

TEST REPORT

No. : XMCCM160500613

Date : Jun.15, 2016

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SHANDONG CHENGLONG STONE GROUP CO., LTD
LAIZHOU CITY, SHANDONG PROVINCE CHINA ZUOCUN TOWN YUNFENG INDUSTRIAL PARK

The following sample(s) was/ were submitted and identified on behalf of the client as:

Commercial Name : G3765
Petrographic Name : MONZONITIC GRANITE
Typical colour : GRAY WHITE
Manufacturer : SHANDONG CHENGLONG STONE GROUP CO., LTD
Manufacturer address : LAIZHOU CITY, SHANDONG PROVINCE CHINA ZUOCUN TOWN
YUNFENG INDUSTRIAL PARK
Place of origin : LAIZHOU CITY, SHANDONG PROVINCE, CHINA
Name of quarry : LAIZHOU HONGJIAN RING MINING CO., LTD. XING JIA HUANG HUA
NANSHAN MINE STONE MINING AREA
Address of quarry : LAIZHOU ZUOCUN TOWN
Intend use : Internal & external wall, flooring and stair
External uses and road finishes to cover external pedestrian and vehicular
circulation areas
Test required : EN 12057:2015 Natural stone products - Modular tiles - Requirements
EN 12058:2015 Natural stone products - Slabs for floors and stairs -
Requirements
EN 1469:2015 Natural stone products - Slabs for cladding – Requirements
EN 1341:2012 Slabs of natural stone for external paving – Requirements and
test methods
EN 1342:2012 Setts of natural stone for external paving – Requirements and
test methods
EN 1343:2012 Kerbs of natural stone for external paving – Requirements and
test methods
Date of Receipt : May.09, 2016
Test Period : May.09, 2016 to Jun.15, 2016
Test result(s) : For further details, please refer to the following page(s)

***** To be continued*****

Signed for
SGS-CSTC Standards Technical
Services Co., Ltd. XM Branch Testing Center



Civi Huang
Authorized Signatory



SGS-CSTC Standards Technical Services Co., Ltd.
Xiamen Branch Testing Materials Laboratory

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Summary of test results:

(Average value)

Test items	Test methods	Test results	Page
Apparent density	EN 1936:2006	2620 kg/m ³	3
Open porosity	EN 1936:2006	0.86 %	3
Water absorption	EN 13755:2008	0.29 %	3
Flexural strength in natural condition	EN 12372:2006	14.3 MPa	4
Flexural strength after 56 cycles freeze/thaw	EN 12371:2010 EN 12372:2006	14.5 MPa	4
Abrasion resistance (polished)	EN 14157:2004 method A	19.2 mm	5
Slip resistance (polished)	CEN/TS 16165:2012 Annex C EN 14231:2003	SRV "dry": 72 SRV "wet": 14	5
Compressive strength in natural condition	EN 1926:2006	169 MPa	6
Compressive strength after 56 cycles freeze/thaw	EN 12371:2010 EN 1926:2006	175 MPa	6
Breaking load at dowel hole	EN 13364:2001	1700 N	7
Petrographic description	EN 12407:2007	Monzonitic Granite	8

***** To be continued*****



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1. Apparent density and open porosity

Test Method:

EN 1936:2006 Natural stone test methods - determination of real density and apparent density and of total and open porosity

Specimens: 6 cubes having 50mm edge, all specimens are in natural condition with sawn faces

Test Result:

Specimens identification No.	1	2	3	4	5	6
Apparent density (kg/m ³)	2620	2620	2610	2620	2610	2620
Arithmetic mean of the apparent density (kg/m ³)	2620					
Open porosity (%)	0.89	0.88	0.90	0.87	0.76	0.88
Arithmetic mean of the open porosity (%)	0.86					

2. Water absorption

Test Method:

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

Specimens: 6 cubes having 50mm edge, all specimens are in natural condition with sawn faces

Test Result:

Specimens identification No.	1	2	3	4	5	6
Water absorption (%)	0.29	0.28	0.30	0.29	0.30	0.30
Arithmetic mean of the water absorption (%)	0.29					

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3. Flexural Strength in natural condition and subjected to frost test

Test Method:

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

EN 12371:2010 Natural stone test methods - Determination of frost resistance

Specimens: 300mm×50mm×50mm, 21pcs, all specimens are in natural condition with sawn faces

Loading rate: (0.25±0.05)MPa/s

Test Result:

Flexural strength in natural condition

Specimens identification No.	1	2	3	4	5	6	7	8	9	10
Flexural strength (MPa)	13.7	15.6	13.5	14.2	13.1	12.9	13.6	16.3	15.8	14.1
Mean value (MPa)	14.3									
Standard deviation (MPa)	1.2									
Lower expected value (MPa)	12.0									

Visual inspection after 56 freezing and thawing cycles: Scale 0, sample intact.

Flexural strength after 56 freezing and thawing cycles

Specimens identification No.	1	2	3	4	5	6	7	8	9	10
Flexural strength (MPa)	15.3	14.5	14.0	17.6	17.2	12.2	14.7	14.5	11.0	14.2
Mean value (MPa)	14.5									
Standard deviation (MPa)	2.0									
Lower expected value (MPa)	10.7									

Change in flexural strength after 56 cycles of freeze/thaw: -1.4%

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4. Abrasion resistance

Test Method:

EN 14157:2004 Natural stone - Determination of abrasion resistance Method A - Wide wheel Abrasion Test

Specimens: 150mm×100mm×20mm, 6pcs, all specimens are in natural condition with one face polished

Testing surface: polished

Test Result:

Specimens identification No.	1	2	3	4	5	6
The length of the groove (mm)	19.0	19.5	19.0	19.5	19.0	19.5
Mean value (mm)	19.2					

5. Slip resistance

Test Method:

CEN/TS 16165:2012 Determination of slip resistance of pedestrian surfaces - Methods of evaluation -

Annex C - Pendulum friction test

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

Specimens: 200mm×150mm×20mm, 6pcs, all specimens are in natural condition with one face polished

Slider material: Slider 55 rubber

Testing surface: polished

Test Result:

Specimens identification No.	1	2	3	4	5	6
Mean pendulum value (Dry condition)	72	71	71	72	72	72
Slip resistance value (SRV "dry")	72					
Mean pendulum value (Wet condition)	14	14	13	13	14	13
Slip resistance value (SRV "wet")	14					

***** To be continued*****



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6. Compressive strength in natural condition and subjected to frost test

Test Method:

EN 1926:2006 Natural stone test methods -Determination of uniaxial compressive strength

EN 12371:2010 Natural stone test methods - Determination of frost resistance

Specimens: 50mm×50mm×50mm, 21pcs, all specimens are in natural condition with sawn faces

Loading rate: (1±0.5) MPa/s

Test Result:

Compressive strength in natural condition

Specimens identification No.	1	2	3	4	5	6	7	8	9	10
Compressive strength (MPa)	163	170	165	175	164	169	176	168	164	173
Mean value (MPa)	169									
Standard deviation (MPa)	5									
Lower expected value (MPa)	159									

Visual inspection after 56 freezing and thawing cycles: Scale 0, sample intact.

Compressive strength after 56 freezing and thawing cycles

Specimens identification No.	1	2	3	4	5	6	7	8	9	10
Compressive strength (MPa)	169	181	177	173	193	173	177	169	169	169
Mean value (MPa)	175									
Standard deviation (MPa)	8									
Lower expected value (MPa)	160									

Change in compressive strength after 56 cycles of freeze/thaw: -3.6%

***** To be continued*****



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7. Breaking load at dowel hole

Test Method:

EN 13364:2001 Natural stone test methods – Determination of the breaking load at dowel hole

Specimens: 200mm×200mm×30mm, 3pcs, 4 holes were drilled on each specimen, all specimens are in natural condition with sawn faces

Diameter of the hole: 10mm, Diameter of the dowel: 8mm

Loading rate: (50±5) N/s

Test Result:

Specimens identification No.		d ₁ (mm)	b _A (mm)	Breaking load F (N)
1	Hole 1	11	42	2000
	Hole 2	9	40	1650
	Hole 3	7	30	1100
2	Hole 1	8	35	1550
	Hole 2	11	42	2300
	Hole 3	10	48	1700
	Hole 4	10	42	2100
3	Hole 1	10	36	1350
	Hole 2	9	41	1600
	Hole 3	8	35	1650
Mean value		9	39	1700
Lower expected value		/	/	1061
Standard deviation		/	/	355

d₁: Distance from the hole to the face

b_A: Maximum distance from the centre of the hole to the edge of the fracture

*****To be continued*****



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8. Petrographical description

Test Method:

EN 12407:2007 Natural stone test methods – Petrographic examination

Test Result:

CLASSIFICATION: Monzonitic granite

HAND SAMPLE DESCRIPTION

Very strong, fresh, gray white, hard. Several dark minerals and opaque particles spreader over the rock fabric in disorder. It is not easily scored with a penknife.

MICROSCOPIC DESCRIPTION

Texture	Fine-medium grained granitic texture
Structure	Massive structure
Major ingredient	Plagioclase(35-40%),Potash feldspar(30%), Quartz(20-25%), Muscovite(5%), Biotite(<5%)
Accessory mineral	Metallic(Opaque) particles, Apatite, Zircon
Secondary mineral	Kaolinite, Sericite, Chlorite, Zoisite, Epidote

MATERIAL COMPONENT	PETROGRAPHIC DETAILS
Plagioclase	Hypidiomorphic platy, which grain sizes are usually 2-3.5mm, partially 0.2-2mm, replaced by kaolinite, sericite, epidote and zoisite inordinately. zonal structure can be seen occasionally, the area where contact to potash feldspar shows metasomatic myrmekitic texture frequently. messy distribution.
Potash feldspar	Hypidiomorphic platy, which grain sizes are usually 2-4mm, partially 0.35-2mm, slight kaolinization, contain few plagioclase inclusions, muscovite inclusions and biotite inclusions, replace some parts of plagioclase, messy distribution.
Quartz	Xenomorphic granular, which grain sizes are usually 2-3.35mm, partially 0.2-2mm, occasionally 5-6mm, undulatory extinction, messy distribution.
Biotite	Flaky, brown, which grain sizes are usually 0.25-2mm, occasionally 2-2.65mm, replaced by chlorite, muscovite and epidote partially, scattered distribution.
Muscovite	Flaky, which grain sizes are usually 0.2-2mm, occasionally 2-3.5mm, replace some parts of plagioclase and biotite, scattered distribution.

*****To be continued*****



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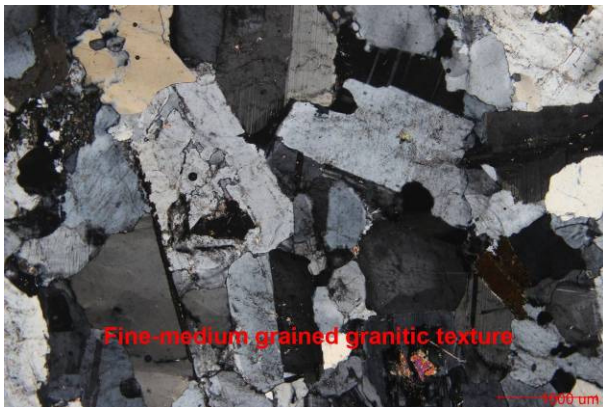
Alterations:

Kolinization, sericitization, zoisitization, epidotization and chlorization can be seen occasionally in the rock fabric.

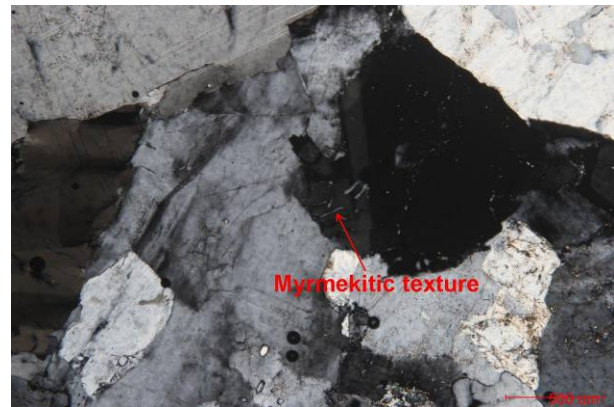
Remaks:

The rock fabric is composed of plagioclase, potash feldspar, quartz, biotite and amphibole. According to content, mineral component and texture of the rock, we named it **Fine-medium grained two-mica-bearing monzonitic granite.**

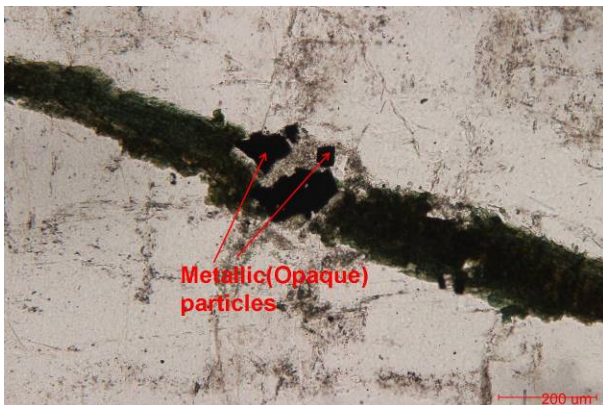
Photomicrographs



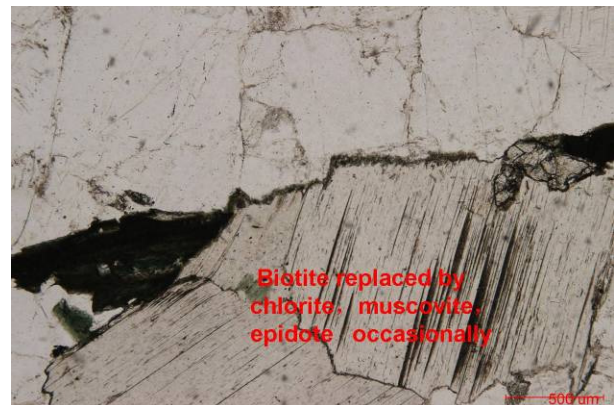
Fine-medium grained granitic texture
(Crossed polarizers)



Myrmekitic texture
(Crossed polarizers)



Metallic (opaque) particles
(Plain light)



Biotite replaced by chlorite, muscovite, epidote occasionally
(Plain light)

*****To be continued*****



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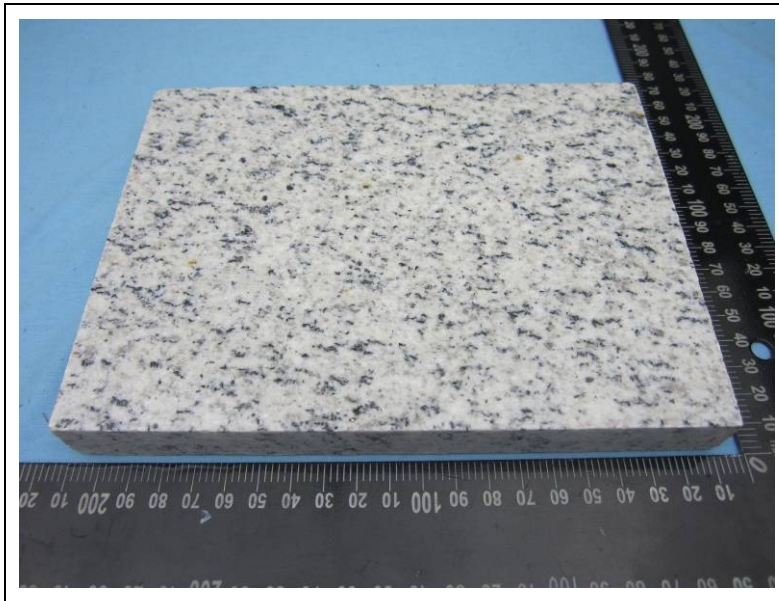
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Apatite (Plain light)

Note: The test was carried out by external laboratory assessed as competent.

Specimen photograph:



SGS authenticate the photo on original report only
*****End of report*****



SGS-CSTC Standards Technical Services Co., Ltd.
Xiamen Branch Testing Materials Laboratory

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No.31 Xianghong Road, XiangAn Torch Industrial Zone, Xiamen, Fujian Province, China. 361101 t (86-592) 5761588 f (86-592) 5765380 www.sgs.com.cn
中国·福建·厦门·火炬(翔安)产业区翔虹路31号 邮编:361101 t (86-592) 5761588 f (86-592) 5765380 e sgs.china@sgs.com