

# Cement Circular

Issue No. : 5/2024

Date : 05-Nov-2024

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Test results for the following cementitious materials

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\* The names of brands/ manufacturers are based on the information provided by the suppliers.

# Also named as "China Resources Cement 華潤水泥" in Cement Circular Issue No. 4/2015 and before.

For cementitious materials not included in the Cement Circular, ER may request PWCL to carry out test.

The above test results were uploaded to CEDD's web-site of <https://www.cedd.gov.hk/eng/public-services-forms/geotechnical/laboratory-testing/public-works-laboratories/index.html>

Should you have any questions regarding this Circular, please contact PTO/Lab2, Mr. H.L.Li, at telephone number 2305 1275, or submit your questions in writing to the Public Works Central Laboratory Building, 2B Cheung Yip Street, Kowloon Bay, Kowloon, Hong Kong (Attn: PTO/Lab2).

Laboratory Reference	2300091	2300118	2400001, 2400002	2400029, 2400030	2400061, 2400062	2400089, 2400090	2400117, 2400118	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	Japan	Japan	Japan	Japan	Japan	Japan	Japan	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3150	3140	3140	3140	3150	3140	3150	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3200	3470	3450	3580	3420	3440	3500	Not specified
Consistence : Standard consistence (%)	27.0	27.5	27.5	27.5	27.5	27.5	27.0	Not specified
Setting Time : Initial setting time (min)	150	165	170	185	170	180	185	Min.45 min
Final setting time (min)	210	210	225	240	225	240	240	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.0	0.5	0.5	0.5	0.5	0.0	0.0	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	26.4	27.0	26.2	26.3	23.2	23.4	24.2	Min. 20 MPa
Average 28 days strength (MPa)	68.0	65.8	66.8	67.1	64.4	63.0	66.7	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	5.3	5.1	5.6	5.1	5.0	4.8	4.9	Not specified
Average 28 days strength (MPa)	8.6	8.7	8.4	9.2	8.5	8.9	9.6	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.5	2.0	2.8	2.2	2.9	2.3	2.3	Max. 5.0%
Insoluble Residue (%)	0.8	0.6	<0.5	<0.5	<0.5	<0.5	0.6	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	1.9	1.9	1.9	1.7	2.0	2.1	1.9	Max. 4.0%
Chloride Content (%)	0.02	0.01	0.03	0.02	0.03	0.01	0.03	Max. 0.10%
K <sub>2</sub> O (%)	0.40	0.35	0.39	0.41	0.39	0.77	0.36	---
Na <sub>2</sub> O (%)	0.20	0.25	0.27	0.26	0.24	0.12	0.36	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.46	0.48	0.53	0.53	0.49	0.62	0.60	---

**2 Champion (一品牌水泥) / 台泥(英德)水泥有限公司**  
**(Portland Cement, Strength Class 52.5N)**

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Laboratory Reference	2300092	2300119	2400003, 2400004	2400031, 2400032	2400063, 2400064	2400091, 2400092	2400119, 2400120	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	Taiwan, China	Taiwan, China	Taiwan, China	Taiwan, China	Taiwan, China	Taiwan, China	China	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3100	3110	3100	3090	3120	3140	3130	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3160	3530	3550	3900	3580	3510	3570	Not specified
Consistence : Standard consistence (%)	27.5	27.5	27.5	28.0	27.5	27.5	27.0	Not specified
Setting Time : Initial setting time (min)	190	170	180	150	175	160	185	Min.45 min
	Final setting time (min)	240	225	225	225	210	225	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.5	0.5	0.5	0.5	0.0	0.0	0.0	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	31.2	27.6	29.6	32.2	28.5	26.9	26.6	Min. 20 MPa
Average 28 days strength (MPa)	65.3	62.6	58.8	62.0	60.7	55.7	63.8	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	5.3	4.7	5.2	5.3	5.0	4.8	4.9	Not specified
Average 28 days strength (MPa)	8.4	8.1	8.5	8.8	9.0	8.4	8.9	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	3.0	3.1	3.2	2.9	3.0	2.8	2.8	Max. 5.0%
Insoluble Residue (%)	1.4	1.2	0.7	0.7	0.6	1.2	0.9	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.7	2.5	2.7	2.5	2.6	3.1	2.7	Max. 4.0%
Chloride Content (%)	0.05	0.05	0.03	0.05	0.04	0.04	0.04	Max. 0.10%
K <sub>2</sub> O (%)	0.68	0.65	0.78	0.83	0.74	0.76	0.45	---
Na <sub>2</sub> O (%)	<0.1	0.15	0.16	0.11	0.13	0.12	0.17	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.53	0.58	0.68	0.66	0.62	0.62	0.46	---

**3 Feng Jiang (峰江牌水泥) / 佛山市高明高力發水泥有限公司**  
**(Portland Cement, Strength Class 52.5N)**

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Laboratory Reference	2300093	2300120	2400005, 2400006	2400033, 2400034	2400065, 2400066	2400093, 2400094	2400121, 2400122	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3100	3090	3120	3130	3130	3100	3130	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3320	3780	3700	3790	3790	3760	3590	Not specified
Consistence : Standard consistence (%)	27.0	27.5	27.5	27.0	27.0	27.0	27.0	Not specified
Setting Time : Initial setting time (min)	175	190	170	160	195	155	170	Min.45 min
	Final setting time (min)	210	240	225	210	225	195	225
Soundness (Le Chatelier) : Expansion (mm)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	26.3	24.2	29.1	26.0	24.7	23.9	23.3	Min. 20 MPa
Average 28 days strength (MPa)	62.2	64.2	58.8	61.5	64.5	61.8	62.2	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	4.6	5.2	5.9	4.4	5.1	4.7	4.5	Not specified
Average 28 days strength (MPa)	7.6	8.2	7.8	9.1	7.8	8.0	7.9	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.7	3.5	1.8	1.5	2.1	2.0	2.0	Max. 5.0%
Insoluble Residue (%)	2.2	1.1	0.7	<0.5	<0.5	0.8	1.5	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	1.4	1.7	1.7	1.3	1.6	1.8	1.6	Max. 4.0%
Chloride Content (%)	0.04	0.04	0.05	0.04	0.04	0.03	0.04	Max. 0.10%
K <sub>2</sub> O (%)	0.56	0.45	0.55	0.44	0.43	0.42	0.46	---
Na <sub>2</sub> O (%)	<0.1	<0.1	0.13	0.12	0.15	0.15	0.17	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.41	0.38	0.49	0.41	0.43	0.43	0.47	---

**4 Golden Eagle (金鷹牌水泥), Special Green Island (青洲牌水泥), Emerald / Green Island Cement Co., Ltd.**  
**(Portland Cement, Strength Class 52.5N)**

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Laboratory Reference	2300095	2300121	2400007, 2400008	2400035, 2400036	2400067, 2400068	2400095, 2400096	2400123, 2400124	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3090	3080	3100	3110	3110	3100	3120	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3520	3840	3780	3660	3800	3800	3570	Not specified
Consistence : Standard consistence (%)	28.0	28.0	27.0	28.0	27.5	27.0	27.0	Not specified
Setting Time : Initial setting time (min)	125	130	130	140	115	110	130	Min.45 min
	Final setting time (min)	165	165	165	165	150	165	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.5	0.0	0.5	1.0	0.0	0.0	0.5	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	26.8	21.8	22.8	24.7	22.4	21.3	21.7	Min. 20 MPa
Average 28 days strength (MPa)	57.4	60.8	62.5	60.7	59.9	55.9	59.6	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	4.9	4.4	4.8	4.4	4.5	4.2	4.6	Not specified
Average 28 days strength (MPa)	9.1	8.4	8.2	7.8	8.3	8.3	7.3	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.7	3.2	2.8	2.9	2.7	2.8	2.9	Max. 5.0%
Insoluble Residue (%)	1.2	1.8	1.2	0.7	1.3	1.3	1.3	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.7	2.2	2.3	2.3	2.4	3.2	2.2	Max. 4.0%
Chloride Content (%)	<0.01	<0.01	<0.01	0.01	0.01	<0.01	0.01	Max. 0.10%
K <sub>2</sub> O (%)	0.66	0.63	0.65	0.72	0.56	0.56	0.66	---
Na <sub>2</sub> O (%)	<0.1	<0.1	0.11	0.1	0.14	<0.1	0.15	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.44	0.51	0.54	0.58	0.51	0.45	0.58	---

Laboratory Reference	2300094	2300122	2400009, 2400010	2400037, 2400038	2400069, 2400070	2400097, 2400098	2400125, 2400126	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	Japan	Japan	Japan	Japan	Japan	Japan	Japan	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3150	3150	3150	3150	3140	3120	3140	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3260	3570	3550	3350	3570	3560	3660	Not specified
Consistence : Standard consistence (%)	27.0	27.0	26.5	26.0	27.0	26.5	27.0	Not specified
Setting Time : Initial setting time (min)	145	165	160	155	150	160	180	Min.45 min
	Final setting time (min)	225	225	210	210	210	225	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.5	0.5	0.0	0.5	0.5	0.0	0.0	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	25.3	26.0	25.6	22.7	29.7	25.7	25.2	Min. 20 MPa
Average 28 days strength (MPa)	61.5	61.9	60.8	60.9	66.7	62.5	62.7	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	4.8	5.5	4.8	4.3	5.5	4.8	4.9	Not specified
Average 28 days strength (MPa)	8.3	9.0	8.7	8.9	8.4	8.8	9.1	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.6	3.0	3.0	2.9	2.9	2.6	2.8	Max. 5.0%
Insoluble Residue (%)	0.9	0.7	<0.5	<0.5	<0.5	0.7	1.3	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	1.9	2.0	2.0	1.9	2.2	2.3	2.1	Max. 4.0%
Chloride Content (%)	0.03	0.02	0.03	0.02	0.04	0.02	0.03	Max. 0.10%
K <sub>2</sub> O (%)	0.38	0.41	0.41	0.41	0.52	0.44	0.46	---
Na <sub>2</sub> O (%)	0.20	0.25	0.29	0.24	0.10	0.26	0.28	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.45	0.52	0.56	0.51	0.44	0.55	0.58	---

**6 Yue Xiu (粤秀牌水泥) / Guanzhou Zhujiang Cement Co., Ltd.**  
**(Portland Cement, Strength Class 52.5N)**

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Laboratory Reference	2300096	2300123	2400011, 2400012	2400039, 2400040	2400071, 2400072	2400099, 2400100	2400127, 2400128	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3150	3150	3160	3160	3170	3130	3150	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3550	3880	3870	3990	3920	3940	3950	Not specified
Consistence : Standard consistence (%)	25.5	26.0	26.5	26.0	27.0	26.5	27.0	Not specified
Setting Time : Initial setting time (min)	140	130	140	170	150	140	145	Min.45 min
Final setting time (min)	180	165	180	210	195	195	180	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.0	0.5	0.5	1.0	0.5	0.5	0.0	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	31.9	29.5	35.2	30.7	31.6	26.8	27.1	Min. 20 MPa
Average 28 days strength (MPa)	59.5	58.9	61.3	58.2	58.8	60.2	60.6	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	5.6	5.4	6.1	5.1	5.5	5.3	5.0	Not specified
Average 28 days strength (MPa)	8.3	8.3	8.4	8.2	8.2	8.4	8.3	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	1.9	2.1	2.0	1.9	1.8	1.2	1.3	Max. 5.0%
Insoluble Residue (%)	1.6	0.9	0.6	<0.5	<0.5	0.6	<0.5	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.6	2.8	2.9	2.4	2.9	2.5	2.9	Max. 4.0%
Chloride Content (%)	0.01	0.02	0.02	0.04	0.03	0.02	0.03	Max. 0.10%
K <sub>2</sub> O (%)	0.59	0.60	0.67	0.64	0.70	0.70	0.72	---
Na <sub>2</sub> O (%)	<0.1	<0.1	0.12	<0.1	<0.1	<0.1	0.11	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.42	0.46	0.56	0.48	0.50	0.51	0.58	---

Laboratory Reference	2300097	2300124	2400013, 2400014	2400041, 2400042	2400073, 2400074	2400101, 2400102	2400129, 2400130	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3140	3150	3130	3140	3150	3130	3160	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3730	4180	4220	4230	4160	4190	4040	Not specified
Consistence : Standard consistence (%)	28.0	27.0	26.0	27.0	27.0	27.0	27.0	Not specified
Setting Time : Initial setting time (min)	160	145	150	150	135	155	150	Min.45 min
	Final setting time (min)	225	195	195	225	180	210	195
Soundness (Le Chatelier) : Expansion (mm)	0.0	1.0	1.0	1.0	0.0	0.5	0.0	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	25.5	26.6	25.9	26.6	28.2	24.5	25.8	Min. 20 MPa
Average 28 days strength (MPa)	57.7	65.6	64.7	65.4	66.1	63.6	63.7	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	4.1	4.8	4.4	4.9	5.0	5.0	5.3	Not specified
Average 28 days strength (MPa)	8.6	8.7	8.5	8.8	8.4	8.2	8.5	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.2	1.6	2.8	1.9	2.0	1.9	2.0	Max. 5.0%
Insoluble Residue (%)	1.5	0.6	0.9	<0.5	<0.5	0.9	0.8	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.6	2.4	2.3	2.3	2.2	2.5	2.3	Max. 4.0%
Chloride Content (%)	0.04	0.02	0.03	0.04	0.05	0.04	0.05	Max. 0.10%
K <sub>2</sub> O (%)	0.40	0.29	0.36	0.31	0.41	0.36	0.41	---
Na <sub>2</sub> O (%)	<0.1	<0.1	0.15	<0.1	0.12	0.12	0.17	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.32	0.28	0.38	0.29	0.39	0.36	0.44	---



Laboratory Reference	2300098	2300125	2400015, 2400016	2400043, 2400044	2400075, 2400076	2400103, 2400104	2400131, 2400132	BS3892:Part 1: 1997  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	
<b>Physical Properties</b>								
Fineness (%)	9.9	9.7	9.5	9.4	7.1	8.8	7.7	Not more than 12%
Particle Density (kg/m <sup>3</sup> )	2670	2400	2650	2590	2610	2500	2620	Not less than 2000 kg/m <sup>3</sup>
Water Requirement (%)	90	90	90	90	90	90	90	^Note (1)
Strength Factor ---	0.86	0.82	0.92	0.90	0.90	0.91	1.06	^Note (1)
Standard Consistence (%)	24.0	25.0	24.0	24.5	24.5	25.0	24.5	---
Initial Setting Time (min)	220	245	250	225	225	215	220	Not less than the initial setting time of the Portland cement used
Soundness (mm)	0.5	0.5	0.5	0.0	0.0	0.5	0.0	Not more than 10 mm
<b>Portland Cement used</b>								
Brand	Champion	Champion	Champion	Champion	Champion	Champion	Champion	---
Lab. Reference No.	2300062	2300062	2300119	2300119	2400031, 2400032	2400031, 2400032	2400091, 2400092	---
Initial Setting Time (min)	160	160	170	170	150	150	160	---
<b>Chemical Composition</b>								
Moisture Content (%)	<0.1	0.3	0.2	0.1	0.3	0.1	<0.1	Not more than 0.5%
Loss-on-ignition (%)	<0.5	1.4	0.6	0.6	0.8	1.1	0.7	Not more than 7%
Sulphate Content, expressed as SO <sub>3</sub> (%)	1.3	1.1	1.2	1.3	1.3	1.5	1.6	Not more than 2.0%
Chloride Content (%)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	Not more than 0.1%
Calcium Oxide Content (%)	16.0	7.3	14.0	14.0	10.8	13.1	12.1	Not more than 10.0%
K <sub>2</sub> O (%)	1.2	1.1	1.2	1.2	1.4	1.2	1.5	---
Na <sub>2</sub> O (%)	1.4	1.9	2.0	1.7	2.0	2.1	1.8	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	2.2	2.6	2.8	2.5	3.0	2.8	2.7	---

^Note: (1) In accordance with GS16.07(b), the criteria for water requirement and strength factor at 28 days shall not apply, but the values of water requirement and strength factor at 28 days shall be reported.

**9 Hung Lee (鴻利牌煤灰) / Dongguan Hung Lee PFA Ltd.**  
**(Pulverised-fuel Ash)**

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Laboratory Reference	2300099	2300126	2400017, 2400018	2400045, 2400046	2400077, 2400078	2400105, 2400106	2400133, 2400134	BS3892:Part 1: 1997  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Fineness (%)	5.9	16.8	10.1	4.9	5.3	16.6	2.1	Not more than 12%
Particle Density (kg/m <sup>3</sup> )	2450	2290	2400	2490	2500	2390	2430	Not less than 2000 kg/m <sup>3</sup>
Water Requirement (%)	95	93	93	89	89	91	90	^Note (1)
Strength Factor ---	0.71	0.73	0.86	0.88	0.83	0.85	0.92	^Note (1)
Standard Consistence (%)	27.0	26.0	26.0	26.0	25.5	26.0	27.0	---
Initial Setting Time (min)	295	240	260	260	285	240	280	Not less than the initial setting time of the Portland cement used
Soundness (mm)	0.5	0.0	0.5	0.5	0.5	0.0	0.0	Not more than 10 mm
<b>Portland Cement used</b>								
Brand	Champion	Champion	Champion	Champion	Champion	Champion	Champion	---
Lab. Reference No.	2300062	2300062	2300119	2300119	2400031, 2400032	2400031, 2400032	2400091, 2400092	---
Initial Setting Time (min)	160	160	170	170	150	150	160	---
<b>Chemical Composition</b>								
Moisture Content (%)	0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	Not more than 0.5%
Loss-on-ignition (%)	1.8	8.2	<0.5	0.7	1.1	1.4	2.2	Not more than 7%
Sulphate Content, expressed as SO <sub>3</sub> (%)	0.5	<0.5	<0.5	0.8	0.5	0.8	0.6	Not more than 2.0%
Chloride Content (%)	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	<0.05	<0.05	Not more than 0.1%
Calcium Oxide Content (%)	9.9	2.4	13.0	9.1	7.1	7.3	7.9	Not more than 10.0%
K <sub>2</sub> O (%)	1.4	3.0	1.4	1.5	1.7	1.5	1.5	---
Na <sub>2</sub> O (%)	0.8	0.5	1.6	1.0	1.1	1.2	1.1	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	1.7	2.5	2.5	2.0	2.2	2.2	2.1	---

^Note: (1) In accordance with GS16.07(b), the criteria for water requirement and strength factor at 28 days shall not apply, but the values of water requirement and strength factor at 28 days shall be reported.

Laboratory Reference	2300100	2300127	2400019, 2400020	2400047, 2400048	2400079, 2400080	2400107, 2400108	2400135, 2400136	BS3892:Part 1: 1997  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	
<b>Physical Properties</b>								
Fineness (%)	10.3	12.1	9.8	10.6	10.1	8.3	8.7	Not more than 12%
Particle Density (kg/m <sup>3</sup> )	2420	2390	2390	2410	2440	2360	2360	Not less than 2000 kg/m <sup>3</sup>
Water Requirement (%)	95	95	95	93	96	96	96	^Note (1)
Strength Factor ---	0.74	0.77	0.75	0.77	0.75	0.80	0.90	^Note (1)
Standard Consistence (%)	29.0	29.0	28.5	28.5	29.0	29.0	29.0	---
Initial Setting Time (min)	205	240	250	225	230	190	195	Not less than the initial setting time of the Portland cement used
Soundness (mm)	0.5	0.5	1.0	0.0	0.5	0.0	0.0	Not more than 10 mm
<b>Portland Cement used</b>								
Brand	Champion	Champion	Champion	Champion	Champion	Champion	Champion	---
Lab. Reference No.	2300062	2300062	2300119	2300119	2400031, 2400032	2400031, 2400032	2400091, 2400092	---
Initial Setting Time (min)	160	160	170	170	150	150	160	---
<b>Chemical Composition</b>								
Moisture Content (%)	0.3	0.1	0.1	0.2	0.3	0.2	0.1	Not more than 0.5%
Loss-on-ignition (%)	2.7	2.4	2.0	2.1	2.3	1.8	1.5	Not more than 7%
Sulphate Content, expressed as SO <sub>3</sub> (%)	0.7	0.7	0.6	0.6	0.6	<0.5	0.60	Not more than 2.0%
Chloride Content (%)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	Not more than 0.1%
Calcium Oxide Content (%)	6.8	6.8	5.6	6.6	7.0	5.1	5.2	Not more than 10.0%
K <sub>2</sub> O (%)	1.1	1.0	1.2	1.2	0.9	0.9	0.9	---
Na <sub>2</sub> O (%)	0.8	0.9	1.2	1.1	0.8	0.6	0.6	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	1.5	1.5	2.1	1.9	1.4	1.2	1.2	---

^Note: (1) In accordance with GS16.07(b), the criteria for water requirement and strength factor at 28 days shall not apply, but the values of water requirement and strength factor at 28 days shall be reported.

**11 Redland (東莞煤灰) / Sha Kok Power Station Plant C - Dong Guan PRC  
(Pulverised-fuel Ash)**

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Laboratory Reference	2300101	2300128	2400021, 2400022	2400049, 2400050	2400081, 2400082	2400109, 2400110	2400137, 2400138	BS3892:Part 1: 1997  Specification
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Fineness (%)	6.9	14.1	11.2	8.0	8.5	4.6	4.6	Not more than 12%
Particle Density (kg/m <sup>3</sup> )	2310	2290	2270	2470	2360	2470	2570	Not less than 2000 kg/m <sup>3</sup>
Water Requirement (%)	93	94	93	91	91	91	90	^Note (1)
Strength Factor ---	0.77	0.78	0.82	0.86	0.80	0.84	0.97	^Note (1)
Standard Consistence (%)	27.0	28.0	27.0	26.0	26.0	25.5	25.5	---
Initial Setting Time (min)	230	250	240	255	220	180	210	Not less than the initial setting time of the Portland cement used
Soundness (mm)	0.5	0.5	0.5	0.5	0.5	0.0	0.0	Not more than 10 mm
<b>Portland Cement used</b>								
Brand	Champion	Champion	Champion	Champion	Champion	Champion	Champion	---
Lab. Reference No.	2300062	2300062	2300119	2300119	2400031, 2400032	2400031, 2400032	2400091, 2400092	---
Initial Setting Time (min)	160	160	170	170	150	150	160	---
<b>Chemical Composition</b>								
Moisture Content (%)	0.1	0.1	<0.1	<0.1	0.2	0.1	<0.1	Not more than 0.5%
Loss-on-ignition (%)	1.2	1.3	<0.5	<0.5	0.6	1.0	1.2	Not more than 7%
Sulphate Content, expressed as SO <sub>3</sub> (%)	0.6	1.0	<0.5	1.1	0.8	1.0	1.2	Not more than 2.0%
Chloride Content (%)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	Not more than 0.1%
Calcium Oxide Content (%)	6.9	5.8	5.7	10.0	9.9	7.8	10.7	Not more than 10.0%
K <sub>2</sub> O (%)	1.4	1.2	1.5	1.3	1.1	1.5	1.4	---
Na <sub>2</sub> O (%)	1.5	0.8	1.3	0.9	1.6	1.4	0.9	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	2.4	1.7	2.3	1.7	2.3	2.4	1.8	---

^Note: (1) In accordance with GS16.07(b), the criteria for water requirement and strength factor at 28 days shall not apply, but the values of water requirement and strength factor at 28 days shall be reported.

**12 Green Slag / Green Island Cement Co., Ltd.**  
**(Ground granulated blast furnace slag)**

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Laboratory Reference	2300011	2300012	2400001, 2400002	2400003, 2400004	2400007, 2400008	2400009, 2400010	2400011, 2400012	BS EN 15167-1:2006
Date of Sample Received	11/09/2023	03/11/2023	03/01/2024	01/03/2024	07/05/2024	28/06/2024	04/09/2024	
Country of Origin Stated By Client	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Hong Kong SAR, China	Specification
<b>Physical Properties</b>								
Standard Consistence (%)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	Not specified
Initial Setting Time (min)	155	165	180	165	175	170	180	≤ twice of initial setting time for Portland cement used
Density (kg/m <sup>3</sup> )	2880	2860	2880	2870	2880	2860	2860	Not specified
Fineness : Specific surface (m <sup>2</sup> /kg)	408	478	472	487	491	486	479	≥ 275 m <sup>2</sup> /kg
Activity Index :								
7 days (%)	51	50	60	63	55	54	60	≥ 45 %
28 days (%)	87	86	83	91	90	87	89	≥ 70 %
Portland Cement used								
Brand	Special Green Island	Special Green Island	Special Green Island	Special Green Island	Special Green Island	Special Green Island	Champion	---
Lab. Reference No.	2300065	2300065	2300121	2300121	2400035, 2400036	2400035, 2400036	2400091, 2400092	---
Initial Setting Time (min)	115	115	130	130	140	140	160	---
<b>Chemical Composition</b>								
Loss-on-ignition (%)	1.2	1.5	1.2	1.3	1.5	<0.5	1.4	≤ 3.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	≤ 2.5%
Chloride Content (%)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	≤ 0.10%
Magnesium Oxide Content (%)	6.1	5.6	5.8	5.6	5.9	5.2	5.4	≤ 18%
Moisture Content (%)	<0.2	0.2	<0.2	0.2	0.3	<0.2	0.3	≤ 1.0%
Sulphide Content (%)	0.8	<0.7	0.8	0.9	0.7	0.9	0.9	≤ 2.0%