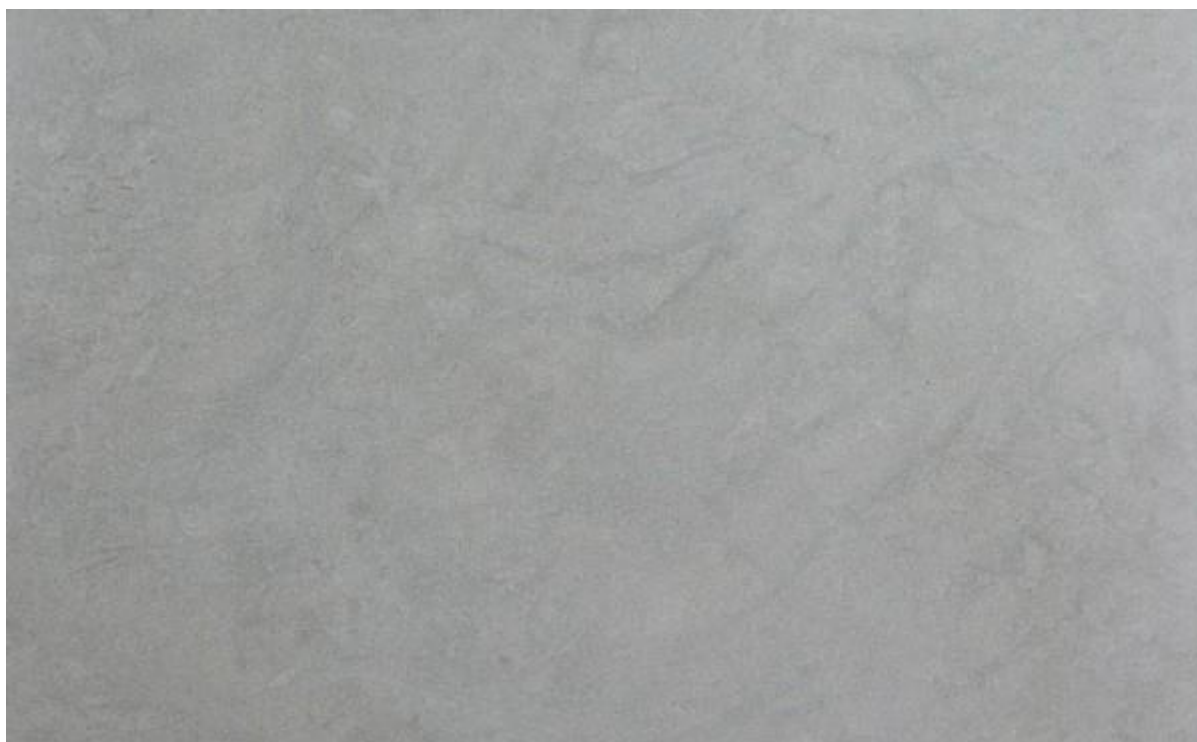


Bateig Azul

Piedra de Novelda



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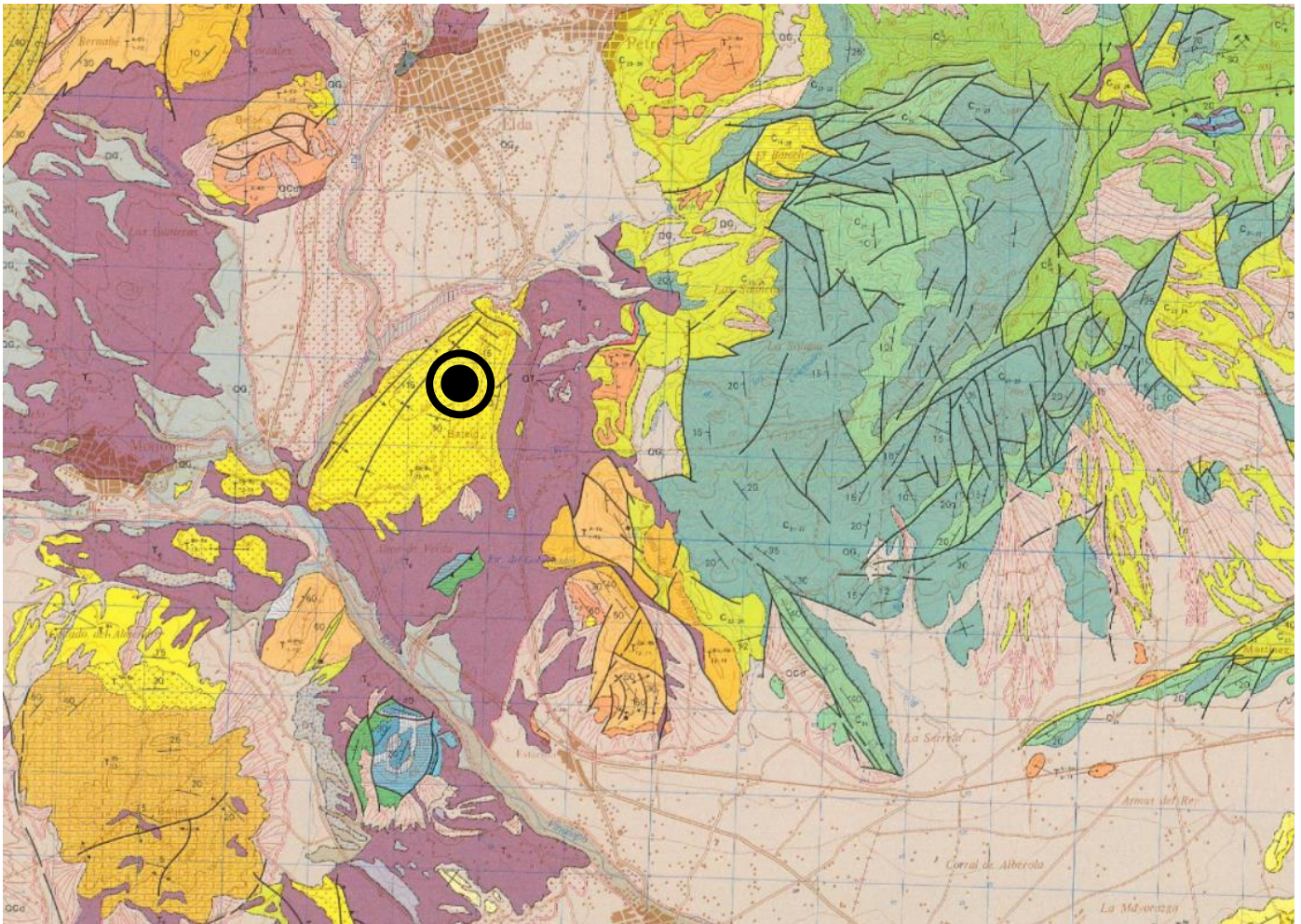
5 cm

Short description:

Bluish porous calcarenite with homogeneous aspect.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Limestone (calcarenite)	grey	Spain	Alicante	Elda Novelda	Elda Novelda

Geological setting



Geology:

The Bateig Limestone is quarried in the surrounding of Novelda (Alicante province, SE Spain). This Middle Miocene calcarenite is part of the fill of one of the so-called Eastern Prebetic basins located in the External Zones of the Betic Cordillera. These small Neogene basins were controlled by folding and diapirism related to the evaporitic mudstones of the Keuper. From sedimentological point of view, Bateig sonte primary sediments belong to a continental shelf with no continuous deposition marked by erosional unconformities, strongly agitated waters that are ideals for benthic, nektonic and planktonic organisms, whilst, simultaneously, causing strong reworking and movement of sediments. Sediments displays abundant organic shells (mainly foraminifera), detrital quartz and neoformed silicates (attapulgitite, glauconite and cristobalite). Sedimentary structures such as extensive bioturbation, burrows and flaser bedding are abundant. A 97 m-thick stratigraphic section is recognized including a lower bioturbated unit that accounts for most of the succession (84 m) and an upper slightly coarser-grained unit where physical sedimentary structures are dominant over biogenic traces.

Geological age: Middle Miocene

Geological unit: Eastern Prebetic basins

Application, use and heritage



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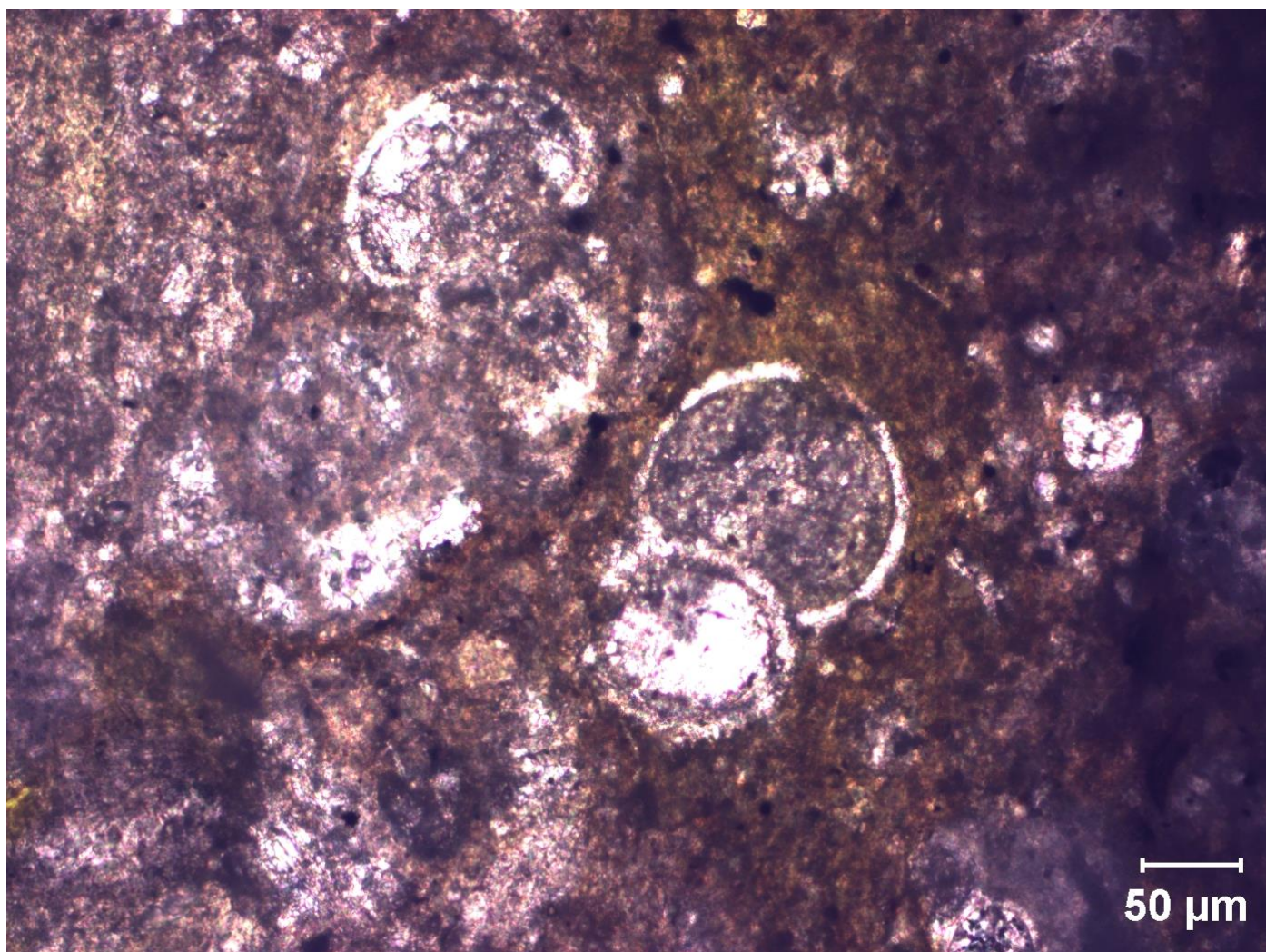
Description:

Nowadays, the Bateig limestone is a broadly used as building material in modern constructions (paving, cladding, etc.) as well as in artefacts and sculptures, being considered as one of the most important dimension stones of Spain at both national and international level.

From a historical point of view, Bateig limestone is used in monumental Spanish architecture since XIXth-XXth century, mainly in Madrid (Linares Palace, Almudena Cathedral, etc.) and Valencia (General Post Office, the City Hall, etc.), and Alicante (some modernist houses). However, the use of this building rock at a local and regional level comes back to the XIIIth century (La Mola castle or San Pedro church in Novelda). During XIXth and XXth centuries, the Bateig limestone was used in the restoration of several important monuments of Spain such as the Almudena Cathedral (Madrid), the cathedral of León, Sevilla or Cuenca.

The Bateig Azul variety is highly appreciated nowadays, but perhaps, its use in cultural heritage is more limited than other Bateig varieties such as White or Llano varieties.

Petrography



Description:

Biomicrite with 15% of terrigenous components (mainly quartz, dolostone and K-feldspar and phyllosilicates). It has been identified clay galls and also clay filling shells. The 60% of components are fossils (foraminifera, bryozoa, echinodermata). The 15% are orthochems (10% micritic matrix; 5% sparry cement). Porosity is lower to 10%.

Source of information:

- 1) Geological Survey of Spain (IGME)
- 2) Ordoñez, S., Louis, M., García-del-Cura, M.A., Fort, R., López de Azcona, M.C. and Mingarro, F. (1994): Physical properties and petrographic characteristics of some Bateig stone varieties. 7th International IAEG Congress. Proceedings Book.
- 3) Gibert, J.M., Goldring, R. (2008): Spatangoid-produced ichnofabrics (Bateig Limestone, Miocene, Spain) and the preservation of spatangoid trace fossil. Palaeogeography, Palaeoclimatology, Palaeoecology, 270: 299-310.

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Mineral 1 (%)	Mineral 2 (%)	Mineral 3 (%)	Mineral 4 (%)	Mineral 5 (%)	Mineral 6 (%)	Mineral 7 (%)
Calcite (86 %)	Dolomite (2%)	Feldspars (2%)	Clay minerals (2%)	Quartz (8%)	Muscovite (AM)	Tourmaline (AM)

Source of information:

- 1) Spanish Geological Survey;
- 2) RockMaquina – Piedras naturales, maquinaria y equipos.
- 3) Ordoñez, S., Louis, M., García-del-Cura, M.A., Fort, R., López de Azcona, M.C. and Mingarro, F. (1994): Physical properties and petrographic characteristics of some Bateig stone varieties. 7th International IAEG Congress. Proceedings Book.

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
2310	12.74	4.32	35.50	12.8

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	

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, mm	Method B - Böhme Abrasion Test, cm ³ / 50cm ²	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm

Source of information:

- 1) Spanish Geological Survey;
- 2) RockMaquina – Piedras naturales, maquinaria y equipos.
- 3) Ordoñez, S., Louis, M., García-del-Cura, M.A., Fort, R., López de Azcona, M.C. and Mingarro, F. (1994): Physical properties and petrographic characteristics of some Bateig stone varieties. 7th International IAEG Congress. Proceedings Book.

Sources of more information

Type of information	Name of provider	URL
This data sheet	Spanish Geological Survey RockMaquina – Piedras naturales, maquinaria y equipos.	
Non-commercial directory	Spanish Geological Survey	
Commercial directory	Bateig Company	www.bateig.com
Scientific publication		
Other publication		

Compiled by:	Instituto Geológico y Minero de España (IGME) http://www.igme.es/	 Instituto Geológico y Minero de España
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