



MINING AND METALLURGY INSTITUTE BOR
TECHNICAL FACULTY BOR, UNIVERSITY OF BELGRADE



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**International October
Conference**

**47th International October Conference
on Mining and Metallurgy**

PROCEEDINGS

Editors:

**Ana Kostov
Milenko Ljubojev**

**4th – 6th October 2015
Hotel “Jezero” Bor Lake, Serbia**



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and



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QUALITY AND USE OF MATERIALS BASED ON LIMESTONE „DOBAR KAMEN“ ARANĐELOVAC

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ABSTRACT

This paper presents the quality and applicability of certain products, based on limestone from the site "Cancar", which is processed in "Dobar kamen" doo Arandjelovac. It can be seen from the results that the products are intended for the rubber and PVC, and PVC floors meet the prescribed quality standards SRPS.

Keywords: limestone sites "Cancar", limestone for rubber and PVC, quality of limestone

1 INTRODUCTION

Limestone is a sedimentary carbonate rock [1] which is largely built from pure calcite. The quality of limestone depends on the mineral composition and content of impurities in it [2]. In his book [3], the author Brzaković says the importance of limestone as compared to the other walls of any origin proves the fact that the limestone outperforms the overall implementation of all other rocks together. This paper gives an overview of possible enhancement of calcium carbonate raw material from the deposit "Cancar" - in Arandjelovac. Limestone which is processed at the facility for production delivery from close range (about 12.5 km), with the surface mine "Cancar" which is owned by the company "Dobar kamen", where there is a mobile crushing plant for crushing the feedstock plumpness 100% - 63mm. Thus delivered raw material processed in the plant dry micronization and provides different range of products.

2 EKSPERIMENTAL

2.1 Basic characteristics of raw material

Analysis of the chemical composition of the raw material limestone from the site "Cancar" is given in Table 1. The analysis was made on the atomic absorption spectrophotometer "Perkin Elmer Analyst 703 300". The results, given in Table 1, show that limestone has very high degree of purity due to the content of CaO of 55.22%. A lot of good chemical composition uniformity deposits can be also seen because a technology probe of CaO was 52.28%.

Measuring the level of whiteness as the main quality parameters firm "Dobar Kamen" follows the daily in its own device. It is a non-contact colorimeter for powder materials manufacturer X-rite, Model VS-150, connected to a computer. The average value of t white balance for the whole deposit is about 90% (standard is 100% MgO).

Table 1 Statistical analysis of the chemical composition of limestone from the site "Cancar"

Elements	Minimum value, (%)	Maximum value, (%)	Average, (%)	Technological test, (%)
SiO ₂	0.12	0.37	0.23	0.20
Al ₂ O ₃	0.22	0.28	0.24	0.23
Fe ₂ O ₃	0.09	0.14	0.12	0.11
MnO	-	0.02	0.01	0.01
MgO	0.24	0.34	0.28	0.27
CaO	55.10	55.37	55.22	55.28
Na ₂ O	0.13	0.17	0.14	0.11
K ₂ O	-	-	-	
P ₂ O ₅	-	0.02	-	tr.
CO ₂	43.40	43.65	43.51	43.55
SO ₃	-	0.04	0.02	tr.
Moisture	0.06	0.10	0.08	0.07
Organic materials	0.03	0.06	0.04	0.03

2.2 Characteristics of some products

Production program "Dobar kamen" has the following products:

- Micronized Products (III with lines): - 10 µm; -10 µm MG; -20 µm W; -20 µm; -24 µmW; -20 µmG; -4 5µmW; -45 µmG
- Milled products (with Lines II): -063 µmW; -063 µmG; -100 µm; -100 µmG; 150 µmW; -150µmG; -200 µmW; -200µm WDKT; -200 µmG; -200 µmGDKT
- Fillers: Filer 1x ground; Animal chalk-large; Filer 2x ground; Animal chalk-small
- Crushed and sieved products (Line I): wood: 0.2-0.8 mm; granulate 0.2-1.2 mm; granules 1.2-2 mm; grit 1.2-2.2 mm.
- Crushed products: UNIT 0-30 mm; PEBBLES 0-60 mm; quarry Stone; crushed stone with caps; RIZLA

This paper gives the characteristics of two products from the production company that has a "Dobar kamen". Table 2 is a comparative survey of the quality that is required by SRPSB.B6.031 and achieved quality on the basis of limestone from the deposit "Cancar". Table 3 gives a comparative overview of the quality requirements and test results of products that are used in the company "Tarkett" PVC flooring. From the results, listed in Tables 2 and 3, it can be seen that the products of limestone intended for rubber and PVC material as the product intended for additive in the production of PVC floors in "Tarkett" meet the quality requirements [4].

Table 2 Required and actual quality of calcium carbonate for use in rubber and PVC industry

Required quality calcium carbonate for use in rubber and PVC (SRPSB.B6.031)						Characteristics of limestone "Cancar"	
Characteristic		Quality					
		A	B	C	D		
Rest of Stached, % , max	125µm	0.005	0.005	0.1	0.1	0.00	0.01
	45µm	0.5	0.5	5.00	5.00	0.01	3.00
Color		corresponding, according to the sample or color of the of claim listed in orders - whiteness				According to MgO 85-91	
CaCO ₃ ,at least in% (in dry sample)		98	96	98	96	98.53	
Evaporative matter at 105C (%), the most		0.4	0.4	0.4	0.4	0.14	
Insoluble matter in HCl, (%), the most		1.5	3.00	1.5	3.00	0.40	
Lo.I.at 1000°C(%), (in dry sample)		43do44.5	42do44.5	43do44.5	42do44.5	43.51	
Alkalinity, (%), Maximum (calculated on Na ₂ CO ₃)		0.03	0.03	0.03	0.03	0.01	
Total copper in ppm, maximum		15	30	15	30	-	
Total manganese in ppm, maximum		50	400	50	400	-	
Total iron in ppm, maximum		300	1000	300	1000	35.00	

In the case of products which are used for rubber and PVC material, all tested chemical and physical characteristics are the limits.

In the case of products used in "Tarkett", all values of the content of CaCO₃, Al₂O₃, Fe₂O₃, MgO are limits. Also, the conditions for grain size distribution: 60% -32µm (60.02%, moisture 0.3% (0.14%), pH 8.0 (8.6) and whiteness of 86-87% (90%) have been fulfilled.

Table 3 Comparison of image quality requirements and test results

Required quality from the firm "Tarkett doo"		Asortment20-200µm, "Dobar kamen" doo	
Chemical composition		Chemical composition	
CaCO ₃	Min 98%	CaCO ₃	Min 98.33%
Al ₂ O ₃	Max 0.2%	Al ₂ O ₃	Max 0.28%
Fe ₂ O ₃	Max 0.1%	Fe ₂ O ₃	Max 0.14%
MgO	Max 0.5%	MgO	Max 0.34%
Granulometric composition		Granulometric composition (average value)	
0-32µm	Max 60%	0-32µm	60.02%
32-40µm			7.15%
40-63µm	10%	40-63µm	10.28%
63-100µm	15%	63-100µm	13.60%
100-200µm	Max 5%	100-200µm	8.95%
>200 µm	0%	>200 µm	0.02
Moisture content		Moisture content	
W	Max 0.3%	W	Max 0.14%
pH value		pH value	
pH	Min 8.0	pH	8.6
Degree of whiteness		Degree of whiteness	
According to MgO	86-87%	According to MgO	90%



3 CONCLUSION

The paper presents the results of limestone products intended for rubber and plastic materials and products intended for additive in the production of PVC floors in "Tarkett". Testing were made on limestone from the site "Cancar" which is processed in "Dobar kamen" doo Arandjelovac. Tests have shown that these products meet the quality requirements.

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