
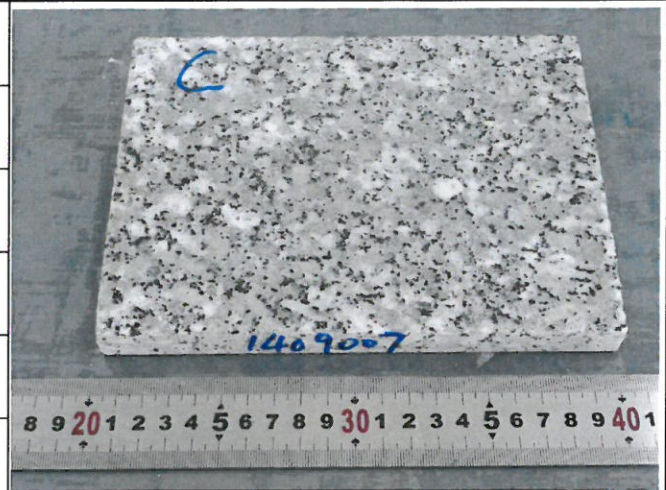


Prüfbericht-Nr.: Test Report No.:	16804179 001	Auftrags-Nr.: Order No.:	1140015559	Seite 1 von 16 Page 1 of 16
Kunden-Referenz-Nr.: Client Reference No.:	N/A	Auftragsdatum: Order date:	29.09.2014	
Auftraggeber: Client:	ENTERPRISE 380 – PHU TAI JOINT STOCK COMPANY SECTION 5, TRAN QUANG DIEU WARD, QUY NHON CITY, BINH DINH PROVINCE, VIETNAM			
Prüfgegenstand: Test item:	Natural Stone Product			
Bezeichnung / Typ-Nr.: Identification / Type No.:	Type: SL WHITE GRANITE, Colour: WHITE, Serial No.: MA82/4 Petrographic: Monzonite granite			
Auftrags-Inhalt: Order content:	Type examination			
Prüfgrundlage: Test specification:	EN 12057:2004 EN 12058:2004 EN 1469:2004 EN 1341:2012 EN 1342:2012 EN 1343:2012			
Wareneingangsdatum: Date of receipt:	16.09.2014			
Prüfmuster-Nr.: Test sample No.:	1409007			
Prüfzeitraum: Testing period:	28.09.2014 - 10.11.2014			
Ort der Prüfung: Place of testing:	See other			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (China) Ltd. Xiamen Branch			
Prüfergebnis*: Test result*:	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
28.11.2014 Luke Xu / PE 		28.11.2014 Robert Xie / Reviewer 		
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position
Sonstiges / Other:				
TÜV Rheinland (China) Ltd. Xiamen Branch Laboratory of Regional Geological Survey Institute of Hebei Province				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				



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Liste der verwendeten Prüfmittel
List of used test equipment

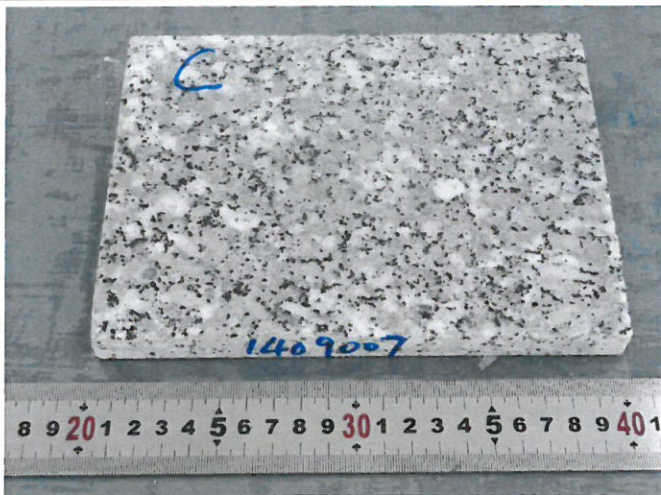
Prüfmittel Test equipment	Prüfmittel-Nr. / ID-Nr. Equipment No. / ID-No.	Nächste Kalibrierung Next calibration
TÜV Rheinland (China) Ltd. Xiamen CMT		
Electronic Balance	XMC001	2015.02.11
Drying Oven	XMC004	2015.04.10
Drying Oven	XMC005	2015.04.10
Universal Testing Machine	XMC006	2015.02.09
Compression Testing machine	XMC007	2015.02.09
Deep Stone Abrasimeter	XMC008	2015.04.10
Pendulum friction tester	XMC009	2015.08.11
Freezing-thawing Chamber	XMC010	2015.04.10
Vacuum vessel	XMC011	2015.06.15
Digital Caliper	XMC017	2015.04.10
Laboratory of Regional Geological Survey Institute of Hebei Province Test Item: Petrographic Examination		
Microscope	2D75387	N/A

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Produktbeschreibung
Product description

1	Type	SL WHITE GRANITE
2	Brand	N/A
3	Color	WHITE
4	Serial No.	MA82/4
5	Petrographic	Monzonite granite
6	Quarry location	DIEN TAN COMMUNE, DIEN KHANH DISTRICT, KHANH HOA PROVINCE, VIET NAM



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Clause	Anforderungen - Prüfungen / Requirements - Tests	Measuring results - Remarks	Evaluation

1. Apparent Density and Open Porosity

Test Period:	08.10.2014 - 11.10.2014
Test Method:	EN 1936:2006
Specimen Dimension:	50mm×50mm×50mm

Specimen No.	$m_d^{1)}$ (g)	$m_h^{2)}$ (g)	$m_s^{3)}$ (g)	Apparent Density (kg/m^3)	Open Porosity (%)
1	354.77	221.87	355.92	2640	0.9
2	366.50	229.31	367.62	2640	0.8
3	342.67	214.01	343.61	2640	0.7
4	363.78	227.26	364.76	2640	0.7
5	351.48	219.88	352.65	2640	0.9
6	344.53	215.40	345.60	2640	0.8
Mean value				2640	0.8

- 1) Mass of the dry specimen
- 2) Mass of the specimen immersed in water
- 3) Mass of the saturated specimen

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2. Water Absorption under Atmospheric Pressure

Test Period:	08.10.2014 - 13.10.2014
Test Method:	EN 13755:2008
Specimen Dimension:	50mm×50mm×50mm

Specimen No.	Length (mm)	Width (mm)	Thickness (mm)	m _d ¹⁾ (g)	m _s ²⁾ (g)	Water Absorption (g)	Water Absorption Rate (%)	
							Based on Weight	Based on Volume
1	50.8	50.2	50.0	340.29	341.12	0.83	0.2	0.7
2	51.4	50.7	51.0	343.68	344.51	0.83	0.2	0.6
3	50.8	50.6	51.6	342.25	343.08	0.83	0.2	0.6
4	50.6	50.0	51.8	367.54	368.42	0.88	0.2	0.7
5	51.3	51.3	51.6	366.06	366.96	0.90	0.2	0.7
6	51.1	50.7	50.6	353.08	353.90	0.82	0.2	0.6
Mean value						0.85	0.2	0.7
Higher expected value						/	0.2	0.8

1) Mass of the dry specimen

2) Mass of the saturated specimen

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3. Abrasion Resistance

Test Period:	13.10.2014 - 15.10.2014
Test Method:	EN 14157: 2004 Method A - Wide wheel abrasion
Specimen Dimension:	150mm×100mm×20mm
Surface finish	Sawn
Load Type:	<input checked="" type="checkbox"/> Isotropic specimen <input type="checkbox"/> Perpendicular to the planes of anisotropy <input type="checkbox"/> Parallel to the planes of anisotropy <input type="checkbox"/> Perpendicular to the edges of the planes of anisotropy

Specimen No.	Specimen Dimension			Mean Value of Groove Width after Calibration (mm)
	Length (mm)	Width (mm)	Thickness (mm)	
1	151.9	100.3	21.4	17.0
2	151.3	101.5	20.3	16.0
3	150.9	101.2	21.5	16.5
4	151.6	100.1	20.1	17.0
5	151.5	100.4	20.5	15.5
6	150.5	101.2	21.9	17.0
Mean value				16.5
Higher expected value				18.1

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Clause	Anforderungen - Prüfungen / Requirements - Tests	Measuring results - Remarks	Evaluation

4. Slip Resistance by Means of the Pendulum Tester

Test Period:	16.10.2014
Test Method:	EN 14231:2003
Specimen Dimension:	200mm×150mm×20mm
Surface finish:	Sawn

Specimen No.	Surface condition	Test result	Unit
1	Dry	64	SRT-Unit
2		66	
3		64	
4		66	
5		64	
6		62	
Temperature correction		0.2	
Mean value (SRV "dry")	Dry	65	SRT-Unit

Specimen No.	Surface condition	Test result	Unit
1	Wet	62	SRT-Unit
2		60	
3		60	
4		58	
5		60	
6		58	
Temperature correction		0.2	
Mean value (SRV "wet")	Wet	60	SRT-Unit

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Clause	Anforderungen - Prüfungen / Requirements - Tests	Measuring results - Remarks	Evaluation

5. Compressive Strength

Test Period:	20.10.2014 - 22.10.2014
Test Method:	EN 1926:2006
Specimen Dimension:	50mm×50mm×50mm
Surface finish:	Sawn
Loading Rate:	(1.0 ± 0.5) MPa/s
Load Type:	<input checked="" type="checkbox"/> Isotropic specimen <input type="checkbox"/> Normal to the planes of anisotropy <input type="checkbox"/> Parallel to the planes of anisotropy

Specimen No.	Specimen Dimension (mm)			Load (kN)	Compressive Strength (MPa)
	Length	Width	Thickness		
1	50.8	50.6	55.0	421	164
2	51.7	51.2	54.5	260	98
3	51.4	50.5	51.6	138	53
4	55.1	50.7	50.9	254	91
5	50.6	50.4	55.0	196	77
6	51.9	50.2	52.8	250	96
7	51.3	49.5	51.5	204	80
8	50.2	50.5	54.8	169	67
9	50.6	48.8	51.2	175	71
10	50.5	49.7	50.6	191	76
Mean Value (MPa)					87
Standard Deviation (MPa)					30
Variation Coefficient					0.34
Lower expected value (MPa)					45

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6. Flexural Strength

Test Period:	20.10.2014 - 22.10.2014
Test Method:	EN 12372:2006
Specimen Dimension:	300mm×50mm×50mm
Surface finish:	Sawn
Loading Rate:	(0.25 ± 0.05) MPa/s
Load Type:	<input checked="" type="checkbox"/> Isotropic specimen <input type="checkbox"/> Perpendicular to the planes of anisotropy <input type="checkbox"/> Parallel to the planes of anisotropy <input type="checkbox"/> Perpendicular to the edges of the planes of anisotropy

Specimen No.	Span	Fracture Plane (mm)		Fracture Position ¹⁾	Fracture Orientation ²⁾	Load (N)	Flexural Strength (MPa)
		Width	Thickness				
1	250	50.7	52.2	m	r	4130	11.2
2	250	51.8	54.4	m	r	5640	13.8
3	250	50.8	53.3	m	r	4540	11.8
4	250	52.7	53.6	m	r	5240	13.0
5	250	51.5	53.5	m	r	4020	10.2
6	250	52.6	51.9	m	r	4590	12.1
7	250	50.3	52.5	m	r	3650	9.9
8	250	50.5	50.3	m	r	4600	13.5
9	250	49.8	55.0	m	r	4200	10.5
10	250	50.5	50.6	m	r	4730	13.7
Mean Value (MPa)							12.0
Standard Deviation (MPa)							1.5
Variation Coefficient							0.13
Lower expected value (MPa)							9.1

1) "m" = ca. middle between supports, "number" = ca. distance to support.

2) "r" = ca. rectangular to sample piece, "sch" = sloped to sample axis, "F" = surface defect in area of breaking.

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7. Frost Resistance

Test Period:	28.09.2014 - 28.10.2014
Test Method:	EN 12371:2010
Specimen Dimension:	50mm×50mm×50mm
Freezing-thawing cycles:	56

Specimen No.	Change in Apparent Volume after Freezing-thawing cycles (%)
1	0.0
2	0.0
3	0.0
4	0.0
5	0.0
6	0.0
7	0.0
8	0.0
9	0.0
10	0.0

Observation depends on appearance

During frost-thaw-cycles:	Intact
After frost-thaw-cycles:	Intact

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Clause	Anforderungen - Prüfungen / Requirements - Tests	Measuring results - Remarks	Evaluation

8. Compressive Strength after Freezing-thawing cycles

Test Period:	30.10.2014 - 03.11.2014	Specimen Dimension:	50mm×50mm×50mm
Test Method:	EN 12371:2010 & EN 1926:2006	Freezing-thawing cycles:	56
Loading Rate:	(1.0 ± 0.5) MPa/s	Surface finish:	Sawn
Load Type:	<input checked="" type="checkbox"/> Isotropic specimen <input type="checkbox"/> Normal to the planes of anisotropy <input type="checkbox"/> Parallel to the planes of anisotropy		

Specimen No.	Specimen Dimension (mm)			Load (kN)	Compressive Strength (MPa)
	Length	Width	Thickness		
1	50.9	49.8	51.5	188	74
2	51.3	49.3	50.0	164	65
3	53.2	51.6	50.4	188	68
4	51.7	50.6	50.9	183	70
5	51.4	50.1	51.3	162	63
6	50.9	50.0	55.0	174	68
7	53.4	51.6	51.7	216	78
8	51.1	49.8	51.1	193	76
9	52.8	51.9	50.0	165	60
10	49.8	49.8	50.7	230	93
Mean Value (MPa)					72
Standard Deviation (MPa)					9
Variation Coefficient					0.13
Lower expected value (MPa)					55

The test comparison under frost affect:		
Without Frost	Mean Value	87MPa
After Frost	Mean Value	72MPa
Change in Compressive Strength		17.2%

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9. Flexural Strength after Freezing-thawing cycles

Test Period:	30.10.2014 - 03.11.2014	Specimen Dimension:	300mm×50mm×50mm
Test Method:	EN 12371:2010 & EN 12372:2006	Freezing-thawing cycles:	56
Loading Rate:	(0.25 ± 0.05) MPa/s	Surface finish:	Sawn
Load Type:	<input checked="" type="checkbox"/> Isotropic specimen <input type="checkbox"/> Perpendicular to the planes of anisotropy <input type="checkbox"/> Parallel to the planes of anisotropy <input type="checkbox"/> Perpendicular to the edges of the planes of anisotropy		

Specimen No.	Span	Fracture Plane (mm)		Fracture Position	Fracture Orientation	Load (N)	Flexural Strength (MPa)
		Width	Thickness				
1	250	53.1	50.0	m	r	4440	12.5
2	250	50.0	50.5	m	r	3910	11.5
3	250	50.0	53.0	m	r	4320	11.5
4	250	50.6	49.7	m	r	3660	11.0
5	250	51.5	50.6	m	r	4380	12.5
6	250	54.7	50.3	m	r	3260	8.8
7	250	51.7	52.3	m	r	4220	11.2
8	250	52.3	50.5	m	r	3400	9.6
9	250	54.8	51.1	m	r	4450	11.7
10	250	51.9	50.7	m	r	3550	10.0
Mean Value (MPa)							11.0
Standard Deviation (MPa)							1.2
Variation Coefficient							0.11
Lower expected value (MPa)							8.6

The test comparison under frost affect:

Without Frost	Mean Value	12.0MPa
After Frost	Mean Value	11.0MPa
Change in Flexural Strength		8.3%

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10. Breaking Load at Dowel Hole

Test Period:	06.11.2014 - 10.11.2014	Hole Diameter:	10mm
Test Method:	EN 13364:2001	Dowel Diameter:	6mm
Specimen dimension:	200mm×200mm×30mm	Anchoring Depth:	25mm
Loading Rate:	(50 ± 5) N/s	Anchoring of Dowel:	in cement
Surface finish:	Sawn	Bearing Length:	120mm
Load Type:	<input checked="" type="checkbox"/> Isotropic specimen <input type="checkbox"/> Perpendicular to the planes of anisotropy <input type="checkbox"/> Parallel to the planes of anisotropy <input type="checkbox"/> Perpendicular to the edges of the planes of anisotropy		

Specimen No.	Specimen thickness	Fragment dimension (mm)		Breaking Load (N)
		Distance from hole to face, d_1	Max distance from hole center to edge, b_A	
1	29.6	9.5	23.8	1500
2	29.7	9.6	34.4	1650
3	29.6	9.5	30.8	1550
4	29.3	10.1	27.8	1550
5	29.0	9.8	33.7	1800
6	29.0	9.5	40.4	1750
7	29.2	9.7	42.9	1550
8	29.3	9.6	33.1	1600
9	29.2	10.2	44.2	1550
10	29.3	9.8	36.7	1650
Mean Value		9.7	34.8	1600
Standard Deviation (N)				97
Variation Coefficient				0.06
Lower Expected Value (N)				1424

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11. Petrographic Examination

Test Period:	04.11.2014 - 05.11.2014
Test Method:	EN 12407:2007
Specimen Dimension:	10cm×10cm×3cm, 2pcs

CLASSIFICATION: Monzonite granite

HAND SAMPLE DESCRIPTION

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

MICROSCOPIC DESCRIPTION

Texture	Medium-coarse grained granitic texture
Structure	Massive structure
Major ingredient	Potash feldspar (40%), Plagioclase (30%), Quartz (20%), Biotite (10%)
Accessory mineral	Metallic(Opaque) particles, Apatite, Zircon, Allanite
Secondary mineral	Sericite, Chlorite, Zoisite, Kaolinite, Epidote

MATERIAL COMPONENT	PETROGRAPHIC DETAILS
Potash feldspar	Xenomorphic granular, which grain sizes are usually 5~14mm (combine with specimens), partial 0.5~2mm, occasionally 0.5~2mm, contain plagioclase inclusions and biotite inclusions, the surface is dirty because of kolinitization, replace plagioclase partially, messy distribution.
Plagioclase	Hypautomorphic platy, which grain sizes are usually 5~8mm, partial 2~3mm, occasionally 0.3~2mm, the surface is dirty because of clayzation and zoisitization, zonal structure can be seen frequently, the area where contact to potash feldspar shows myrmekitic texture and net-edge structure, messy distribution.
Quartz	Xenomorphic granular, which grain sizes are usually 5~9mm, partial 2~5mm, occasionally 0.2~2mm, undulatory extinction, messy distribution.
Biotite	Flaky, brown, which grain sizes are usually 0.2~1.5mm, replaced by chlorite and epidote partially, some take on feint when they are replaced totally, messy distribution.

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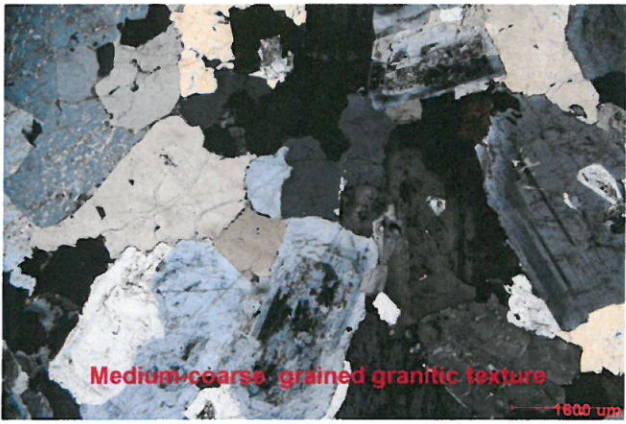

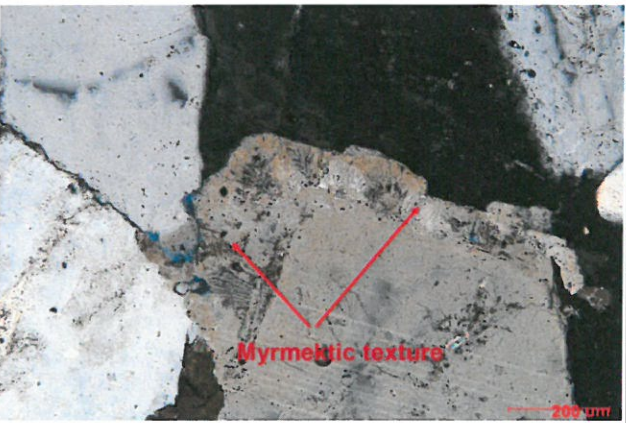
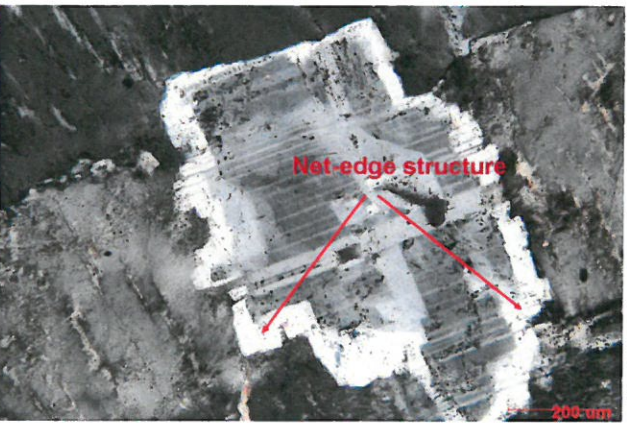
Alterations:

Slightly. Chloritization ,sericitization , kolinitization,epidotization and zoisitization can be seen partially in the rock.

Remarks:

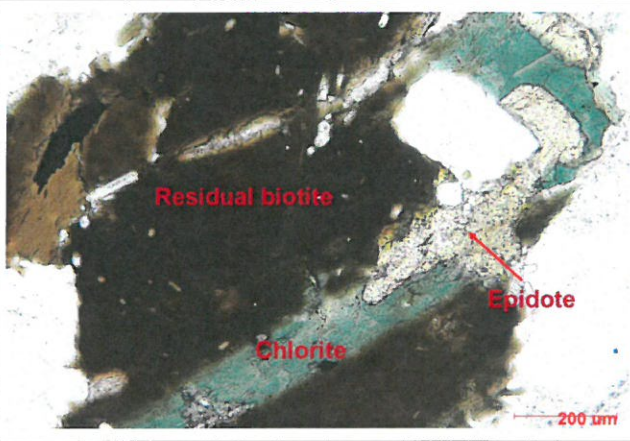
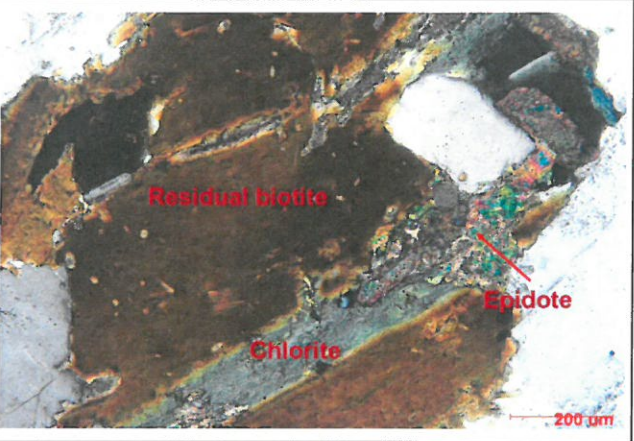

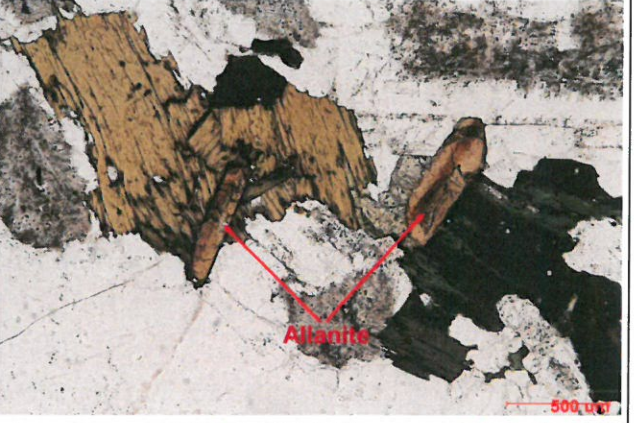
The rock is composed of potash feldspar, plagioclase, quartz and biotite.According to mineral component , texture and structure of the rock,we named it medium-coarse grained biotite **monzonite granite**. It belongs to volcanic rock(acidic intrusive rock).

Photomicrographs

Medium-coarse grained granitic texture (Crossed polarizers)	Zonal texture of plagioclase (Crossed polarizers)
	
Myrmekitic texture(Crossed polarizers)	Net-edge structure(Crossed polarizers)
	

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<p>Biotite are replaced by chlorite and epidote partially (Plain light)</p>	<p>Biotite are replaced by chlorite and epidote partially (Crossed polarizers)</p>
	
<p>Plagioclase inclusions in Potash feldspar (Crossed polarizers)</p>	<p>Allanite(Plain light)</p>
	

Note: The test of petrographic examination was carried out in an external laboratory of TÜV Rheinland.

END OF TEST REPORT