

# Cement Circular

Issue No. : 1/2024

Date : 08-Mar-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	2300001	2300027	2300046	2300061	2300091	2300118	2400001, 2400002	BS EN 197-1:2000/2011 Strength Class 52.5N Specification
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
Country of Origin Stated By Client	Japan	Japan	Japan	Japan	Japan	Japan	Japan	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3140	3150	3150	3150	3150	3140	3140	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3210	3290	3270	3230	3200	3470	3450	Not specified
Consistence : Standard consistence (%)	27.5	27.5	27.0	27.0	27.0	27.5	27.5	Not specified
Setting Time : Initial setting time (min)	145	150	155	155	150	165	170	Min.45 min
Final setting time (min)	180	210	210	210	210	210	225	Not specified
Soundness (Le Chatelier) : Expansion (mm)	1.0	0.0	0.0	0.0	0.0	0.5	0.5	Max.10 mm
Compressive Strength ( broken mortar prism ) :								
Average 2 days strength (MPa)	25.9	25.4	24.7	24.0	26.4	27.0	26.2	Min. 20 MPa
Average 28 days strength (MPa)	67.0	62.2	60.4	62.2	68.0	65.8	66.8	Min. 52.5 MPa
Flexural Strength ( mortar prism ) :								
Average 2 days strength (MPa)	5.0	4.7	4.8	4.9	5.3	5.1	5.6	Not specified
Average 28 days strength (MPa)	8.4	8.8	8.6	8.6	8.6	8.7	8.4	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.7	2.6	2.6	2.4	2.5	2.0	2.8	Max. 5.0%
Insoluble Residue (%)	<0.5	<0.5	<0.5	<0.5	0.8	0.6	<0.5	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.0	1.8	2.0	1.7	1.9	1.9	1.9	Max. 4.0%
Chloride Content (%)	0.03	0.02	0.03	0.02	0.02	0.01	0.03	Max. 0.10%
K <sub>2</sub> O (%)	0.40	0.41	0.40	0.40	0.40	0.35	0.39	---
Na <sub>2</sub> O (%)	0.21	0.23	0.22	0.20	0.20	0.25	0.27	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.47	0.49	0.49	0.47	0.46	0.48	0.53	---

**2 Champion (一品牌水泥) / Taiwan Cement Corporation  
(Portland Cement, Strength Class 52.5N)**

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Laboratory Reference	2300002	2300028	2300047	2300062	2300092	2300119	2400003, 2400004	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
Country of Origin Stated By Client	Taiwan, China	Taiwan, China	Taiwan, China	Taiwan, China	Taiwan, China	Taiwan, China	Taiwan, China	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3140	3140	3120	3120	3100	3110	3100	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3490	3520	3530	3210	3160	3530	3550	Not specified
Consistence : Standard consistence (%)	27.0	27.5	27.0	27.0	27.5	27.5	27.5	Not specified
Setting Time : Initial setting time (min)	150	180	175	160	190	170	180	Min.45 min
	Final setting time (min)	210	255	225	210	240	225	225
Soundness (Le Chatelier) : Expansion (mm)	0.5	0.5	0.0	0.0	0.5	0.5	0.5	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	28.3	25.1	30.9	27.7	31.2	27.6	29.6	Min. 20 MPa
Average 28 days strength (MPa)	62.8	56.3	58.7	66.1	65.3	62.6	58.8	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	5.0	4.6	5.2	5.0	5.3	4.7	5.2	Not specified
Average 28 days strength (MPa)	8.7	8.5	7.8	7.6	8.4	8.1	8.5	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.2	2.1	3.0	2.9	3.0	3.1	3.2	Max. 5.0%
Insoluble Residue (%)	<0.5	<0.5	0.8	0.9	1.4	1.2	0.7	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.6	2.3	2.6	2.5	2.7	2.5	2.7	Max. 4.0%
Chloride Content (%)	0.01	<0.01	0.05	0.05	0.05	0.05	0.03	Max. 0.10%
K <sub>2</sub> O (%)	0.50	0.53	0.71	0.69	0.68	0.65	0.78	---
Na <sub>2</sub> O (%)	0.27	0.31	0.16	<0.1	<0.1	0.15	0.16	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.60	0.66	0.62	0.55	0.53	0.58	0.68	---

**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	2300004	2300030	2300049	2300063	2300093	2300120	2400005, 2400006	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3100	3130	3130	3120	3100	3090	3120	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3730	3580	3570	3410	3320	3780	3700	Not specified
Consistence : Standard consistence (%)	27.0	27.0	27.0	27.0	27.0	27.5	27.5	Not specified
Setting Time : Initial setting time (min)	155	155	160	160	175	190	170	Min.45 min
Final setting time (min)	195	210	210	210	210	240	225	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.0	0.5	0.5	0.0	0.0	0.0	0.0	Max.10 mm
Compressive Strength ( broken mortar prism ) :								
Average 2 days strength (MPa)	24.7	26.2	26.0	23.1	26.3	24.2	29.1	Min. 20 MPa
Average 28 days strength (MPa)	60.2	57.9	58.2	59.9	62.2	64.2	58.8	Min. 52.5 MPa
Flexural Strength ( mortar prism ) :								
Average 2 days strength (MPa)	5.3	5.2	5.0	4.7	4.6	5.2	5.9	Not specified
Average 28 days strength (MPa)	7.1	7.4	7.3	7.6	7.6	8.2	7.8	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.1	1.7	1.8	2.8	2.7	3.5	1.8	Max. 5.0%
Insoluble Residue (%)	0.7	<0.5	0.5	0.7	2.2	1.1	0.7	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.4	2.2	2.1	1.7	1.4	1.7	1.7	Max. 4.0%
Chloride Content (%)	0.03	0.03	0.04	0.03	0.04	0.04	0.05	Max. 0.10%
K <sub>2</sub> O (%)	0.59	0.59	0.60	0.56	0.56	0.45	0.55	---
Na <sub>2</sub> O (%)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.46	0.47	0.48	0.44	0.41	0.38	0.49	---

Laboratory Reference	2300005	2300031	2300050	2300065	2300095	2300121	2400007, 2400008	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
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> )	3070	3110	3130	3110	3090	3080	3100	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3180	3030	3020	3280	3520	3840	3780	Not specified
Consistence : Standard consistence (%)	27.0	26.0	27.0	28.0	28.0	28.0	27.0	Not specified
Setting Time : Initial setting time (min)	100	115	125	115	125	130	130	Min.45 min
Final setting time (min)	135	165	165	165	165	165	165	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.0	0.5	0.0	0.0	0.5	0.0	0.5	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	24.5	23.5	24.3	20.8	26.8	21.8	22.8	Min. 20 MPa
Average 28 days strength (MPa)	58.2	60.0	60.8	61.5	57.4	60.8	62.5	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	4.7	4.3	4.5	4.2	4.9	4.4	4.8	Not specified
Average 28 days strength (MPa)	7.7	8.5	8.0	7.6	9.1	8.4	8.2	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	3.4	2.9	2.5	2.5	2.7	3.2	2.8	Max. 5.0%
Insoluble Residue (%)	1.1	<0.5	0.7	<0.5	1.2	1.8	1.2	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.7	2.7	2.3	1.9	2.7	2.2	2.3	Max. 4.0%
Chloride Content (%)	0.02	0.01	0.02	<0.01	<0.01	<0.01	<0.01	Max. 0.10%
K <sub>2</sub> O (%)	0.84	0.65	0.74	0.70	0.66	0.63	0.65	---
Na <sub>2</sub> O (%)	<0.1	<0.1	0.15	<0.1	<0.1	<0.1	0.11	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.64	0.50	0.63	0.52	0.44	0.51	0.54	---

**5 Onoda / Chichibu Onoda Cement Corporation**  
**(Portland Cement, Strength Class 52.5N)**

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Laboratory Reference	2300006	2300032	2300051	2300064	2300094	2300122	2400009, 2400010	BS EN 197-1:2000/2011 Strength Class 52.5N Specification
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
Country of Origin Stated By Client	Japan	Japan	Japan	Japan	Japan	Japan	Japan	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3130	3150	3120	3160	3150	3150	3150	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3230	3230	3270	3230	3260	3570	3550	Not specified
Consistence : Standard consistence (%)	26.5	26.5	27.0	26.5	27.0	27.0	26.5	Not specified
Setting Time : Initial setting time (min)	140	130	155	120	145	165	160	Min.45 min
Final setting time (min)	180	180	195	180	225	225	210	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.5	0.0	1.0	0.0	0.5	0.5	0.0	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	26.9	23.1	26.2	22.2	25.3	26.0	25.6	Min. 20 MPa
Average 28 days strength (MPa)	66.7	61.0	63.0	62.2	61.5	61.9	60.8	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	5.2	4.4	5.1	4.5	4.8	5.5	4.8	Not specified
Average 28 days strength (MPa)	8.7	8.3	8.6	8.3	8.3	9.0	8.7	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.7	2.4	3.1	2.4	2.6	3.0	3.0	Max. 5.0%
Insoluble Residue (%)	<0.5	<0.5	<0.5	<0.5	0.9	0.7	<0.5	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.2	1.8	2.2	1.5	1.9	2.0	2.0	Max. 4.0%
Chloride Content (%)	<0.01	0.03	0.03	0.03	0.03	0.02	0.03	Max. 0.10%
K <sub>2</sub> O (%)	0.44	0.44	0.45	0.44	0.38	0.41	0.41	---
Na <sub>2</sub> O (%)	0.25	0.25	0.24	0.21	0.20	0.25	0.29	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.54	0.54	0.54	0.49	0.45	0.52	0.56	---

**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	2300008	2300034	2300053	2300066	2300096	2300123	2400011, 2400012	BS EN 197-1:2000/2011 Strength Class 52.5N  Specification
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Density (kg/m <sup>3</sup> )	3120	3150	3120	3150	3150	3150	3160	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3490	3750	3800	3770	3550	3880	3870	Not specified
Consistence : Standard consistence (%)	25.5	27.5	25.5	26.0	25.5	26.0	26.5	Not specified
Setting Time : Initial setting time (min)	130	160	165	115	140	130	140	Min.45 min
Final setting time (min)	165	225	210	165	180	165	180	Not specified
Soundness (Le Chatelier) : Expansion (mm)	0.5	0.5	0.0	0.5	0.0	0.5	0.5	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	27.7	32.5	30.0	30.9	31.9	29.5	35.2	Min. 20 MPa
Average 28 days strength (MPa)	58.0	62.1	63.0	55.9	59.5	58.9	61.3	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	5.4	5.3	5.6	5.7	5.6	5.4	6.1	Not specified
Average 28 days strength (MPa)	8.3	7.9	8.1	8.6	8.3	8.3	8.4	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	2.4	2.2	1.9	1.7	1.9	2.1	2.0	Max. 5.0%
Insoluble Residue (%)	0.6	<0.5	0.7	<0.5	1.6	0.9	0.6	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.4	2.4	2.7	2.1	2.6	2.8	2.9	Max. 4.0%
Chloride Content (%)	0.02	0.04	0.03	0.04	0.01	0.02	0.02	Max. 0.10%
K <sub>2</sub> O (%)	0.61	0.60	0.63	0.60	0.59	0.60	0.67	---
Na <sub>2</sub> O (%)	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	0.12	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.48	0.45	0.61	0.47	0.42	0.46	0.56	---

Laboratory Reference	2300009	2300035	2300054	2300067	2300097	2300124	2400013, 2400014	BS EN 197-1:2000/2011 Strength Class 52.5N Specification
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
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	3160	3160	3140	3150	3130	Not specified
Fineness : Specific surface (cm <sup>2</sup> /g)	3860	3810	3770	3670	3730	4180	4220	Not specified
Consistence : Standard consistence (%)	28.5	26.5	27.0	26.0	28.0	27.0	26.0	Not specified
Setting Time : Initial setting time (min)	145	150	170	115	160	145	150	Min.45 min
	Final setting time (min)	195	225	210	150	225	195	195
Soundness (Le Chatelier) : Expansion (mm)	0.0	0.5	0.0	0.0	0.0	1.0	1.0	Max.10 mm
<b>Compressive Strength ( broken mortar prism ) :</b>								
Average 2 days strength (MPa)	34.0	33.5	28.7	26.7	25.5	26.6	25.9	Min. 20 MPa
Average 28 days strength (MPa)	61.6	64.8	59.0	57.7	57.7	65.6	64.7	Min. 52.5 MPa
<b>Flexural Strength ( mortar prism ) :</b>								
Average 2 days strength (MPa)	5.5	5.6	5.1	4.7	4.1	4.8	4.4	Not specified
Average 28 days strength (MPa)	8.4	8.4	8.1	8.2	8.6	8.7	8.5	Not specified
<b>Chemical Composition</b>								
Observed Mass Loss-on-ignition (%)	1.6	1.6	1.8	1.3	2.2	1.6	2.8	Max. 5.0%
Insoluble Residue (%)	<0.5	<0.5	<0.5	<0.5	1.5	0.6	0.9	Max. 5.0%
Sulphate Content, expressed as SO <sub>3</sub> (%)	2.4	2.4	2.5	2.7	2.6	2.4	2.3	Max. 4.0%
Chloride Content (%)	0.04	0.03	0.02	0.03	0.04	0.02	0.03	Max. 0.10%
K <sub>2</sub> O (%)	0.64	0.56	0.33	0.33	0.40	0.29	0.36	---
Na <sub>2</sub> O (%)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.15	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	0.50	0.44	0.27	0.31	0.32	0.28	0.38	---



Laboratory Reference	2300010	2300036	2300055	2300071	2300098	2300125	2400015, 2400016	BS3892:Part 1: 1997
Date of Sample Received	3/1/2023	10-03-2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
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>								
Fineness (%)	8.7	8.8	9.6	9.4	9.9	9.7	9.5	Not more than 12%
Particle Density (kg/m <sup>3</sup> )	2440	2430	2570	2550	2670	2400	2650	Not less than 2000 kg/m <sup>3</sup>
Water Requirement (%)	90	90	90	90	90	90	90	^Note (1)
Strength Factor ---	1.03	1.02	1.04	1.03	0.86	0.82	0.92	^Note (1)
Standard Consistence (%)	25.5	25.5	23.5	24.5	24.0	25.0	24.0	---
Initial Setting Time (min)	220	230	205	145	220	245	250	Not less than the initial setting time of the Portland cement used
Soundness (mm)	0.5	0.5	0	0.5	0.5	0.5	0.5	Not more than 10 mm
<b>Portland Cement used</b>								
Brand	Champion	Champion	Special Green Island	Special Green Island	Champion	Champion	Champion	---
Lab. Reference No.	2200105	2200105	2300033	2300033	2300062	2300062	2300119	---
Initial Setting Time (min)	190	190	130	130	160	160	170	---
<b>Chemical Composition</b>								
Moisture Content (%)	0.1	0.3	0.2	0.2	<0.1	0.3	0.2	Not more than 0.5%
Loss-on-ignition (%)	0.7	0.9	0.7	0.9	<0.5	1.4	0.6	Not more than 7%
Sulphate Content, expressed as SO <sub>3</sub> (%)	1.3	1.2	1.6	1.3	1.3	1.1	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 (%)	11.0	9.9	14.0	12.0	16.0	7.3	14.0	Not more than 10.0%
K <sub>2</sub> O (%)	1.0	1.0	1.4	1.2	1.2	1.1	1.2	---
Na <sub>2</sub> O (%)	2.4	2.3	2.7	2.5	1.4	1.9	2.0	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	3.1	2.9	3.7	3.3	2.2	2.6	2.8	---

^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.

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Laboratory Reference	2300013	2300037	2300056	2300072	2300099	2300126	2400017, 2400018	BS3892:Part 1: 1997  Specification
Date of Sample Received	18/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Fineness (%)	15.5	18.1	12.8	16.9	5.9	16.8	10.1	Not more than 12%
Particle Density (kg/m <sup>3</sup> )	2190	2240	2330	2290	2450	2290	2400	Not less than 2000 kg/m <sup>3</sup>
Water Requirement (%)	96	96	97	95	95	93	93	^Note (1)
Strength Factor ---	0.83	0.86	0.86	0.87	0.71	0.73	0.86	^Note (1)
Standard Consistence (%)	27.5	28.5	28.5	26.0	27.0	26.0	26.0	---
Initial Setting Time (min)	255	260	245	140	295	240	260	Not less than the initial setting time of the Portland cement used
Soundness (mm)	0.5	0.5	0.0	0.0	0.5	0.0	0.5	Not more than 10 mm
<b>Portland Cement used</b>								
Brand	Champion	Champion	Special Green Island	Special Green Island	Champion	Champion	Champion	---
Lab. Reference No.	2200105	2200105	2300033	2300033	2300062	2300062	2300119	---
Initial Setting Time (min)	190	190	130	130	160	160	170	---
<b>Chemical Composition</b>								
Moisture Content (%)	0.1	0.2	0.2	0.2	0.1	<0.1	<0.1	Not more than 0.5%
Loss-on-ignition (%)	1.1	1.3	2.1	8.9	1.8	8.2	<0.5	Not more than 7%
Sulphate Content, expressed as SO <sub>3</sub> (%)	0.5	0.7	0.7	<0.5	0.5	<0.5	<0.5	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 (%)	3.7	5.2	4.2	4.4	9.9	2.4	13.0	Not more than 10.0%
K <sub>2</sub> O (%)	1.1	1.3	1.1	2.9	1.4	3.0	1.4	---
Na <sub>2</sub> O (%)	0.8	0.9	1.0	0.4	0.8	0.5	1.6	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	1.5	1.7	1.8	2.3	1.7	2.5	2.5	---

^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.

(2) Supply of PFA from Hung Lee (鴻利牌煤灰) / Dongguan Hung Lee PFA Ltd. was affected due to the COVID-19 epidemic.

Laboratory Reference	2300011	2300038	2300057	2300073	2300100	2300127	2400019, 2400020	BS3892:Part 1: 1997
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
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>								
Fineness (%)	8.9	9.7	9.8	10.4	10.3	12.1	9.8	Not more than 12%
Particle Density (kg/m <sup>3</sup> )	2310	2370	2400	2330	2420	2390	2390	Not less than 2000 kg/m <sup>3</sup>
Water Requirement (%)	94	95	98	99	95	95	95	^Note (1)
Strength Factor ---	0.92	0.91	0.83	0.96	0.74	0.77	0.75	^Note (1)
Standard Consistence (%)	28.5	29.0	28.0	28.5	29.0	29.0	28.5	---
Initial Setting Time (min)	210	230	215	140	205	240	250	Not less than the initial setting time of the Portland cement used
Soundness (mm)	0.0	0.5	0.5	0.5	0.5	0.5	1.0	Not more than 10 mm
<b>Portland Cement used</b>								
Brand	Champion	Champion	Special Green Island	Special Green Island	Champion	Champion	Champion	---
Lab. Reference No.	2200105	2200105	2300033	2300033	2300062	2300062	2300119	---
Initial Setting Time (min)	190	190	130	130	160	160	170	---
<b>Chemical Composition</b>								
Moisture Content (%)	0.1	0.3	0.2	0.4	0.3	0.1	0.1	Not more than 0.5%
Loss-on-ignition (%)	2.3	1.6	1.5	2.7	2.7	2.4	2.0	Not more than 7%
Sulphate Content, expressed as SO <sub>3</sub> (%)	<0.5	0.6	0.6	0.5	0.7	0.7	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 (%)	4.4	5.2	4.5	4.7	6.8	6.8	5.6	Not more than 10.0%
K <sub>2</sub> O (%)	1.1	1.3	1.4	0.9	1.1	1.0	1.2	---
Na <sub>2</sub> O (%)	0.9	0.8	0.9	0.8	0.8	0.9	1.2	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	1.6	1.7	1.8	1.4	1.5	1.5	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.

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Laboratory Reference	2300012	2300039	2300058	2300074	2300101	2300128	2400021, 2400022	BS3892:Part 1: 1997  Specification
Date of Sample Received	3/1/2023	10/3/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024	
Country of Origin Stated By Client	China	China	China	China	China	China	China	
<b>Physical Properties</b>								
Fineness (%)	4.3	11.7	14.6	13.1	6.9	14.1	11.2	Not more than 12%
Particle Density (kg/m <sup>3</sup> )	2480	2280	2320	2240	2310	2290	2270	Not less than 2000 kg/m <sup>3</sup>
Water Requirement (%)	90	93	94	94	93	94	93	^Note (1)
Strength Factor ---	0.97	0.90	0.82	0.89	0.77	0.78	0.82	^Note (1)
Standard Consistence (%)	26.5	28.0	25.0	26.5	27.0	28.0	27.0	---
Initial Setting Time (min)	255	270	260	160	230	250	240	Not less than the initial setting time of the Portland cement used
Soundness (mm)	0.5	0.5	0.5	0.0	0.5	0.5	0.5	Not more than 10 mm
<b>Portland Cement used</b>								
Brand	Champion	Champion	Special Green Island	Special Green Island	Champion	Champion	Champion	---
Lab. Reference No.	2200105	2200105	2300033	2300033	2300062	2300062	2300119	---
Initial Setting Time (min)	190	190	130	130	160	160	170	---
<b>Chemical Composition</b>								
Moisture Content (%)	0.1	0.2	0.2	0.2	0.1	0.1	<0.1	Not more than 0.5%
Loss-on-ignition (%)	1.2	1.4	1.0	1.0	1.2	1.3	<0.5	Not more than 7%
Sulphate Content, expressed as SO <sub>3</sub> (%)	1.0	0.7	0.7	0.6	0.6	1.0	<0.5	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 (%)	8.1	8.2	6.1	2.8	6.9	5.8	5.7	Not more than 10.0%
K <sub>2</sub> O (%)	0.3	1.2	2.0	1.8	1.4	1.2	1.5	---
Na <sub>2</sub> O (%)	1.5	0.8	1.4	1.1	1.5	0.8	1.3	---
Total Alkali ( Na <sub>2</sub> O Eq.) (%)	1.7	1.6	2.7	2.3	2.4	1.7	2.3	---

^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	2300001	2300004	2300005	2300010	2300011	2300012	2400001, 2400002	BS EN 15167-1:2006	
Date of Sample Received	3/1/2023	12/4/2023	3/5/2023	10/7/2023	11/9/2023	3/11/2023	3/1/2024		
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 (%)	30.5	29.5	30.0	30.0	30.0	30.0	30.0	Not specified ≤ twice of initial setting time for Portland cement used	
Initial Setting Time (min)	160	165	200	170	155	165	180		
Density (kg/m <sup>3</sup> )	2860	2860	2840	2870	2880	2860	2880		Not specified
Fineness : Specific surface (m <sup>2</sup> /kg)	434	419	439	415	408	478	472		≥ 275 m <sup>2</sup> /kg
Activity Index :									
7 days (%)	62	51	60	55	51	50	60	≥ 45 %	
28 days (%)	87	85	94	88	87	86	83	≥ 70 %	
<b>Portland Cement used</b>									
Brand	Special Green Island	Special Green Island	Champion	Champion	Special Green Island	Special Green Island	Special Green Island	---	
Lab. Reference No.	2200084	2200084	2300028	2300028	2300065	2300065	2300121	---	
Initial Setting Time (min)	125	125	180	180	115	115	130	---	
<b>Chemical Composition</b>									
Loss-on-ignition (%)	1.8	1.3	1.7	1.5	1.2	1.5	1.2	≤ 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 (%)	5.3	6.8	5.6	6.2	6.1	5.6	5.8	≤ 18%	
Moisture Content (%)	0.3	<0.2	0.2	0.2	<0.2	0.2	<0.2	≤ 1.0%	
Sulphide Content (%)	0.7	<0.7	<0.7	0.7	0.8	<0.7	0.8	≤ 2.0%	