by means of a slurry of water and abrasive fed into the cut

3.4 Products and installation terms

3.4.1

anchor

retention device or element to fix a slab or a dimensioned stone, usually to a wall, usually for cladding

or lining

3.4.2

ashlar

small block of stone, shaped and squared, with a roughly regular form used as a construction or masonry element

3.4.3

bearing length

length of the end of a lintel which bears on its support

3.4.4

bed joint

horizontal joint in masonry

3.4.5

bindero

stone element, very often in porphyry, and mostly used for paving, where the upper face (exposed) is a natural plane one and the edges are splitted

3.4.6

bracket

corbel

support that projects horizontally from a masonry surface

3.4.7

book-match installation

installation geometry where slabs adjacent to each other in the original block are installed in situ in double pairs with aligned joints to show the symmetry of the veins at the joints (in two directions)

3.4.8

cladding

slabs cut to size which form a wall covering for outside and inside use, fixed to a structure either by

anchors or by means of mortar or adhesives

3.4.9

closed joint

installation of stone elements in floors or cladding where the distance between the elements is minimum, scarcely visible

3.4.10

cramp

U-shaped piece of metal used to tie stone units together or to their backing

3.4.11

cut sheet

fabrication drawing detailing piece mark, location and dimensions of each single stone unit

3.4.12

contrasting arc installation

layout in a pattern forming arcs where every arc makes contrast with the adjacent arc and the sides of the paved area in flooring with small cubes

3.4.13

dimension stone work

stone element (thickness >80 mm) prepared to specific dimensions for inside or outside application

3.4.14

dowel

anchor consisting in a cylindrical metal bar which is introduced into the edge of a slab or a dimensioned stone to fix it to a wall, usually for cladding or lining

3.4.15

drip

rectangular inset, made in the lower part of manufacts exposed to water run-off (e.g.: window ledges)

and intended to facilitate the collection in drops and the precipitation of water

3.4.16

efflorescence

whitish powder sometimes found on the surface of stones and masonry, caused by the deposition of

soluble salts carried through or into the surface by moisture

3.4.17

executive drawing

detailed drawing of a project containing specific information about the stone elements and their installation (geometry, dimensions, reference quotas, finishing, machining operations, formats, anchorages) and every other element needed to define a processing list/order

3.4.18

joint

interruption in the substrate, or between stone elements installed in cladding and paving/flooring, required to allow several technical phenomena to take place (heat expansion, settling of the load- bearing structure, homogeneous distribution of the tensions etc.)

3.4.19

face

surface of a piece of stone intended to be seen in use

3.4.20

filmogenous

protective chemical substance that acts by creating a film of the surface of a stone material

3.4.21

genoa flooring

traditional type of flooring where small compositional irregular elements (5 mm to 7 mm), are mixed and cast at random (seeding), or following a precise pattern, in a layer of cement binder

3.4.22

grout

pulp of semi-liquid consistency, used to fill voids and seal joints (like those between tiles)

3.4.23

inlay

stone product (but also in other materials, e.g.: wood), of very high decorative value, composing variously shaped pieces placed in slots prepared in advance in the underlying support slab

3.4.24

installation with adhesive stratum

installation of cladding/flooring using mortars based on plastic binders (glues)

3.4.25

iridescence

exhibition of coloured reflections from a mineral; a play of colours

3.4.26

load-bearing anchor

anchor connecting a stone element to a structure performing load-bearing functions

3.4.27

masonry

construction of stone, bricks or blocks

3.4.28

mock-up

simulation of the ultimate installation of a stone project in the workshop for purposes such as control, verification and final testing

3.4.29

modular tile cut

size tile

modular tile is a piece of natural stone in standard sizes, obtained by cutting or splitting at a thickness less than 12 mm, to be fixed to a structure by means of mortar or adhesives

3.4.30

mortar installation

conventional system for the installation of stone elements where a bed of mortar is distributed between the base of the stone element itself and the main support

3.4.31

mosaic

technique used in floor or wall decoration involving the insertion of small pieces (tesserae) mounted on the underlying surface through a support (cement, chalk etc.)

3.4.32

notch

v-shaped indentation made along the edges of a stone panel for the insertion of anchoring devices

Note 1 to entry: See also anchor and 3.3.44.

3.4.33

open-book installation

installation geometry where slabs adjacent to each other in the original block are installed in situ in pairs with aligned joints to show the symmetry of the veins at the joints

3.4.34

open face

surface of a stone element which remain visible after the installation of the element itself

3.4.35

open joint

installation of stone elements in floors or cladding where the distance between the elements is clearly visible (normally greater than 4 mm)

3.4.36

opus incertum

traditional typology of paving where slabs of irregular shape, dimension and thickness (often with split surface), installed in situ without any geometrical order

3.4.37

opus romanum

roman mosaic

typology of flooring consisting of regular elements (square, rectangular, polygonal) arranged with geometrical order, often to form repetitive patterns

3.4.38

palladian

paving/flooring with the opus incertum technique but with some differences (e.g.: larger elements, saw-cut surface, smooth surfaces, joints sealed with cement grout etc.)

3.4.39

pallet

wooden base used to transport, support storage and shipment of various goods

3.4.40

peacock tail installation

in flooring with small cubes, a peculiar layout whose geometry resembles a peacock tail

3.4.41

pebble-stone

paving in stone consisting of pebbles/cobbles of one, or more, stones juxtaposed between each other

3.4.42

putty

stiff paste used to fill cracks or holes in natural stone

3.4.43

reinforcement; liner

the strengthening of fragile or unsound stone by laminating fibreglass or similar material to the back of the slabs

3.4.44

retainer anchor

anchor connecting a stone element to a structure without performing load-bearing functions

3.4.45

riser

upright member between two stairs treads

3.4.46

rubble stone

natural stone masonry unit, of any shape, with variable dimensions, whose face is rough or worked

3.4.47

Running

free length

installation geometry of floors where the stone elements have a fixed width and a variable length, but normally within maximum and minimum limits (at least 1.5 times the width)

3.4.48

sandwich panel

panel made up of a thin slab in stone material (3 ÷ 12 mm) supported by an armature in another material, required for the necessary rigidity and compactness (e.g.: honeycomb, aluminium, fibre

glass+resins etc.)

3.4.49

sampling

preliminary supply for demonstration purposes of semi-finished products (e.g.: slabs, solid pieces,

strips) or finished goods (e.g.: tiles) representative of final supply

3.4.50

sealant

elastic adhesive compound used to seal stone veneer joints

3.4.51

seasoning

process of storing stone after quarrying to reduce its moisture content and bring it to proper condition for use

3.4.52

semi-finished

referred to any stone material after the primary cut requiring further processing operations to get a final product ready for installation

3.4.53

shop drawing; shop ticket

detailed drawing showing dimensions, location, finishing and anchoring system, which may be used by the fabricator to draw up a cut sheet

3.4.54

simple kerf

linear groove performed on the head or the edge of a stone element (e.g. slab), along its entire length, and used to anchor the element itself in claddings

3.4.55

slab

flat piece of natural stone obtained by cutting or splitting at a nominal thickness > 12 mm

3.4.56

slot

short groove cut in the back or the edge of a stone panel for insertion of an anchor

3.4.57

smollero

stone element, often in porphyry, and mostly used for paving, where the upper head (exposed) and the edges are split processed, and the two lateral faces show the natural plane of the quarry

3.4.58

strip

slab-like semi-finished element where the thickness is much less than the other two dimensions, normally produced from undersized and irregular blocks

3.4.59

surface treatment

application of certain materials (i.e. chemicals) to the exposed face of a slab

3.4.60

tolerance

difference, within defined limits, of a numeric value characterising a stone product (e.g.: length, thickness, planarity) or one of its attributes

3.4.61

translucency

transparency effect in some stone materials (crystalline marble, alabaster, onyx), attainable even with routine thicknesses (2 cm ÷ 3 cm), when they are observed against the light

3.4.62

vanity-top

universal term for the tops of sinks and wash-basins

3.4.63

vein

decorative motif typical of certain stones appearing as a band clearly distinguishable from the bottom colour. It may be a single-coloured, multi-coloured, more or less broad, regular, sinuous etc

3.4.64

venetian flooring

traditional type of flooring where small compositional irregular elements (5 mm ÷ 20 mm), are mixed and cast at random (seeding), or in accordance with a precise pattern, in a layer of still-fresh cement binder

3.4.65

ventilated façade

typology of building façade where the cladding is separated from the support wall by a specific gap and including an adequate ventilation between the cladding itself and the support wall

3.4.66

wainscot

stone strip with an elongated rectangular shape, positioned around the perimeter of an environment

(mostly in interiors) or near the steps in a staircase

3.4.67

work size

size of a masonry unit specified for its manufacture, to which the actual size should conform within specified permissible deviations

4 Scientific classifications

Geological time scale (informative)

Table 1 — Abbreviated chronostratigraphic table

Million years	Eonothem	Erathem	System		Series
2.6	Phanerozoic	enozoic	Quaternary		Holocene
					Pleistocene
23			Tertiary	Neogene	Pliocene
					Miocene
66				Paleogene	Oligocene
					Eocene
					Paleocene
145		Mesozoic	Cretaceous		upper
					lower
201			Jurassic		upper
					middle
					lower

252			Triassic	upper
				middle
				lower
298		Paleozoic	Permian	Lopingian
				Guadalupian
				Cisuralian
358			Carboniferous	Pennsylvanian
				Mississippian
419			Devonian	upper
				middle
				lower
			Silurian	Pridoli
				Ludlow

Million years	Eonothem		Erathem	System	Series
443					Wenlock
				Llandovery	
			rdovician		
485					middle
					lower
					Furongian
			Cambrian		Series 3
					Series 2
541					Terreneuvian
1000 1600	Precambrian	Proterozoic	Neo-proterozoic Meso- proterozoic		
2500			Paleo- proterozoic		
4000		Archaean			
4600		Hadean			

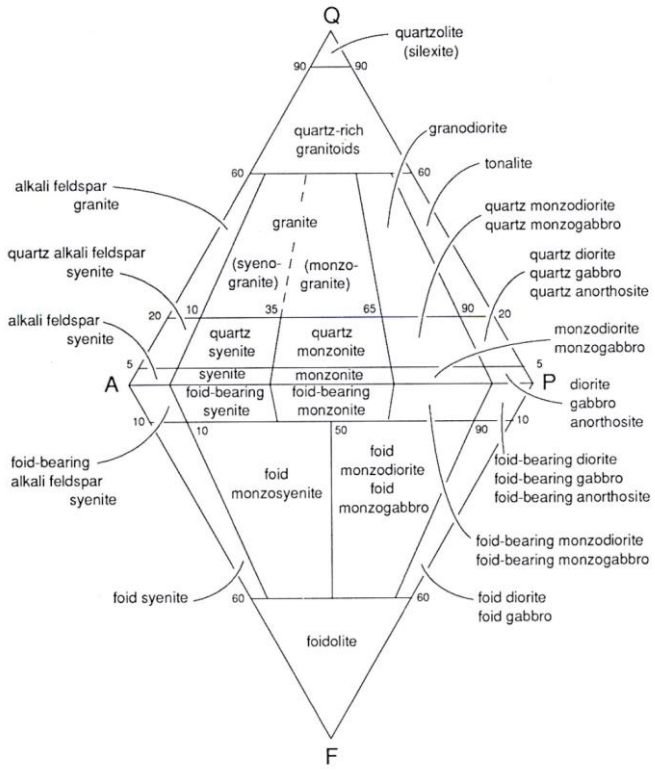
Table 2 — Conventional hierarchy of formal chronostratigraphic and geochronologic terms

Unit Order	Largest	First	Second	Third	Fourth
Chronostratigraphic	Eonothem	Erathem	System	Series	Stage
Geochronologic	Eon	Era	Period	Epoch	Age

4.1 Scientific classification charts

4.1.1 Igneous Rocks Classification Charts

4.1.1.1 Plutonic Rocks (Mafic minerals < 90 % vol.)



Where:

Q quartz
A alkali feldspar
P plagioclase
F feldspathoid

Figure 1 — Classification of plutonic rocks based on modal analysis under optical or electron scanning microscope

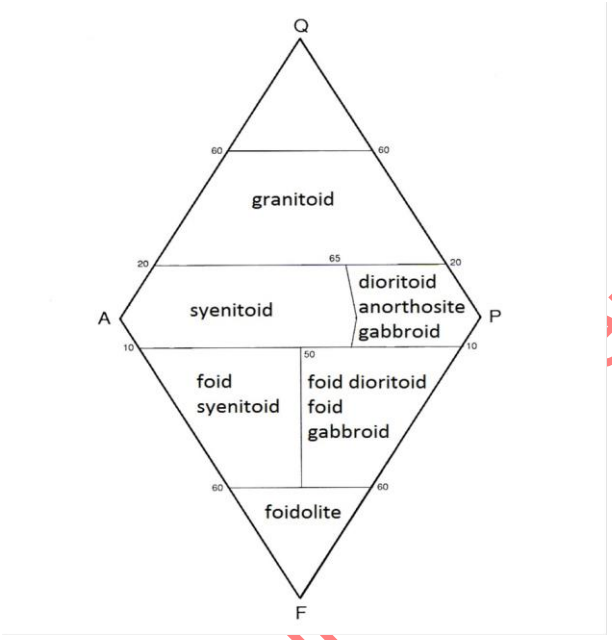


Figure 2 — Classification of plutonic rocks based on mesoscopic modal analysis

4.1.1.2 Gabbroic rocks (Gabbro and Anorthosite)

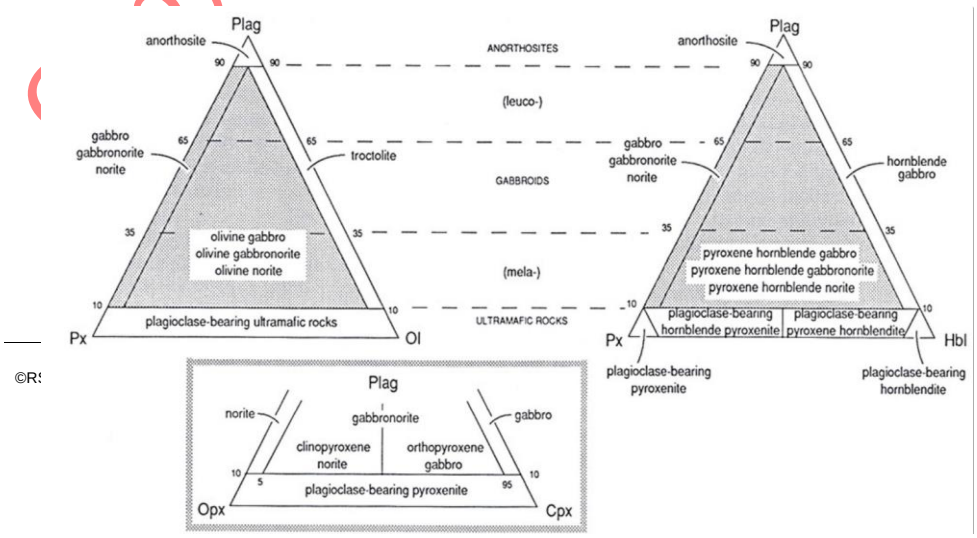
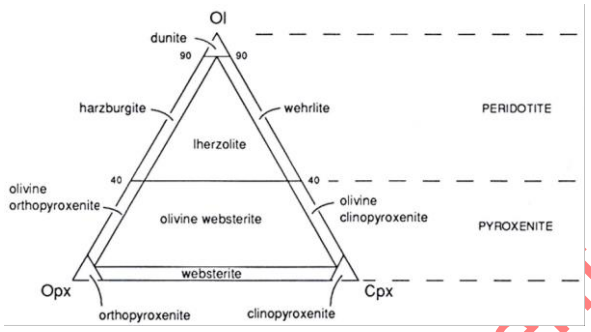


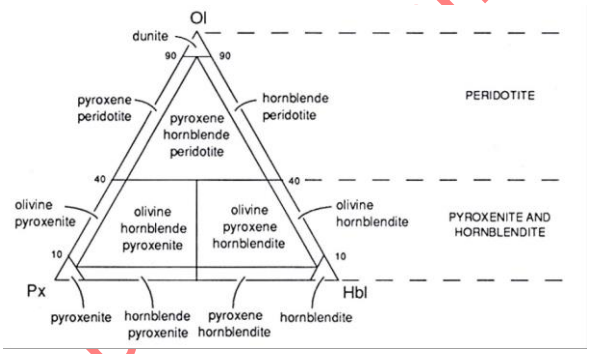
Figure 3 — Gabbroic rocks

Where:
Cpx: clinopyroxene
Hbl: hornblende
Ol: olivine
Opx: Orthopyroxene
Plag: plagioclase (An5 to An100)
Px: pyroxene

4.1.1.3 Ultramafic rocks (Mafic minerals > 90 % vol.)



a)

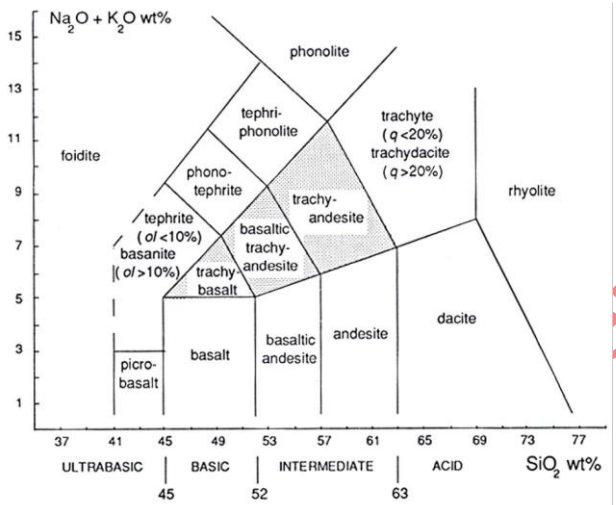


b)

Figure 4 — Ultramafic rocks

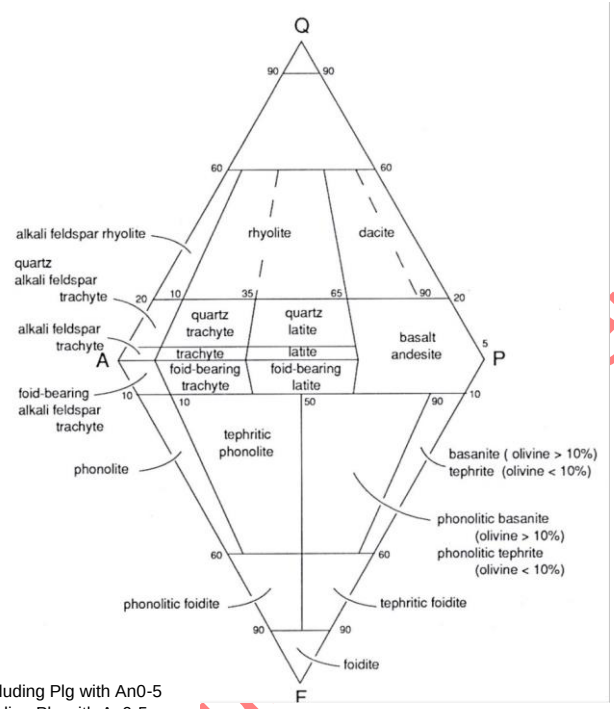
4.1.1.4 Volcanic Rocks

If a mineral mode cannot be determined owing to the aphanitic/glassy nature of the rock/groundmass, and a chemical analysis of the rock is available, the TAS (Total Alkali – Silica) classification should be used. The TAS rock names are given in Figure 4, where SiO_2 and Na_2O+K_2O contents (in weight%.) of fresh rocks have to be plotted after analysis has been recalculated to 100 % vol. on H_2O and CO_2–free basis. For the rocks in the fields of trachybasalt, basaltic trachyandesite and trachyandesite, further subdivisions in the sodic and potassic varieties are advisable



Further subdivisions of shaded fields	trachybasalt	basaltic trachyandesite	trachyandesite
$Na_2O - 2.0 \geq K_2O$	hawaiite	mugearite	benmoreite
$Na_2O - 2.0 \leq K_2O$	potassic trachybasalt	shoshonite	latite

Figure 5 — Chemical classification of volcanic rocks using TAS



Where,

Q silica minerals

A alkali feldspar including Plg with An0-5

P plagioclase excluding Plg with An0-5

F feldspathoid

Figure 6 — Classification of volcanic rocks based on modal analysis under optical or electron scanning microscope

4.1.1.5 Volcanic Rocks (Pyroclastic Rocks)

Table 3 — Terms for pyroclastic — epiclastic rocks

Average clast size in mm	***Pyroclastic***		***Tuffites (mixed pyroclastic-epiclastic)***	***Epiclastic (volcanic and/or non-volcanic)***
64	Agglomerate, pyroclastic breccia		Tuffaceous conglomerate,	Conglomerate, breccia
2	Lapilli tuff			
1/16	(Ash) tuff	coarse	Tuffaceous sandstone	Sandstone

1/256		fine	Tuffaceous siltstone		Siltstone
			Tuffaceous	mudstone,	Mudstone, shale
			shale		
Amount pyroclastic	100 % vol. to 75 %				
material	vol.		75 % vol. to 25 % vol.		25 % vol. to 0 % vol.

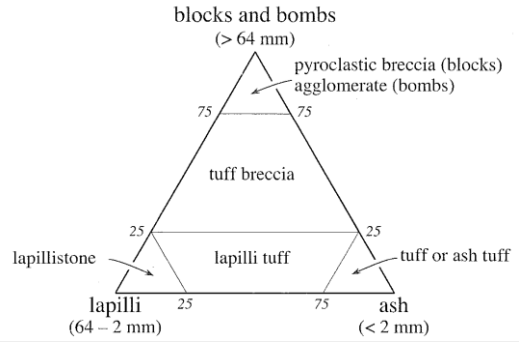


Figure 7 — Classification of polymodal pyroclastic rocks based on the proportions of blocks/bombs lapilli and ash (Le Maitre 2002, p.8, after Fisher 1966)

Table 4 — Classification of pyroclasts and pyroclastic rocks based on clast size

Clast size in mm	***Pyroclast***	**Pyroclastic deposit**	
		Mainly unconsolidated: tephra	***Mainly consolidated: pyroclastic rock***
64	bomb, block	agglomerate bed of blocks or bomb, block tephra	agglomerate pyroclastic breccia
2	lapillus	layer, bed of lapilli or lapilli tephra	lapilli stone
1/16	coarse ash grain fine ash grain (dust grain)	coarse ash fine ash (dust)	coarse (ash) tuff fine (ash) tuff (dust tuff)

4.1.2 Sedimentary rocks classification charts

4.1.2.1 General

The classification of sedimentary rocks is based on mineral composition and on grain size.

4.1.2.2 Classification of siliciclastic rudaceous rocks.

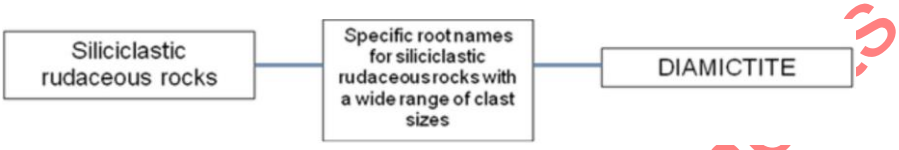


Figure 8 — Classification of siliciclastic rudaceous rocks

Figure 9 — Classification of siliciclastic arenaceous rocks.

4.1.2.4 4.2.2.4 Classification of siliciclastic arenaceous sedimentary rocks according to composition

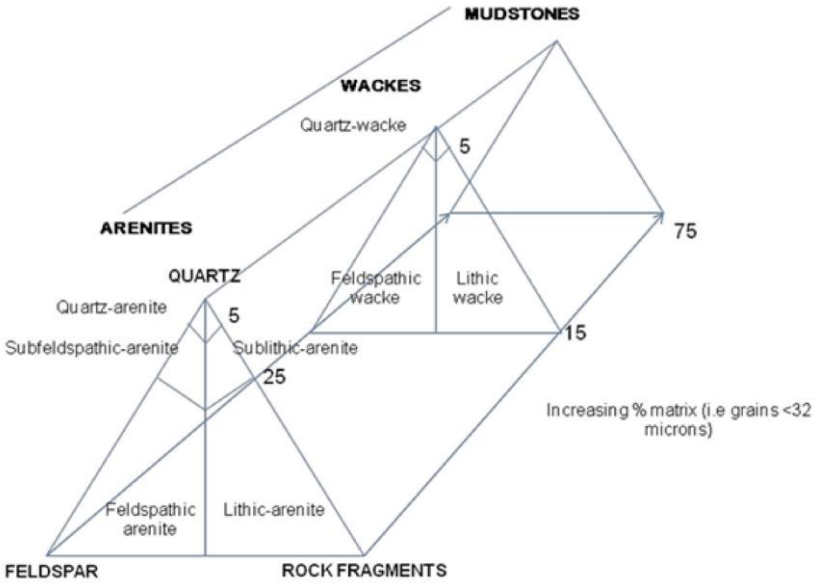


Figure 10 — Classification of siliciclastic arenaceous sedimentary rocks according to composition

4.1.2.5 4.2.2.5 Sandstone Classification

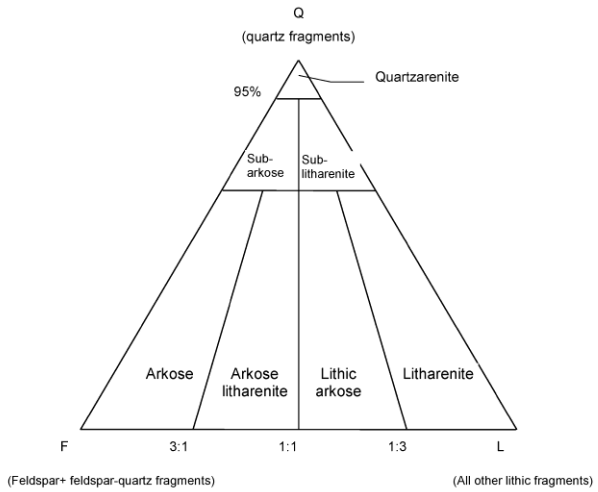


Figure 11 — Sandstone Classification

4.1.2.6 4.2.2.6 Classification of Greywackes

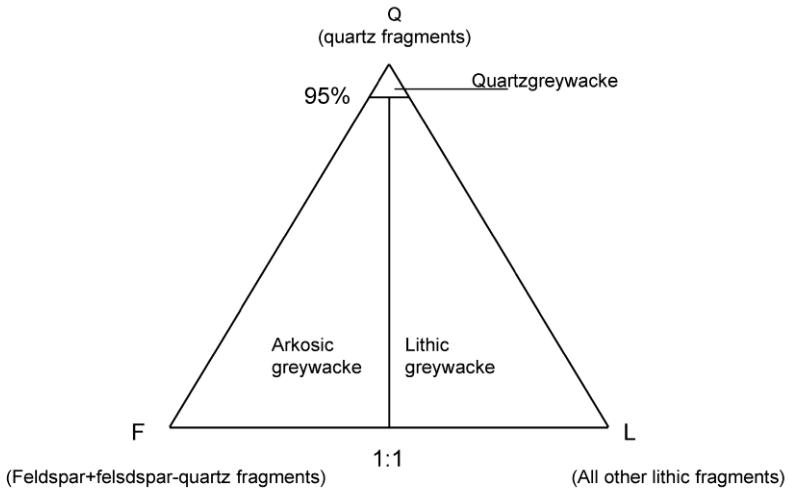


Figure 12 — Classification of Greywackes

4.1.2.7 Classification of non-clastic siliceous rocks

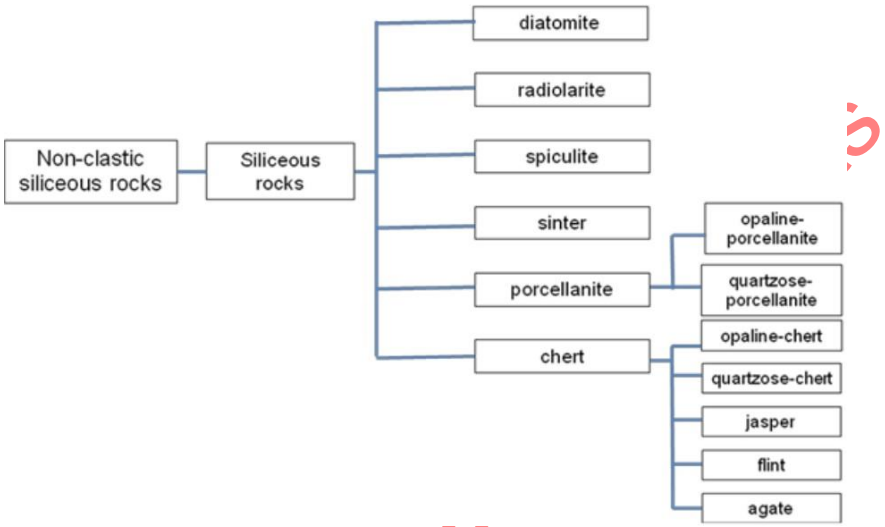


Figure 13 — Classification of non-clastic siliceous rocks

4.1.2.8 Classification of limestones

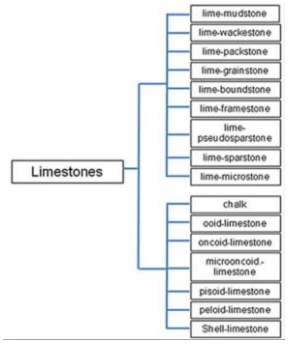


Figure 14 — Classification of limestones

4.1.2.9 Classification of limestones. Based in

Table 5 — Classification of clastic limestones

<table>
<tr><td colspan="3" rowspan="2">Allochems per volume</td><td colspan="2">More than 10 % Allochems</td><td colspan="2">Less than 10 % Allochems</td><td rowspan="2">Undisturbed bioherm limestone</td></tr>
<tr><td>Sparry calcite predominant</td><td>Micritic matrix predominant</td><td>1 % vol. to 10 % vol. Allochems</td><td>Less than 1 % vol. Allochems</td></tr>
<tr><td colspan="3">more than 25 % vol. Intraclasts</td><td>Intrasparite</td><td>Intramicrite</td><td>Intraclast bearing micrite</td><td rowspan="4">Micrite</td><td rowspan="3"></td></tr>
<tr><td rowspan="4">less than 25 % vol. Intraclasts</td><td colspan="2">more than 25 % vol. Ooids</td><td>Oosparite</td><td>Oomicrite</td><td>Ooidbearing micrite</td></tr>
<tr><td rowspan="3">less than 25 % vol. Ooids</td><td>> 3:1</td><td>Biosparite</td><td>Biomicrite</td><td rowspan="2">Fossiliferous micrite</td></tr>
<tr><td>3:1 to 1:3</td><td>Biopelsparite</td><td>Biopelmicrite</td><td>Biolithite</td></tr>
<tr><td>< 1:3</td><td>Pelsparite</td><td>Pelmicrite</td><td>Pelletiferous micrite</td><td>Dismicrite</td><td></td></tr>
</table>

4.1.2.10 Classification of dolostones

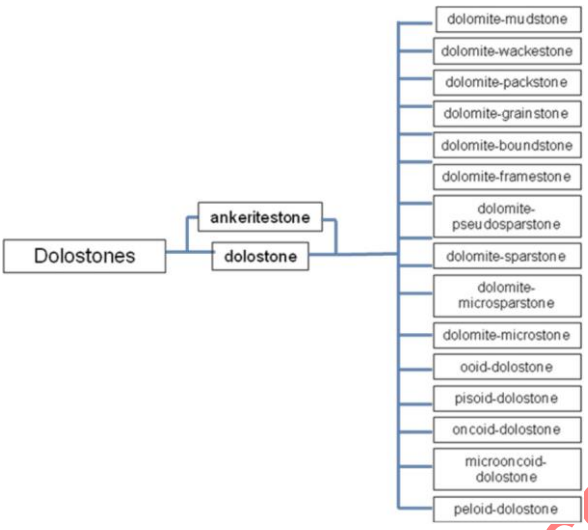


Figure 15 — Classification of dolostones

4.1.2.11 Classification of carbonates according to dolomite content

Table 6 — Carbonates according to dolomite content

Limestone	0 % vol. to 9 % vol. Dolomite
Dolomitic Limestone	10 % vol. to 49 % vol. Dolomite
Calcitic Dolomite	50 % vol. to 89 % vol. Dolomite
Dolomite	90 % vol. to 100 % vol. Dolomite

4.1.2.12 Classification of non-carbonate salts

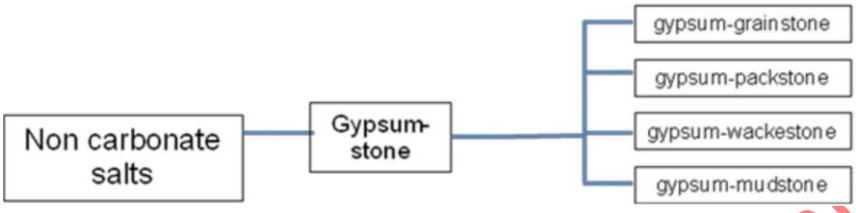


Figure 16 — Classification of non-carbonate salts

4.1.3 Most common specific names of metamorphic rocks

4.1.3.1 General

Table 7 — General recommendation

	Geol. Terms #		Geol. Terms #
Amphibolite	3.1.17	Marble	3.1.291
Blue schist	3.1.59	Migmatite	3.1.313
Calc-silicate rock	3.1.77, 3.1.63	Ophicarbonate	3.1.348
Calcschist	3.1.73	Phyllite	3.1.382
Eclogite	3.1.137	Quartzite	3.1.422
Granulite	3.1.204	Slate	3.1.466
Gneiss	3.1.189	Schist	3.1.441
Hornfels	3.1.228		

4.1.3.2 Classification of marble according to dolomite content

Table 8 — Marble according to dolomite content

Calcitic marble	0 % vol. to 10 % vol.
Calcitic-dolomitic marble	10 % vol. to 50 % vol.
Dolomitic-calcitic marble	50 % vol. to 90 % vol.
Dolomitic marble	90 % vol. to 100 % vol.

Annex A

(informative)

Examples of petrographical families/groups used in building

IGNEOUS ROCKS	**PLUTONIC ROCKS**	
	Granite-Family	quartz-rich granitoids
		alkali feldspar granite
		granite
		granodiorite
		tonalite
	Syenite-Family	quartz alkali feldspar syenite
		alkali feldspar syenite
		foid-bearing alkali feldspar syenite
		quartz syenite
		syenite
		foid-bearing syenite
		quartz monzonite
		monzonite
		foid-bearing monzonite
	Diorite-Family	quartz monzodiorite
		monzodiorite
		foid-bearing diorite
		quartz diorite
		diorite
		foid-bearing monzodiorite
	Gabbro-Family	quartz monzogabbro
		monzogabbro
		foid-bearing monzogabbro
		quartz gabbro
		norite
		olivine norite
		clinopyroxene norite
		gabbronorite
		olivine gabbronorite
		orthopyroxene gabbro
		gabbro
		olivine gabbro
		troctolite
		pyroxene hornblende gabbro

	hornblende gabbro
	foid-bearing gabbro

Anorthosite-Family	quartz anorthosite
	anorthosite
	foid-bearing anorthosite
Foid-Syenite-Family	foid syenite
	foid monzosyenite
Foid-Diorite-Family	foid monzodiorite
	foid diorite
Foid-Gabbro-Family	foid monzogabbro
	foid gabbro
Foidolite Family	foidolite
ULTRAMAFIC ROCKS	
Peridotite-Family	dunite
	plagioclase-bearing pyroxene peridotite
	pyroxene peridotite
	harzburgite
	lherzolite
	wehrlite
	pyroxene hornblende peridotite
	hornblende peridotite
Pyroxenite-Family	olivine pyroxenite
	plagioclase-bearing olivine pyroxenite
	olivine orthopyroxenite
	olivine websterite
	olivine clinopyroxenite
	pyroxenite
	plagioclase-bearing pyroxenite
	orthopyroxenite
	websterite
	clinopyroxenite
	olivine hornblende pyroxenite
	hornblende pyroxenite
	plagioclase-bearing hornblende pyroxenite

	Hornblendite-Family	olivine pyroxene hornblendite
		olivine hornblendite
		pyroxene hornblendite
		plagioclase-bearing pyroxene hornblendite
		hornblendite
		plagioclase-bearing hornblendite

	VOLCANIC ROCKS	
	Rhyolite-Family	alkali feldspar rhyolite
		rhyolite
		dacite
	Trachyte-Family	quartz alkali feldspar trachyte
		alkali feldspar trachyte
		foid-bearing alkali feldspar trachyte
		quartz trachyte
		trachyte
		foid-bearing trachyte
		quartz latite
		latite
		foid-bearing latite
	Andesite-Family	andesite
	Basalt-Family	basalt
	Phonolite-Family	phonolite
		tephritic phonolite
	Basanite-Family	phonolitic basanite
		basanite
	Tephrite-Family	phonolitic tephrite
		tephrite
	Foidite-Family	phonolitic foidite
		tephritic foidite
		foidite
	Siliceous-Rocks-Family	siliceous rocks
		quartz arenite

SEDIMENTARY ROCKS	Sandstone-Family	quartz greywacke
		subarkose
		sublithic arenite
		subfeldspathic arenite
	Arkose-Family	arkose
		arkose litharenite
		feldspathic arenite
		lithic arkose
		lithic arenite

	Greywacke-Family	greywacke
		feldspathic greywacke
		arkosic greywacke
		lithic greywacke
	Clay-Family	claystone, shale
	Marl-Family	marl
	Limestone-Family	limestones
		dolomitic limestones
		mikritic limestones
		sparitic limestones
		oolithic limestones
	Dolomite-Family	dolomites
		calcitic dolomites
		dolostones
	Evaporite-Family	gypsum
		salt
	Quartzite-Family	quartzite
	Gneiss-Family	gneiss
		migmatite
		anatexite
	Fels-Family	albite fels
		chlorite fels
		glimmer fels
		hornblende fels
		epidote fels

METAMORPHIC ROCKS	Serpentinite-Family	serpentinite
	Amphibolite-Family	amphibolite
		granulite
	Greenschist-Family	greenschist
	Slate/Schist-Family	schist
		micaschists
		phyllite
		slate
	Marble-Family	calcitic marble
		calcitic dolomitic marble
		dolomitic calcitic marble
		dolomitic marble
		ophicalcite
	Eclogite-Family	eclogite

Bibliography

[1] BOGGS S. JR. Petrology of Sedimentary Rocks. Cambridge University Press, Cambridge, England, 2009

[2] BASTIDA J., LÓPEZ BUENDÍA A., URQUIOLA M. (2010). Natural Stone classification and specifications review. Global Stone Congress 2010

[3] FETTES D., DESMONS J., eds. Metamorphic Rocks (A Classification and Glossary of Terms): (2007).

Cambridge University Press, The Edinburgh Building, Cambridge CB2 8RU, U.K. xii + 244 pages. ISBN 978–0–521–86810–5

[4] LE MAITRE (EDITOR). P. Bateman, A. Dudek, J. et al. Keller. A classification of Igneous Rock and Glossary of Terms: Recommendations of the international Union of Geological Sciences Subcommisson on Systematics of Igneous Rocks. Blackwell Scientific publications, Oxford, United Kingdom, 1989

[5] FOLK R.L. Practical petrographic classification of limestones. American Association of Petroleum Geologists BulletinK. 1959, V43 pp. 1–38

[6] KRAEFT U. Was bringt die Europäische Normung der Natursteinbranche. (1994). STEIN 5/1994. pp 36-38

[7] KEAREY P. Dictionary of geology. Penguin Book, Second Edition, 2001, 327 p.

[8] UDDEN J.A. Mechanical composition of clastic sediments. Bull. Geol. Soc. Am. 1914, 25 pp. 655–744

[9] WENTWORTH K. A scale of grade and class terms for clastic sediments. J. Geol. 1922, 30 pp. 377–392

[10] FEPA-Standard 42-1:2006, Grains of fused aluminium oxide, silicon carbide and other abrasive

[11] FEPA-Standard 42-2:2006, Grains of fused aluminium oxide, silicon carbide and other abrasive materials for bonded abrasives and for general applications Microgrits F 230 to F 2000

[12] EN 1925:1999, Natural stone test methods - Determination of water absorption coefficient by capillarity

[13] EN 14581:2004, Natural stone test methods - Determination of linear thermal expansion coefficient

[14] EN 14579:2004, Natural stone test methods - Determination of sound speed propagation [15] EN 14157:2004, Natural stone test methods - Determination of the abrasion resistance [16] EN 14205:2003, Natural stone test methods — Determination of Knoop hardness

[17] EN 14231:2003, Natural stone test methods - Determination of the slip resistance by means of the pendulum tester

[18] EN 14580:2005, Natural stone test methods - Determination of static elastic modulu

[19] EN 14158:2004, Natural stone test methods - Determination of rupture energy

[20] EN 13373:2003, Natural stone test methods - Determination of geometric characteristics on units

[21] EN 14147:2003, Natural stone test methods - Determination of resistance to ageing by salt mist

[22] EN 12370:1999, Natural stone test methods - Determination of resistance to salt crystallisation

[23] EN 14146:2004, Natural stone test methods - Determination of the dynamic modulus of elasticity (by measuring the fundamental resonance frequency)

[24] EN 1926:2006, Natural stone test methods - Determination of uniaxial compressive strength

[25] EN 1936:2006, Natural stone test methods - Determination of real density and apparent density, and of total and open porosity

[26] EN 12372:2006, Natural stone test methods - Determination of flexural strength under concentrated load

[27] EN 12440:2008, Natural stone - Denomination criteri

[28] EN 12371:2010, Natural stone test methods - Determination of frost resistance

[29] EN 13161:2008, Natural stone test methods - Determination of flexural strength under constant moment

[30] EN 13755:2008, Natural stone test methods - Determination of water absorption at atmospheric pressure

[31] EN 16140:2011, Natural stone test methods - Determination of sensitivity to changes in appearance produced by thermal cycle

[32] EN 14066:2013, Natural stone test methods - Determination of resistance to ageing by thermal shock

[33] EN 16301:2013, Natural stone test methods - Determination of sensitivity to accidental staining

[34] EN 16306:2013, Natural stone test methods - Determination of resistance of marble to thermal and moisture cycles

[35] EN 1467:2012, Natural stone - Rough blocks - Requirements

[36] EN 1468:2012, Natural stone - Rough slabs - Requirements

[37] EN 12407, Natural stone test methods - Petrographic examination

[40] EN 1469, Natural stone products - Slabs for cladding - Requirements

[41] EN 12059, Natural stone products — Dimensional stone work — Requirements

[42] EN 13364, Natural stone test methods - Determination of the breaking load at dowel hole

[43] EN 12057, Natural stone products - Modular tiles - Requirements

[44] EN 12058, Natural stone products - Slabs for floors and stairs – Requirements

DRS 515: 2022

Price based on 19 pages