



GLOBALSTONE
c o n g r e s s 2 0 2 3

7th EDITION

MOSTEIRO DA BATALHA
BATALHA, PORTUGAL

PROCEEDINGS

18TH - 23RD OF JUNE 2023



ASSIMAGRA
MINERAL RESOURCES OF PORTUGAL



**CLUSTER
PORTUGAL
MINERAL
RESOURCES**



**UNIVERSIDADE
DE ÉVORA**

Natural Stones from Portugal – Proposal for harmonizing Commercial Names

J. Carvalho^{1*}, C. Carvalho¹, L. Lopes², A. Silva³, C. Santos,² L. Sousa⁵, R. Martins², C. Marques⁴

(44) LNEG – National Laboratory for Energy and Geology, *jorge.carvalho@lneg.pt

(45) UÉVORA – University of Évora and ICT – Earth Sciences Institute

(46) CTCV – Technological Centre for Ceramics and Glass,

(47) ASSIMAGRA – Portuguese Association of the Mineral Resources Industry,

(48) UTAD – University of Trás-os-Montes and Alto Douro and CGEO - Geosciences Center, University of Coimbra

Summary: *Over the years, the Portuguese Geological Survey – LNEG, has been dedicated to the characterization of Portuguese natural stones. Today, a newly updated LNEG web portal contains information on 149 natural stones, which are known by their unique trade names. Many of these names integrate the EN 12440 - Natural Stone - Denomination Criteria standard, but others do not. Furthermore, there many other names used to identify natural stones that are traded today and that do not integrate the LNEG web Portal or the EN 12440. This work presents a harmonization proposal for the commercial denomination of the Portuguese natural stones. It is a working basis for a final list that must be submitted to ISO/Technical Committee 118 – Natural Stones.*

Key words: *natural stones, commercial names, denomination criteria, harmonization, European standard*

Introduction

In the early 80's of the past century, LNEG – National Laboratory for Energy and Geology (Portuguese Geological Survey), through its predecessor public institutions, began to characterize and catalogue the natural stones quarried in Portugal. This initial work resulted in the first Portuguese Ornamental Stones Catalogue, published in 4 volumes between 1983 and 1994, and 8 supplementary technical sheets edited between 1995 and 2000. At the beginning of the 21st century, the 1st computerized version of the Catalogue began to be developed and a Portuguese Ornamental Stones Portal was included in LNEG's website. It was updated with a new version in 2021 (<https://geoportal.lneg.pt/en/databases/rop/>), encompassing all the information contained in the catalogue, in addition to new functionalities of which the “search by features” stands out. Over the years, some new stones have been added to the Portal, which currently contains information regarding 149 commercial names.

Meanwhile, based on data from both LNEG's Ornamental Stones Catalogue and Portal, other printed and online catalogues have emerged with the aim of disseminating and promoting the Portuguese natural stones (e.g., <http://www.primeirapedra.com/stones/> and <https://stonebyportugal.com>), most of them endorsed by ASSIMAGRA, one of the Portuguese industrial associations dedicated to mineral resources.

The criteria determining the inclusion of stones with varied commercial names were not always the same, both in the Catalogue and in the web portals. It depended mainly on the commercial interests of the extractive companies, since they provided the samples for testing and also named their own stones. New commercial names were often given to stones with a name already well established in the market. Furthermore, natural variability contributed to this disorganization. Legal questions are also a key-point, since some commercial names are registered trademarks.

Today there is awareness that a unique type of stone can be traded under different commercial names, despite what the rational should be: assigning a unique commercial name to each type of stone. Indeed, in the world of construction materials, well-known traditional commercial names are often considered as more relevant quality certificates than stone scientific names or technological tests.

In this context of building materials, many of the names of the Portuguese natural stones are part of the EN 12440 – Natural Stone - Denomination Criteria. This European standard provides a list of names under which most EU stones are known and should be used when trading them. However, the Portuguese list in EN 12440 is strongly outdated, no longer matching what is currently published in the LNEG's Natural Stones Portal,

nor with the natural stones that are being quarried and traded nowadays.

This paper aims to disclose the work carried out to harmonize the nomenclature of Portuguese natural stones. The list of commercial names presented here is a working basis for a final list to be submitted to ISO/Technical Committee 118 – Natural Stones, to be analysed, voted and hopefully accepted to be included in the next revision of EN 12440. Some names may be included or excluded from the list, depending on the methodological criteria that are still being worked on.

Methodology

A small working group took the task of harmonizing the names of the Portuguese natural stones. It integrates staff from the entities that have been most dedicated to this issue over recent years, namely LNEG – National Laboratory for Energy and Geology, ASSIMAGRA - Portuguese Association of the Mineral Resources Industry, CTCV - Technological Centre for Ceramics and Glass, and the universities of Évora and Trás-os-Montes and Alto Douro. The adopted methodology consisted of consecutive decision-making actions.

The first decision was the adoption of the denomination criteria set out in EN 12440, *i.e.*, that the commercial name must be accompanied by the stones' petrological family/group (according to EN 12407 and EN 12670), typical colour and its place of origin. There are no petrographic studies allowing the correct determination of the petrological family/group of all stones currently marketed, which should be a factor for their exclusion from a list of stones to be included in EN12440. However, the reality is that they are being commercialized, which is why, at least temporarily, they continue to be part of the list that is now presented. The colour of each stone was chosen from the list of 20 colours presented in Table I. The list tries to avoid the use of fancy colour names, and was recently defined within the framework of the Eurolithos project (Carvalho & Heldal, 2020).

Table I – List of colour names for natural stones

Natural Stone Colours	
Beige	Grey-green
Black	Light grey
Black-green	Light pink
Blue	Multi-coloured
Blue-grey	Pink
Brown	Red
Dark grey	Reddish brown
Green	White
Grey	White-black
Grey-brown	Yellow

A second decision was to exclude the stones considered as heritage stones, *i.e.*, those that are no longer being exploited, nor are they expected to be in the short/medium term for several reasons (lack of mineral reserves, land-use planning or environmental issues, etc.).

Thirdly, it was agreed to include in the new list all the stones for which production is expected to continue on a regular basis over the next few years, despite not yet being included in the Portuguese Ornamental Stones Portal.

Finally, considering the three main types of natural stones in Portugal – granites, limestones and marbles – some specific decisions were taken. It is usual that each granite, limestone or marble quarrying site produces more than one type of stone, which is due to chromatic and/or textural variations in the mineral deposit. These unique aesthetic features may result from surface weathering processes in granites, or different sedimentary layers in limestones, or particular metamorphic processes in the marbles case, amongst others.

The chromatic and/or textural variations may result from significant mineralogical and microstructural differences, which will necessarily have repercussions on their physical-mechanical characteristics. On the other hand, the stones can differ chromatically and/or texturally without showing significant differences in their physical-mechanical characteristics. In all these cases, the decision was to consider them different natural stones with specific commercial names.

Another common case is that of adjacent quarries exploiting the same stone type, which is traded with different commercial names due to individual marketing options. For these cases it was decided to adopt the name already established in the market, or the most consensual one; the remaining being taken alternatively, up to a maximum of two.

Results

The result of the work carried out with all the commercial names known by the work team for Portuguese natural stones is the list of names presented in Table II. It is organized according to the main groups of natural stones and comprises a total of 160 different natural stone varieties, where 92 correspond to commercial granites, 27 to limestones, 29 to marbles, 11 to slates and one migmatite belonging to the miscellaneous group of natural stones. The total surpasses the current number of stones in the LNEG's Ornamental Stones Portal, because the inclusion of each new type of stone in this Portal

depends, above all, on the willingness of stone companies to provide the specimens for the necessary analysis and tests.

Conclusions

Natural Stone Declarations of Performance contain the natural stones' commercial name, place of origin and relevant characteristics for the products to which they relate. Updating the current trade names of Portuguese natural stones has strong commercial implications

because it can contribute to mitigate the harmful effects of some existing disorder. At the same time, we hope that an updated list of Portuguese natural stones in EN 12440 standard may push companies to better comply with it.

Table II – Projected list of Portuguese natural stone commercial names for the next revision of the EN 12440.

Commercial Name	Alternative 1	Alternative 2	Colour	Group	Lithology	Municipality
AMARELO ALPENDORADA			yellow	Granite	Granite	Marco de Canaveses
AMARELO ARIZ			yellow	Granite	Granite	Moimenta da Beira
AMARELO AZÊVO			yellow	Granite	Granite	Pinhel
AMARELO BOTICAS			yellow	Granite	Granite	Boticas
AMARELO CARDIELOS	Amarelo Samonde		yellow	Granite	Granite	Nogueira
AMARELO CARRAZEDA	Amarelo Samorinha		Yellow	Granite	Granite	Carrazeda de Ansiães
AMARELO CASTRO DAIRE			yellow	Granite	Granite	Castro Daire
AMARELO CAVEZ	Amarelo Vitória	Amarelo Moimenta	yellow	Granite	Granite	Cabeceiras de Basto
AMARELO FIGUEIRA			yellow	Granite	Granite	Figueira de Castelo Rodrigo
AMARELO FONTE ARCADADA			yellow	Granite	Granite	Sernancelhe
AMARELO GALHO			yellow	Granite	Granite	Vieira do Minho
AMARELO GONDOMAR	Ouro Velho		yellow	Granite	Granite	Guimarães
AMARELO JARMELO SÃO PEDRO	Amarelo Pínzio		yellow	Granite	Granite	Guarda
AMARELO LAPA			yellow	Granite	Granite	Aguiar da Beira
AMARELO LUZELOS	Amarelo Pardo		yellow	Granite	Granite	Carrazeda de Ansiães
AMARELO MACIEIRA	Amarelo Beirão		yellow	Granite	Granite	Sernancelhe
AMARELO MANGUALDE	Amarelo Corvaceira		yellow	Granite	Granite	Mangualde
AMARELO MONDIM			yellow	Granite	Granite	Mondim de Basto
AMARELO PENAFIEL			yellow	Granite	Granite	Penafiel
AMARELO PONTE DE LIMA	Amarelo Limiano	Amarelo Estorãos	yellow	Granite	Granite	Ponte de Lima
AMARELO SÃO DOMINGOS	Amarelo Penas Covas		yellow	Granite	Granite	Montalegre
AMARELO SÃO MARTINHO			yellow	Granite	Granite	Monção
AMARELO SOAJO			yellow	Granite	Granite	Arcos de Valdevez
AMARELO SOUSELO			yellow	Granite	Granite	Cinfães
AMARELO TALHADAS			yellow	Granite	Granite	Sever do Vouga
AMARELO TRIGO	Amarelo Penedono	Amarelo Estrela	yellow	Granite	Granite	Penedono
AMARELO VALPAÇOS			yellow	Granite	Granite	Valpaços
AMARELO VILA REAL	Amarelo Real	Amarelo Torre	yellow	Granite	Granite	Sabrosa, Vila Real, Vila Pouca de Aguiar
AMARELO VIMIEIRO			yellow	Granite	Granite	Arraiolos
AZUL AIRÃO			blue-grey	Granite	Granite	Guimarães
AZUL BOTICAS			blue-grey	Granite	Granite	Boticas
AZUL CASTRO DAIRE	Cinzento Castro Daire		blue-grey	Granite	Granite	Castro Daire

Commercial Name	Alternative 1	Alternative 2	Colour	Group	Lithology	Municipality
AZUL GALHO			blue-grey	Granite	Granite	Vieira do Minho
AZUL GONDOMAR	Cinza Gondomar	Cinza Guimarães	blue-grey	Granite	Granite	Guimarães
AZUL LEIJAL			blue-grey	Granite	Granite	Montalegre
AZUL LIMAGA			blue-grey	Granite	Granite	Trancoso
AZUL PONTE DE LIMA	Cinza Limiano	Cinzento Ponte de Lima	blue-grey	Granite	Granite	Ponte de Lima
AZUL TRAGAL	Cinzento Tragal	Cinza Tragal	blue-grey	Granite	Granite	Mogadouro
AZUL TRANSMONTANO	Azul Cristal Transmontano	Azul Águas Frias	blue-grey	Granite	Granite	Chaves
AZUL VALPAÇOS			blue-grey	Granite	Granite	Valpaços
BRANCO AGUIAR	Branco Micaela		light-grey	Granite	Granite	Aguiar da Beira
BRANCO ALMEIDA			light-grey	Granite	Granite	Almeida
BRANCO CANDOSO	Branco Vila Flor	Cinzento Carrazeda	light grey	Granite	Granite	Vila Flor
BRANCO CARAVELA			light grey	Granite	Granite	Castelo de Vide
BRANCO CORAL	Coral White	Branco Miguel	light grey	Granite	Granite	Viseu
BRANCO LAPA			light grey	Granite	Granite	Nelas
BRANCO MACIEIRA	Branco Diamante		light grey	Granite	Granite	Sernacelhe
BRANCO PÉROLA	Branco Atlântico		light grey	Granite	Granite	Monção
BRANCO VILA REAL	Branco Real		light grey	Granite	Granite	Sabrosa, Vila Real, Vila Pouca de Aguiar
BRANCO VIMIEIRO	Silver White	Kristal White	light grey	Granite	Granite	Arraiolos
CASAS DA SERRA			yellow	Granite	Granite	Boticas
CINZA CLARO SÃO DOMINGOS			grey	Granite	Granite	Montalegre
CINZA ESCURO BRAGA	Azul Palmeira	Cinza Lagido	dark grey	Granite	Granite	Braga
CINZA FINO			grey-brown	Granite	Granite	Pinhel
CINZA LAPA			grey	Granite	Granite	Aguiar da Beira
CINZA PÓVOA			grey	Granite	Granite	Póvoa de Lanhoso
CINZA RIO DE MEL			grey	Granite	Granite	Trancoso
CINZALA	Cinzento Sta. Eulália		grey	Granite	Granite	Elvas
CINZENTO ALPENDORADA	Azul Alpendorada	Cinzento Claro	grey	Granite	Granite	Marco de Canaveses
CINZENTO ANTAS	Antas Grise	Grigio Aveiro	grey	Granite	Granite	Penalva do Castelo
CINZENTO ARIZ	Cinza Ariz	Zira Grey	grey	Granite	Granite	Moimenta da Beira
CINZENTO ARRONCHES	Cinza Arronches		grey	Granite	Granite	Arronches
CINZENTO CARAMULO			grey	Granite	Granite	Tondela
CINZENTO CARRAZEDA			grey	Granite	Granite	Carrazeda de Ansiães
CINZENTO CINFÃES	Cinzento Montemuro		grey	Granite	Granite	Cinfães
CINZENTO ESCURO RORIZ			dark grey	Granite	Granodiorite	Santo Tirso, Paços de Ferreira
CINZENTO ÉVORA	Branco-Preto Barrocal	Cinza Évora	grey	Granite	Granodiorite	Évora
CINZENTO FORNOS			grey	Granite	Granite	Fornos de Algodres
CINZENTO JARMELO SÃO PEDRO	Cinzento Arrifana		grey	Granite	Granite	Guarda
CINZENTO MANGUALDE	Cinzento Corvaceira		grey	Granite	Granite	Mangualde
CINZENTO PENAFIEL	Cinza Penafiel	Azul Penafiel	grey	Granite	Granite	Penafiel
CINZENTO PENALVA	Cinzento Esmolfe		grey	Granite	Granite	Penalva do Castelo
CINZENTO PÉROLA			grey	Granite	Granite	Penedono
CINZENTO PINHEL	Branco Ricão		grey	Granite	Granite	Pinhel

Commercial Name	Alternative 1	Alternative 2	Colour	Group	Lithology	Municipality
CINZENTO SÁTÃO	Silva Fine Grey		grey	Granite	Granite	Satão
CINZENTO TELÕES	Cinza Telões		grey	Granite	Granite	Vila Pouca de Aguiar
FAVACO	Cinzento Favaco	Preto Favaco	dark grey	Granite	Diorite	Elvas
GRAN PERLA	Perla Cinzento		grey	Granite	Granite	Cabeceiras de Basto
JANÉ	Gneisse Chainça	Cinza Alagoa	blue-grey	Granite	Gneiss	Castelo de Vide
MACHEADO CASTRO DAIRE			yellow	Granite	Granite	Castro Daire
OTELO	Lages	Pinheiro	grey	Granite	Granite	Marco de Canaveses
PEDRAS SALGADAS	Cinzento Claro Pedras Salgadas		grey	Granite	Granite	Vila Pouca de Aguiar
PRETO ARRONCHES	Gabrodiorito Arronches		dark grey	Granite	Diorite	Arronches
PRETO ODIVELAS	Gabro Odivelas		black	Granite	Gabbro	Ferreira do Alentejo
PRETO SANTA COMBA	Negro Santa Comba		dark grey	Granite	Granodiorite	Vila Nova de Foz Côa
ROSA ARRONCHES			pink	Granite	Granite	Arronches
ROSA MONÇÃO	Rosa Minho	Crema Júlia	pink	Granite	Granite	Monção, Valença
ROSA MONFORTE	Forte Rosa	Rosa D. João	pink	Granite	Granite	Monforte
ROSA REBOLEIRO	Salmon Reboleiro	Salmon Imperial	pink	Granite	Episyenite	Trancoso
ROSA SANTA EULÁLIA			pink	Granite	Granite	Elvas
SIENTO MONCHIQUE	Cinzento Monchique	St. Louis	grey-brown	Granite	Nepheline syenite	Monchique
SPI ALPALHÃO	Azul Alpalhão	Cinza Alpalhão	grey	Granite	Granite	Nisa
ABANCADO	Lioz Abancado		beige	Limestone	Limestone	Sintra
ALPININA	Alpinina Clara	Topázio	beige	Limestone	Limestone	Porto de Mós, Ourém, Santarém, Alcanena
AMARELO NEGRAIS			yellow	Limestone	Limestone	Sintra
ANÇÃ	Pedra Ançã	Calcário Ançã	white	Limestone	Limestone	Cantanhede
AZUL CADOIÇO	Vidraço Portela Azul		blue-grey	Limestone	Limestone	Alcobaça
AZUL FERREIRAS	Lagos Blue	Vidraço Escarpão	blue-grey	Limestone	Limestone	Albufeira
AZUL MOLEANOS	Moleanos Azul		blue-grey	Limestone	Limestone	Alcobaça
AZUL VALVERDE	Azul Mónica		blue-grey	Limestone	Limestone	Santarém
BRANCO VALONGO			beige	Limestone	Limestone	Rio Maior
BRECHA SANTO ANTÓNIO	Brecha Marítima		grey-green	Limestone	Limestone	Porto de Mós
BRECHA TAVIRA	Brecha Vermelha	Brecha Tavira Vermelha	reddish brown	Limestone	Limestone	São Brás de Alportel
CREME FÁTIMA	Creme Casal	Faticreme	beige	Limestone	Limestone	Ourém
ENCARNADÃO	Encarnado Lameiras	Encarnado Pedra Furada	red	Limestone	Limestone	Sintra
LAGOS GOLD			beige	Limestone	Limestone	Albufeira
LIOZ	Lioz Pero Pinheiro	Lioz Azulino	beige	Limestone	Limestone	Sintra
MOCA CREME	Moca Creme Clássico	Moca Creme Grão Grosso	beige	Limestone	Limestone	Santarém
MOCA PERLINA			beige	Limestone	Limestone	Santarém
MOCA RELVINHA	Relvinha	Moca Creme Grão Fino	beige	Limestone	Limestone	Santarém
MOLEANOS	Vidraço Moleanos	Creme Moleanos	beige	Limestone	Limestone	Alcobaça
MOLEANOS RIJO			beige	Limestone	Limestone	Alcobaça
SEMI-RIJO ARRIMAL	Salgueira	Branco Mar	beige	Limestone	Limestone	Porto de Mós, Rio Maior
SEMI-RIJO CABEÇA VEADA			beige	Limestone	Limestone	Porto de Mós, Santarém

Commercial Name	Alternative 1	Alternative 2	Colour	Group	Lithology	Municipality
SEMI-RIJO CODAÇAL	Rosal		beige	Limestone	Limestone	Porto de Mós
ST. FLORIENT ROSE			light pink	Limestone	Limestone	Sintra
VIDRAÇO ATAÍJA AZUL			blue-grey	Limestone	Limestone	Alcobaça
VIDRAÇO ATAÍJA CREME			beige	Limestone	Limestone	Alcobaça
VIDRAÇO PORTELA CREME			beige	Limestone	Limestone	Alcobaça
AZUL LAGOA	Azul Guerra		grey	Marble	Marble	Vila Viçosa
BRANCO BORBA	Branco Venado Borba	Branco Vergado Borba	white	Marble	Marble	Borba
BRANCO ESTREMOZ	Branco Venado Estremoz	Branco Vergado Estremoz	white	Marble	Marble	Estremoz
BRANCO LAGOA	Branco Venado Lagoa	Branco Vergado Lagoa	white	Marble	Marble	Vila Viçosa
BRANCO PARDAIS	Branco Venado Pardais	Branco Vergado Pardais	white	Marble	Marble	Vila Viçosa
BRANCO ROSADO ESTREMOZ	Branco Rosado		white	Marble	Marble	Estremoz
BRANCO VENADO POÇO BRAVO			white	Marble	Marble	Borba
BRANCO VIGÁRIA	Branco Venado Vigária	Branco Vergado Vigária	white	Marble	Marble	Vila Viçosa
CREME BORBA	Creme Venado Borba	Creme Vergado Borba	beige	Marble	Marble	Borba
CREME MOURO			beige	Marble	Marble	Borba
CREME ESTREMOZ	Creme Venado Estremoz	Creme Vergado Estremoz	beige	Marble	Marble	Estremoz
CREME LAGOA	Creme Venado Lagoa	Creme Vergado Lagoa	beige	Marble	Marble	Vila Viçosa
CREME PARDAIS	Creme Venado Pardais	Creme Vergado Pardais	beige	Marble	Marble	Vila Viçosa
CREME ROSADO PARDAIS	Creme Rosado Fonte da Moura		light pink	Marble	Marble	Vila Viçosa
CREME VIGÁRIA	Creme Venado Vigária	Creme Vergado Vigária	beige	Marble	Marble	Vila Viçosa
FICALHO			multi-coloured	Marble	Marble	Serpa
PELE DE TIGRE			white-black	Marble	Marble	Borba
ROSA BORBA	Rosa Venado Borba	Rosa Vergado Borba	pink	Marble	Marble	Borba
ROSA ESTREMOZ	Rosa Venado Estremoz	Rosa Vergado Estremoz	pink	Marble	Marble	Estremoz
ROSA LAGOA	Rosa Venado Lagoa	Rosa Vergado Lagoa	light pink	Marble	Marble	Vila Viçosa
ROSA PARDAIS	Rosa Venado Pardais	Rosa Vergado Pardais	pink	Marble	Marble	Vila Viçosa
ROSA PORTUGAL	Rosa Aurora	Rosa Puro	pink	Marble	Marble	Borba
ROSA VENADO POÇO BRAVO			pink	Marble	Marble	Borba
ROSA VIGÁRIA	Rosa Venado Vigária	Rosa Vergado Vigária	pink	Marble	Marble	Vila Viçosa
RUIVINA	Ruivina Escuro		dark grey	Marble	Marble	Borba
RUIVINA CLARO	Ruivina Fonte da Moura		grey	Marble	Marble	Borba
TRIGACHES	Cinzento Anegrado Trigaches	Cinzento Claro Trigaches	grey	Marble	Marble	Beja
VERDE SERPA	Verde Atlântico		green	Marble	Marble	Serpa
VERDE VIANA	Verde Sampaio	Verde Viana Cristal	green	Marble	Marble	Viana do Alentejo