

# PLAZROK™

## TESTING & CERTIFICATION



# PERFORMANCE & SPECIFICATION

**Plazrok™** typical product specification data:

Property	SI
Relative Density (Specific Gravity)	0.85 g/cm <sup>3</sup>
Bulk Density	335 kg/m <sup>3</sup>
Modulus of Elasticity	250 MPa
Compressive Strength	7 MPa
Absorption	>0.1 mass %
Thermal conductivity	0.5W/mK
Colour	Grey
Surface condition	Hydrophilic

Produced from 100% waste stream recycled plastics which can itself be recycled. **Uses all waste stream plastics type 1–7** as defined in ASTM D7611.

Available in all **standard sieve sizes from sand (600µm) to aggregate (25mm+)** typically in accordance with ASTM C33 (other sizes available on request).

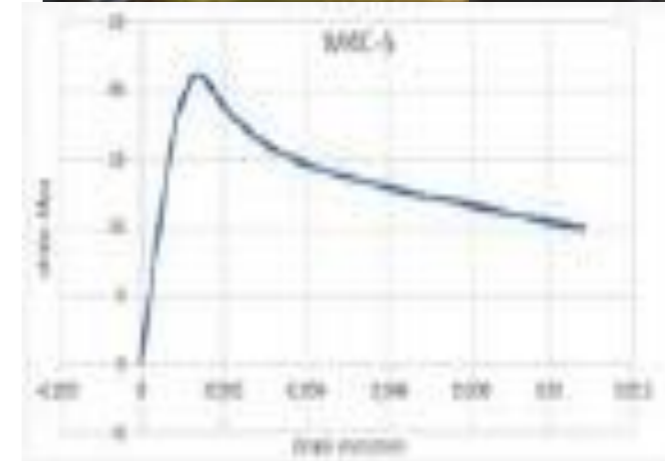


# TESTING & CERTIFICATION

**Plazrok™** has been tested in a wide range of concrete mix designs and has also been Fire tested in comparison to conventional concrete elements, demonstrating a superior performance.

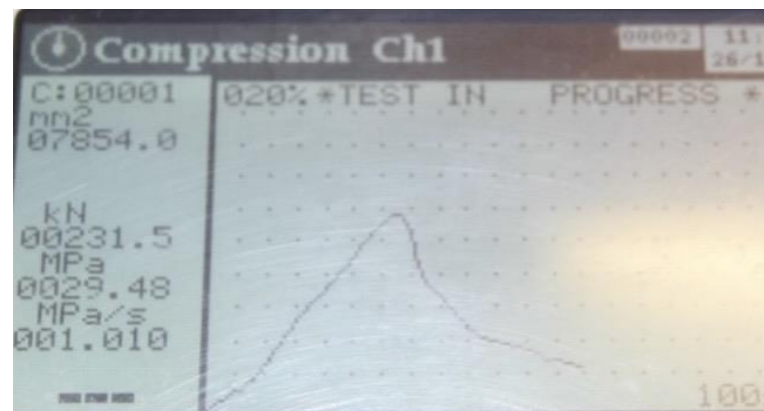
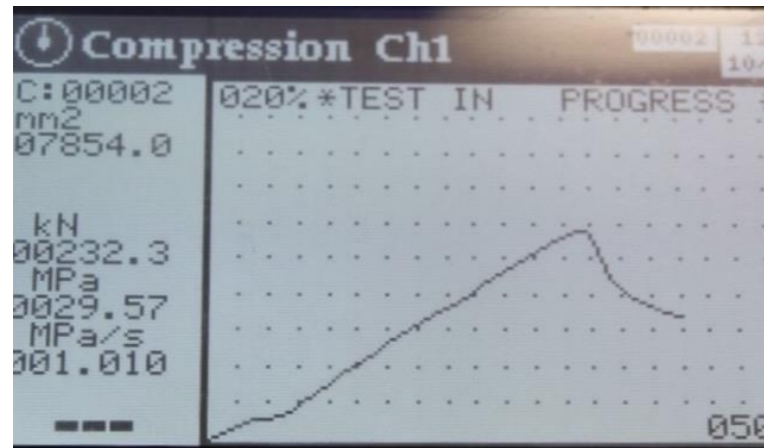
A sample of the typical testing standards:

- **Fire Testing** in accordance with the general principles of **ANZ 1530.4:2014**.
- **Compression Testing** in accordance with NZS 3112.2
- **Yield and Slump Testing** in accordance with NZS 3112.1
- **Slump Testing** in accordance with NZS 3104
- **Split Tensile Testing** in accordance with NZS 3112.2
- **Flexural Testing** in accordance with NZS 3112.2
- **ASTM C136** Sieve Analysis of Fine and Coarse Aggregates
- **ASTM C78** Flexural Strength Testing
- **ASTM C496** Tensile Testing
- **ASTM C666** Freeze Thaw Durability Testing
- Other further testing...



# TEST REPORT PLAZROK COMPRESSION TESTING

Mix design - Atlas, Kumeu, NZ														Strength Tests							
M20-	Agg 1	Agg 2	Agg 3	UPC	UPC	UPC	Sand	PC	Addmix	Water	Addmix	Addmix	C/w	Slump	Mix	Test	5-Nov	12-Nov	26-Nov	26-11	
	GW10	GW20	PAP7	15m	-	-	KS		S Fume	-	Air Ent	BV40		(mm)	Density	mass	7 day	14 day	28 day	28 day	
												(Ltr)			(Kg/m3)	kg	Mpa	Mpa	Mpa	Mpa	
M20- 1	PB	300	-	550	100	0	0	375	375	0	165	-	0.805	0.44	75	1,866	3.350	-	-	-	29.48
M20- 2	PB	300	-	550	100	0	0	375	375	0	165	-	0.805	0.44	75	1,866	3.200				29.57
Notes:																					
##																					



M20-	1A	1B	BD		
Top	100.00	99.96	Agg 1	GW10	1,660
Top	100.00	99.06	Agg 2	GW20	1,660
Bottom	100.00	100.00	Agg 3	PAP7	1,660
Bottom	100.00	99.85	UPC	15m	375
Length	200.00	200.00	UPC	-	400
Length	200.00	200.00	UPC	-	400
N	0.00	0.00	Sand	KS	1,700
Mpa	0.00	0.00	PC	-	1,506
Ave D	100.00	99.72	Addmix	S Fume	660
Ave L	200.00	200.00	Water	-	1,000
Ave A	0.00785	0.00783	Addmix	Air Ent	1,000
Ave V	0.00157	0.00157	Addmix	BV40	1,000

# PLAZROK 240KSC (23.5MPA) COMPRESSION TESTING ASTM 2023

## CHULALONGKORN UNIVERSITY ACCREDITED TEST LABORATORY



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Type of test: Compressive Strength of Cylindrical Concrete Specimens (ASTM C39-21)

Client: Enviroplaz Engineering Co., Ltd. - 410 Bueng Khwang Rd., Saensach, Minburi, Bangkok 1510 Thailand

Test product: Concrete cylinders of various mix designs with top ends capped (Mix 4 - C320 LWR, with Plazrok<sup>®</sup>)

Mix proportion for 1 m<sup>3</sup> of concrete:

Mix	Mix Title	Minimum 28-day Compressive Strength,		Cement, kg	Coarse Aggregate, kg	Lightweight Aggregate, kg	Fine Aggregate, kg	Water, kg	Superplasticizer, cm <sup>3</sup>
		ksc	MPa						
4	C320 LWR	320	31.4	337	1,036	25.2	735	168	4,442

Testing machine: TMC compression machine (serial no. 5310; 3000-kN capacity)

Test results:

(The test results are good only for the specimens tested.)

Mix 4 - C320 LWR; Test conditions: Temperature = 29°C, Relative humidity = 64%

Specimen No.	Diameter, mm				Height, cm	Weight, g	Date		Age, days	Maximum Compression Load, kN	Compressive Strength, MPa	Type of Fracture
	Top		Bottom				Cast	Tested				
	#1	#2	#1	#2								
1	150.1	150.0	150.1	150.1	30.0	11,400	11-Apr-23	18-Apr-23	7	478.0	27.0	Columnar
2	150.0	150.1	150.1	150.0	30.2	11,200	11-Apr-23	18-Apr-23	7	410.7	23.2	Columnar
3	150.1	150.1	150.1	150.1	30.0	11,300	11-Apr-23	18-Apr-23	7	452.3	25.6	Columnar
Average =										25.1		

Mix 4 - C320 LWR; Test conditions: Temperature = 29°C, Relative humidity = 68%

Specimen No.	Diameter, mm				Height, cm	Weight, g	Date		Age, days	Maximum Compression Load, kN	Compressive Strength, MPa	Type of Fracture
	Top		Bottom				Cast	Tested				
	#1	#2	#1	#2								
1	150.1	150.0	150.1	150.1	30.2	11,300	11-Apr-23	25-Apr-23	14	539.4	30.5	Columnar
2	150.0	150.1	150.1	150.0	30.1	11,100	11-Apr-23	25-Apr-23	14	588.0	33.2	Columnar
3	150.1	150.1	150.1	150.1	30.1	10,900	11-Apr-23	25-Apr-23	14	539.4	30.5	Columnar
Average =										31.9		

Mix 4 - C320 LWR; Test conditions: Temperature = 29°C, Relative humidity = 70%

Specimen No.	Diameter, mm				Height, cm	Weight, g	Date		Age, days	Maximum Compression Load, kN	Compressive Strength, MPa	Type of Fracture
	Top		Bottom				Cast	Tested				
	#1	#2	#1	#2								
1	150.1	150.1	150.0	150.1	30.2	12,400	11-Apr-23	09-May-23	28	598.7	33.8	Columnar
2	150.0	150.1	150.2	150.1	30.0	11,100	11-Apr-23	09-May-23	28	586.0	33.1	Columnar
3	150.0	150.1	150.0	150.1	30.2	11,400	11-Apr-23	09-May-23	28	590.5	33.4	Columnar
Average =										33.5		

Type of test: Compressive Strength of Cylindrical Concrete Specimens (ASTM C39-21)

Client: Enviroplaz Engineering Co., Ltd. - 410 Bueng Khwang Rd., Saensach, Minburi, Bangkok 1510 Thailand

Test product: Concrete cylinders of various mix designs with top ends capped (Mix 2 - C240 LWR, with Plazrok<sup>®</sup>)

Testing machine: TMC compression machine (serial no. 5310; 3000-kN capacity)

Test results:

(The test results are good only for the specimens tested.)

Mix 2 - C240 LWR, with Plazrok<sup>®</sup>

Age = 7 days



After Test

Mix 2 - C240 LWR, with Plazrok<sup>®</sup>

Age = 14 days



After Test

Mix 2 - C240 LWR, with Plazrok<sup>®</sup>

Age = 28 days



After Test

Date of test report: May 22, 2023

Tested by: (Assist. Prof. Dr. Tanate Srisirojanakorn)



Center for Engineering Service (CES) - Faculty of Engineering, Chulalongkorn University  
Room 307, Building 3, Phayathai Road, Pathumwan, Bangkok 10330 Tel: (+66) 2218-6344 Fax: (+66) 2218-6404 Email: ces.eng@chula.ac.th

Date of test report: May 22, 2023

Tested by: (Assist. Prof. Dr. Tanate Srisirojanakorn)



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Test passed, target strength achieved, final copies of test reports available from PIL.

# PLAZROK 320KSC (32MPA) COMPRESSION TESTING ASTM 2023

## CHULALONGKORN UNIVERSITY ACCREDITED TEST LABORATORY



FACULTY OF ENGINEERING  
CHULALONGKORN UNIVERSITY  
CENTER FOR ENGINEERING SERVICE



Type of test: Compressive Strength of Cylindrical Concrete Specimens (ASTM C39-21)

Client: Enviroplaz Engineering Co., Ltd. - 410 Bueng Khwang Rd., Saensab, Minburi, Bangkok 1510 Thailand

Test product: Concrete cylinders of various mix designs with top ends capped (Mix 2 - C240 LWR, with Plazrok<sup>®</sup>)

Mix proportion for 1 m<sup>3</sup> of concrete:

Mix	Mix Title	Minimum 28-day Compressive Strength,		Cement, kg	Coarse Aggregate, kg	Lightweight Aggregate, kg	Fine Aggregate, kg	Water, kg	Superplasticizer, cm <sup>3</sup>
		ksc	MPa						
2	C240 LWR	240	23.5	273	1,036	25.2	788	137	3,610

Testing machine: TMC compression machine (serial no. 5310; 3000-kN capacity)

Test results:

(The test results are good only for the specimens tested.)

Mix 2 - C240 LWR; Test conditions: Temperature = 28°C, Relative humidity = 66%

Specimen No.	Diameter, mm				Height, cm	Weight, g	Date		Age, days	Maximum Compression Load, kN	Compressive Strength, MPa	Type of Fracture
	Top		Bottom				Cast	Tested				
	#1	#2	#1	#2								
1	150.1	150.0	150.1	150.1	30.0	11,500	16-Mar-23	23-Mar-23	7	340.1	19.2	Columnar
2	150.0	150.1	150.1	150.0	30.0	11,200	16-Mar-23	23-Mar-23	7	360.3	20.4	Columnar
3*	-	-	-	-	-	-	-	-	-	-	-	-
Average =										19.8		

Note: \* - Specimen No. 3 was discarded due to presence of voids.


Mix 2 - C240 LWR; Test conditions: Temperature = 28°C, Relative humidity = 66%

Specimen No.	Diameter, mm				Height, cm	Weight, g	Date		Age, days	Maximum Compression Load, kN	Compressive Strength, MPa	Type of Fracture
	Top		Bottom				Cast	Tested				
	#1	#2	#1	#2								
1	150.1	150.0	150.1	150.1	30.1	11,000	16-Mar-23	30-Mar-23	14	488.5	27.6	Columnar
2	150.0	150.1	150.1	150.0	30.1	11,300	16-Mar-23	30-Mar-23	14	668.3	37.8	Columnar
3	150.1	150.1	150.1	150.1	30.1	11,800	16-Mar-23	30-Mar-23	14	610.1	34.5	Columnar
Average =										32.7		

Mix 2 - C240 LWR; Test conditions: Temperature = 29°C, Relative humidity = 68%

Specimen No.	Diameter, mm				Height, cm	Weight, g	Date		Age, days	Maximum Compression Load, kN	Compressive Strength, MPa	Type of Fracture
	Top		Bottom				Cast	Tested				
	#1	#2	#1	#2								
1	150.1	150.0	150.0	150.1	30.0	11,400	16-Mar-23	13-Apr-23	28	610.7	34.5	Columnar
2	150.0	150.1	150.0	150.1	30.0	11,100	16-Mar-23	13-Apr-23	28	583.4	33.0	Columnar
3	150.0	150.1	150.0	150.1	30.1	11,700	16-Mar-23	13-Apr-23	28	691.7	39.1	Columnar
Average =										33.8		

Date of test report: May 22, 2023

Tested by:   
(Assist. Prof. Dr. Tanate Srisinrojankorn)



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CENTER FOR ENGINEERING SERVICE



Type of test: Compressive Strength of Cylindrical Concrete Specimens (ASTM C39-21)

Client: Enviroplaz Engineering Co., Ltd. - 410 Bueng Khwang Rd., Saensab, Minburi, Bangkok 1510 Thailand

Test product: Concrete cylinders of various mix designs with top ends capped (Mix 4 - C320 LWR, with Plazrok<sup>®</sup>)

Testing machine: TMC compression machine (serial no. 5310; 3000-kN capacity)

Test results:

(The test results are good only for the specimens tested.)

Mix 4 - C320 LWR with Plazrok<sup>®</sup>

Age = 7 days



After Test

Mix 4 - C320 LWR with Plazrok<sup>®</sup>

Age = 14 days



After Test


Mix 4 - C320 LWR with Plazrok<sup>®</sup>

Age = 28 days



After Test

Date of test report: May 22, 2023

Tested by:   
(Assist. Prof. Dr. Tanate Srisinrojankorn)



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Test passed, target strength achieved, final copies of test reports available from PIL.

# OVERVIEW



Single size distribution



Average size : 25 mm.



Cutting section

# UNIT WEIGHT TESTING

## ASTM C29



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Type of test: Bulk density of aggregate (ASTM C29-17a)

Client: Enviroplaz Engineering Co., Ltd. - 410 Bueng Khwang Rd., Saensach, Minburi, Bangkok 1510 Thailand

Test product: Plazrok® - lightweight composite aggregate, provided by the client

Method for bulk density: Method A - rodding

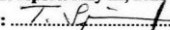
Testing measure: Steel cylindrical bucket

Test results:

(The test results are good only for the specimens tested.)

Determination	Value
Weight of measuring cylinder, T, kg	4.175
Weight of measuring cylinder and water, kg	9.920
Weight of water, kg	5.745
Volume of measuring cylinder, V, m <sup>3</sup>	0.006
Weight of cylinder + sample, G, kg	6.115
Weight of sample, kg	1.940
Bulk density of sample, M, kg/m <sup>3</sup>	336

Date of test report: May 22, 2023

Tested by: 

(Assist. Prof. Dr. Tarate Srisiriroj)



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Unit weight : 336 kg/m<sup>3</sup>

# ABSORPTION TESTING

## ASTM C127



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CHULALONGKORN UNIVERSITY  
CENTER FOR ENGINEERING SERVICE



**Type of test:** Absorption of coarse aggregate (ASTM C127-15)

**Client:** Enviroplaz Engineering Co., Ltd. - 410 Bueng Khwang Rd., Saensach, Minburi, Bangkok 1510 Thailand

**Test product:** Plazrok® - lightweight composite aggregate, provided by the client

**Test results:**

(The test results are good only for the specimens tested.)

Determination	Value
Weight of oven-dry sample in air, A, g	355.69
Weight of saturated-surface-dry sample in air, B, g	355.71
Absorption, %	0.0

Note: The test was performed only for absorption value, not for specific gravity value because the test product was lighter than water.

**Date of test report:** May 22, 2023

**Tested by:** T.P.  
(Assist. Prof. Dr. Tanate Srisirojwong)



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**Absorption = 0.0085%**  
**~ 0% ☐ No absorption**