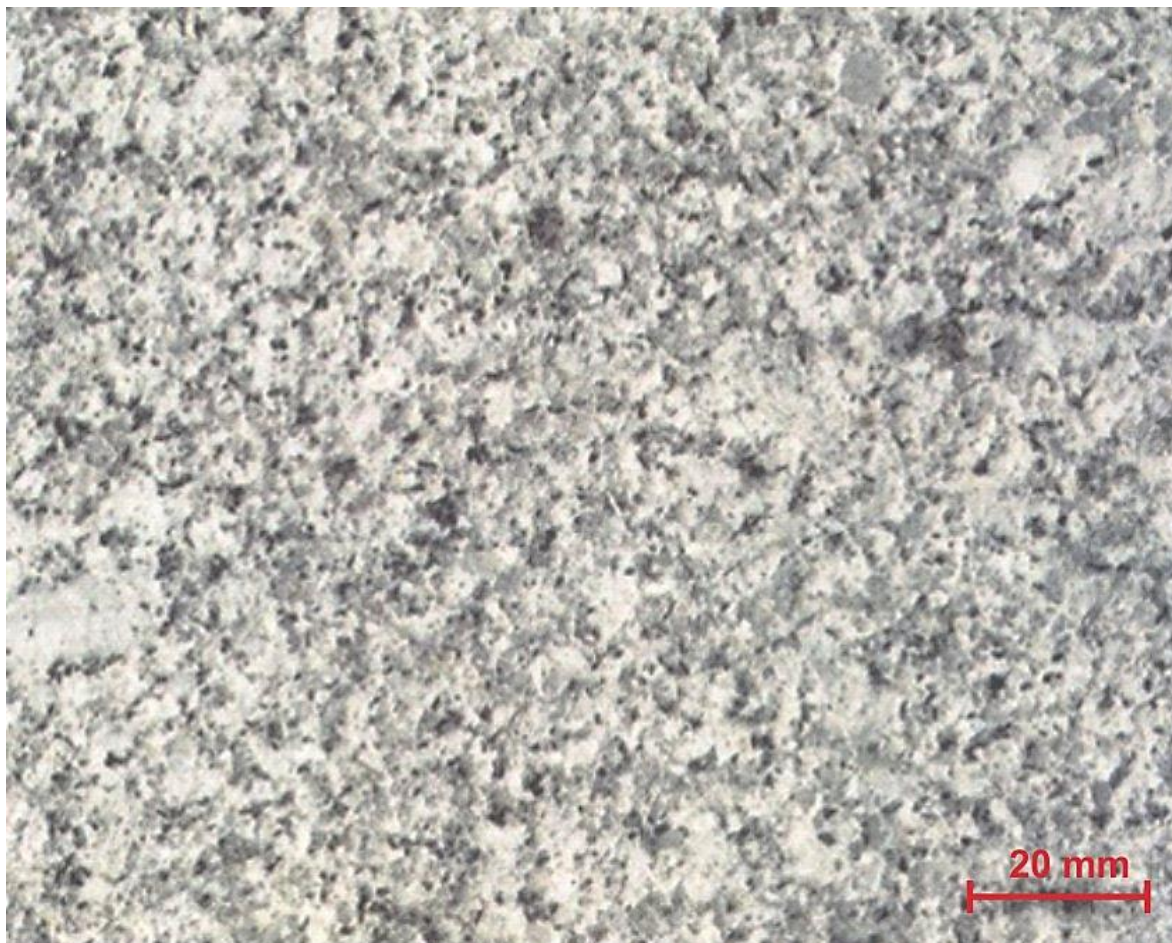


Cinzeno Alpendorada

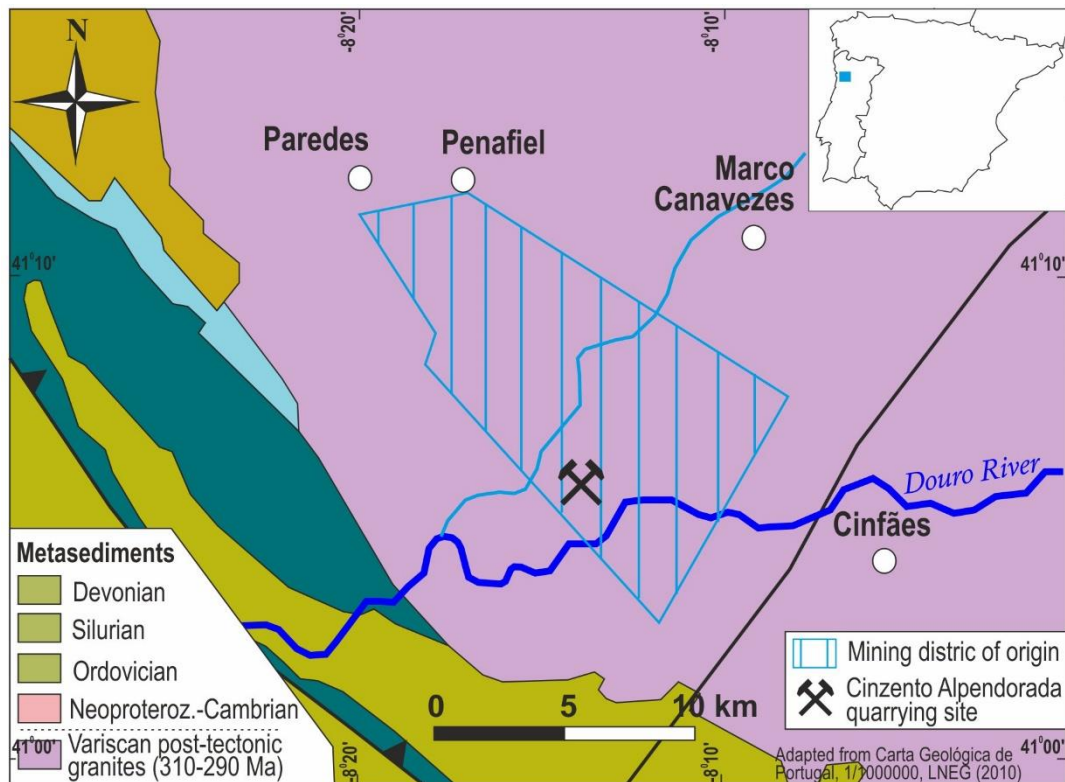
Azul Alpendorada, Cinzeno Claro



Two-mica granite, medium to coarse grained, with a bluish gray coloration and very slight porphyroid tendency due to the occurrence of sparse megacrystals of plagioclase and potassium feldspar.

Commodity	Lithology	Typical colour	Place of origin			
			Country	District	Municipality	Village
Commercial granite	Monzogranite	Grey	Portugal	Porto	Marco de Canaveses	Alpendorada e Matos

Geological setting



Geology:

Quarrying of Cinzento Alpendorada takes place on the southwestern edge of a large late to post-tectonic calc-alkaline granite massif, which has an NW-SE orientation, extending from the region of Viana do Castelo to the proximities of Castro Daire

Production:

Geological age: Carboniferous

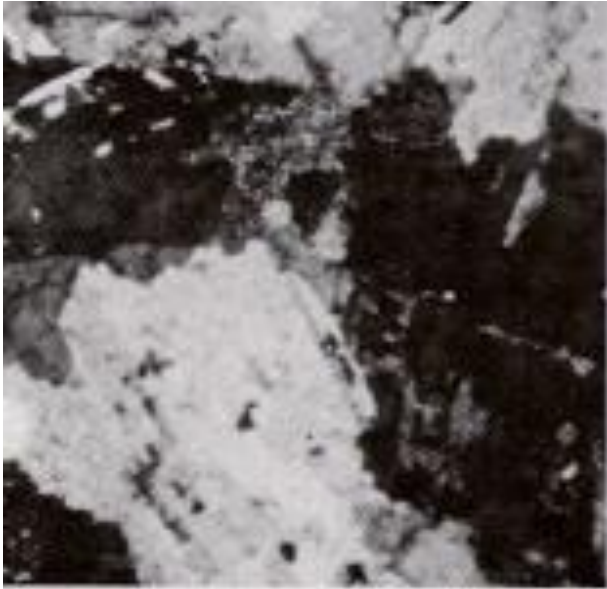
Geological unit:

Application, use and heritage

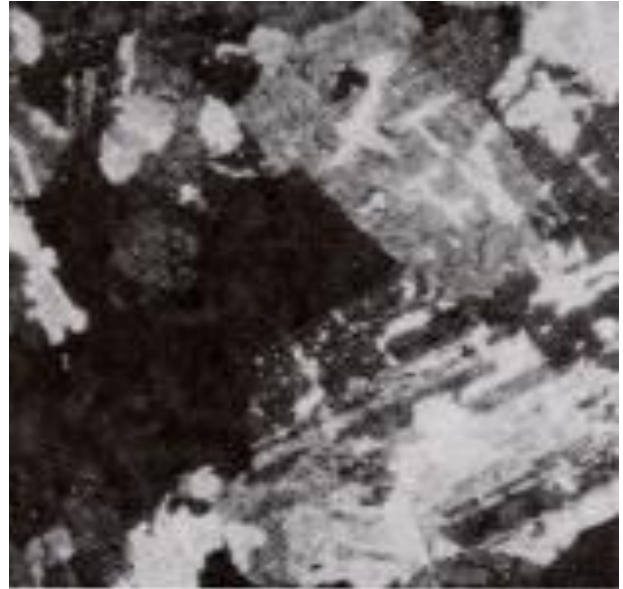
Description:



Petrography



Thin section parallel to the preferred orientation plane, when applied.



Thin section perpendicular to the preferred orientation plane, when applied.

Description:

Granite with a granular hypidiomorphic texture, medium to coarse grained, characterized by the coexistence of crystals with anhedral, subhedral and euhedral morphology. The modal mineralogical composition of the studied stone, projected in the QAP diagram of nomenclature of plutonic stone, allowed to classify it as a monzogranite or monzonitic granite.

Source of information:

Geological Survey of Portugal (LNEG - Laboratório Nacional de Energia e Geologia, IP).

Mineral composition

Plagioclase (oligoclase) (%)	Quartz (%)	Potassium feldspar (microcline and pertite microcline) (%)	Muscovite I (of primary origin) (%)	Biotite (%)	Muscovite II (resulting from post-magmatic alteration of feldspars) (%)
~31.2	~30.2	~26.3	~5.1	~4.1	~2.3
Apatite, zircon, monazite, andalusite, chlorite, rutile, calcite and opaque minerals (ilmenite) (%)					
~0.8					

Source of information:

Geological survey of Portugal (Laboratório Nacional de Energia e Geologia, IP)

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2650	0.5	0.2	218	15.9

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
—	—	—	—

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
15.2	48	212	48	—

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %
—	—	—	—

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, 6mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
19.0	—	—	—	3100	28.5

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
sawn	74	54	6	—

Source of information:

Geological survey of Portugal (Laboratório Nacional de Energia e Geologia, IP)

Chemical properties

Main elements (%)

SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	MnO	MgO	CaO	Na ₂ O	K ₂ O	P ₂ O ₅	TiO ₂	SO ₃	LOI
72.90	14.60	1.76	0.03	0.38	0.87	2.89	4.92	0.32	0.27	—	0.84

Trace elements (ppm)

V	Cr	Mn	Co	Ni	Cu	Zn	As
10	9	—	< 5	< 7	< 6	66	< 6
Sr	Cd	Ba	Pb	Be	Rb	Bi	U
110	—	290	28	—	348	—	8.53
Sc	Y	Th	Sb	Ta	Nb	Zr	Sn
< 7	11	15.0	—	1.65	16.2	100	12
Ag	B	Mo	W	Ga	Ge	Se	Cs
—	—	—	< 6	23	—	—	—
Tl	Hf						
—	2.45						

REE (ppm)

La	Ce	Pr	Nd	Sm	Eu	Gd	Tb
23.1	50.5	6.05	22.6	4.36	0.43	3.39	0.53
Dy	Ho	Er	Tm	Yb	Lu		
2.40	0.36	0.79	0.09	0.65	0.07		

Methods applied:

Determination of the main elements: X-Ray Fluorescence.

Determination of trace elements (except for U, Th, Ta, Nb and Hf): X-Ray Fluorescence.

Determination of U, Th, Ta, Nb, Hf and REE elements: Inductive plasma mass spectrometry.

Source of information:

Geological survey of Portugal (Laboratório Nacional de Energia e Geologia, IP)

Sources of more information

Type of information	Name of provider	URL
This data sheet:	Geological survey of Portugal (Laboratório Nacional de Energia e Geologia, IP)	www.lneg.pt https://rop.lneg.pt/rop/index_en.php
Non-commercial directory:		
Commercial directory:		
Scientific publication:		
Other publication:		

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